

DEC/JAN 1977

VOL. 2, NO. 2
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MODERN RECORDING

SERVING TODAY'S MUSIC/RECORDING-CONSCIOUS SOCIETY

A Session with
Santana

Sound Reinforcement —
for Yes, Zeppelin, Elvis

The Bottom Line Cabaret

The Elcaset — What and Why??

Lab Reports • New Products • Record Reviews

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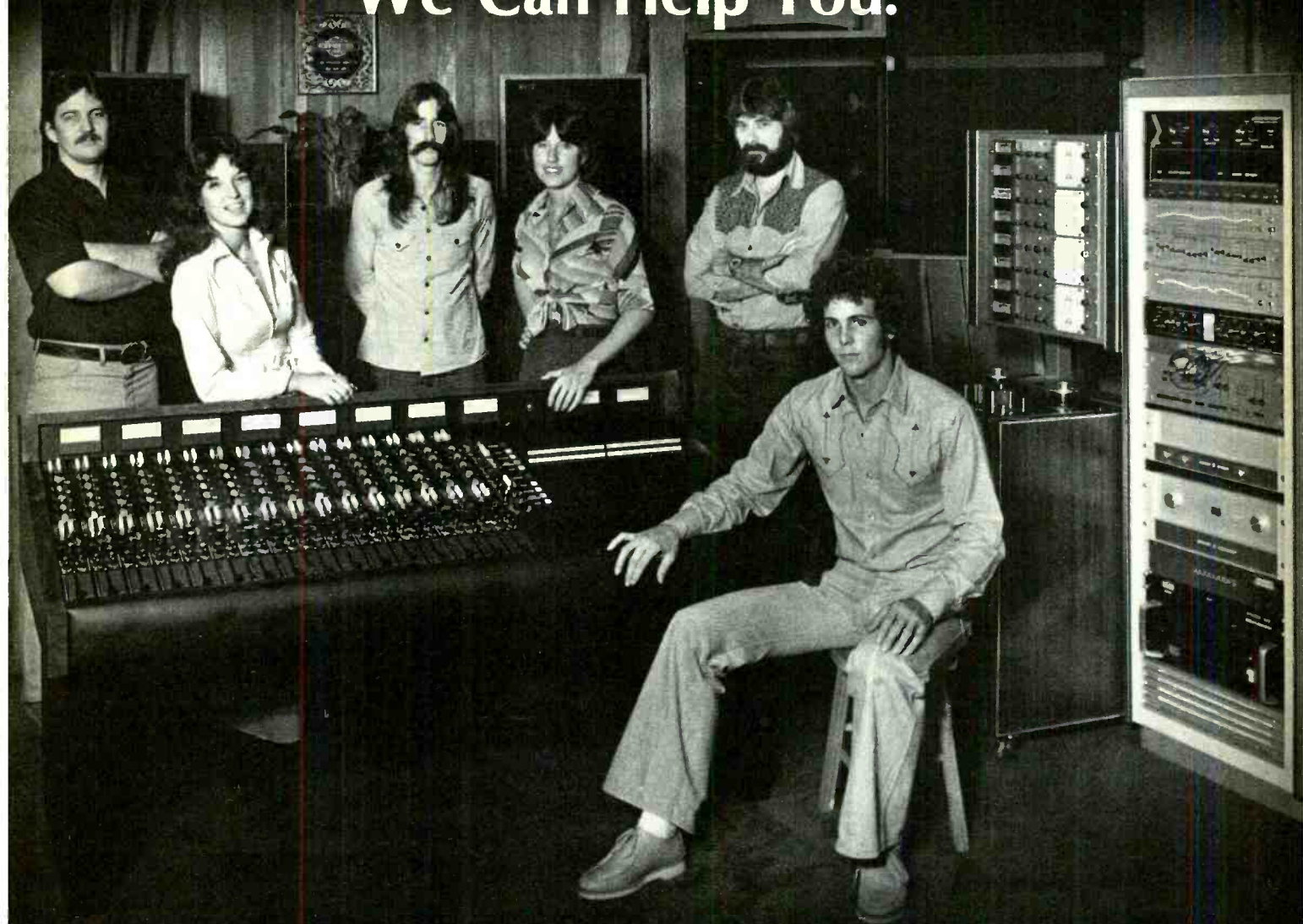


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CIRCLE 84 ON READER SERVICE CARD

