SERVING THE CREATIVE AUDIO AND MUSIC ELECTRONICS INDUSTRY

SOUND ARTS

MERCHANDISING JOURNAL

$2.00

VOL. 3 NO. 7
AUGUST 1980

SHOWED UP, SHOWED OFF, SHOWED OUT; A REVIEW OF CES AND NAMM

GETTING BUSINESS PUTER ON LINE

ING SENSE UARRANTIES, T 3

EXPRESSION


envelope filter
dual fifteen band eq
stereo chorus
noise gate fx driver
WIDTH
SPEED
REGEN
flanger
dyna comp
distortion +
thirty-one band eq
IN / OUT
POWER
LEVEL
phase 90
MANUAL
SWEEP
WIDTH
SPEED
MIX
POWER FLANGER
DOUBLER
12.0
MODE
pitch transposer display
PRESET
MIX
REGEN
LEVEL
pitch transposer
digital delay
DELAY RANGE
BANDWIDTH
REGEN
LEVEL
MIX
OVER LOAD
IN
OUT
dyna comp
envelope filter
micro amp
six band graphic equalizer
ten band graphic equalizer
phase 100

You have enough to work on in building your business without having to work out to build your body. Bulky, heavy speaker cabinets can cause you a lot of grief. Like backache, arm strain, and injured toes or fingers. They can get you into heavy transportation costs, heavy handling costs, and heavy installation costs. They take up too much space in your shop, store or warehouse and too much space in your client's facility or on a stage. They can be view-obstructing and distracting, too. Now, in many cases, you can do without them.

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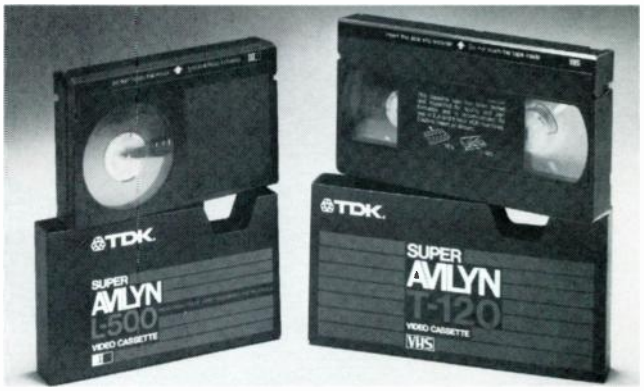

TDK

The Leader in Tape Technology

CIRCLE 70 ON READER SERVICE CARD

VOL. 3 NO. 7

SERVING THE CREATIVE AUDIO AND MUSIC ELECTRONICS INDUSTRY

SOUND ARTS

MERCHANDISING JOURNAL

AUGUST 1980

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Cover photo by Doug Hanewinckel

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A LETTER FROM THE EDITOR

"In the recent past, the conventions assumed a carnival air. This year, the spirit was subdued . . . [no] flashing lights and merry-go-rounds. Freebies were few." A colleague's-eye-view of CES and NAMM? Actually, the quote is from the New York Times Book Review report on the American Booksellers Association convention in June—also in Chicago. Which goes to show, I guess, that we've reached the mainstream of American society in at least one respect.

Both CES and the Namm Expo were in fact more subdued than they have been, although reactions to the sobriety were mixed, with some companies saying that these shows were more conducive to serious business. And hot product is hot product no matter what the surrounding climate. At any rate, although fewer retailers were at both shows, many of our readers were there, and we enjoyed seeing them at our booth and around the show floor. There were show deals and products aplenty and Len Feldman and Allen Hester write in this issue about the Consumer Electronics Show and the NAMM Expo respectively.

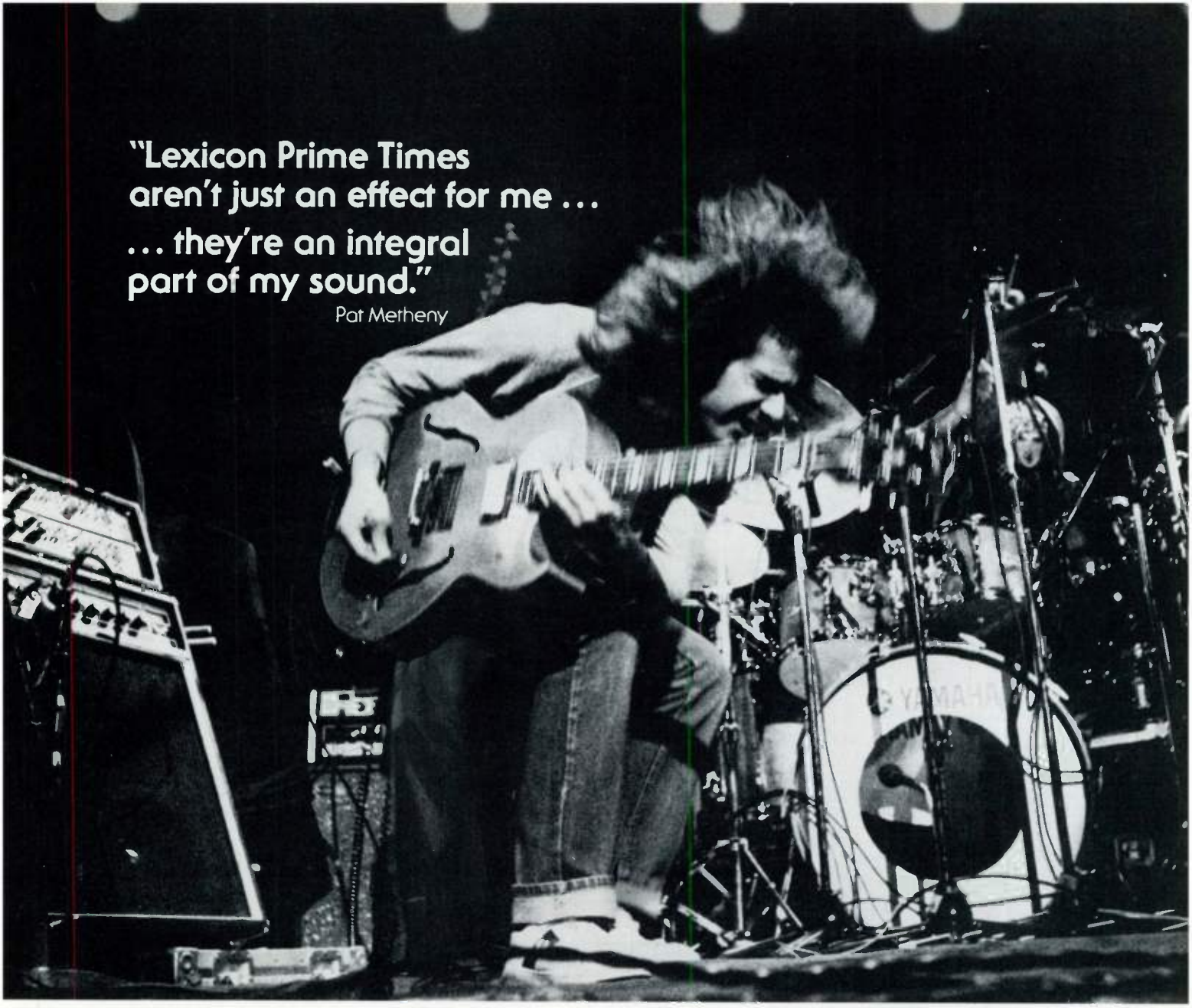
In their articles, or for that matter in any review of this industry's status, the central processor takes a central place in new technology. At CES, dbx and Eumig, among others, made use of the CPU for new sound applications. At the AES show, we were introduced to the Fairlight CMI (for Computer Musical Instrument). At NAMM, introductions included Arp's soon to be produced Chroma, and MTI showed new voicings for their computerized General Development system. MTI, by the way, is selling and delivering the Development System direct. Base price is $27,500.

The movement of non-musical technology into the music scene continues of course in video. Both Paul McCartney and the Boomtown Rats especially have shown the possibilities in synthesis of sound and sight. And some retailers are readying themselves for the revolution. Our Dealer Dossier this month features Cramer Audio-Video.

Read on to prevent the silicon chip inside the head from switching to overload. None of us likes Mondays, but the future is as good as gold.

Regards,

Judith Morrison Lipton



Pat Metheny records for ECM Records.

"I felt I needed a bigger guitar sound, and the sound engineer at Talent Studios in Oslo where I was recording told me to wait while he plugged in a box. What came over the monitor was the greatest guitar sound I'd ever heard, something I'd been seeking for many years. The box was a Lexicon digital delay."

"I'm amazed at the guitar sound I get from Prime Time. No other delay has its warmth. Prime Time creates a space around the sound which in a lot of ways is as important as the sound itself. Knowledgeable listeners say our concerts sound like our records. Much of that can be attributed to the Lexicon Prime Time."

"Today, I use five Lexicon systems on a typical concert, of which I do about 300 a year. On stage at my right hand is a Prime Time; another Prime Time is at the board that mixes the drums and piano. A third Prime Time is used on the PA line. We also use a Model 92 and the new 224 digital reverb."

If you'd like to experience the sound enhancement that's made Lexicon's Prime Time the favorite of Pat Metheny and dozens of top touring and recording groups, circle reader service number or write to us. We'll arrange to get you into Prime Time.

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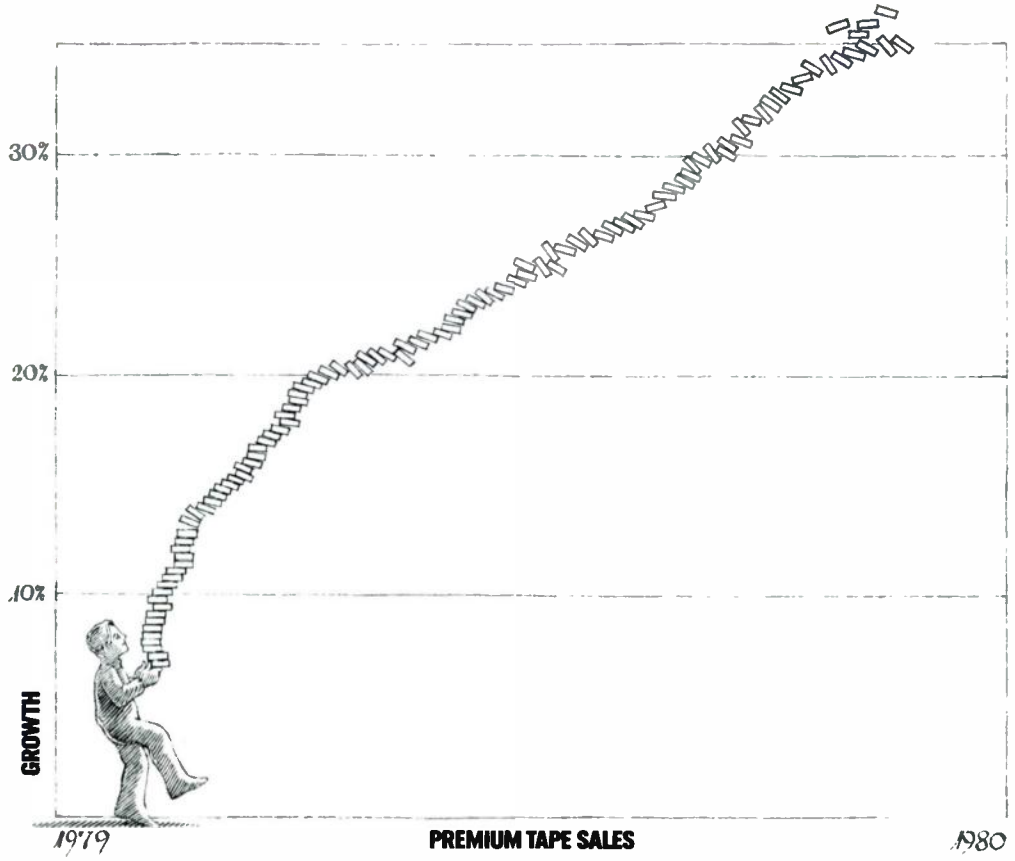
CIRCLE 54 ON READER SERVICE CARD

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

TERMS:

AUG. 1980

A CONTINUING INDUSTRY GLOSSARY

RECORDING

By Larry Blakely

Level Indicator: Can be a meter, LED display, light meter, or any other visual method to indicate the level of a piece of electronic equipment or system. A level indicator does not usually have any *standard* specifications or tolerances as does the VU meter, which must meet very stringent specifications.

Braided Shield: The shielding on wire that is wrapped in a braid and is typically found on microphone cables.

Spiral Shield: The shielding on wire that is wrapped rather than braided.

Heated Stylus: A disc cutting stylus that is wrapped with a special wire which is heated by applying electricity. This wire heats the actual cutting stylus which will allow the stylus to do a better job of cutting the lacquer disc. Discs cut with a heated stylus will typically be quieter and cleaner cut groove excursions than those cut with an unheated stylus.

Analog Reverb: A reverberation system that incorporates the use of analog audio circuitry and signal processing techniques.

Digital Reverb: A reverberation system that incorporates the use of digital audio circuitry and signal processing techniques.

Safe Mode: An operational mode on a tape recorder where a given channel cannot go into the record mode even though the master record button is depressed.

Ready Mode: An operational mode on a tape recorder where a given channel will go into record mode when the master record button is depressed.

Sync Mode: An operational mode on a tape recorder where a given channel will go into the "sync" mode when the master record button is depressed.

Track Assignment: The process of assigning tracks for a particular recording job. When there are a given number of recording tracks available, one must determine which instruments or parts will go on each of the available

ELECTRONIC MUSICAL INSTRUMENTS & ACCESSORIES

By Wayne Howe

Sidebands: The sum (f_c+f_m) and difference (f_c-f_m) frequencies resulting from amplitude modulation.

Upper Sideband: Any and all frequencies that result above the carrier frequency from amplitude modulation.

Lower Sideband: Any and all frequencies that result below the carrier frequency from amplitude modulation.

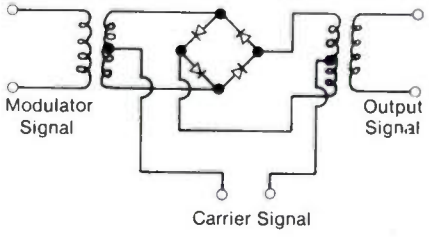
Double-Sideband Suppressed Carrier Modulation: Amplitude modulation which retains the sidebands, but which eliminates or reduces the carrier frequency f_c.

Single-Sideband Suppressed Carrier Modulation: Amplitude modulation which eliminates or reduces either the upper or lower sideband *and* the carrier frequency.

Ring Modulator: an amplitude modulation device on many synthesizers which enables the synthesist to generate sum and difference frequencies based on the modulator and carrier signals which it processes. Most synthesizer ring modulators are double-sideband suppressed carrier modulators.

Lattice-type modulator: Same as a ring modulator. By feeding the carrier signal in to the center tap of the input and output transformers, the actual carrier wave frequency is never transmitted to the output. However, as the modulating signal is applied, the diodes become unbalanced and the sum and difference frequencies (upper and lower sidebands) appear across the output. Notice that the diodes in the circuit form a ring, with all four diodes pointing in the same direction; hence the term ring modulator. (See figure 1.)

FIGURE 1



SOUND REINFORCEMENT

By Glen E. Meyer

Calculating Frequency Response of Vented Enclosures: It may be desirable to plot the low-end frequency response of a particular vented enclosure design. This would indicate to you the total low end response as opposed to just the 3 dB down point calculated by previous methods. To develop such a plot is not a real difficult matter, but could be time consuming—depending on how many points are used in the plot—if a programmable calculator is not used.

To make the calculation, one needs to know the f_s (Hz), Q_{ts}, V_{as} (ft^3), V_b (ft^3), and f_b (Hz). The first thing to do is solve for a number of constants that will simplify the use of a large formula which will come later.

$$A = \frac{f_b^2}{f_s^2}$$

$$B = \frac{A}{Q_{ts}} + \frac{f_b}{7f_s}$$

$$C = 1 + A + \frac{f_b}{7f_sQ_{ts}} + \frac{V_{as}}{V_b}$$

$$D = \frac{1}{Q_{ts}} + \frac{f_b}{7f_s}$$

To calculate the relative response in dB at each frequency f,

$$\text{let } f_n \frac{f}{f_s}.$$

Substitute each f_n into the following equation along with the predetermined constants.

Response (dB) =

$$20 \log \frac{f_n^4}{\sqrt{f_n^4 - Cf_n^2 + A)^2 + (Bf_n - Df_n^3)^2}}$$

The more frequencies that are used, the better the accuracy will be. However, a few random frequencies will pret-

TEAR HERE

A CONTINUING INDUSTRY GLOSSARY

RECORDING

tape tracks. Track assignment is the process of assigning what is to be recorded on each individual track.

Track Assignment Sheet: Also referred to as a "tape legend." This is a sheet of paper on which one records what is assigned to each tape track. This sheet of paper is either attached to the rear of the tape box via masking tape or inserted inside the box for future reference. Usually, the number of false starts, takes, and time of each take is also written on this tape legend or track assignment sheet.

False Start: When a musical selection or program is being recorded and for some reason the musicians stop playing (usually because someone made a mistake or missed a musical entrance). This is the term used when a recording process is stopped in the earlier portions of the selection or program. After this happens, the same tune or program is usually played and recorded again.

Incomplete: The term used when the recording process is stopped during the middle or latter part of the selection or program. After this happens the same tune or program is usually played and recorded again.