MODERN RECORDING

SERVING TODAY'S MUSIC/RECORDING-CONSCIOUS SOCIETY

DEC/JAN 1977

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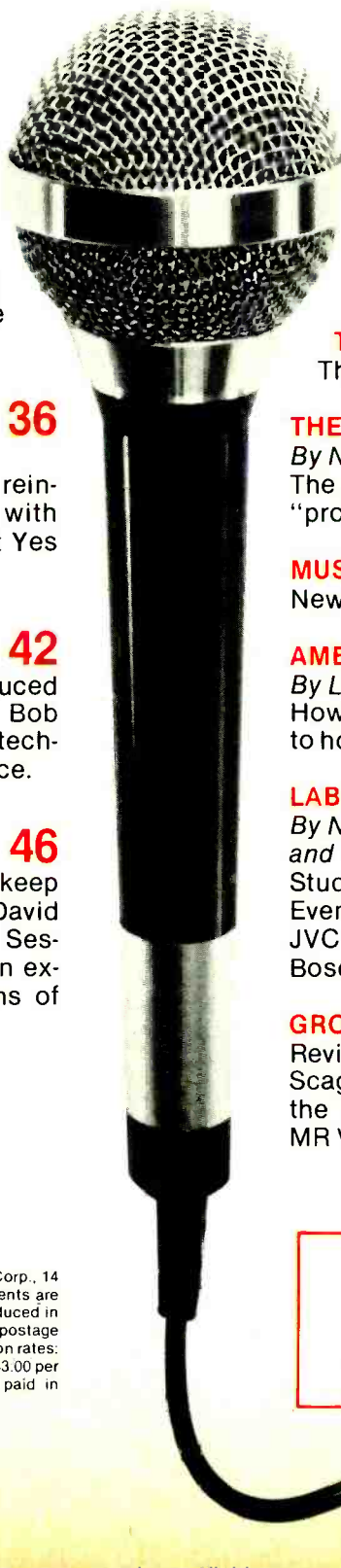
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LIZ BEENER**
Art Staff

VINCENT P. TESTA
Publisher

Editorial and Executive Offices
Modern Recording
14 Vanderventer Ave.
Port Washington, N.Y. 11050
516-883-5705

Richard A. Cowan, *President* Cary L. Cowan, *Controller*

Editorial contributions should be addressed to
The Editor, Modern Recording, 14 Vanderventer
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SOUND or SABOTAGE?

I would like to direct this article to the so called "live engineers" whose sole purpose is to play with a lot of knobs and sliders, smoke pot to the point of incoherence and make it with all the groupies who think he is marvellous, running that electrical monster.

A case in point was a recent Summer Spectacular in Maine. Several well-known acts were booked, including Helen Reddy, Tanya Tucker and K.C. and the Sunshine Band. The sound company was a local one. To begin with, the speaker array consisted of just about one of every kind of speaker enclosure there is (unbalanced and mismatched in all it's glory). The board was a Tascam, and the EQ was so overdone that the only natural sound I heard was the feedback (which was almost continuous), due to poor mic and monitor placement.

The first act of the week-long fiasco was Helen Reddy. Although she never sounded so bad, she managed to smile through her disgust, and joke with the audience about the sound system. Pretty embarrassing for a performer, especially when it is not her fault. As the week went on, the sound got worse.

The last act was K.C. and the Sunshine Band. If they had walked off the stage, I wouldn't have blamed them a bit. The sound crew was so involved in the pipe that was being passed that they forgot what channel everyone was on. On two occasions K.C. had to ask them to turn his mic on. Yes, I said *on*. If I hadn't been looking at the band at one point, the balance was so bad I would have thought half of them were not playing. The end result was a comedy for the audience, tragedy for the band, and a good high for the crew.

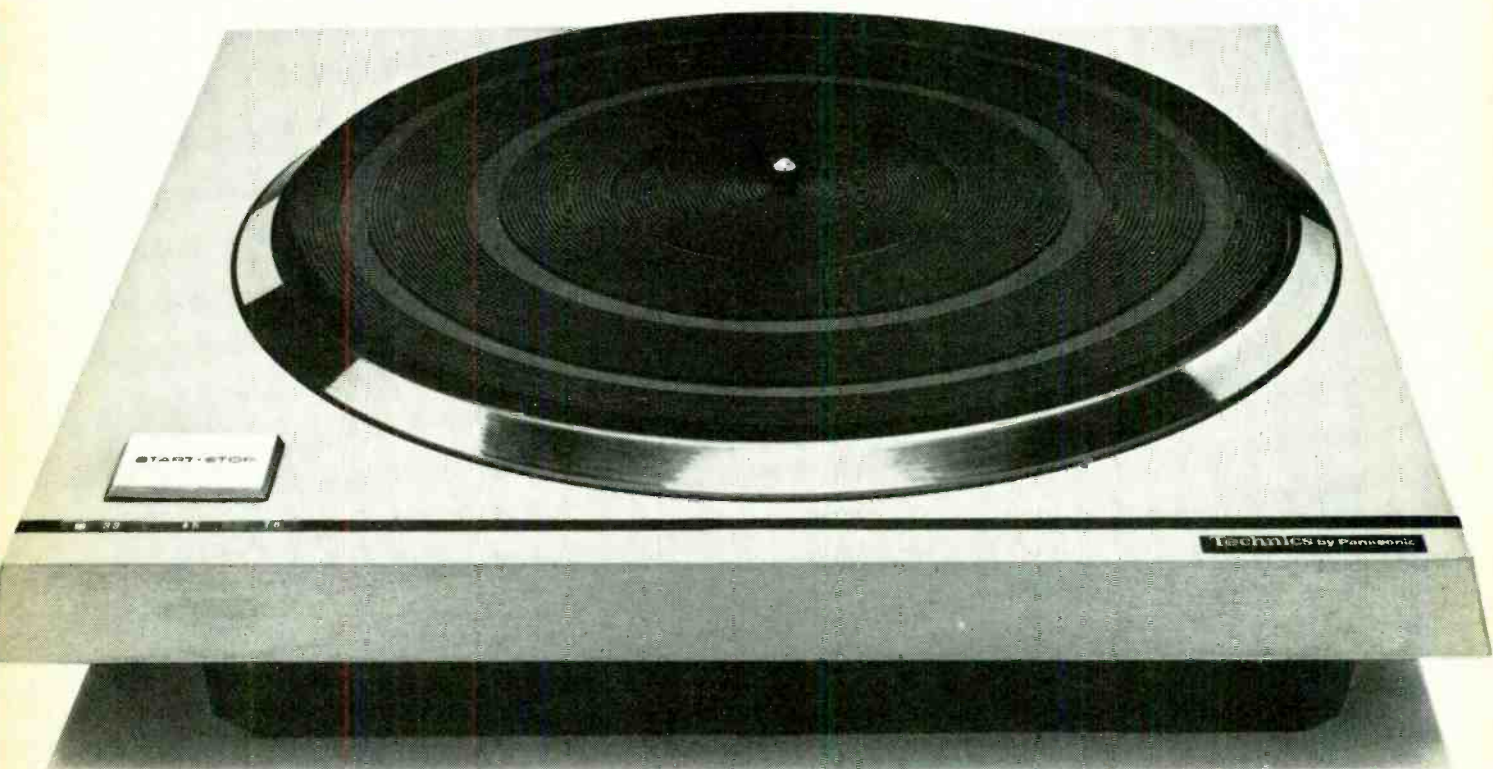
I have been in the sound reinforcement business for six years, and have been a drummer for fifteen. I study hard and long to be a good clean engineer, and I have only scratched the surface of technical knowledge I need. Today's musicians are more and more dependent on their engineers to give them balance and quality. Too many of them sound worse with the extra man, and that's sad.

A good engineer knows his equipment inside out, and knows how to use it. I think more time should be spent getting a proper balance of vocals and instruments *in relation to each other*, rather than to the engineer's own *taste*. Too much effort is placed on volume without feedback, with little or no regard for distortion and painful sound pressure levels.

To those people who want to be engineers, women included (would like to see more of them), I recommend lots of reading, school and working with an already-established sound company. For those who don't want to go to school and learn engineering the right way, I plead with them to take up another art, like painting, and stop sabotaging good music.

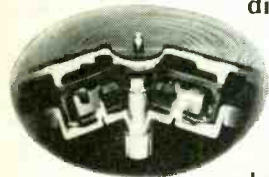
—Ed Garnier, Engineer
Spectrum Audio Productions Co.
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LETTERS TO THE EDITOR

Tanglewood Untangled

Just a couple of dB of dropout in Norman Eisenberg's "Tanglewood" article (Aug/Sept., page 38). Mr. Eisenberg states that without a digital delay line, "live" sound would reach listeners 1/5 of a second *before* the reinforced sound." (My italics.) Not true.

With no delay line, the signal from the reinforcement speakers closest to the listener would arrive first; if we adopt the working expedient that sound travels one foot per millisecond through still air, then a listener sitting near to a speaker set 200 feet from the stage would first hear *that* speaker, and then, 1/5 of a second later, hear the "live" sound from the stage speakers.

This "live" signal will, of course, be weaker. But in large auditoriums and festival sites multiple images from successive sets of reinforcement speakers can really be "disconcerting." There are sometimes (remember the old ballpark?) three or four or five distinct repeats.

Delay lines can be used not only to overcome this problem, but to create, as Mr. Eisenberg gently alludes to, some very positive and fascinating psychoacoustic dividends—advantages so usurous as to suggest black box magic:

The delay line is set up not to delay the feed to the reinforcement speaker by the 200 milliseconds suggested by the example...but is set to delay the reinforcement speaker by just *a little bit more*.

This ensures that the "live" signal arrives *first* at the listener's ear. The "lead" time we add is itself imperceptible; in this example we would delay the feed to the reinforcement speaker by about 210 ms.

This additional delay allows us to take advantage of a beautiful bit of esoterica known as the Haas Effect, which says, essentially, that a blindfolded listener will believe the *source* of the signal to be in the direction from which comes the *first-arrived* signal... *even if that first-arrived signal is several dB weaker* than the signal coming from closer, off-to-the-side, reinforcement speakers.

Utilizing the Haas Effect allows you to create an audible illusion that the signals' source is at the stage... *where it belongs!*

An additional advantage is that by so synchronizing each set of reinforcement speakers several dB apparant gain is realized due to additive levels from each synchronized set. This undoubtedly desirable level increase assumes the status of a mere footnote to the Haas Effected Magic!