Take: A term used to identify the completed recordings of a musical selection or program. Those takes which were started and were incomplete are labeled either "false start" or "incomplete," depending upon the approximate time (beginning, middle or near the end) at which the selection or program stopped and the recording ceased. It is usually possible to have several "takes" (completed recordings)

Cable Tie: A plastic type of device that is used to hold a group of wires together. Some types require a special tool to tighten and "cinch" the tie, while others are "self cinching." Some of the "self cinching" cable ties do require a special tool to tighten the tie around the wires. If you do not desire the tie to be very tight around the wires, "self cinching" ties can be tightened by hand.

ELECTRONIC MUSICAL INSTRUMENTS & ACCESSORIES

Frequency Modulation: The process by which the frequency of a carrier signal is controlled by the instantaneous level of a modulating signal. In the same way that tremolo is a form of amplitude modulation, so vibrato is a form of frequency modulation. Frequency modulation produces upper and lower sidebands around the frequency of the carrier signal. These sidebands are at integral multiples of the modulating frequency. If the modulation frequency is a sine wave, the sidebands are in matched pairs above and below the carrier frequency. However, if a complex modulating signal is used, the spectra of sidebands will not be in matched pairs due to the rapid change of frequencies and consequent phase and amplitude shifting of the sidebands.

In synthesizers, it is possible to feed complex signals in to voltage-controlled oscillators and obtain very discordant output signals to make cymbal and bell-type effects.

It should also be understood that natural sounds cannot be frequency modulated, *i.e.,* act as the carrier signal, with the typical voltage-controlled synthesizer. This is due to the fact that the natural sound's frequency is already established, and hence its frequency cannot be changed. However, frequency-varying effects of natural sounds may be achieved through rising delay lines and encoding or decoding at varying rates.

Modulation Index: This frequency modulation term is used to describe sinusoidal modulation of a sinusoidal carrier frequency. It is the ratio of the maximum frequency deviation of the carrier signal from its normal frequency to the frequency of the modulating wave. The equation for this is:

$$\frac{A f_c \text{ (deviation of carrier signal)}}{f_m \text{ (modulating frequency)}}$$

Deviation Ratio: Another name for modulation index.

SOUND REINFORCEMENT

ty well indicate the system's low end response. It is pretty exciting to design a box and predict its frequency response and find that after the box is actually made, it behaves as predicted.

Center Frequency: Specifications of various audio components many times use the term "center frequency." For instance, polar curves indicate that they are octave or 1/3-octave band segments with center frequency being such and such. Graphic equalizers, as an example, generally indicate center frequencies (or at least close to the actual frequency to avoid confusion).

To calculate the frequency range covered when center frequency is known, follow this procedure:

Let f_o = the known center frequency.

Let N = number of divisions in the octave (N=1 for octave, N=3 for 1/3-octave, N=6 for 1/6-octave, etc.)

Let M = the multiplying or dividing factor which is equal to $2^{\frac{1}{2n}}$.

Now, solve for the two end frequencies:

$$f_{low} = \frac{f_o}{M} \quad \text{and} \quad f_{high} = f_o M$$

Example: You have a 1/3-octave equalizer. What is the range of coverage of this band when it has a center frequency of 800 Hz?

Solution: $N=3$, $M = 2^{\frac{1}{(2\times3)}} = 2^{\frac{1}{6}} = 1.1225$

Therefore: $f_l = \frac{800}{1.225} = 712.7$ Hz

This is not to indicate that adjustment of this 800 Hz band segment will not affect the adjacent band segments. The resultant interaction is dependent upon the characteristics of the particular equalizer.

A chart of typical octave-band centers and the frequency range contained in that octave band segment will be printed next month.

TEAR HERE

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.

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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.

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CIRCLE 74 ON READER SERVICE CARD

TROUBLESHOOTERS' BULLETIN

Continued from last month

PILOT LAMP PROBLEMS

(1)

If the equipment does not function properly check the following items:

1. Power connections, power to outlet, is unit plugged in? Are there any breaks in the power cable?
2. Is the unit turned on?
3. Are all other connections made properly?
4. Check fuses and circuit breakers--both in the building and the equipment.

(2)

5. If the unit works and the pilot light does not, suspect pilot lamp circuit problems. Three types of pilot lamps are commonly used today: incandescent bulbs, neon-low lamps and LEDs.

First check the lamp. Does a replacement lamp work? Is there voltage at the lamp's leads? If the lamp is in a socket, check for broken leads within the socket or dirty contacts on the lamp or socket. Most lamps are operated with one or more resistors in series or parallel (or a combination of

(3)

the two) with the lamp. Any of these resistors can become shorted, open, intermittent or change its value. Each of these resistor malfunctions creates its own lamp problems. Occasionally one of these resistors will appear good on a meter, but will break down when current is applied to it. Substitution or shunting the suspected resistor with a good one of similar or slightly higher resistance results in proper operation, if this is the problem.

(4)

Neon and LED lamps are often thought to last forever because they normally have a very long life. However, they can go bad. Neon lamps can develop problems that significantly alter the voltage level at which they operate. Voltage or current surges can burn out an LED.

NEIL LEWBEL
Technical Writer

(5)

LEAKY TRANSISTORS

Solid State amplifiers which are noisy, crackling, popping, etc., can often be traced to leaky pre-amp or driver transistors. The transistor may test okay on an in-circuit transistor tester or ohmmeter test, but still be leaky. The only way to test for leakage is to remove the transistor from the circuit and then run a leakage test on it.

(6)

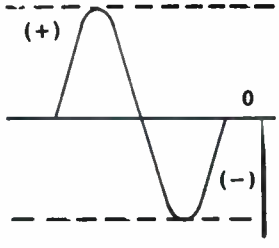
A transistor with even a few micro amps leakage can cause all manner of problems in terms of noise and faulty operation. In pre-amps, noisy transistors can be located by opening the base lead of the suspected transistor or connecting it to the emitter lead; the noisy transistor will be silenced when this is done. Start at the first stage and work toward the pre-amp output, not the other way.

MARK W. ROGERS
Daddy's Junky Music Store

What exactly is the meaning of bias in tape recording?

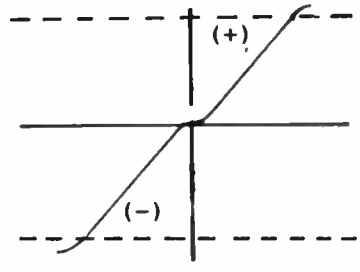
Before looking at bias, we must talk about what happens to those little magnetic particles that are imbedded in the tape. New from the package, the tape has very little signal on it. Background noise is at its absolute minimum. The particles of magnetic oxide have one very interesting property: each one will try very hard to keep the polarizing signal you give to it . . . but there will be a strong resistance to change. In the record process, you are polarizing each particle in one direction or another, from a full positive to negative, or negative to positive. (See figure 1.)

FIGURE 1. SOURCE SIGNAL



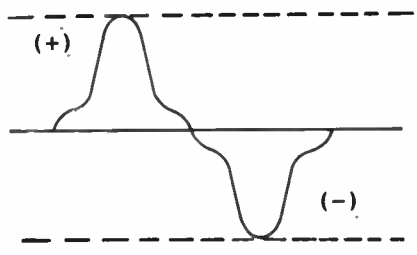
As the particle takes the magnetic swing from one extreme to another, the energy goes through the "zero" or changeover point. Herein lies the problem which bias solves. At this point there is extra resistance to the changeover in either direction. This is called *hysteresis.* Figure 2 shows a signal transfer-function curve which illustrates hysteresis-induced crossover distortion. You can see the line shift as it travels through the zero-charge area. This area of the line is described as being non-linear. The resulting interaction with your source is illustrated in figure 3. The source signal has been altered. Again, this is a characteristic of the magnetic oxide. Letting the process go on this way without intervention results in a terrible recording, high in noise and distortion, and in some cases tough to recognize as your source. The perfect solution would be to avoid having the energy travel through the "zero" point at all. Since this is not possible, here is where bias comes in. The bias is polarizing the particles and it encounters and overcomes the resistance. The rate is so fast (the frequency so high) that it's inaudible, so we can't hear the bias or the problem it has with hysteresis (resistance). Meanwhile, as the bias is working on the particles, we add our source (music or voice) to it. This interaction of bias and source creates a modulated or changing waveform (figure 4). The actual frequencies of bias and source are not changed or lost in any way in this combination. In essence, the bias carries the music through the "zero" or changeover point smoothly. The high frequency bias (rather than the music portion) suffers the phenomena of the changeover problem. The part of the signal that is affected (the bias as explained above) is so high we can't hear it.

FIGURE 2.



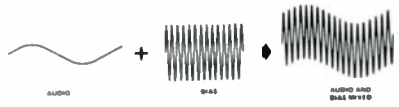
TRANSFER FUNCTION CURVE

FIGURE 3.



DISTORTED RECORDING

FIGURE 4.



More technically, there is a bias filter which eliminates the extreme high frequency information from the output signal. This assures you that the sound won't be affected by it and your amp is protected from its potentially damaging effects. Any residual extreme high frequency information left after the filtering is so short in wavelength that the play head gap cannot even detect it.

So, what's left is our source, clean and accurate. To state it very simply, bias allows the magnetic particles to receive the music accurately by helping to overcome the resistance to magnetic change.

What is tape equalization?

Tape is a magnetic medium. A given portion of tape can hold a limited amount of magnetic signal. Equalization is a way of managing the source information so that the low and high frequency energies contained therein are coordinated with both the magnetic capacity of the tape and the phenomena which tend to inhibit the recording process. (Look at figure 1.) One main thing to consider is the playback head. It acts as a filter affecting high frequencies. This is caused by several factors. To overcome this, high frequencies are boosted with record and play EQ.

There is another problem which is solved by the EQ. In record, generally the high frequency energies are boosted and the lows are cut to some extent. This allows for all frequencies to be represented efficiently on tape while avoiding magnetic saturation. If the tape was saturated by one particularly strong frequency component at a chosen point in a song, then all other frequencies, at that point, would be distorted along with it. Of course, this

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.

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would sound bad. So, a correctly-adjusted record EQ circuit will manage or "equalize" the source information contained in the signal to avoid saturation. Now, the signal that actually goes on tape is not yet an exact image of the source. It is highly modified by the record EQ. The signal that comes off the tape is not ideal either. It is still a highly modified version of your source. A final stage of EQ is required to bring it back to sounding like the source. This is called playback EQ. By the way, there are standardized curves which represent the actual modification of signal in record and play. In open reel, there are two accepted systems that you will hear about: NAB (National Association of Broadcasters), used widely in the U.S., and CCIR/DIN (Deutsches Industrie Normal), widely used in Europe.

In cassettes, two systems are used and described as being: 70μ sec or 120μ sec. The 70μ sec system is actually composed of two values, 70 microseconds and 3180 microseconds (millionths of a second). Each value corresponds to an actual frequency. For example, 70 microseconds is the time it takes for a particular frequency to go through one complete cycle. If the value is .1 second, the frequency will be 10 Hertz. It would be easy to get buried in the math involved with equalization. We won't. It is far more complex than the subject of bias. The formula for figuring the frequency is:

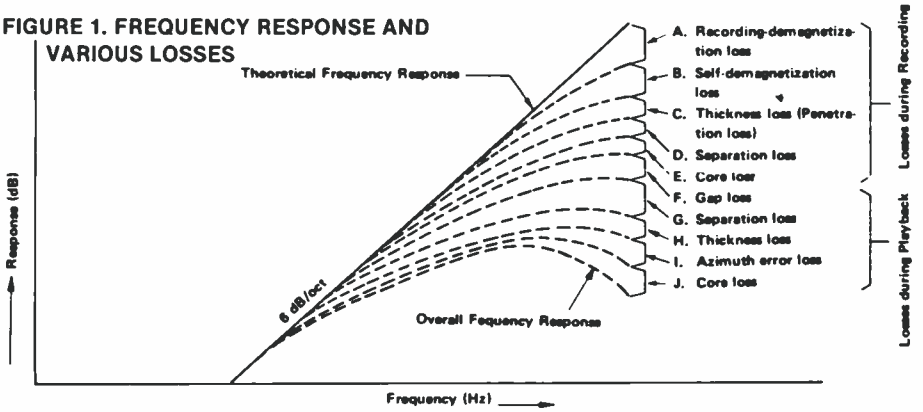
T = time value (example: 70μ
Given: I = intermediate value (only good for this calculation)
F = the frequency you are seeking

Step 1. Divide $\frac{1}{T} = I$

Step 2. Multiply $1 \times 1{,}000{,}000 = F$ (Note: Use 1,000,000 because T was in microseconds).

With the tape using the 70μ sec designation (like CrO_2 & $FeCrO_2$ or substitutes), the values of 70 and 3180μ sec become the frequencies of 14, 286 Hz and 314 Hz respectively. What this says to the consumer is that the electronics need only concentrate on the range of 314 Hz to 14,286 Hz. The information outside of that range is not actively dealt with by the EQ circuit. For the tape using the 120μ sec designation, the values are 120 & 3180μ sec,

FIGURE 1. FREQUENCY RESPONSE AND VARIOUS LOSSES



so the turnover frequencies are 8333 Hz and 314 Hz respectively. Now, don't let this scare you into thinking that the frequency response beyond that range is lost; it's not. All of the compensation found in the record and play EQ circuits does what is required to make the final product a clean and accurate reproduction of the source.

How do I choose the correct tape?

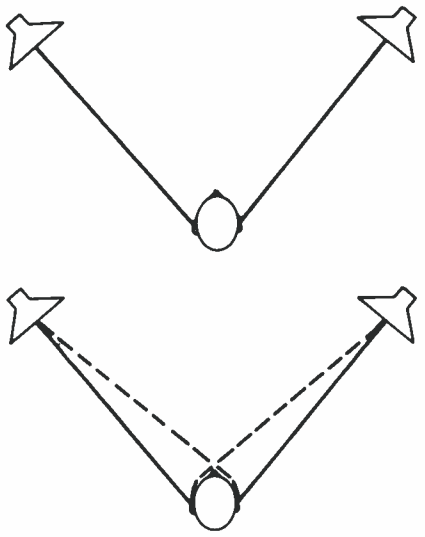
There are three things to consider when choosing a tape for your multitrack projects. First, does the manufacturer recommend a specific tape for its machine? TEAC, for example, will often advise a customer of the type of tape used to calibrate a particular model. However, that's no guarantee that you will agree with the choice as being best for your machine; let your ears be the judge. Second, is it a recognized high quality audio tape with low noise and good dynamic range? Some people get good deals on lower grades of tape and get lower grade results. Third, have you heard anything from associates concerning current quality control of the tapes you've focused on? Most flaws in manufacturing that you hear about are corrected quickly, so you should consider them temporary. The name brand tapes are overall consistently good, and have the capacity to record virtually any kind of audio source. In the professional recording studio, in most cases, the studio engineer chooses the tape. It is best to trust his choice, too, because he knows what tape works best with his equipment and he is skilled at setting up the machines with that tape. Also, if you walk in with another brand, you'll be paying the studio rate for the time it takes the engineer to reset the equipment for your tape. Many engineers won't use another brand because they wouldn't trust it and couldn't guarantee good results.

Roy Kamin
TEAC

What is the meaning of crosstalk of stereo imaging?

A basic distortion inherent in normal stereo systems occurs because each ear hears both speakers. This causes interference or "crosstalk" between the first-arrival sounds that create the stereo image and thus degrades that image.

An explanation of how stereo works may help to make this clearer. A listener seated equidistant between and some distance back from a pair of stereo loudspeakers will perceive a sound that occurred at stage center to originate midway between the speakers. The sound was equally loud in both channels and the distance the sound travels from the speaker to the listener's ear is equal for both channels.



Now if we move the sound a bit to one side, say to the left, it will be recorded more loudly in the left channel than in the right, and because it is closer to the left microphone, it will be recorded a fraction of a second earlier in the left channel than in the right. On playback, the listener perceives the sound as originating left of center because it is louder in the left channel and because it

is reproduced earlier in the left channel and thus reaches his left ear sooner than his right.

Now let's complicate this fairly simple stereo model by introducing a little more of the real world. Our original model doesn't take into account the fact that each ear hears both speakers. There is a direct path from left speaker to left ear and from right speaker to right ear, but there is also a slightly longer path from left speaker to right ear and right speaker to left ear.

Let's see what happens to our left-of-center sound when we apply this model. The first signal the listener hears is the left speaker in his left ear. The second signal he hears will be either the left speaker in his right ear or the right speaker in his right ear. Which of these he hears first depends on many variables, but primarily on the distance left of center that the sound originates. Lastly, he will hear the right speaker in his left ear. Since he hears first the left speaker in his left ear, he has no trouble determining that the sound originated left of center, but the effect of the interference (also called "crosstalk" or "leakage") signal to the right ear is to pull the sound to the right, closer to stage center.

Up to now we have been dealing with a single sound. When we expand the model to include a complex combination of sounds such as music, we find that the effect of the interference signals is to confine the stereo image to the area *between* the speakers. This is a basic distortion inherent in all normal stereo systems.

This distortion can be effectively reduced by introducing a time-delayed, phase-inverted, error-cancelling signal that eliminates the interference signals. The result is that the stereo image expands beyond the speakers and both lateral and front-to-back imaging of instruments is improved.

The actual synthesis of the error-correcting signals involves consideration of many factors including diffraction effects, frequency cancellation effects, speaker placement, listener location, etc. When the theory was originally developed in the 1960's, the only way it could be implemented was with the use of a very large digital computer. Recent advances in large scale integrated (LSI) circuitry have made it possible to reduce the circuitry to fit, for instance, into the hand-held Sound Concepts IR2100.