Digital delay systems are lately being specified as standard equipment in new churches, ballparks and theatres. Digital delay is now part of the sound package of every Broadway show, where levels must be "polite" and echoes are intolerable. The same delay line can hold down a late night gig at the local recording studio—it's the same unit we use in the studio in quite the opposite fashion, to "de-synchronize" signals just a bit to create automatic unison double tracking. For both applications, a digital system is necessary, because the frequency response and dynamic range of the sweet young analog ("bucket brigade") delay lines now available fall apart once they're pushed over 25 or 30 milliseconds.

If only because of prices which, until recently, scared off all but the most money stacked of us, digital delay, and the wonderful world between one and a hundred milliseconds has been a pretty tightly mixed secret.

But literal piles of "old" ICs have been whittled down to countable numbers of "new" ICs, and within the past few months, full-fledged digital delay has become affordable to most studios and live performing bands. So through the miracle of accessibility, it's become more than idle hanger chat to go public with the SF-like applications of digital delay.

What's especially interesting is that technological sleight-of-hand has radically chopped the price of a basic digital delay line; the leading delay line manufacturer, Eventide Clockworks, has just come out with a unit called the "Har-

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monizer" which features not only front-panel selectable delay time and two independent delay outputs, but has the additional capability of generating *automatic harmony* in addition to automatic unison! Loaded with options, the Eventide Harmonizer comes in for between \$1500 and \$2 grand. Not bad, to get all the tricks you can play with time and a good dynamic range!

—Ken "Digital Delay" Schaffer
The Ken Schaffer Group
New York, N.Y.

P.S.—I've enclosed, FYI, specs on the Harmonizer and the 1745 DDL. I sell these units and consult on their more esoteric applications. I hope that this letter strikes you as interesting and usable; I've seen neigh little on the beautiful thing called digital delay! I love MR (and learn from it!). Best of Luck.

—K.S.

Ford's False Assumption??

In your "P.A. Primer" part I, Mr. Ford and Mr. Roth state that by bi-amping (vs. a passive crossover) one can achieve the same output level using half the required power in watts.

I would like to refer Mr. Ford and Mr. Roth to an article that disproves this theory of achieving more power for the same watts (Biamplication, Why and How, by Don Davis, db magazine, Aug/76).

Their assumptions are false because they were comparing two sine-waves. Music consists of complex waveforms, which do not add together coherently.

—An unsigned letter from Canada

Equalized Women

In coming across a copy of your magazine in Electric Lady Studio last month, I thought, what a pretty interesting magazine, except one thing—Ms. Helen Michaels, from Detroit, Michigan, in your letter section.

I would just like to say one thing. Obviously Ms. Michaels is talking to the wrong person(s). I am a sound engineer (or to be pointfully specific, a female sound engineer!). I mix and sound trouble shoot for Arista recording artists Gil Scott-Heron, on all road gigs and help with their recordings. I've become respected by my male counterparts with many sound companies, and I am looking forward to working with other artists on the road as well as in the studio (my current move).

But I am not alone. There is a female

sound engineer at Paul's Mall in Boston, Mass. She handles (mixes and repairs) all sound problems (and is damn good too, I might add), in both club rooms. There is also a sound company (Audio Unlimited) in Greensboro, N.C., that has two good experienced women working with them. So in short, it's a matter of who your friends are. I'm sure that Trish Russel of 'Unlimited' would be glad to talk with you further on this important subject, as well as I. You just have to dig sometimes if it's important enough.

Oh, by the way, I read *Glamour* too!

—Ms. Nyya F. Lark
1927 Marthas Rd.
Alexandria, Va.

I was *reading*, not scanning, one of your back issues (Aug/Sept) and came across an article under the heading "Women and Engineering" in the Letters To The Editor column. I'm presently a bartender; however, this is not what I want for myself as a career. I want to be a recording engineer. What I need to know is the avenues that I must take to accomplish this—what is feasible as a first step toward my goal? I would appreciate it very much if you could possibly provide me with some information as to basic training and/or provide some other means of getting in-the-studio experience. If this information is discussed in one of your back issues, please advise. By the way, from now on I will be reading MR; that is definitely one intelligent step in the right direction.

Also, if it is possible I would appreciate any names of women in the recording-engineering field including that of Helen Michals. Thanx again!

—Brenda Miller Young

(The Recording Institute of America offers on-location, in-studio courses for the beginner and advanced student. For information contact: Recording Institute of America, 15 Columbus Circle, N.Y.C., N.Y. 10023.)

MR Monthly??

Do you plan to go monthly, or, even better (heh, heh, wring, wring), bi-weekly in the near future? I'm sure many of your readers are wondering. (How about it fellow MR readers?)

The other point I'd like to make concerns your equipment reviews.

With the myriad new products being offered to the semi-pro recordist, would it be possible for you to do conceptual reviews?—that is review several different

(continued on page 87)

THE COST/PERFORMANCE EQUATION: HOW MUCH TAPE RECORDER IS ENOUGH?

Essentially, a tape recorder is a machine you can use to capture your talent and faithfully reproduce it. Practically, the more you make demands on a tape recorder, the more demands it can make on you.

Put another way, a tape recorder can be your wings or an anchor. It can work for you or it can work against you.

At \$1,299.95 the investment you make in the Dokorder 1140 gets you a partner instead of a handicap. Compare what it does to what it costs and you won't find a better tape recorder anywhere.

The 1140 lets you concentrate on your music as art. Much of the concern you have about your music as signal is handled for you automatically.

The 1140 has logic circuitry that takes care of getting you in and out of Sync and in and out of Source automatically. It makes knowing where you are in multi-track recording a whole lot easier.

The 1140 also has an automatic cue-up function, called Program Memory. Once it's set up, the Pro-

gram Memory automatically brings you back to the beginning of material and either stops or plays it again, depending on what you tell it.

The transport controls on the 1140 are digital logic-operated so you can go from one mode to another directly except in Record and there is a motion sensing system which lets you go into play from fast forward or rewind when the reels stop.

Bias controls are up-front on the transport and there is a built-in pink noise generator which supplies a test signal to each channel. This unusual device makes biasing simple but extremely accurate.

There is a lot more hardware to the 1140: peak level indicators, discrete playback and record amplifiers, 62-Volt record drive circuit, wide band sync response, etc.

All to make it easier to put music on tape.

DOKORDER 1140

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TALK BACK

Building a Mix

Working as Production Manager for a Boston radio station that promotes "live" music, bands will come into our studios and frequently I will be asked to mix them for broadcast.

The problem I encounter most often with these "live" sessions is the choice of instruments with which to "build a mix."

In a typical band consisting of bass, drums, percussion, guitars, keyboards, horns and vocals, which instruments would be best to start with? It would seem logical to begin with the rhythm section, but *where* in that section? How should one progress from there? Also, using the same instruments previously mentioned, where should they be placed in the stereo perspective (left, center, right)?

I've wanted to answer this question for many months and your publication seems like a Godsend! Keep it up, folks.

—Philip Adler
Production Manager
WERS-FM, Boston, MA.

There are no set rules on how to "build a mix." It is all done to the engineer's and producer's preferences.

You mentioned the logical approach of beginning with the rhythm section. This section is the base upon which the music is built, so it is often the object of first concern. *Where* in the rhythm section? One way is to start with drums and percussion and then proceed with the bass. The bass usually has much to do with percussion, plus it is the bottom of the melodic aspect of music. Follow with rhythm guitar, rhythm keyboard, and any other rhythm instruments within the group.

After the rhythm section is completed, you can proceed with background instruments such as the horn section.

Then lead instruments such as guitar, or whatever the group might have for solo breaks. The vocal background may be next, completing the mix with the lead vocal.

We must remember that this is a "live" mix and mistakes cannot be covered in a post-recorded mix. If there are many changes in either EQ, level, limiting, panning, echo, etc., it would be very helpful to have a cue sheet with a run-through of any important changes in the set mix to follow. It is advisable to run through the whole set if possible as a dry run or rehearsal. In doing this you might find you have more cues than hands, so you may need an assistant, if possible, or change that part of the mix to fit your capabilities.

The stereo perspective of left, center, right, can be built with the thought of combining the way the group normally would set up, and with the way special effects are to be put across. In this way instrument leakage to the microphone of another instrument would not be so prevalent. For example, if the playing position of a saxophone is very near that of a piano, and the sax is placed to the extreme right and the piano extreme left in the mix, piano leakage might exist in the sax track on the opposite side from its own. Being placed the way they are set up would eliminate that problem, keep the "live" sound, capture the group's quality, and make procedures easier in the active environment of a "live" concert.

Any special effects to be accomplished would usually be under the direction of the group and its producer. Also keep in mind the limitations of the board being used.

When the mix is completed you might want to hear the group itself to compare the sounds. It will provide time to leave your mix and to go back fresh to re-evaluate what you have constructed.

The song should reflect the producer's concept of what it should be. Engineers usually have ideas for the producer and know the equipment's capabilities of serving the producer in the best possible way. A proper mix needs the collaboration of the group, the engineer, and the producer to achieve the desired sound.

—Stu Gale
Ultra-Sonic Recording Studios
Hempstead, N.Y.

Dokorder Tips

Before I get to my problem I would like to extend my congratulations to the staff of MR for putting together a truly fine magazine that, for me, came just at the right time, as I am just beginning to record and I need all the help I can get.

I have just purchased the Dokorder model 1140 4-channel tape deck. The dealer that I purchased the deck from, although very good price wise, knew absolutely nothing about my machine, recording, or anything else for that matter. In fact, they told me the machine had built-in echo and was able to perform the "Ping-Pong" effect without the use of a mixer. I had to bring the manual to the store the next day to set them straight so that maybe the next customer will know what he is or isn't getting.

I have my tape deck, but being a vocalist I wanted a reverb effect. So I was told by a friend to buy the Pioneer model SR-202W reverberation amp. Incidentally my power supply is a Marantz 4415 receiver. So I bought the reverb (for two channels) and herein lies my problem. It seems that the Dokorder does not have mic/line mixing abilities so all I can record with a reverb effect is the phono or AM & FM (line) sources, and not the microphone input

which is what I wanted the reverb for. I have yet to purchase a low impedance microphone and am using one that was supplied with an inexpensive cassette machine (which I believe is a high impedance mic). I tried connecting it to the receiver's phono input with two "Y" connectors, however I feel I am losing frequency and I don't know what kind of microphone to buy if this is the only way I can achieve the reverb effect while recording.