Joel Cohen
Sound Concepts

OUR VARIABLE SPEED CONTROL WILL MAKE YOU CHANGE YOUR TUNE.

If you're already working with an 80-8 or 40-4, our Variable Speed Control is a very cost-effective addition. For just $350* you'll adjust 15 ips to the tune of ±20%.

And you'll get a brand new single speed servo-controlled DC motor in the deal. Your multichannel recorder becomes more versatile. And it ends up lasting longer. Remember trying to over-

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dub a piano only to find it out of tune with the track? Or sweating through three hours with a singer who flatted the last note of an otherwise flawless performance? You'll turn these late-night horror stories into lullabies with Variable Speed Control.

Try it for adding a "tunable tom" effect to your song. Then experiment with other rhythmic twists.

Turn two singers into a chorus of eight. Add harmonies. Transpose from A up to C, or back down to F#. With the 80-8, you have eight tracks to build your song.

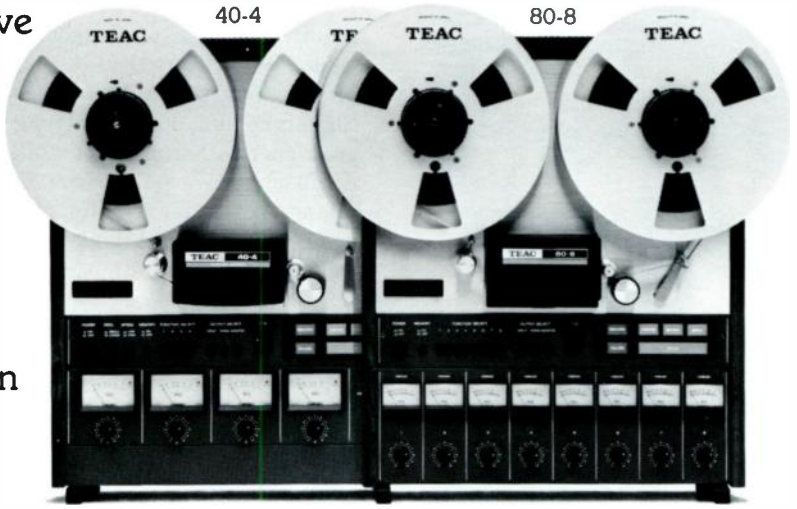
When you're working with synthesizers, you can spend hours experimenting. Or seconds repairing an out-of-tune tone. Try creating your own special effects, bending and shaping other instruments to fit your ideas. Whether you have an 80-8 or 40-4, you have the capability to turn basic music into complex arrangements.

As a production aid, our Variable Speed Control becomes Executive Producer when that beautiful radio spot comes in at 32 seconds. Just rewind the tape, set the control and 28 seconds later you're right on the money.

For audio-visual soundtracks, slide or filmstrip audio tracks, Variable Speed Control lets you solve tough cueing and timing problems. Without re-recording, wasting time and losing money.

If you buy an 80-8 before October 31, 1980, you can get the Variable Speed Control and the new DC servo-controlled motor free of charge—plus arrangements for free installation. Get all the details at your participating TASCAM Studio Series dealer today, and discover how easy it is to sing a new tune.

*Suggested list price, optional with dealer; installation required.



TASCAM STUDIO SERIES

TEAC Professional Products Group

By Craig Anderton

HOW TO DEMO GUITAR SYNTHESIZERS

Effectively demonstrating equipment has always been a problem, but that problem has now become compounded due to the large number of high-technology "toys" being introduced on a seemingly daily basis. In this column, I'd like to discuss a generalized approach to demonstrating guitar synthesizers.

The most important concept to grasp is that all synthesizers operate on similar principles. If you're interested in the technical aspects of what makes these things tick, see my columns in the March through October 1979 issues of SOUND ARTS; but don't worry if the technical details aren't clear. If you can avoid becoming intimidated just because something may be new and different, and if you can approach the subject with an open mind combined with a certain amount of curiosity, the task should go pretty easily.

FAMILIARIZATION AND ADJUSTMENT

The first thing you must understand is that guitar synthesizers are rather picky little beings, and are particular about what kinds of signals they like. If the synthesizer you're using doesn't require the use of a special pickup (such as the Korg X911), you're best off selecting the guitar's bass pickup. Signals coming out of the treble pickup are richer in harmonic content, which confuses the synthesizer pitch-to-voltage converter circuits; they prefer something that contains more of the fundamental tone. In some cases, it may even be necessary to turn the tone control all the way down in order to eliminate as many harmonics as possible.

In the case of systems requiring a special pickup (ARP, Zetaphon, 360 Systems, Roland, and the like), that pickup is usually designed to sit in a specific place on the guitar. Make sure that the adjustment is as close as possible to what is recommended by the manufacturer for best results.

In addition to making sure that the guitar is putting out the right kind of signal, it's important to match the synthesizer to the particular playing style being used. Some players pick hard, others pick softly; some use flat picks, some thumb picks, and so on. Obviously, it's difficult to design an electronic circuit that can handle all of these various styles flawlessly. So, most synthesizers have some kind of adjustment control that regulates the sensitivity of the machine. It's important to take the time to get this setting as closely matched as possible to an individual's playing style. If the customer finds this process too time-consuming, it might help to reassure him or her that once these adjustments are made for a given style, they don't have to be varied much thereafter. If, during the course of demonstrating the synthesizer, you start to notice that it is "glitching out" (i.e. malfunctioning in an obvious way, such as failing to track frequency properly, missing notes, etc.), then you should go back and re-set the various pertinent adjustments. It seems the most common problem is that people start off playing softly, and then as they get into the machine more, they start to play more forcefully; this can overload the synthesizer and cause problems. Once you've gotten past the stage of matching the machine to the player, then it's time to start phase 2 . . .

HAVE SOME "KILLER" PATCHES

If any store employees discover any particularly neat sounds for a given machine, encourage them to write these down in a patch book. Also, if someone comes in who knows about synthesizers and starts getting some good sounds, don't be shy about asking if you could take notes on some of the patches. If anything, the player will feel complimented.

Once you've assembled a goodly collection of patches for your machines, when someone comes in you can immediately set up the appropriate knobs in order to get the player "on the air" as soon as possible. Nothing dampens a player's interest more than hearing a bunch of rotten sounds come out of a device before you finally find something that sounds decent (if, in fact, you do come up with something decent). Should SOUND ARTS readers be interested in having me cover some "killer" patches for some of the more popular units currently available, write in and I'll get on it.

AMBIENCE ENHANCEMENT

Synthesizers by themselves have a basically flat kind of sound . . . they

don't have any of the ambient qualities associated with acoustical instruments. In order to dress up the sound of a synthesizer a bit, it's a good idea to use some kind of echo, reverberation, phase shifting, flanging, and the like to make the sound more pleasing. Of course, you have to level with the musician and explain that part of the sound is from external enhancement rather than the synthesizer itself; but the result might be sales of an echo unit as well as the synthesizer! I went into one store recently that was trying to sell an older, less popular model of guitar synthesizer. As an incentive for buyers, they offered another synthesizer as an "expansion module"...but I think that was the wrong approach. What probably would have really sold that synthesizer would have been the addition of a solid-state echo unit and flanger.

HAVE ALL PERTINENT ACCESSORIES AVAILABLE

Many synthesizers have provisions for adding footswitches, control pedals, and other accessories to enhance the performance of the unit. Have these available and use them! All of these devices add more user control to a given guitar synthesizer, which gives the player more options and more sonic possibilities. Naturally, knowing that these kinds of options exist help make the individual unit far more attractive in the buyer's eye.

STRESS THE BENEFITS

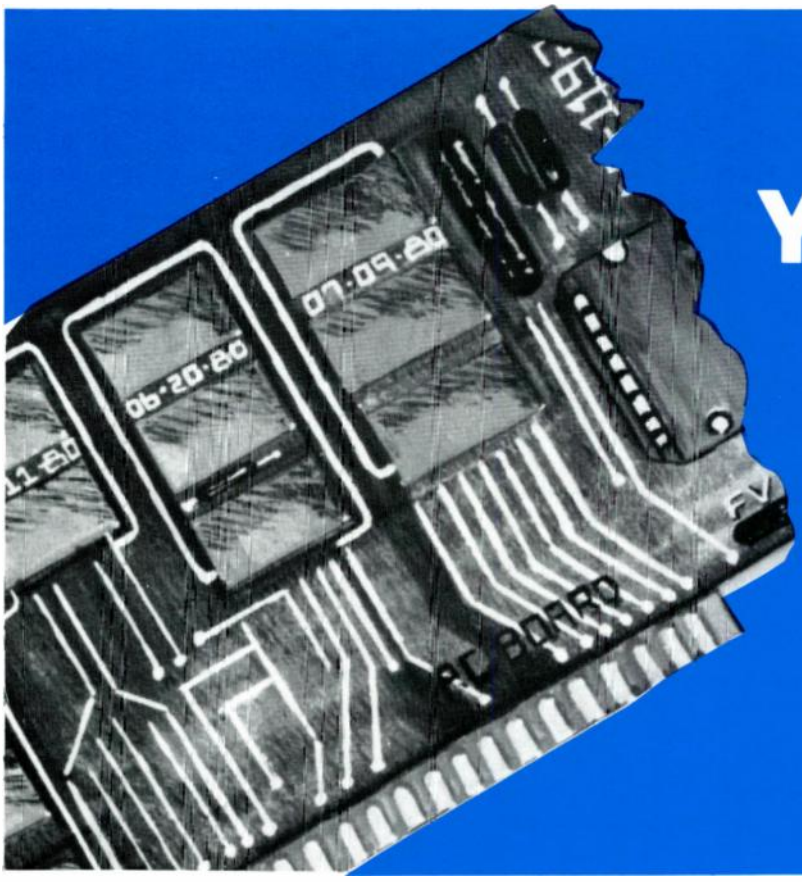
It's important to know whether the player is contemplating purchasing the unit for mostly live use or mostly studio use. Some units (such as the E-H Micro-Synthesizer, Korg X911, and Roland's GR-300) are optimized for rapid setup time and simple patching changes. Others are designed for greater flexibility at the expense of easy setup, which makes them more suited to studio use. Studio musicians also generally require a unit that is as glitch-free as possible, since every blown take means a financial, as well as psychological, loss. Live players can be more tolerant of an occasional problem, because live music is not scrutinized in the same way as music made in the studio.

ADDITIONAL HINTS

As mentioned before, guitar synthesizers have an essentially flat kind of sound. While ambience enhancing devices do help, they still can't show what it would be like to use a guitar synthesizer in an ensemble context—which is one of the appplications where the guitar synthesizer really shines. So, at least offer the customer the use of something like a rhythm box to give a bit of a backdrop for the synthesizer. Ideally, demonstrating a guitar synthesizer should be done with the aid of a multitrack recorder; it's always very impressive to lay down an entire orchestra of sound with a single instrument and synthesizer. This is another reason for having your book of patches around—you can show the musician how to lay down things like bass parts, horn parts, string parts, and special effects using the guitar synthesizer.

FINAL COMMENTS

As mentioned in an earlier column, guitar synthesizers are not for everybody. Also, the musician must remember that there is a certain amount of give-and-take required; certain playing adjustments must be made in order to use the synthesizer to maximum advantage. However, the odds are excellent that if you've been able to demonstrate that exceptional sounds can be coaxed out of the unit, that it can fill a number of valid musical roles either live or in the studio, and that the addition of few simple effects can really make a big difference in the sound, chances are that the player will put up with any minor glitches in order to gain these benefits. When properly demonstrated, a guitar synthesizer should show the guitarist that it is now possible to gain a whole new family of timbres for the guitar...and I have yet to meet any guitarist who wasn't turned on by the idea of getting everything from trumpets to violins to flying saucer sounds in addition to all the wonderful sounds he already gets from the guitar. So if the guitar synthesizer section of your store is not exactly humming, think about the ideas presented above and see if they apply to your situation. Ask one of the most electronically astute of your salespeople to sit down with an instruction manual and guitar synthesizer, play for a little while, and come up with some excellent patches that really show off the machine.



AFTER YOU BYTE:

Getting The Business Computers On Line

By J.D. Sharp

My last article dealt with purchasing a computer system and the many considerations in choosing a system which will be suitable for the task it will be asked to perform. Now we'll deal with the second hurdle: how to get the system up and running in the working environment without utterly disrupting the normal conduct of business. We'll assume that enough homework was done to prevent a disaster in picking the right hardware; I refer you to the last article for some guidelines in that respect.

Installation of the computer should begin before it ever arrives. Although a computer may make life much easier for you and the bookkeeper, buying a computer has never solved the problem of messy books and accounts. So the first critical step is to have your house in order before attempting to transfer over to computerized record keeping. I say *critical* because the accuracy of the records will affect the usefulness of the information which comes back from the computer from the first day on, and accuracy in the transfer process lays the foundation for the entire system. There comes a moment in using a computer when its power to handle information becomes clear—when, for instance, a user can look over a year's worth of sales records and produce a detailed analysis of return on investment, turns on inventory, sales breakdown by department, item or person, and so on. That wonderful moment will be greatly postponed if care is not taken at the outset.

Another way in which advance preparation can alleviate aggravation is by anticipating the need for personnel to operate the computer. This may involve hiring someone new, or simply training a capable employee. It is much easier to determine this need by going over the system which is to be installed step by step, running through the series of actions that take place to enter information about accounts or inventory. Hopefully, you will have chosen software which provides you with "menu-driven" displays on the terminal; these menus tell the operator what to do and what options there are at each step along the way. This is much more accessible and understandable than a system which has codes and key words which have to be memorized, and can make it much easier for other people to be trained to operate the computer. It will be necessary to have at least a second employee or owner familiar with the system, as a contingency for illness or vacation; even something as simple as a traffic jam could be a problem if only one person knows the ropes.

The computer will not replace a person in another way; there are lots of ins and outs to dealing with both customers and suppliers, and many of these subtleties will be lost on the "dumb" machine, which basically does just what it is told, no more and no less. It can help to keep things human and friendly to have your regular bookkeeper continue to deal with accounts. If he or she is unable to cope with the computer, at least make sure that the channels of communication are open, so there is continuity in the way that everyone is treated; there are few things worse than a long-time customer suddenly having to deal with a new person with new paperwork.

Backup is something that is discussed a lot when talking about computers, and that is because of the nightmare created when information is destroyed, altered, or lost because of equipment failure. Possible sources of failure are: a bad floppy disk, which is not unlike getting a bad cassette tape; mechanical failure (we all know about that); or power interruption. The best way to handle this is by carefully backing up all invaluable files, stuff like accounts receivable and payable, and the inventory record. If a file is updated daily, the first step should be to make a copy of the file as it stands before update. Most systems have some provision for verifying a copy, which means the computer will compare the copy to

the original and will let it be known if any differences are found; it is rare to have a problem in copying. The backup disk can be set aside, to provide fail-safe recovery in the event of a system "crash," which is what computer folks like to call computer failure, whether hardware or software related. Many scare stories about computer horrors are totally preventable, and would never have occurred if this precaution had been taken.

There are other methods of backup which vary according to the type of storage medium used. Hard disk systems, which are used for applications demanding larger amounts of storage, often consist of a removable medium paired with a non-removable disk; the removable section can be used to back up the permanent part. Very large systems use different tape drives to "dump" the contents of vital files. Needless to say, copies should also be maintained of the actual programs that make up the system software; most software houses recommend that you immediately make a copy of their software and then put the original away for safe keeping. A good practice is to periodically print out vital files, and consideration should be given to keeping some of these print-outs in a different location from the computer, in case of disaster; this will provide a means of reconstructing records, and is good business practice whether or not one is using a computer. Many businesses which are dependent on the computer will also keep copies of vital floppy disks in a separate location for the same reason. Again, system crashes are a fact of life, and are painless if a few simple precautions have been taken.

Controls are necessary to monitor the operation of the system, and I don't mean the kind of controls with knobs on them, but rather various checks and balances built into the software. The computer can increase the risk of loss in the absence of the same types of controls which are normally part of a textbook business operation. The computer provides the means for a manager to look into all aspects of the business, but it may also provide a method of covering up inventory shrinkage or questionable transactions. There are several ways of dealing with this, but most revolve around having the users identify themselves as they "log on" to the system; the computer then keeps a record of who did what, and when it was done. This is an absolute necessity for a system which will be used by different people. The software can also be structured so that a person's identification code only gives him or her access to a restricted portion of information which includes only the programs and files necessary to perform the task at hand. It is not necessary or desirable for the shipping/receiving clerk to know what the bank balance is. In this way, management can keep tabs on the whole business without compromising security. Controls of this type vary widely from system to system, and of course they can be customized into a tailor-made software package, so be sure to examine this aspect of the program for your business.

Any system will have some inherent bugs when first installed. Several factors can greatly affect how much trouble should be anticipated. First, a system can be chosen which has already been configured for the same type of business. A thorough search may turn up a package specifically designed around the needs of a piano and organ store, a hi-fi specialist, or a band instrument store. A program of this type needs to be examined just as carefully as a "general" retail package, to determine whether the customized features really are useful to all stores of the specific type, or whether the owner of one such store paid to have a bunch of unusual and unnecessary subroutines written in to a program. But if a program can be found which takes into account the type of business involved, the savings in time and money can be considerable. A careful look below the surface is the key, to determine how much of the specific modification is useful to the immediate application. A program of this type should also stand on its own merits with regard to all the conventional record-keeping tasks; in other words, one might be better off starting with a high-quality, field-proven, factory-supported software package which requires some refashioning than with a pre-customized package which takes into account some of the specifics of the enterprise, but offers mediocre accounting otherwise.

Another factor which can make all the difference is the level of help to expect from the vendor of the system. I know of a musical manufacturer who now has an extremely well-designed computer system, because he himself learned how to program. This was unfortunately necessary because he contracted with a software firm to write custom software for his type of operation. The software house was experienced in other areas, such as elaborate packages for law offices, and wanted to try its hand at something new. Things went great at first, with many elegant niceties getting built in, but as time went on, the software people got involved in another (higher-paying) development project, which is when the manufacturer learned to program. He was fortunate in two respects; first, he had a solid background in electronics, and took to programming immediately; and second, and more important, he was covered by a contract, so that when the software house failed to perform according to the agreement, he was able to get a substantial reduction to his bill.

The same old rules apply here as to any sales contract. Verbal promises are meaningless and can only lead to ill will later on, so spell out the specifics as far as support goes. This should include modifications, if any, that are included in the package; the cost (either per hour or flat rate) for modifications and customization; the guarantee of performance and responsibility of a software installer (it's his fault if the system doesn't operate; it's your fault if it works but you can't keep it together to put the right information into the system); and any long-term warranties or support which are included in the purchase price. It is crucial to get all this written into an agreement, because it will make it possible to assess the real costs involved in customizing a system. My manufacturer friend tells me that he would do it differently if he had to do it over again, by starting wth a proven, off-the-shelf system, and paying only to modify it to his specifications.

I agree with this approach, and find it useful for another reason: The same basic software can be used to set up accounting for several different businesses, with only minor revisions. However, there are applications which are unusual in nature, and the owner of such a business may very well be better off having custom software written, rather than struggling endlessly to adapt a "proven" system.

An aspect not to be overlooked is service. It is wise to consider just what kind of service to expect, since most warranties run out in ninety days (at least the labor coverage)! This should be an important factor in determining from whom to buy a system, but it becomes truly critical after the business is "on computer." While it may be possible for some giant corporation to tell you that the payment check is "in the computer," most suppliers aren't

going to go for that excuse from the local music shop owner. Does the computer supplier have loaner machines for back up? If not, what kind of turnaround time will the supplier guarantee? Is there a suitably-equipped repair shop, and if so, where is it located, and what are the hours? Is a technician available on call, even after hours? Will the supplier still be around a year from now if a problem develops? It should be obvious that mail ordering of computer systems should be avoided unless the purchaser is expert in electronic diagnosis and repair as well as software writing. It should also be obvious that service is one of the most important things that a computer supplier can provide, and it is reassuring to know that a good organization stands behind your system, even if you may never have to call upon their services.

There can be a point of diminishing returns when using a computer, and it is important to determine how that affects getting the business on the machine. It is not necessarily beneficial to computerize down to the last tack and paper clip. A more down-to-earth example of this might be hardware that the pro sound division carries. There may be 50 or more types of Switchcraft hardware. In order for a computerized record to be kept for sales of the different items, each item would need to have an "item code" associated with it, which would then have to be available to the cashier (in a point-of-sale system) or salesperson. It might be more rational to keep a divided bin of each item, with perhaps 25 in each compartment, and reorder when the front compartment empties. Instead of tagging and/or coding every item, an entry could be made to the system which indicates that 25 pieces have been used up and have been reordered. Although the ability to have the computer automatically reorder every item may be lost, a great deal of hassle may be avoided; a record could still be developed which would reveal the frequency with which reorders are made. It takes some common sense to know where to draw the line; it may or may not prove useful to keep track of 55 different types of guitar and bass strings by the pack in order to determine which ones are most popular, but no matter what, it is a lot of work. It could be easier to actually code and record the items on which commission is paid, since the process of calculating commissions is made extremely simple by the computer.

Another way to decide what to code is to look at the different profit centers within the store, and figure out where the most loss is taking place because of items going out of stock. If the electric grand piano just sold, it is unlikely that it will be overlooked, but it is sickeningly easy to run out of nine volt batteries or guitar polish. Remember, the ideal situation would be one where every single item in the store is coded; this would allow completely automatic reordering, since levels can be set which trigger the computer to add an item to the daily report of items requiring restocking, and the computer can be told in advance how many of an item to reorder. This procedure must be tempered, however, with some sense of whether or not it really accomplishes anything, since it may end up taking much longer to keep track of everything this way, and a simple walk through the stockroom with a list of stocking levels and items may accomplish the same thing.

The most valuable inventory control function that the computer performs may be to "age" items on the floor and identify slowmovers. We have a remarkable ability to grow attached to a piece of equipment, or to be oblivious to its continued presence on the sales floor. Meanwhile, flooring costs could be mounting up, or dollars may simply be tied up in the wrong place. The computer can be programmed to "turn out the rascals," unemotionally revealing the length of time an item has been around, and can save money for those dealers who use flooring.

Priorities are always important, and this is equally true in implementing a computer system. A good policy for some companies has been to first go for the areas with the most problems and the areas where the most can be gained by computerizing. If inventory is the big bugaboo, then concentrating on that problem first may be a good strategy. Too many companies have burdened themselves with computerizing head to foot overnight, only to discover that a step-by-step approach would have served them better. There is something to the argument that says the true and complete benefit of a system can't be realized without complete conversion, but making the process at least somewhat gradual has definite advantages. For one thing, it is possible to acclimate to the system, avoiding shell shock among employees who suddenly find themselves thrown into the midst of mysterious new processes and rules.

It is also a way to find out if there are some missing parts or gross errors in the configuration.

This may seem funny to talk about in light of the fairly considerable sum it may cost to put together a system, but it is uncanny how easy it is to overlook an essential link in the operation of the business. It is far better to discover this during a "run-in" period, because a problem may be of the type which is common to all the different programs in a software package. It is also advantageous to deal one-at-a-time with other types of software problems, such as discovering that certain parts of the program just aren't going to make it and need modification. Putting the whole business on in one shot may turn up 15 of these problems all at once, causing frustration, confusion, and the general feeling of having bitten off more than one can chew, whereas dealing with each snag successfully will build confidence in the total system.

Maintain current business systems until the computer-based systems are proven to be working 100 percent. This should be chiseled in stone. It is more work to do this, since two complete, parallel record-keeping systems will be in operation, but the extra labor is more than worth its price in the peace of mind it brings to the business owner. As emphasized above, the run-in period may be shaky, and in many ways problems should be expected, since it is extremely rare that any major system goes in and goes "up" (more computereze) on the first try. If the computer is expected to immediately take over, the pressure created by a delay is heightened.

A second point to consider is that without a parallel system, there is no check on the computer and/or the software; that is, it may be turning out beautiful rows of figures in tidy columns, but there may be a bug in either the software or memory which is making it add wrong! Although this doesn't happen all that often, it is not unknown for people to be tearing their hair out trying to figure out what they are doing wrong, when an I.C. in the computer memory has fried and is introducing spurious garbage into the program. This type of failure is far more likely during the first days of a computer's operation, when everything heats up real nicely, and chips suffer from what is called "infant mortality." This is the point of lengthy burn-ins which most manufacturers give their products, but some bad chips manage to hide their problems until they are in the hands of the end user. This should not be altogether unfamiliar to those of us who sell electronic products, be they amps, keyboards, or effects, and is certainly not a reflection on the computer industry, which goes to greater lengths than most other industries to avoid such problems. I only dwell on the subject to underline the importance of maintaining the tested and true system, however time-consuming, for a decent interval, so that the hardware can be proved out and the software shown to be appropriate and completely functional.

The introduction of a computer into the operations of a business will be made far more rewarding by careful advance planning. Analysis of personnel needs, priorities, necessary controls, and back-up systems will help to orient the user to a system matched to his or her application, and may be helpful in finding a supplier of hardware and/or software who will provide the needed level of support, either in writing custom software, or in adapting an off-the-shelf package to the particulars of a business. Realism with respect to the down side of computerizing will result in far greater satisfaction overall. Preparing for "crashes," and implementing a system gradually will prevent craziness at a later stage. Providing for after-sale service in advance will avoid frantic and expensive searches in the dark of night for qualified computer technicians.

If this all seems like a lot of work, it is good to remember that it is quite worth it and will more than repay the initial effort by saving both money and time down the road. Unlike other investments which offer benefits a long way down the road, the computer system yields results almost immediatley and becomes more valuable as time goes on, since the "data base" of business records becomes larger and represents a longer time period. A system may also provide side benefits to the user other than record-keeping, since the same hardware is used for word processing (that's how this article was written) and mailing lists. These other applications can make the system easier to amortize.

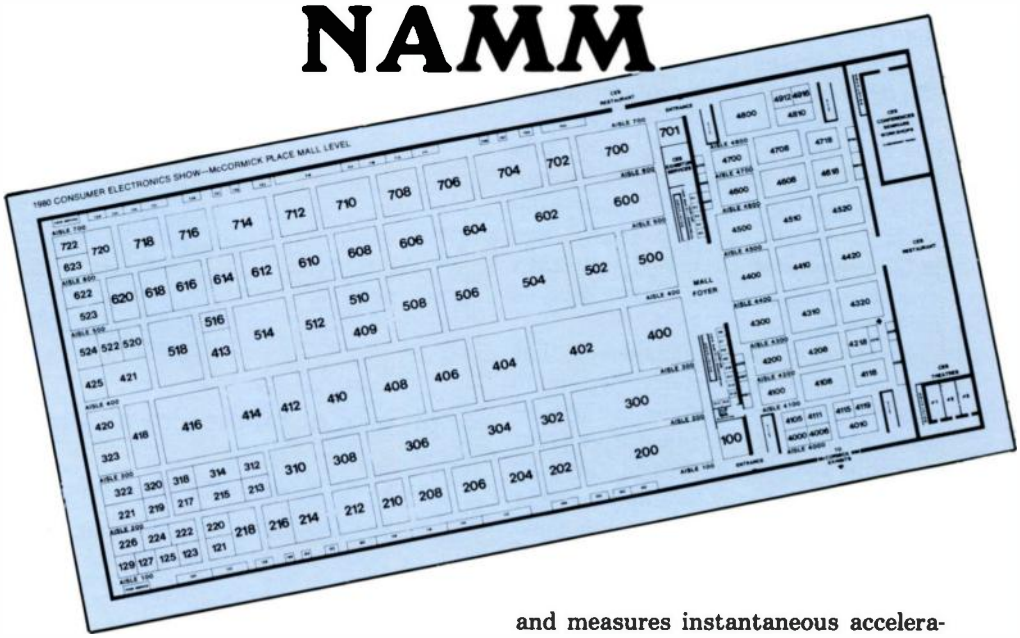
A computer in the office should not be frightening, and can be the single most valuable piece of machinery in the office. A rational approach to the introduction of this tool into a business will make the experience.

Showed Up, Showed Off, Showed Out;

A Review Of CES And NAMM

CONSUMER ELECTRONICS SHOW

By Leonard Feldman

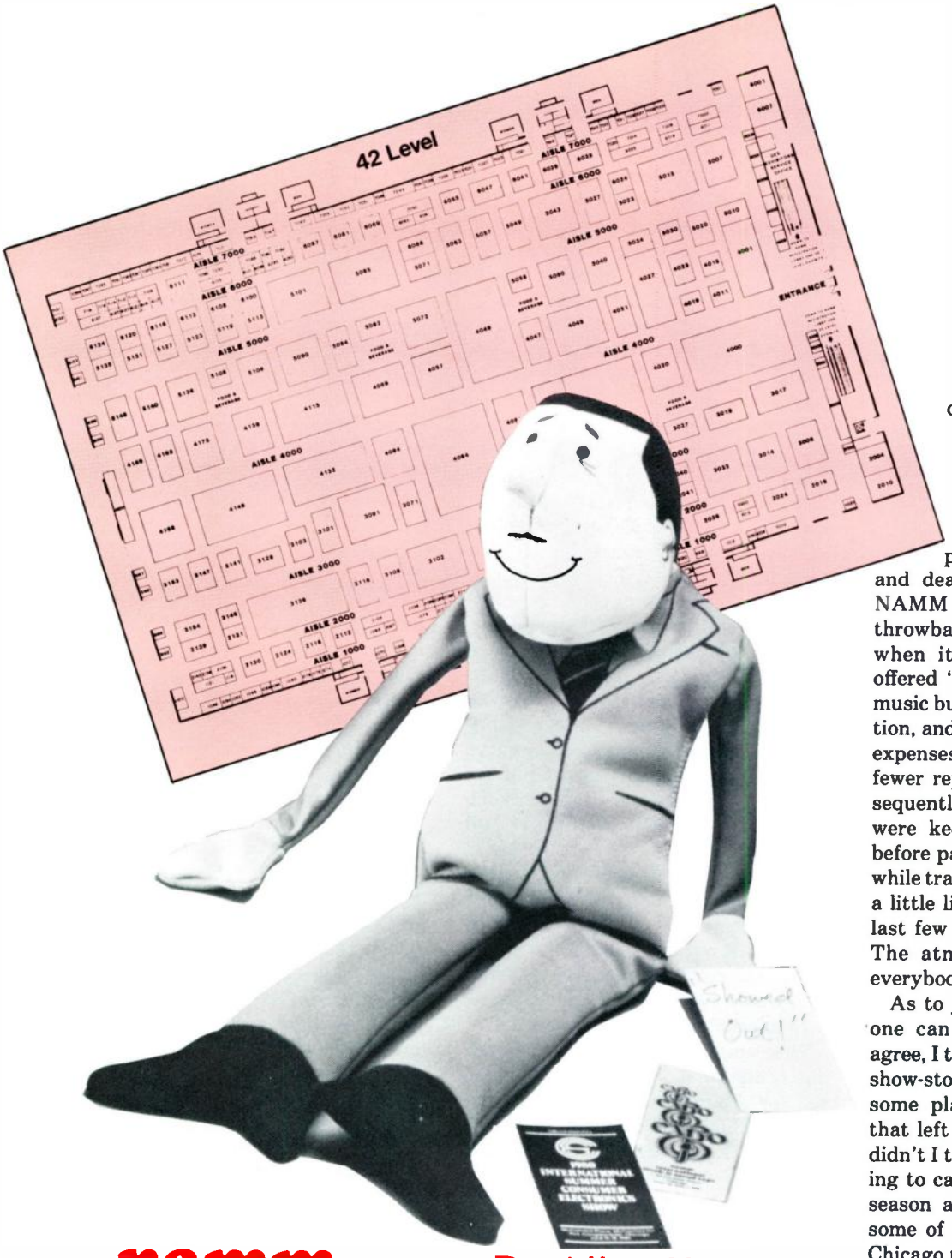


The word on the floor at the Summer Consumer Electronics Show in Chicago was that "audio was down" and "video was up." Maybe so, but you wouldn't know it judging by some of the high-end audio product introductions which attracted attention from buyers and casual visitors alike. All of which suggests that the audio retailer who caters to the music-performing or music-involved professional or semi-professional is apt to have an easier time weathering the current recession than is the retailer who sells strictly to the audiophile neophyte or even the second stereo system buyer.

A sampling of some of the new and unusual high-end product introductions follows, but is by no means to be considered a complete list of what was new and unusual in high end audio products that meet the needs of our reader-retailers.

WORLD'S HIGHEST PRICED SPEAKER SYSTEM?

If Infinity's new Infinity Reference Speaker system (IRS for short) isn't the world's costliest speaker system, it will do until something else comes along to claim the title. The price: a cool $20,000 (that's Twenty Thousand and there are no typographical errors in the numbers). The sound: in our view, superb! The speaker system comes in four sections, each of which stands 7½ feet tall. There are 36 dipole electromagnetic induction midrange drivers per side and six servo-controlled polypropylene woofers per side. An accelerometer is attached to the bobbin of each woofer and measures instantaneous acceleration. The woofer systems are each driven by self-contained 1.5 kilowatt servo-controlled amplifiers which receive correction signals from the accelerometers to achieve negative feedback for the total system. The cabinets are hand rubbed and rosewood finished and the woofer units are filled with sand to prevent resonances. The midrange /tweeter columns are shaped like airfoils to prevent any diffraction



namm international music & sound expo

By Allen Hester

The first summer NAMM show of the new decade was appropriately filled with the new and the innovative. The technology of music continued to become more sophisticated and more prominent in the finished products that were introduced. But at the same time, the carefully hand-crafted instruments stood right along side the programmable disco lighting systems in testament to the diversity of the industry and the dedication of instrument makers, whose craft is thousands of years old, whose work is meticulous, and whose pride was evident in the marvelous instruments that were displayed in McCormick Place.

It was trade show time, a time when manufacturers meet retailers head-on for exhausting days of cross-examinations, proposals, counter-proposals, and deals, deals, deals. In a sense, NAMM in the summer of 1980 was a throwback to the older trade shows when it came to special discounts offered "only at the show." Even the music business has felt the bite of inflation, and because travel and exhibition expenses are so high, fewer dealers and fewer reps made it to the show. Consequently, the ones who were there were keen to fill some sales orders before packing up and going home. So while traffic on the convention floor was a little lighter than it has been in the last few years, the trading was brisk. The atmosphere was positive, and everybody had "the best." Naturally.

As to just what was "the best," no one can say, but everybody would agree, I think, that there were some real show-stoppers, some real turkeys, and some plain old common-sense ideas that left everybody wondering, "Why didn't I think of that?" So, without trying to call any turkeys (they're out of season anyway), let's take a look at some of the goodies brought forth in Chicago this year.