Can you please tell me:

(1) What if anything can I do to achieve reverb using the tape deck's mic inputs without spending a lot more money?

(2) What type of microphone with what type of line and plug can I use?

(3) Would the Beyer 500 microphone be good with my machine?

(4) Any other tips will be greatly appreciated.

Thank you for your time and effort.

—Gary Chesner
Brooklyn, N.Y.

To attach the reverb for a microphone recording, I would recommend that you plug the microphone into the mic input of the 1140, then take the line output of the channel and put that into the input of the reverb. Then, take the output of the reverb and put it into an open channel line input of the 1140. Thus, one can use the reverb without having to buy a mic preamp.

Secondly, as different microphones are used for different purposes, it is very hard to recommend any microphone unless I know what specific purpose is intended, and even then my recommendation is subject to argument. I would, however, suggest buying at least one good dynamic and one good condenser. Shure, Sony, Beyer—all are more than adequate for home recording and some "live" situations.

Lastly, the only other tip I have is to try to use your recorder as much as possible. It is only through this process that you will know and learn what can and cannot be done.

—Lyden A. Song
Dokorder, Inc.
Lawndale, CA.

Sound On Film

I often find myself involved in setting up a sound system for a sales meeting and getting the task of making an optical track on a 16mm film sound as good as quarter-inch tape playback.

My biggest problems seem to be two-

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just had Siamese twins

that give you true stereo tracking compression/limiting at less than 1/6 of the price of that big mother. dbx 162 rms level detectors are coupled to respond to the energy sum of the two inputs to give you precise stereo tracking you could never achieve with two separate compressor/limiters using their individual controls.

Like the dbx 160 little mother, the 162 Siamese twins let you compress any stereo source by any ratio from 1:1 up to infinite compression, and you can limit above any threshold from -38 to +12 dB.

The dbx 162 twins also inherited all the little mother's other excellent features including:

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In addition to all these features, the dbx 162 is easily expandable to four or more perfectly tracking channels with single knob control. For complete information or to arrange a demonstration of the dbx Siamese twins, contact your dbx dealer or circle reader service number or contact:

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dbx

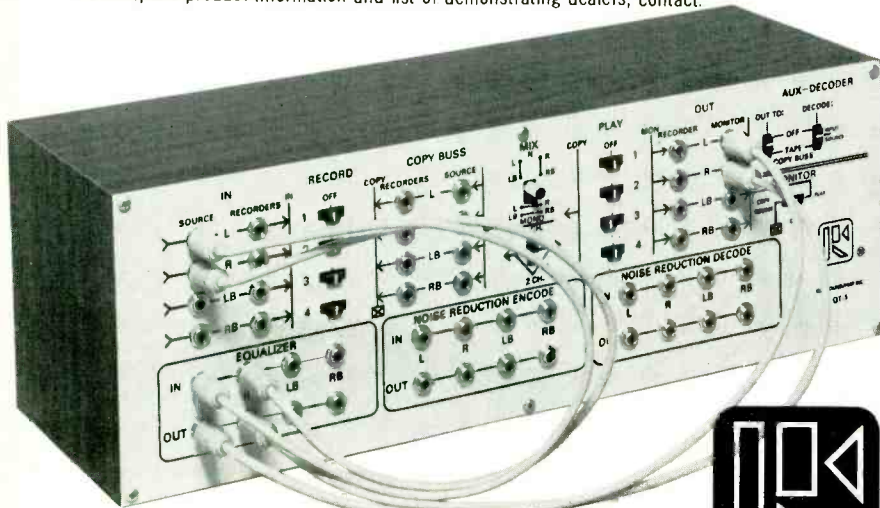
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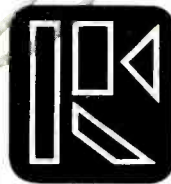
The QT-1 is obsolescence-proof and provides professional studio type flexibility and convenience at an audiophile price of \$249.95.

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fold: (a) distortion, and (b) impedance mismatch. Since I'm not an electrician or sound expert, perhaps you could give me some advice on how to best set-up a 16mm projector to get the best sound playback.

—Mike Drago
Kaleidoscope Productions, Inc.
Dallas, Tx.