Drums are not something that are discussed in this magazine a lot, but there was so much activity in the drum world this year that a few things bear mentioning. All the major drum companies had a monster set of drums on display as a sort of tongue-in-cheek comment on the "ultimate" drum set. However, the Sonor company wasn't kidding when they rolled out their solid bubinga-wood set of tubs. Already famous for their beautiful rosewood drums, Sonor went a step further with the exotic wood set, which retailed out at a modest $6,600!

Not to be outdone, Ludwig had some new modular tom mounts that enabled

CONSUMER ELECTRONICS SHOW

Continued from page 26.

effects. The IRS system would make a fantastic monitoring system in a well equipped studio or performing hall. And, lest the retailer have fears of having to install these monsters, Infinity Systems told us that any purchaser of the IRS system (the company is backordered by an unspecified number of pairs) is entitled to have a factory trained representative install the units in their final location, regardless of where the buyer lives. I presume this offer applies only to the U.S., however.

A COMPUTERIZED EQUALIZER/ANALYZER

The way dbx, Inc. tells it, they are a company dedicated to processing audio signals so that they come closer to being replicas of live sound. All of their efforts in this direction until now have involved attempting to increase the dynamic range of reproduced music. Their companders, both those used for professional purposes and those used in home audio products, not only improved dynamic range but offered noise reduction as a worthwhile bonus. Now, dbx addresses the problem of accurate frequency response in a music reproducing system; and not just response of the audio components but of the listening room right up to the listener's ears. Yes, dbx displayed an equalizer, but one unlike any you have ever seen. To use an equalizer properly (and most are grossly mis-used by hi-fi buffs and professionals alike) requires that the user have a real-time spectrum analyzer as well as a wide-band test signal such as pink noise. Even with these expensive tools on hand, the interaction between adjacent controls on a typical equalizer makes the job of proper EQ adjustment a long and tedious one. The new Model 20/20 Computerized Equalizer-Analyzer introduced at CES by dbx, Inc. is really four complete products in one. First, it is a ten-band octave-by-octave equalizer. In addition, it is a real-time spectrum analyzer using 300 LED's (30 per octave band) to display actual levels of sound, either at the speaker's output terminals or, using a supplied calibrated microphone, at any chosen listening position. There is also a single row of LED's that serves as an overall sound pressure level meter. So far, nothing new, right? Well, get ready for this! The unit has a built-in software program which enables it, at the touch of a button, to "read" response of the room (via the microphone) and to quickly adjust all ten octave bands of the graphic equalizer electronically until flat system response is obtained. The whole operation takes place completely automatically and in about 10 seconds, as the user watches the LED's of each band change their positions. Once system response has been adjusted to "flat," a touch of one of nine memory buttons stores the equalization curve settings in the memory circuits of the dbx unit, to be recalled at the touch of a button at any time in the future. And because different locations within a room or in different rooms require other EQ settings, as many as nine curves can be memorized by the unit in this manner. Of course, manual override of any of the curves is possible for those who would rather not listen to music with guaranteed "flat" response.

This amazing combination of computer, digital and analog circuitry will sell for around $1300 and should be available in the autumn of 1980 at dbx dealers. The company hinted that a future professional version of the computerized equalizer costing considerably more than the 20/20 would feature ⅓ octave bands instead of full-octave controls, but no date was set for the introduction of that unit.

STILL BETTING ON ANALOG AUDIO

For a company that just a few months ago was struggling for its very survival, Tandberg seems to have made a remarkable recovery in this country as well as in its home, Norway. This high-technology firm, best known for its tape recording products, claims to have come up with the analog answer to the high cost of digital tape recording. It is an experimental open reel deck based upon the firm's previously produced TD-20A deck. Specifications read as well as some digital tape units (and in some respects better) and the deck could sell for only $2000. The machine features 7½ and 15 ips speeds and, in addition to the Actilinear recording electronics found in the standard TD-20A, this deck uses 10-microsecond playback equalization and Tandberg's exclusive Dyneq dynamic equalization. The result is extended dynamic range at high frequencies of as much as 12 dB. Typically, this combination achieves an overall signal-to-noise ratio of 80 dB with frequency response extending all the way out to 35 kHz (well beyond present-day digital machine capabilities) and a wow-and-flutter figure of less than 0.02%.

Tandberg is suggesting that 10 microsecond EQ settings be offered on open reel decks as an optional second EQ position in much the same way that cassette decks offer a variety of equalization settings to suit different types of tape. They perceive this as a way in which relatively inexpensive reel-to-reel recorders can outperform the best of the cassette decks and even provide performance equivalent to that offered by far more expensive digital processor /deck combinations such as those offered by Sony or Soundstream.

If certain audio products are beginning to incorporate some of the functions of a home computer, others are being designed to interface well with such computers. Consider, for example, the FL-1000 Cassette Tape Deck produced by Eumig. Though not a new product introduction at Summer CES, the company has developed a new software program which permits graphic demonstration of the interrelationship between an 8-bit home computer and the cassette deck. The FL-1000 deck incorporates an extremely powerful microprocessor chip which can be controlled with a calculator type keying system on the front panel of the FL-1000. Up to sixteen FL-1000's can be interconnected through a single computer and can be individually controlled, simultaneously or sequentially, to play or record any section of tape. One machine can play a musical selection while another machine searches out a selection, stops and waits. Then the second selection can be played while a third machine rewinds or moves in fast-forward to another selection and waits to turn on and play. Meanwhile, a fourth machine can, for example, be making a whole new recording of the entire process and so on, and so on.

Under computer direction, titles and index locations of all the musical sel-

ections on a tape can be digitally recorded in the first few seconds of a cassette. Then, by inserting a programmed cassette into the FL-1000 and punching a few computer buttons on the interfaced computer, the user can obtain a readout of the tape's contents on the computer screen. The FL-1000 can then be instructed to play any of the selections on the tape in any order. The possibilities are virtually endless!

FOR THE DISCO SET

There were at least two turntables at the show which would make any DJ ecstatic with joy. The first of these was developed by Lux Corporation of Japan and is being offered by their U.S. based subsidiary, Lux Audio of America. Dubbed the Lux PD-555 Turntable, this massive device can be fitted with two separate tonearms (none are supplied with the unit). The system, which will retail for under $3000, is equipped with a separately supplied vacuum pump arrangement which, through an ingenious arrangement of tubes and motors, creates a near-perfect vacuum beneath the record that is placed on the turntable platter. Not only does this eliminate any warpage that was originally present in the record, but the record becomes almost an integral part of the turntable platter itself, thereby reducing any resonance effects that might otherwise occur. Needless to say, stylus tracking in the absence of warpage is vastly improved and there is less likely to be any groove-hopping even when the system is in close proximity to loud sound pressure levels or high levels of floor-borne vibration.

The vacuum pump establishes the required vacuum in just three to five seconds (a meter tells you when correct vacuum has been developed) so that during actual record playing the vacuum pump is not operating and therefore contributes no audible mechanical noise.

HIGHEST PRICED TURNTABLE

If a $20,000 reference speaker system seems to be outrageously high-priced, consider the new reference turntable introduced by the well known Thorens Company, whose products are now being distributed by Epicure Products, Inc. The new turntable was developed by Thorens engineers as an experiment to see just what modern technology could accomplish when no cost restraints were imposed.

Once it was completed in prototype form, the people at Thorens discovered that there actually was a demand for the turntable and now it is available on special order with a 3 to 6 month delivery cyle. The cost: a mere $15,000, but for that you get a belt driven turntable powered by an electronically controlled synchronous motor and pitch control over a ±6% range at any of the machine's three speeds (33⅓, 45 or 78 rpm). Provision is made for the installation of as many as three tonearms about the perimeter of the turntable.

Gold plated suspension housings are adjustable to set the heavy iron-filled aluminum cast floating chassis resonance at any frequency from 1 Hz to 5 Hz for isolation from acoustic feedback and floor-borne vibrations. A specially damped 14½ pound platter rotates on a highly polished precision main bearing. The "dream turntable" provides unparelleled performance, according to Thorens engineers. Wow and flutter is less than 0.02% DIN and rumble is better than 84 dB, DIN "A" (*unweighted*). In case you might be wondering how such a rumble measurement could be verified (most test records contain more rumble than that in and of themselves), Thorens made the measurement using a special rumble-measuring coupler that does not depend upon the use of any test record.

NEW HEADPHONE TECHNOLOGY

Sony has literally re-invented the stereo headphone with their lightweight MDR series of phones ranging in weight from 40 to 55 grams (55 grams is less than 2 ounces). For the recording engineer, musician engaged in multitrack recording, or anyone who finds it necessary to wear stereo phones for extended periods of time, these lightweight phones (which are already being copied by others) are a blessing. Highly efficient (the MDR-3 model delivers 96 dB SPL per milliwatt input), all of these featherweights deliver amazingly good bass response in addition to extended high frequency response. All of us are so accustomed to judging phones visually that you may well be shocked the first time you listen to these new phones—but listen to them you must if you want to see what "breakthrough" really means.

DOLBY HX GAINS INCREASED ACCEPTANCE

After a rather slow start last year, many manufacturers of stereo cassette decks have begun to adopt Dolby's new headroom extension system known as Dolby HX. The system increases high-level high-frequency recording capability on cassette decks where, normally, tape saturation would restrict such recording levels. It accomplishes this by varying instantaneous recording bias as well as record equalization. The same sensing signal that determines operation of Dolby B noise reduction is used to control bias and EQ levels when using the HX system. At the last CES held in Las Vegas at the beginning of 1980, there was only one company, Harman-Kardon, displaying a deck with Dolby HX. At this show, Harman-Kardon showed several models with the Dolby HX feature and we saw samples of decks using the new development from such companies as Blaupunkt, Cybernet, Lux, Teac, Eumig and NAD, to name just a few.

MARKET REACTION

We could go on naming additional product introductions, but every CES is more than just a collection of new and old products. CES is the coming together of all elements of the consumer electronic market and, as such, it can set the tone for business in the year ahead. Reactions of dealers visiting CES this past June have been summarized in simple phrases such as "cautious optimism," "uncertainty," "wait and see attitude," etc. There is no denying that the emphasis at this show shifted from audio (which dominated earlier CES exhibitions) to video. Nonetheless, audio exhibitors still represented at least a third of all manufacturers, and just about all of the exhibitors at the Pick-Congress Hotel (where smaller companies who can't afford costly displays at McCormick Place or McCormick Inn hold forth) were involved in high-technology audio in one way or another.

The retailer catering to the music oriented, audio-involved consumer should not despair. There are signs that new technology such as digital audio will ultimately replace the program sources we know today. And, when that happens, the new level of dynamic range and the new signal-to-noise capabilities of the programs of the future will require a re-thinking of almost every audio component we use today, from input to transducers. Contrary to some gloomy assessments heard at the show, audio is not "dead." It's simply marking time and waiting for its next spurt of phenomenal growth. Just hang in there!

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drums to be stacked to the rafters, and Pearl introduced their new 8-ply maple shells, wood finishes, and new colors. Another important development was the new Gretsch hardware, which is dynamite!

And don't forget Tama, the relatively new company that is making a strong move into the market with a super line of drums and some heavy endorsers from every area of popular music. Tama's new solid rosewood 12-ply snare drum was a big hit, as were the new hi-gloss wood finishes. And with endorsers like Lenny White, Billy Cobham and Mick Fleetwood, the Tama line is definitely going places.

What about guitars? Well, let's start with Gibson's new models. The crew from Kalamazoo introduced a 335S, a solid-body, scaled-down version of the venerable ES-335. Another addition to the Gibson stable was the re-issue of the famous 1958 sunburst, with two-piece curly maple top, one-piece body, and a variety of finishes.

Speaking of re-issues, Fender had a beautiful baby blue Precision bass guitar at their booth, with matching blue headstock, four-bolt neck, old-style decal, and single-ply white pickguard. It looked like something out of a '64 Fender catalog, which is to say, it looked absolutely super, and bass players will dig it for sure.

Over at the Peavey booth, the new T-25 guitar was on display along with the existing line of T-60 guitars and T-40 basses. Peavey has slightly altered the body shape of the T-60 series, and they are now offering some very attractive finishes on an already attractive instrument, the T-60. The T-25, by the way, is a fiberglass-bodied guitar that represents something of an industry coup for Hartley Peavey and that amazingly industrious group of people from down in Mississippi.

And then there were the Erlewine guitars, the Seymour Duncan pickups, the Third Hand guitar capos, and all the little stuff. This is what makes a trade show so great; right alongside the industry giants like Gibson, Fender and Peavey, small young companies displayed their products with just as much vigor. Mark Erlewine is a young man out of Austin, Texas, who hand-builds some dynamite electric solid-body guitars. The Erlewine Automatic, an object lesson in beauty and simplicity, has a two-piece flame maple top, one-piece mahogany body and fixed neck, Explorer-style headstock, and single-humbucking, single-volume knob setup.

Seymour Duncan Research Laboratories is another small company, headed up by a guitarist and former guitar maintenance man for Jeff Beck and other rock notables. Duncan is based out in Santa Barbara, but he made it to Chicago to compete with the big guns in the replacement parts phase of the guitar market. While other companies such as DiMarzio, Schecter and Mighty Mite have expanded into the production of guitar bodies, brass hardware, and even complete guitars (in Schecter's case, anyway, and their creations are to be envied), Seymour Duncan has stuck to the production of pickups for electric guitars. Duncan has designed a replacement pickup for the old Gibson "soapbar" pickup, the Fender Jazzmaster and the Fender Jaguar. These once-forgotten guitars are being rediscovered by the new generation of rockers, and the demand for quiet, strong pickups is bound to increase.

Other guitar companies were well-represented, too. Alembic introduced some new instruments that are a little less expensive than their older models, yet still worthy of the Alembic name. Here again, exotic woods and active electronics were the hallmarks of the new Alembic axes. And Bill Bartolini, one of the pioneers of active-electronic pickups and such for guitars, was on hand with his quadrophonic and hexaphonic pickups, as well as a handful of beautiful hand-made guitars, one of which had an unusual green and yellow finish reminiscent of the old Grammer guitars that used to be made in Nashville.

Speaking of Nashville, there was considerable enthusiasm among all the pedal steel guitar manufacturers for the recent surge in the popularity of country music. No doubt the latest lesson in social behavior from Hollywood, *Urban Cowboy*, has had an impact on the public, and western wear has once and for all been sanctioned as fashionable by the fashion designers in New York, but for whatever reasons, steel guitar builders are happy, and sales are increasing. As Maurice Anderson, president of MSA Guitars out of Dallas said, "We are going great guns all over the country. It looks as though the steel guitar is being accepted in a big way this year."

However, there was more going on at NAMM than guitars; a lot more. Several new electronic keyboards and synthesizers caused a big stir, not the least of which was the new Yamaha electronic piano. I say piano, but it was much more than that. This new programmable instrument offered incredibly accurate voicings of the major electronic piano sounds, a clavinet sound, B-3, vibes and other sounds, all of which were accurate to the last high harmonic.

Over at the Oberheim booth, the prize display was the new OB-SX, a slightly less extensive version of the OB-X. The SX retains all the programming functions of the OB-X, but with fewer programs available. In addition, Oberheim has developed a conversion kit for existing models that allows the voice storage capability to be expanded up to 48 voicings.

Another good-looking keyboard was that developed by Kustom. This 88-key piano featured a full set of on-board tone and volume controls, wooden piano keys, dynamic touch response, and best of all, the Kustom 88 collapses into its own road case!

An important development in the synthesizer field was the Liberator by Moog. This futuristic-designed syntho looks more like Buck Rogers' ray gun than anything else, but it is simply a synthesizer that the player wears strapped around his/her neck like a guitar. The right hand does the playing while the left hand does the controlling on what looks like the barrel of the "ray gun." The Liberator brings to the mass market what was once reserved for keyboard superstars like Herbie Hancock and Roger Powell—unlimited stage freedom for the synthesist.

Speaking of synthesizers, I shouldn't forget to mention the new *bass* guitar syntho unit introduced by Roland. It is a simple, compact floor unit, much like the GR-300 guitar syntho. This new unit should go over big with bassists, since it looks like it could be the hottest

thing for bass guitar since the round wound string!

Arp Instruments introduced a new four-voice electronic piano at the show which is a "little brother" to their new 16-voice instrument. This is something a little different for Arp, a company that pioneered the synthesizer field, but which has until now stayed away from the piano market. Hopefully, the Arp reputation will carry this new addition to the line a long way.

There was so much happening in the field of sound reinforcement and instrument amplification that I hardly know where to begin. Integrated Sound Systems introduced the new Vortec Series speaker enclosures, designed for over-the-road use with epoxy finishes, Sessions hardware and field-replaceable high-frequency speaker diaphragms. Vortec even offers a support kit that includes spare diaphragms and tools to make repairs easy in the field. JBL has expanded their Cabaret Series of club systems to include a new subwoofer. Electro-Voice had a new vocal mike and a new set of small speakers, among other things. Bi-Amp had a new modular reverb system for live sound reinforcement and/or studio use. DeltaLab introduced a new version of their Digital Delay Line with extended delay capacity. BGW came on strong with a new power amp, a monster 1250 watts RMS, no doubt capable of driving the new 400-watt speakers developed by Gauss. That's right, 400 watts!

The dbx 900 Series modular signal processing system was a highlight of the show, causing a big stir among pro audio dealers. The dbx company introduced the Model 902 De-Esser, the 903 Compressor and the 904 Noise Gate. Up to eight modules can be fitted into the 5¼" rack mount offered by dbx.

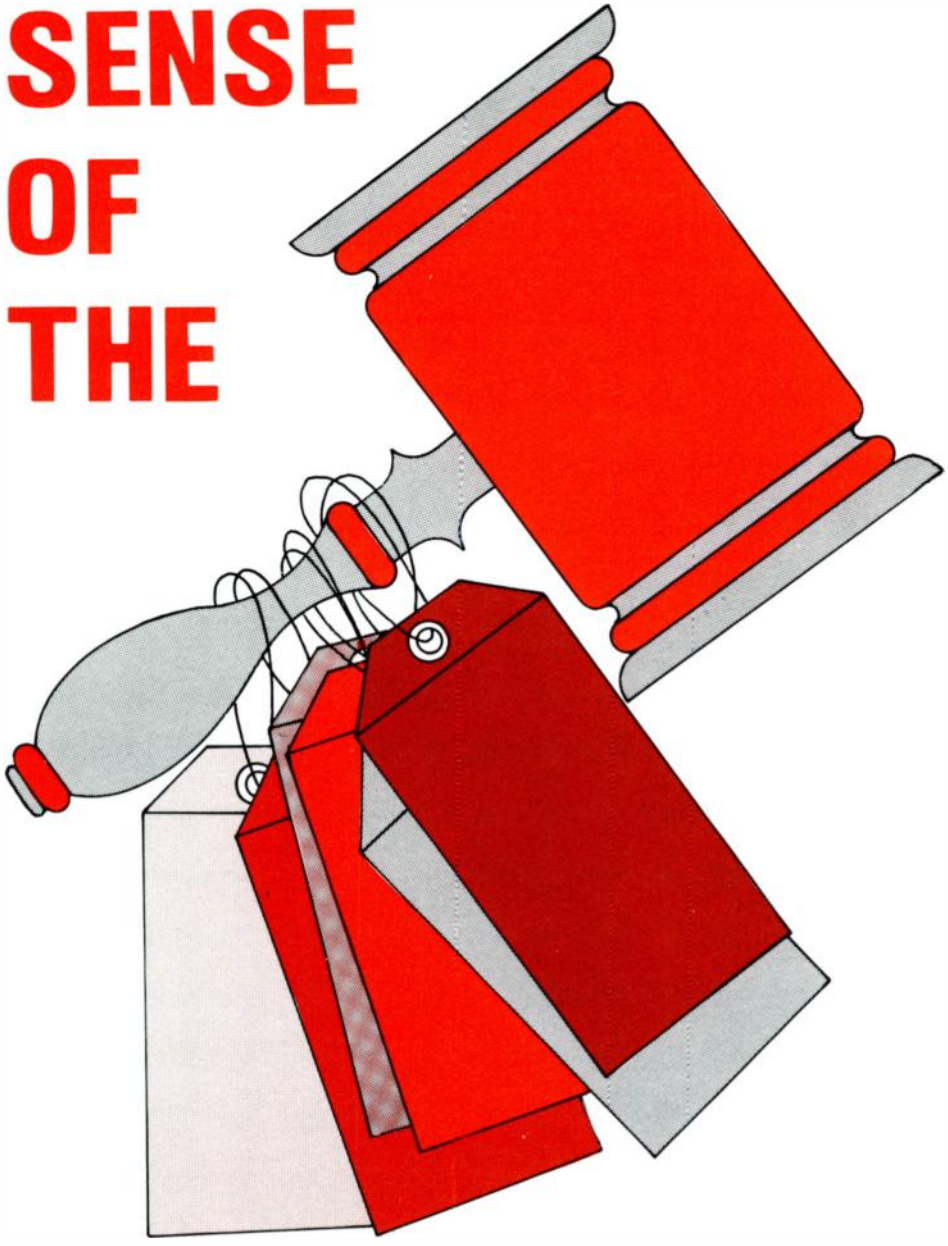
Modular Sound Systems had an impressive stack of Bag End speaker enclosures at the show. There were over 40 different models, all contructed of 13-ply birch plywood and finished in a dark walnut oil finish. All the hardware is flush-mounted, and the cabinets come loaded and pre-tested with either JBL or Gauss drivers.

Cerwin-Vega had a new full-range cabinet, the V-35B, which made its debut as the most powerful single cabinet in the C-V line. Tapco introduced a new 72 series mixing console, and MXR had a new System Preamp for home stereo use.

Also at MXR there were several new effects, including a new version of the distortion unit, the Distortion II, a new limiter, and a new A-B footswitch that was completely noiseless. Whirlwind Audio came up with a great idea for a guitar cable: a half-curled, half straight cable that allows the best of both worlds for those thousands of guitarists who have anguished over guitar cords that keep getting in the way. Of course, elsewhere on the trade show floor, other companies had other answers to the nagging problem of guitar cords that get in the way: Nady Systems had a new wireless system for guitar that cost less than $400, and it tracked the guitar signal beautifully. It seemed like there was a better answer to almost everything else at NAMM this year,

Only such questons as "What do we look at next," "Why can't they serve a decent hamburger," and "When do we get to rest" seemed to go unanswered. But who knows, by the end of the '80's we'll probably have guitars that will defy gravity and amps with built-in microwave ovens—for those long nights on the road and the long days on the trade show floor.

MAKING SENSE OF THE WARRANTY



Part 3

By Richard Silverman

In the first two articles in this series, we examined some of the rules of the Magnuson Moss Warranty Act, the regulation of warranty advertising, the difference between "full" and "limited" warranties, and state law warranty requirements. In this, the final installment, we will focus on a proposed Federal Trade Commission Rule, limitations on some warrantors, remedies for violations of Magnuson Moss, and enforcement.

UNREASONABLE DUTIES UNDER FULL WARRANTIES

As noted in the last article, the Magnuson Moss Warranty Act provides that a warrantor calling its warranty "full" may not impose upon the consumer any duty (other than notification) as a condition of getting service for a defective product—unless the duty is "reasonable."

In 1977, the Federal Trade Commission issued a proposed Rule on duties which would be considered "unreasonable." This proposed Rule has now been revised by the Commission staff, and the staff's recommended final Rule has just been published.

The recommended Rule is significant both from the viewpoint of the manufacturer who offers a full warranty and the retailer who performs warranty service and/or offers his own warranty on products he sells. The FTC staff has now taken the following positions:

Return of Products. The warrantor may not require a consumer to return any product unless the warrantor can establish that this requirement is reasonable. Evidence to support the reasonableness of a return requirement may come from consumer research or scientific tests (both of which must meet specified criteria), company sales and service records, or any other method or source generally accepted in the marketing research field as reliable and valid. If 75 percent of an appropriate population would consider it reasonable to return the product or actually carries the product away from the point of purchase or to a service point when non-warranty service is required, there is a presumption that a return requirement is reasonable. While the Rule itself does not contain a specific weight standard, the Appendix states that a return duty would probably be reasonable if a product could be readily held in two hands, and weighed less than 28.3 pounds if likely to be returned by an average group of females or weighed up to 40.4 pounds if likely to be

Cherokee Studios, Hollywood, California.

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Flat frequency response. It means accuracy. Naturalness. Reality.

JBL gives it to you without the bigger box that you'd expect along with it, since the 4313 only measures about 23" x 14" x 10"!

This new, compact professional monitor produces deep, distortion-free bass. And does it with a newly developed 10" driver. Its massive magnet structure and voice coil are equivalent to most 12" or 15" speakers. Yet it delivers heavy-duty power handling and a smoother transition to the midrange than most larger-cone speakers.

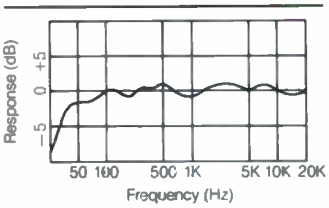
The 4313's edge-wound voice coil midrange accurately reproduces strong, natural vocals and powerful transients.

Up top, a dome radiator provides high acoustic output with extreme clarity and wide dispersion. A large 1" voice coil gives it the ruggedness needed in professional use.

Working together, these precision matched speakers offer superb stereo imaging, powerful sound levels and wide dynamic range.

Audition the 4313 soon.

We think you'll agree that its combination of flat response, power and moderate size flattens the competition.



On-axis frequency response, 4313 monitor

James B. Lansing Sound, Inc.,
8500 Balboa Blvd.,
Northridge, California 91329.

JBL First with the pros.

CIRCLE 65 ON READER SERVICE CARD

returned by an average group of males. These weights should not be considered as maximums since it is conceivable that a warrantor could establish, through one of the methods described previously, that it is reasonable to require the return of a product of greater weight. Similarly, in the case of a large or bulky product, a return requirement could be considered unreasonable, even if the product weighed less than the examples cited.

Built-In Products. The warrantor may not require a consumer to remove and return a built-in product unless the warrantor can substantiate that the requirement is reasonable. "Built-in Product" is defined as:

> Any product that is attached, fastened, or installed in or on real or personal property. For purposes of this rule, 'built-in product' does not include any product attached by plug or hose or connected by screws, bolts, nails or other fasteners that can be easily removed and replaced without causing damage to surounding areas; or any product made to be free standing but attached, fastened or installed in or on real or personal property by choice."

We feel that the exclusions from the definition are broad enough to prevent most consumer audio equipment from being considered built-in products.

Mailing and Shipping. The warrantor may not require a consumer to pay for mailing or shipping of a product (including insurance) to or from a warranty service point. The warrantor *is* permitted to require consumers to pay these costs so long as the consumer is reimbursed by the time the product is returned to him.

If the warrantor requires the product to be mailed or shipped to a warranty service point, any risk of loss is on the warrantor, unless the consumer does not follow the warrantor's instructions to obtain insurance.

The warrantor is not required to reimburse the consumer for costs of travel to and from a post office or other shipping point.

The warrantor may not require a consumer to carry (instead of mailing or shipping) a warranted product to a warranty service point, but may require a consumer to use specific mailing or shipping methods. For example, a consumer may be required to ship a product by surface rather than air freight.

The warrantor may not require a consumer to get his permission before mailing or shipping a product to a warranty service point, but may include a list of warranty service points and require the consumer to mail or ship the product to the closest service point.

The warrantor may not require a consumer to mail a product that is not mailable under U.S. Postal Service regulations.

Original Packaging. The warrantor may not require a consumer to return a product in its original package, but may provide packaging as needed or include instructions on how to package the product properly. The risk of loss from any damage caused by failure to follow packaging instructions is on the consumer.

Return to Selling Dealer. The warrantor may not require a consumer to obtain warranty service only from the selling or installing dealer, unless no other warranty service point is maintained, and must permit a consumer to obtain warranty service from any warranty service point which is maintained. (However, the warrantor may place limits on the mailing or shipping of the product, as described above).

Proof of Warranty Eligibility. The warrantor may require a consumer to prove that a product is covered by a warranty (e.g., by supplying the bill of sale), but may not require the consumer to return a warranty registration card, warranty service card or any other card to make the warranty effective. The warrantor may suggest that one way a consumer can prove warranty eligibility is by the return of an optional warranty registration card.

Method and Content of Notice. The warrantor may not require a consumer to provide written notice of a defect. The consumer is permitted to notify the warrantor of a defect by telephone, in person, or in any other reasonable way.

The warrantor may require a consumer to describe the way a product failed or is defective, but may not require a specific explanation of the nature or origin of the defect.

Time for Giving Notice. The warrantor may not require a consumer to provide notice of a defect before the expiration of the warranty. The FTC Staff Report states that at the very least, the time for giving notice should be no shorter than the term of the warranty, and that there may be situations (such as when a defect is discovered at the end of a warranty period), in which it would be reasonable to give notice after the warranty expires. However, no precise time limits are provided in the Rule.

The Rule notes that the eight described duties are the most common ones in use; other duties will be considered illegal if they are unreasonable. The Appendix to the Rule gives a test to be followed to determine whether other duties are reasonable. The test includes these questions:

- Does the warrantor have a legitimate interest related to the warranty in imposing the duty?
- If there is a legitimate interest, does the duty tend to discourage warranty claims?
- If there is a legitimate interest which does not tend to discourage warranty claims, is there a less burdensome alternative duty which is as efficient for the warrantor and which does not tend to discourage warranty claims?

The Recommended Final Rule must now be considered by the Commission, which may adopt it in the recommended form, refuse to adopt it, or adopt a modified version. We anticipate a decision sometime in 1981.

REMEDIES PROVIDED FOR VIOLATIONS OF THE MAGNUSON MOSS ACT

Consumer Remedies: Any consumer damaged by a violation of the Act or the breach of a written warranty, implied warranty or service contract, may bring suit in state or federal courts. If the consumer prevails in the litigation, the Court may award him attorneys' fees and costs. There are limitations on consumers' access to the federal courts in these matters. The amount of any individual claim must be at least $25, the amount in controversy (computed on the basis of all claims involved in the litigation) must be at least $50,000, and if the action is brought as a class action, there must be at least 100 named plaintiffs.

The Act allows further restrictions on the ability of consumers to sue in federal courts: A warrantor may establish an "Informal Dispute Settlement Mechanism" (which is somewhat like a panel of arbitrators), and may require that consumers present their claims to the Mechanism before instituting litigation. The Federal Trade Commission has adopted rules on information which must be disclosed to consumers concerning the Mechanism, Mechanism organization and operation, qualification of members, record keeping, audits (reports of which must be submitted to the FTC), and openness of records and proceedings.

Decisions of the Mechanism are not legally binding, but the warrantor must

act in good faith. If the consumer is dissatisfied with the decision or with the warrantor's response to the decision, he may institute litigation. The decision of the Mechanism is then admissible in evidence.

Government Remedies: The Act authorizes both the U.S. Attorney General and the FTC to institute litigation in cases of deceptive warranties or failure to comply with the Act.

Since the passage of the Act, a number of actions have been instituted by the FTC.

George's Radio and Television Company, Inc.: George's, a Washington, D.C. appliance retailer which offered its own warranty, was charged with improperly calling its warranty an "Extended Limited Warranty" (rather than a "full [statement of duration] warranty" or "limited warranty" as required by the Act), with failing to make all the disclosures required by the FTC's Disclosure Rule, and with failing to comply with the FTC's Pre-Sale Availability Rule, with respect to its own warranties and with those offered by the manufacturers of products which it sold.

In November, 1979, the Commission issued a Final Order prohibiting George's from committing these violations. The Order provides specifically that if George's continues to offer its own warranty, it must include the following statement: "This warranty is offered by George's. Compare this with the warranty offered by the manufacturer."

In addition, for a period of two years, George's must post, in each department that sells warranted consumer products costing more than $15, a 2-foot by 2-foot sign stating: "IMPORTANT! Not all warranties are the same. You can see manufacturers' warranties and store warranties before you buy. Please ask."

Arnaudville Industries, Inc. and Madison Mobile-Modular Homes, Inc.: These two companies are mobile-home manufacturers. Arnaudville had designated its warranty a "Full One-Year Limited Warranty," and the FTC's Complaint asserted that this wording was deceptive and could mislead consumers. It was also alleged that Arnaudville had failed to make certain required disclosures. In 1979, a Consent Order was issued which provides that Arnaudville must extend full warranty protection to those mobile home owners who received the warranty in question, must designate its warranty properly in the future, must make the required disclosures, and must send a letter to consumers advising them of their rights.

The Complaint against Madison asserted that the company had failed to designate its warranty as either "full" or "limited," had misrepresented that buyers have no implied warranty rights under state law, had failed to make certain required disclosures, and had stated in its warranty that consumers were required to return a registration card to the company in order for the warranty to be enforceable, despite the fact that Madison did not really require the return of the card.

Under a Consent Order issued in 1979, Madison is required to designate its warranty properly, to refrain from disclaiming implied warranties, to make the required disclosures, and to refrain from using a registration card unless the warranty discloses that the warranty may be enforced even without the return of the card. As in the case of Arnaudville, the Order also required Madison to advise consumers of their rights, by letter.

Montgomery Ward & Co., Inc. Wards chose a binder system as its primary method of compliance with the FTC's Pre-Sale Availability Rule.

The Rule provides that a seller using a binder system must maintain binders in each department where warranted products are sold or in a location which provides customers with "ready access" to the binders. The binders must either be displayed in a manner "reasonably calculated" to get the prospective buyer's attention, or the binders must be available upon request and signs must advise customers of that availability. The signs must be located in prominent locations in the store or department.

Wards supplied its retail outlets with a select number of binders and signs. In 1977, a number of the FTC's regional offices conducted surveys of Wards' stores to determine whether Wards was complying with the Pre-Sale Availability Rule. The surveys showed that the binders and signs were being used on only a limited basis, that while the signs indicated that binders were available in the "Customer Accommodation Center," they were not always available there, and that sales personnel did not always furnish copies of written warranties at the request of FTC investigators and failed to advise them of the availability of the binders.

A Complaint was issued by the Commission in 1978, and in December, 1979, the Administrative Law Judge issued his decision. The Judge stated that the test in determining whether a location provides "ready access" to binders depends on whether it would be an undue burden to require the consumer to go to that location. Where a retailer is small, one complete set of binders at a single location will suffice, but in large multi-department retail operations (having more than one floor), a minimum of one binder on every floor where sales are made is necessary to constitute ready access. The Judge concluded that the ready access standard does *not* require that binders actually be placed in a sales area, but if they are placed in another area, signs concerning the binders must be sufficiently close to the point of sale.