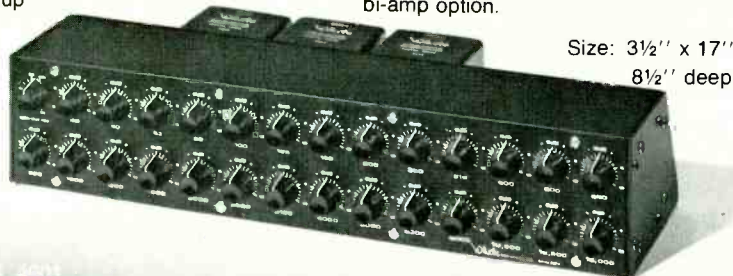
16mm optical sound will *never* sound like magnetic tape due to the frequency response limitations of film—6,000 hertz as opposed to 15,000 hertz of magnetic tape. Should you be working with an external amplifier I would suggest the following: take the speaker output of the projector and plug it into the auxiliary input of the external amplifier. Set the external amplifier volume control at a normal setting for the room, then adjust the projector volume control. If you find that you don't have enough level, increase the volume at the external amplifier. Should you be going into a microphone input, I would suggest that you insert a 30dB in-line pad between the speaker and the external amplifier. If this doesn't clear up your problem, please write me directly describing the exact equipment you are using.

—Valen B. Peters
Sound One Corp.
New York, N.Y.

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Stalking the Phantom Channel

Recently I noticed that if I reversed the polarity on one of the channels of my Pickering XV-15 cartridge, that anything common to both channels would be lost if I depressed the mono switch on my Kenwood receiver.

Is this method safe for reproducing a "phantom" 3rd channel? And will there be any acoustic or electrical problems?

—Michael Amonett
Ball Corp.
Muncie, Ind.

Operating your cartridge with reversed polarity of one channel, and paralleling the two channels via the mono switch is a method commonly employed to provide vertical sensitivity and cancellation of any lateral components of record groove information. Operation in this mode is useful in reproducing the vertically recorded information of some early Edison discs, or so called "hill and dale" recordings.

The above may be considered analogous to reproducing laterally recorded

(mono) discs by simply paralleling the two cartridge terminal pins, left to right hot, and left to right ground. This provides lateral sensitivity and cancellation of any recorded vertical information.

A center channel may be derived, providing either sum or difference signals, by modification of the amplifier output circuits. Alternatively, the Dynaco System for derived quad will afford a 3rd (and 4th!) channel of information.

—Paul Torraca
 Manager—Quality Assurance
 Pickering and Co., Inc.
 Plainview, N.Y.

“Weighty” Spec Problems

I have been comparing specs between the Tascam 80-8 and Otari MX5050-8 recorders and have noticed a great discrepancy in their S/N ratios. The Tascam boasts a 65dB weighted, 60dB unweighted ratio at 3% THD, while the Otari is rated at 58dB NAB weighted. I also noted that the S/N ratios on all the other Otari machines are listed at between 63 and 68 dB weighted. Why the great difference here? Is the NAB curve different from regular weighting? Can I expect as quiet a recording from the Otari as from the Tascam?

—Bruce Gold
 ANA Productions
 Valparaiso, Ind.

Your letter concerning the apparent S/N differences between the Otari and Tascam half-inch eight-channel machines illustrates the need for manufacturers to supply readily understandable and accurate specifications. We at Otari welcome the opportunity to respond.

The spec sheet that was distributed to dealers to introduce the Otari MX-5050-8D was a preliminary sheet. The specs quoted were based on the prototype machines and were purposely conservative and rated at a lower record level of 185 nWb/m. A new spec sheet is being issued and reflects the performance of the production machines now being delivered.

The published and guaranteed S/N spec for the Otari MX5050-8D is now 62dB unweighted S/N and 65dB NAB weighted S/N, referenced to 520 nWb/m record level. This spec is measured by using Ampex 456 tape, and not Scotch 206 as was originally used for the record level adjustment.

It should be noted that all half-inch

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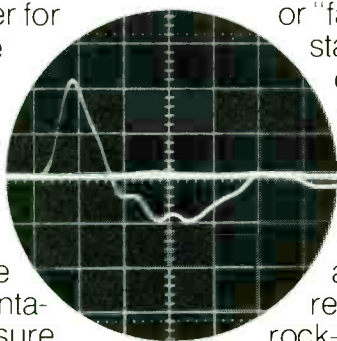
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The price won't overload you either.



*Outdoor test with Tektronix scope, set for 10V/division vertical, 0.1 μsec/div. horizontal. 22 cal. starter's pistol mounted 15 cm from MD 421 measured pressure of 111,000 dynes/cm² (175 dB SPL). Smooth, rounded scope trace indicates total lack of distortion.

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eight-track recorders use the quarter-track format. Most other Otari recorders are of the half-track format and are consequently at an automatic 3dB advantage because of the wider track spacing of the half-track format. The MX-5050-8D has S/N specs equal to other Otari quarter-track, two-channel recorders.

To answer briefly the noise weighting question, all weighted S/N measurements made in the United States normally are made using an NAB specified weighting filter. This filter has a high and low frequency cut-off designed to account for the response characteristics of our ears and to reflect the audible noise characteristics of a machine. In this country, the NAB weighting curve is the commonly employed standard.

The MX-5050-8D incorporates the same professional features of the MX-5050 series along with some new and unique design, operating features and sturdy mechanical construction.

—Lewis Barrett
Otari Corp.
San Carlos, CA

I think I can shed some light on your question:

(1) With our long experience in the quarter-track format we found that we could improve the S/N of the 80-8 by adjusting it for the IEC standard rather than the NAB. This reduces high frequency noise by a few dB.