The Order issued by the Judge requires that if Wards continues to use binders, signs advertising their availability must be on each cash register for departments in which consumer products costing more than $15 are sold. The Order further requires Wards to instruct all salespersons, store managers and others of their obligation under the Pre-Sale Availability Rule. Wards has appealed the Judge's decision, and a decision by the Commission has not yet been issued.

CONCLUSION

This series of articles has examined warranty legislation at both the federal and state levels. In this age of "consumerism," we anticipate that legislative and enforcement activities will increase, and retailers would be well advised to become familiar with their obligations under the federal and state laws and to make every effort to comply. It is certainly apparent from the litigated cases that the FTC staff is willing to bring enforcement actions against retailers as well as manufacturers.

Since individual warranty issues may differ, this series should be treated as only general information and not as "legal advice." The reader should consult his own attorney concerning specific warranty questions or problems.

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 SOUND SH

A lot of companies have replacement pickups on the market these days, Seymour Duncan and his small staff of seven people build a variety of single-coil and humbucking pickups that are second to none in their attention to original looks and sound.

Duncan started out as a rewinding service, specializing in re-creating the sound of vintage Fender pickups for the Telecaster and Stratocaster. The company now offers seven different humbucking models and sixteen versions of single-coil models, as well as seven models for the Precision Bass.

The STL-1B is a vintage "Broadcaster" lead pickup for the Telecaster guitar. The pickup features magnets that have an "aged" magnetic field and flat pole pieces that deliver an even string response. The pickup has a black waxed string wrapping, lacquered bobbin, a ferrous bottom plate, and cotton braid hookup wire. The STL-1B offers the guitarist the look and sound of the legendary Fender pickup that was made from 1948 to 1953.

For those who prefer the humbucking sound, there is the '59 model, replica of the Gibson pickup, complete with the square pin hole in the bobbin and the recessed molding ring on the top of the bobbin—things that only an obsessive person would worry about, but there are apparently enough obsessives out there to make a market. Just look at what the replacement parts business has developed into in the last five years. Incredible!

CIRCLE 1 ON READER SERVICE CARD

Cambridge Physics has a new three-way speaker system with a frequency response that goes a half-octave lower than other closed-box systems in the "large bookshelf" category. The Model 310 is designed to eliminate the need for a separate sub-woofer of low frequency synthesizer without losing low frequency efficiency.

The crossover networks in the 310 are series/parallel second-order Butterworth designs, with 12 dB per octave slopes. The crossovers are built with saturation-free inductors that have insignificant resistance in the audio range. Crossover points are 520 and 4,000 Hertz.

The driver consists of a 1-inch dome tweeter, a 4½-inch cone midrange and a 10-inch woofer with a long throw voice coil. The system operates comfortably at output levels up to 104 dB, and will handle up to 200 watts peak input power on a music program.

The midrange driver uses the surround as an acoustical tuning element rather than a mere mechanical support. The cross-sectional profile of the surround has been designed to place its resonance well outside the mid-range pass band. The 310 woofer is also a proprietary design with a free air resonance at 18 Hz. It uses a vented pole piece of optimum heat removal and higher compliance to the input waveform.

CIRCLE 2 ON READER SERVICE CARD

Portable lighting systems are a constant source of frustration to musicians. They have to have some kind of stage lighting, because even in this day of disco-format nightclubs, not every stop along the way has good stage lighting. Besides, once a band gets a light system and hires someone to run it, the lights become an integral part of the production,

OPPE

By Charlie Lawing

something that the players come to rely on to enhance their act.

But lights burn out; if you are using gels, they burn up, tear or get lost; if the light system pulls a lot of power, and house circuits are weak or too few, then you spend all night throwing circuit breakers or replacing fuses. And dimmers! Well, you can forget that; dimmers interfere with the amplifiers so badly that everything on stage hums like a worn-out electric fan. Even dimmers in the house lights will cause the annoying hum.

So it is with surprise and some measure of delight that musicians will greet the new Dimmer Pack from **Roctronics** Entertainment Lighting. According to the manufacturer, the new light dimming package can handle up to 9000 watts of power *without* creating excessive interference in sound systems operating nearby. The Dimmer Pack contains three 3000-watt dimmers. It has enough capacity to handle ninety 100-watt light bulbs, and it measures only 24" × 12" × 5". The Dimmer Pack is so small and lightweight that it can be hung at the top of lighting towers, immediately adjacent to the lighting fixtures, thereby saving enormously in the amount of cable that would have to be run from the top of the tower to a conventional remotely located dimmer. As an indication of the unit's rugged construction, the Dimmer Pack carries a three year warranty on everything but the fuses and triacs, which can be replaced easily by the user.

CIRCLE 3 ON READER SERVICE CARD

The **Aphex** Aural Exciter, that mysterious device that studios and producers have been renting at a rate of $30 per minute, is now going to be offered to the public for sale. The rental and lease agreements are still available to the industry, but the company feels that the time is right to offer the product for sale. The Aphex Model 602B will carry a retail tag of $2,700, which means that a studio could *own* the unit for roughly what it would have previously cost to rent the unit for 2.5 albums' worth of material. Aphex expects to move into the area of television production in a big way, since the Aural Exciter works best with inefficient playback systems. Those little three-inch TV speakers won't be the same after the Aphex! The psychoacoustic phenomenon created by the Aural Exciter has been used by such luminaries as Linda Ronstadt and James Taylor in the recording studio with great success, and I expect the consumer demand for this product to be extremely high. Not only will studio owners have a keen interest in the Aural Exciter, hotel owners, club owners, and broadcast stations will be interested as well.

CIRCLE 4 ON READER SERVICE CARD

DOD Electronics has a new flanger, the Flanger 670. The unit is AC-powered and has the standard flanger features: manual and automatic sweep, width control, regeneration control and speed control. The 670 has an illuminated power switch, and an active bypass footswitch that doesn't click every time you step on it. The 670 also has an LED status indicator that blinks at the sweep rate. This is particularly handy for the guitarist or keyboard player who likes to set sweep rate at speeds that are in sync with the tempo of the song being played; such an indicator also lets the player know if the sweep control has accidentally been moved during a performance, which

could save the player some embarrassing moments on stage. The 670 also has a built-in compander for increased signal-to-noise ratio.

CIRCLE 5 ON READER SERVICE CARD

Eventide Clockworks has a compact version of their popular Harmonizer now available for the working musician. The HM80 is a small unit with a full range of features, including pitch changing, delay, feedback control, mix (of effect + dry signal), and repeat. The unit also has a new feature not found on the earlier studio version. This is the reverse control, which achieves a time reversal effect. The HM80 can change pitch up to an octave above or below the original signal; it can delay the signal up to 270 milliseconds; it can capture and repeat a word or short fill-in riff, but unfortunately it won't fry eggs or mix a drink. The HM80 is designed for live performance use, and is so small that it can even be worn on a shoulder strap if the user so desires.

CIRCLE 6 ON READER SERVICE CARD

St. Louis Music Supply has expanded its line of Crate amplifiers to include five new models, one of which is a closed-back bass amp. The Crate model CR-1B is a bass amp that has a ported closed back with a 12" speaker and 20 watts of RMS power. The cabinet is made of solid ponderosa pine and has a perforated steel grillcloth. Controls on the front panel include gain, treble, bass and master volume, plus a line out jack on the rear panel.

The new Crate Mini CR-M is the lowest priced Crate amplifier available to date, and it features a 10" speaker with 20 watts RMS power. Tone controls include gain, treble, bass and master volume. A line out jack is also provided, and the cabinet, like all Crate cabinets, is made of solid ponderosa pine.

A couple of other new Crate amps are also available with separate foot switchable distortion and bright boosts. These amps have a separate distortion control, plus preamp overloading which can be included with the gain and master volume controls. The Model CR-1D comes without reverb, and the CR-1RD has reverb. Still another addition to the line is the CR65, a 60-watt amp that features a 12" British Celestion speaker with a 54-ounce magnet. The CR65 is a two-channel amp with separate tone controls for each channel, and different integrated circuits in each of the two preamp sections.

CIRCLE 7 ON READER SERVICE CARD

MXR has added a new product to its line that represents a departure from the usual MXR fare. The new Linear Preamp is designed to serve as the basic control unit for home stereo set-ups. The preamp has the usual complement of features found on most home stereo units, as well as some extra goodies thrown in for good measure.

The Linear Preamp has a subsonic filter, and two tape loops as well as left-right mono/reverse capabilities. In addition, a unique gain switch offers 20 dB of additional gain when needed, thus enhancing the signal-to-noise ratio. The Linear Preamp adds no tone coloration of its own, thereby maintaining sonic integrity and accurate stereo imaging under normal use conditions.

The Linear Preamp is housed in a black anodized aluminum enclosure with solid walnut end-pieces. The unit is 19 inches wide and only 1¾" high, so although it is not rack-

The SOUND SHOPPE
REAR ENTRANCE

mountable as is, it will fit into any such rack-mounted component system easily, as well as fitting into an unmounted system. Anyway, the rack ears are available as an option. More good things from a solid company, MXR.

CIRCLE 8 ON READER SERVICE CARD

For those of you who don't know or have not had a chance to find out, **Emilar** makes a good horn driver. That's right, and as a matter of fact they have a new one just placed on the market. While we're on the subject, let me tell you a little about it: The ECH-175-A has a frequency range of 500 Hz to 17 kHz and is capable of handling up to 40 watts of RMS power. The new driver was made possible by the development of a new proprietary voice coil and diaphraghm that Emilar has just developed at their plant in Anaheim. Great place, Anaheim. And just think, those guys at Emilar dont even have to buy a plane ticket to go to the winter trade show!

The Emilar company has also announced the shipment of a new Y-Throat adapter, the Model EEY-1, intended for use with any two Emilar drivers and an Emilar EH 500 compression horn. Emilar is good people and you can see for yourself.

CIRCLE 9 ON READER SERVICE CARD

The latest in what seems to be a never-ending barrage of special effects devices has just been christened and launched by **Electro-Harmonix**, that astute New York City outfit that always comes up with the catch names for their stuff, like the Big Muff Fuzz and the Electric Mistress. Anyway, they have this new gizmo now called the Mini-Synthesizer, purportedly the smallest synthesizer in the world with full performance capabilities. By "full performance capabilities" they mean dynamic touch sensitivity, pitch bending, multiple harmonic mix, suboctave and phase shift.

Good ole Electro-Harmonix, they've even put a power amp and a speaker in this little critter, and hey, when was the last time you bought *anything* with batteries included! The unit is AC/DC (after all, it *is* from New York) and has an output jack that allows hookup to home stereo or other amplification.

The Mini has a two-octave keyboard that can be transposed for a total of five octaves. The output waveform is a variable width pulse that allows a variety of tonalities (including bagpipes and nose flute!). The wave can be swept automatically for a phasing effect, and a square wave one octave below the keyboard note can be blended in if desired.

CIRCLE 10 ON READER SERVICE CARD

DB Systems' DB-7 Precision Phase Inverter, Bandpass Filter and Bridging Adapter is a multi-function device featuring buffered inputs and outputs, switchable + or − phase for either or both channels, an 18 dB/octave Butterworth subsonic filter and an 18 dB/octave linear response (Bessel) supersonic filter. The filters affect the response at 20 Hz and 20 kHz by less that 0.2 dB so their influence on audio frequencies is negligible. Also included are outputs for bridging two stereo amplifiers into two mono amplifiers, provided the amps are rated as safe under such conditions. In this mode, up to four times the original power is possible.

CIRCLE 11 ON READER SERVICE CARD

By Tom Morse

DEALER DOSSIER

Cramer Audio-Video Needham Massachussets

The history of Cramer Video, Inc. began back in 1970 when Cramer Electronics, envisioning the tremendous future and promise of television as a communication tool, established a separate video division to serve the needs of their industrial customers' video needs.

In November 1979, Thomas Martin and Daniel Mulhern purchased the division from Cramer Electronics. (Subsequently, Cramer Electronics was acquired by Arrow Electronics who elected to terminate the use of Cramer's name in favor of their own.) Messrs. Martin and Mulhern chose Cramer Video Inc. as the name of their new corporation.

Several months after its founding, Bill Lewis and several co-workers from Lebow Labs in Allston, Massachusetts joined the firm to establish an audio arm of the company to match the expertise and professionalism that Cramer had demonstrated in the video field.

As presently composed, Cramer Video Inc. has a complete audio/video systems capability—from design through installation—without equal in New England. The company, barely seven months old, has been so successful that it is a full six months ahead of its own initial projections.

SOUND ARTS had the opportunity to talk with Bill Lewis about Cramer audio and video, and the increasing compatability of the audio industry and the visual communications field.

How large an undertaking was it to turn a video company around to audio visual and pro sound?

Lewis: I don't mean to sound as if I'm patting myself on the back, but it was a matter of experience and of having the people who knew the audio business. Then it was very simple. We essentially had every line that Lebow had transferred over here, so we had instant credibility and instant access to lines. Immediately.

What are Cramer's priorities now? You have video and pro audio. Are there any musical instruments?

Lewis: Strictly electronics, complete studio outfits.

Who are your primary customers?

Lewis: We deal primarily with bands, rock groups, and industrial companies. More and more industrial companies are putting in large audio visual facilities and doing far more sophisticated audio sound tracks as an adjunct to their video production.

What are the uses of audio-visual to industry?

Lewis: Video has become a major means of corporate communication. Companies are now using video tape as a means of bringing the field people up-to-date with new products, giving them an introduction to the product and explaining what it will do.

Now to do that, a company has to equip the field offices with the playback equipment. We have consequently been able to aim for a firm with enough credit resources to handle the purchase of several hundred video machines. Lebow was sort of floundering on a shoestring, and when we did get a very large corporate commitment it was very hard to finance that. We don't have those problems here. This company's extremely well-financed.

And for the musician?

Lewis: The rock band or musician who wants to put in his own recording studio can come in here, in our control room, which is set up to combine many different products, and get a true cockpit feeling. It's attached to a recording studio, too.

How do you get new customers?

Lewis: We have seven salesmen in the field at all times, and they are calling on audio-visual people, training directors and the users of video and audio equipment at industries and colleges.

Are your salespeople versed in all aspects of your merchandise.

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

Lewis: We basically have two salesmen who specialize in audio and five who specialize in video. However, each one has specific knowledge of the other disicpline in order to intelligently open the door for an expert to come in and serve the customer's needs.

What kind of advertising and promotions do you do?

Lewis: Well, we just ran an open house. We do some advertising in some of the more electronically oriented publications for our television business and in the fall we're going to be doing national publications for our audio. The pro audio business is so much a word-of-mouth business. A person who sees a band playing and is interested in a piece of their equipment will ask about it and go out and seek that company. We also get very good leads from the manufacturers—people who are interested in their products, people who have sent away for literature. And we have a system for following up on them. The name goes into our computer, and after a period of time, if there appears to be no interest, the name is dropped; but it does stay in there for six months.

In your advertising, do you use coop funds?

Lewis: There is no coop in pro. Wish there were. A company may have, for example, coop on their hi-fi products, but they don't have it on their industrial products. So any advertising the dealer does, he has to pay for out of his own pocket.

Tell me a little about the open house you've just had.

Lewis: Well, first of all we took everything out of the room, and then we had about 40 individual displays set up, everything from manufacturer's representatives and factory people here demonstrating products. We had about 800 people show up.

Now this was not to celebrate any expansion or to promote a big sale.

Lewis: No, it was more or less an open house to acquaint people with Cramer's facility and capabilities, and to give our industrial customers a chance to see products, many of which had only been seen previously at the National Association of Broadcasters convention. We had, for example, the new 3M one-inch VTR which sells for in excess of $40,000. It was the first time anyone has had the chance to see that in New England. We had a microwave system with a camera and the transmitter set up on WCOZ's FM tower overlooking Route 128; that signal was microwaved across 128 and picked up by a dish on our roof and displayed down here on our monitor. We had this demonstration because we are involved in several teleconference systems for industrial and educational concerns.

How do you find salespeople? You've started out with the crew from Lebow.

Lewis: It's very difficult to find trained people. In the audio field all of our salespeople are trained and have been in audio for years as a broadcast salesman, studio operator, studio musician, songwriter, and professional musician.

Do you have the facility and time to train your own?

Lewis: Yes, we have training seminars once a week.

Do you find that being outside of Boston affects you in any way?

Lewis: Well, I don't think location is as important in the commercial sound field or the pro sound field as people think. One of the largest dealers covering New York City works out of Connecticut. That's AudioTechniques. I think also that today musicians wanting to buy a piece of processing gear will drive the four or five miles it takes. We're really only 12 minutes from Boston.

Do you find that being located within the Route 128 complex of industries and corporations is to your advantage?

Lewis: I don't see that it helps or hinders.

How do you select your merchandise?

Lewis: We know which are our fast moving items, and those are the ones we stock. But in a line like Electro-Voice, there must be 35 to 40 items to choose from. Shure is the same thing. Shure has literally 60 microphones we could purchase, and it's impossible to stock more than the very popular ones: the SM57's, SM58's, SM18's. And there are certain audio brands like Orban and UREI. You know that if they bring out a product, there's going to be a demand for it. Same with dbx. dbx has just announced a new line of modular equipment. We just ordered it the other day, and I know that when that comes in, there's going to be a ready and waiting market for it.

Are there any seasonal indications that you find affecting you?

Lewis: The pro audio business is usually very slow during the summer. July and August are typically the two slowest months. That's what it was like at Lebow, and I see no reason for it to be different here. Although, because of the growing industrial market, there is perhaps a less seasonal nature to our business. The industrial companies are buying 4 track tape machines now; they're buying large 8 and 10 input boards, whereas before they used to get along with a Shure M67 mixer.

How is your facility divided up: sales, inventory, etc.

Lewis: In our 12,000 square feet, we have the studio, and that really has to be considered an active sales area. First

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and foremost, we have a complete 800 square-foot studio that is used to demonstrate audio and video equipment. It also can be rented out to industrial companies who need to use a studio for adding things to tapes or doing some editing. We also have an editing suite that we rent out. We've had several industrial customers, and we rent the editing suite an average of 20 hours a week.

Do they bring in their own operators?

Lewis: No. We supply the operator, who will then follow their editing instructions.

How much custom work do you do?

Lewis: As much as we can get. We do design. I consider myself one of the few experts around in projection setup design, and the first large job that Cramer did was a $90,000 job for the Boston Globe that included 30 slide projectors, a complete auditorium sound system and the multi-media gear to control it, complete interface with custom lecterns, custom control panels with a room environment control, light dim and screen operation and all that.

Does that happen often: a situation where someone says, "I've got so much space and I want a projection and sound system designed for it?"

Lewis: Yes, it does. I'm doing consulting now for an architect on a project in Saudi Arabia to design a multi-media pavillion for one of the large aircraft companies. That's going to be installed sometime in September.

Designing sounds like very challenging business for you.

Lewis: It's the most challenging thing to do, and in many ways it's the most rewarding. We just did a custom apartment house intercom system, where the equipment had to be done in brass. The panels were made of brass, mounted on a mahogany desk, and tied in with a television surveillance system. And the whole thing was going into a very elaborate custom desk. Not your typical intercom desk.

Is most of your designing done from floor plans and vertical plans?

Lewis: Yes.

Do you involve yourself with acoustical materials or carpeting, that sort of thing?

Lewis: No. An architect will design the space, and then there is an acoustical consultant to do the interior acoustics, and we supply all the audio and video equipment.

Then, not only can you design an audio-visual setup and supply the equipment; you also have the people with the expertise to record programs and run them.

Lewis: Absolutely.

Are people with this expertise hard to find?

Lewis: Our video recording person has had network experience. He has enough work to keep him quite busy. We have on our staff two people who can do audio recording. One fellow was an engineer and a musician and he can do recording, and we also have a technician who has his own recording studio and he can function as a recording engineer as well.

Tell me about your service area.

Lewis: We service everything that we sell. We're a warranty station for everything we sell.

Do you find that the pool of good,

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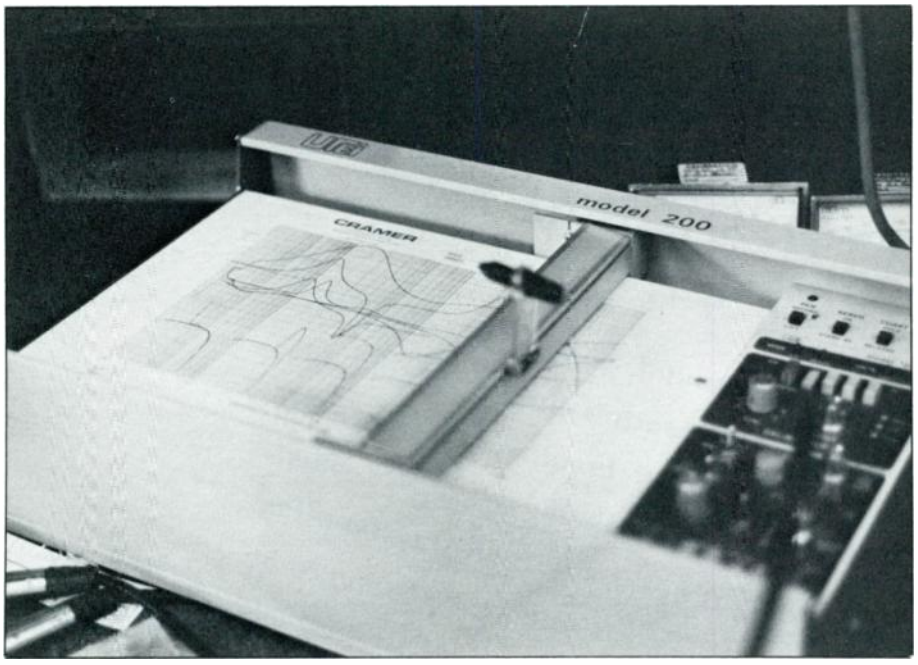


trained technicians is very shallow?

Lewis: It's virtually non-existent. New England is unusual. We're not experiencing the recession in the electronics industry. We have companies like Digital and Wang Labs gobbling up all the technicians. We've just done some work for GTE which is doing the MX missile system, and they are spending tons of money recruiting engineers from other parts of the country. They're producing a tape for regional seminars showing how wonderful it is to work for GTE. They've got the biggest single contract that the Defense Department has ever awarded. The first phase is $300 million, and that's just scratching the surface.

How does repair work out for you? Do you profit from it?

Lewis: Essentially it's a break-even proposition. We solicit business on those products that we are a warranty station for, and that's a break-even thing.

With so many recording studios in the Boston area, your repair business must be good.

Lewis: Most recording studios have a pretty good technical staff, and they do most of their own repairs. Some of the specialized digital things have to go back to the factory. They can't be repaired in the field. In many cases the manufacturer won't even send you the schematics.

How many technicians do you have on your staff?

Lewis: There are four people and they are very busy.

Are you planning on adding people?

Lewis: We will have to expand within the next three or four months.

Are you planning physical expansion?

Lewis: Well, I think since the company's barely seven months old, we're literally expanding every day, but I can't say that we are anticipating putting another floor on the building. We're still growing. We know that the company's less than a year old, and we're going to finish up at the end of the year doing several million dollars worth of business.

Do you have financing for customers?

Lewis: We have several lease companies that we can put people in contact with. We don't do any financing ourselves.

Do you do any field work in the filming aspects of video?

Lewis: We are able to rent a crew to do location recording and filming. In fact, our control room operator has been cleared for the handling of classified material, and we do some video tape editing and some production here of a classified nature. The industrial customers find it's a lot cheaper to come here than to go to New York City.

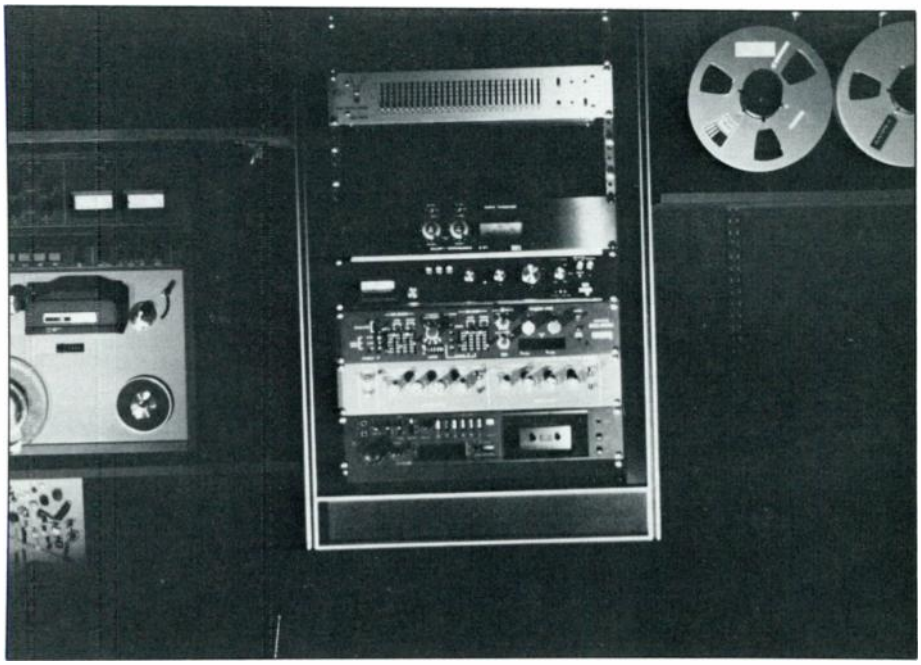
Do you ever do video tapes of rock groups so that they can send them to prospective club owners or agents?

Lewis: Yes. We've done tapes in our recording studio setup for several rock bands, including James Montgomery. This video taping of an act is a new thing, but it's a very important step. So often, a major part of a band's show is a visual one, and video is a way of showing that to a prospective booker.

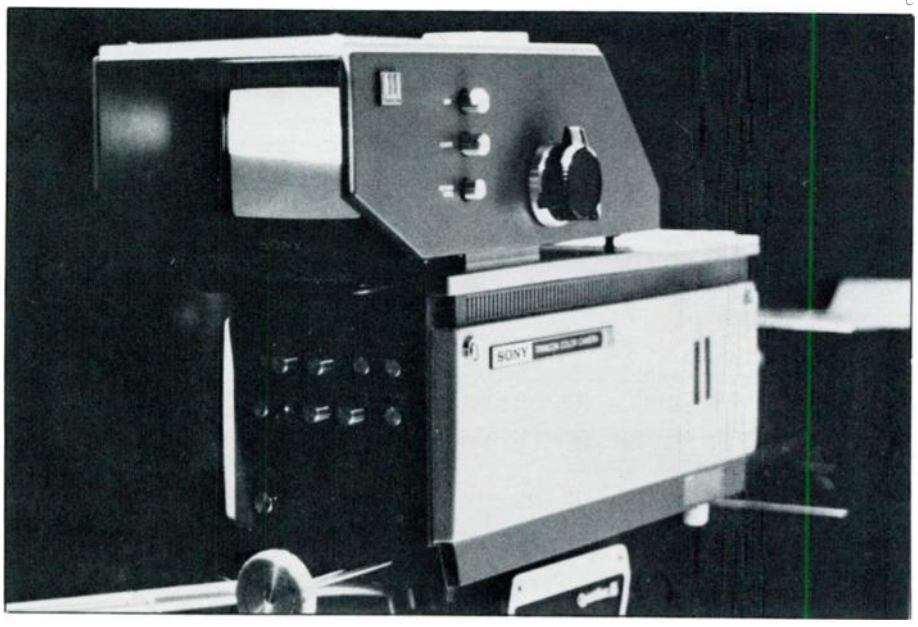
Sound equipment is getting smaller and lighter of course, but what do you see as the vanguard of the state of the arts in the recording industry?

Lewis: I think the big question on everyone's mind is what the true impact of digital tape recording is going to be. I think digital tape recording in a large scale for audio is still two to three years away.

The one product that we have had the most interest in is the new Tascam 85-16 tape recorder. It's 16 channels with one inch tape for less than $12,000, which by the way has dbx noise reduction built in at that price. And that machine is going to be an incredibly popular device, because other 16 track machines are almost twice as much money. We have had calls from people in Germany who want one. The machine literally is going to revolutionize a cer-



tain segment of the recording studio market. I don't think the big studios in California and Nashville will even consider it, but we're going to find, I feel, a great many well-known studios, even in the Boston area, who will consider using a machine like this, because the tape cost is less, the quality is essentially the same, and the dollar investment is one hell of a lot less. And also, a lot of the small, 8-track studios will be able to afford 16-track. We have industrial companies now that are talking about doing very lavish television productions using video machines and audio machines synched together, and this machine, again at that price range, will allow that sort of thing to be done. I think it's going to really create within the audio market a very significant revolution.



INDUSTRY UPDATE

Device, the publication for electronic musicians, has moved its headquarters to Napa, California.

Star Instruments, Inc. has formed Star International Inc. to handle all non-domestic sales and service of Star electronic drums and percussive synthesizers. **Joseph A. Teceno, Jr.** is Operations Manager.

Agfa-Gevaert, Inc. will begin building a magnetic tape plant in Huntsville, Ala., this fall, with operations expected to begin toward the end of 1982. The new subsidiary, known as Agfa Tape, Inc., represents an investment of $25,000,000, and will produce both audio and video tapes.

Leader Instruments Corporation has appointed **Michael Gomez** Eastern Regional Manager and **Marc Gottlieb** Western Regional Manager, thus completing "the expansion of its national sales staff."

Ampex Corporation and Aurex, S.A. de C.V. have announced a $3 million expansion of Aurex's Mexico City facility, a joint venture company which manufactures and markets magnetic tape. The plant expansion is scheduled for completion in early 1981.

Buddy Emmons has renewed his contract with Emmons Guitar Co., Inc. and will continue as Director of Product Planning and Development. Emmons, according to the company, "will continue his active role in new product design [and] promotion."

Paul Ackel has been appointed Sales Engineering Coordinator for Panasonic's Professional Audio Division. He has been with the company since 1976 and was previously with Marantz. At the Electronic Components Division of Panasonic, **Frank Winters** has been named Group Manager for Standard Products; **Steve Belcak** has been promoted to National Sales Manager; and **Jim Ambrose** will take over for Belcak as Eastern Sales Manager.

Under **Sidney Harman's** recently completed reacquisition of Harman International, **Herbert Paige** has been named President, and **Jerry Kalov** has been named President and CEO of JBL, its major subsidiary. Kalov was previously president of the manufacturing group of International Jensen. Paige and Kalov, along with **Walter Goodman, Alan Patricof** and **Stanley Weiss**, have been elected to the Board of Directors of Harman International.

John Robbins has been named to the newly created position of National OEM Sales Manager for the Professional Products Division at James B. Lansing Sound, Inc. **Ken Lopez** has been appointed Western Regional Sales Manager for JBL's pro products.

The Magnetic Tape Division of Sony Industries is now handling all marketing of Betamax videotape in the U.S. consumer market. Previously, marketing had been split between the consumer and tape divisions. Sony's Hi Fi Division is now distributing the CBS Mastersound recordings through its audio dealer network.

Paul Baba has been appointed to the new position of Director of Product and Market Planning for Ampex's Magnetic Tape Division. **S. Erek Jenstad** has resigned his position as Division Marketing Director. **Howard Lilley** has been named National Sales Manager of Ampex's Audio-Video Systems Division.

Bill Stocking of Hi Strategy, Inc., Chicago, has been named MXR Consumer Product Group representative in northern Illinois and eastern Wisconsin.

Gabriella Engebretson, Bill Sparling and **Jack Arndt** have been appointed District Managers of Altec Lansing's Professional Products Division.

Dorie Johnson has been named Regional Sales Manager for Audio-Technica U.S., Inc. Johnson was Customer Services Manager.

American Acoustics Labs has named **James E. Straus** National Sales Manager. **Michael Calhoun** will succeed Straus as Internal Operations Manager.

Barry M. Shereck has been elected President of U.S. Pioneer Electronic Corp.'s subsidiary, Pioneer Artists. Shereck remains a Senior Vice President and member of the Office of the President of U.S. Pioneer. Pioneer Artists was formed to acquire, develop and market optical videodisc programming.

Bob Brennan has been appointed Sales Manager for Music Technology Inc.'s Vantage Guitar Division. Brennan has been affiliated with Kustom and Multivox in sales and managerial positions.

J. Peter Moe has been named Executive Vice President and Chief Operating Officer of Tandberg of America, Inc. Prior to this promotion, Mr. Moe was Vice President-Administration and Chief Financial Officer for Tandberg, titles which he will retain.

The American Music Conference has awarded its Hall of Fame Award to **Jack F. Feddersen, Vito Pascucci** and **Henry Z. Steinway** for "providing leadership and unique contributions to the development of the music business."

Ralph Hoopes has been named Anvil Cases' Vice President of Public Relations, responsible for advertising, promotion, publicity and liaison with equipment manufacturers. Anvil has also announced the establishment of a direct sales team, replacing independent representatives, and an East Coast warehouse.

Interlake Audio of Canada has signed a marketing and distribution contract with Fostex Corporation of Japan. The two firms have appointed Parasound, Inc. of San Francisco exclusive U.S. sales representative of the Fostex line in the pro audio, sound reinforcement and broadcast markets.

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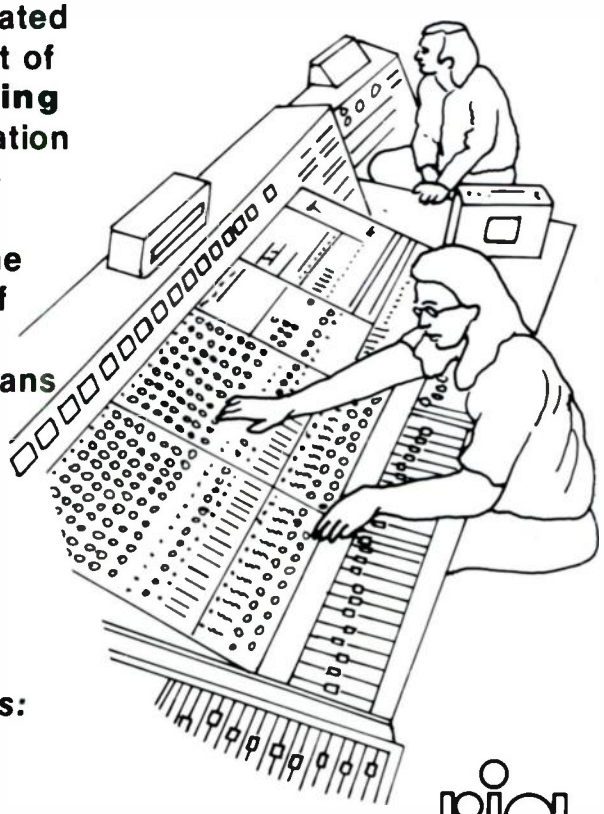

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