(2) We adjust TEAC Tascam Series recorders for Ampex 456 tape. This new generation of tape has improved headroom and also reproduced "hotter," thereby again improving the S/N ratio of the recorder.

(3) The 80-8 is a one speed machine (15 ips). Since we don't have to worry about designing a "compromise" head that works at 7½ ips as well as 15 ips, this head can be optimized for better performance. We can have a wider gap, hence more efficient playback and less noise. See pages 6-10 in the "TEAC White Paper on Tape Technology" (available from us) for a more in-depth explanation of this.

(4) The 80-8 uses a combination Record/Reproduce head so it is essentially a two head machine (we provide the third head for ease of calibration). Since your record head is also your playback head, the performance of the machine in the sync mode is not degraded in frequency response or noise.

(5) Although this should explain the 7 dB difference you were wondering about, let me point out the DX8 which attaches to the 80-8. This eight channel dbx unit will provide you with a S/N ratio of approximately 90dB, as well as with improved headroom. An amazing testament of the growth of the tape recorder technology. Signal-to-noise is destined to obscurity.

—Theo Mayer III
Training Manager
TEAC Corporation of America
Montebello, CA.

Lost Frequency Response

Congratulations MR: I certainly enjoyed your magazine. In reading over your very first issue Vol. 1, issue 1, I ran into something that rather puzzled me. In the article entitled "Recording Techniques," it mentions on page 31 the "ping-pong" or "bouncing" techniques used in major studios. My questions concern the matter of frequency response *lost* by using the sync head to reproduce (in the transfer to open tracks) already laid down material—and then combining many of these to one or more open tracks. It is my understanding in the manufacture and design characteristics of record and reproduce [playback] heads, there are significant differences in head gaps: reproduce [playback] heads use much smaller gaps to obtain greater response at the upper limits, whereas record heads use larger gaps in getting more signal *to* the tape! It seems that the only way around this would be if these larger multi-track decks use super, super record heads to sync with. Anyway, what is your thinking on this one?

—Duke Kelso
Santa Monica, Cal.

First of all, one must consider the fact that the composite or "mixed" track will be a second generation copy of the originals. It will be a bit noisier and some high frequency loss may occur at this point.

The record head gap is, in general, larger than that of the playback head and the gap length is directly related to the head's ability to saturate a certain thickness of the oxide layer. However, for playback the gap is usually smaller because its length is inversely proportional to the head's ability to reproduce high frequencies. Thus, it would seem that one again runs the risk of losing some "high end" in using the record head for reproducing.



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In practice, these losses do occur to some extent—a dB or two at 15 kHz or a little more noise than you'd care to hear in a quiet section of the song—a lot depending on the particular machine and its maintenance. Worn-out heads or misalignment can lead to trouble, especially with older machines.

All is not lost though, for the multi-tracks of the mid-seventies are boasting identical frequency response curves for both playback and sync. At least one manufacturer has additionally provided playback equalization for the sync mode, where most machines have only level adjustment. It seems likely that soon the perils of bouncing will be at a minimum.

—Dave Wittman
Electric Lady Studios
New York, N.Y.

Home Studio Problems

I have a small home studio (actually it's just a room with furniture). My equipment is as follows: TEAC 3340, GSL 7030 (mixes), Tascam 5 board, Tapco 220 equalizer, Tapco 400 reverb, dbx 154, Crown 150, assorted mics like Sennheiser 421, Nakamichi electret-condenser, AKG 1000E, D190E, 200E and

124 and Shure 154. Plus the other little trinkets like headphones, etc. . . I generally record for my own pleasure and home use. A friend of mine wants to record a record and use me as engineer. Is this equipment good enough to do the job? (I know it's not Westlake Audio, and my abilities are probably not as good as Dave Hewitt's). Are there really albums in existence which have been recorded on 3340's? Name some.

Also, my 3340 has a minus dB (-dB) output and input level. The 7030 GSL which I use to mix to has the same. My board, a Tascam 5 has two output levels, a -10dB (low) and -2dB (high). Now I have to match the levels so I keep the board at -10dB. If I send the master out to be processed do I specify the signal level (although reading 0 VU on the meters) is at -10dB, or do I have to somehow get this level to a 0 dB, or a +4dB level by the use of line-level amplifiers, and/or obtain a real "pro" mastering deck?

Finally, is there some source that novices in this area can turn for answers? It would be really great to have easy access to something for this type of problem—a set of books, something?

—Bill Montello, Jr.
Warwick, R.I.

Yes, if you are up to it, the gear you mentioned is capable of cutting a disk. Especially with such additions as your dbx.

Cutting a disk is different from simply making a tape because the phase relationships of your signals start becoming more of a factor. Have your machines aligned and make sure your azimuth alignment is accurate.

I would also suggest spending some time with someone from a disk mastering lab. They will probably be very happy to give you pointers and warn you of pitfalls to avoid. (Things that are peculiar to the "mineral scratching across plastic" medium.)

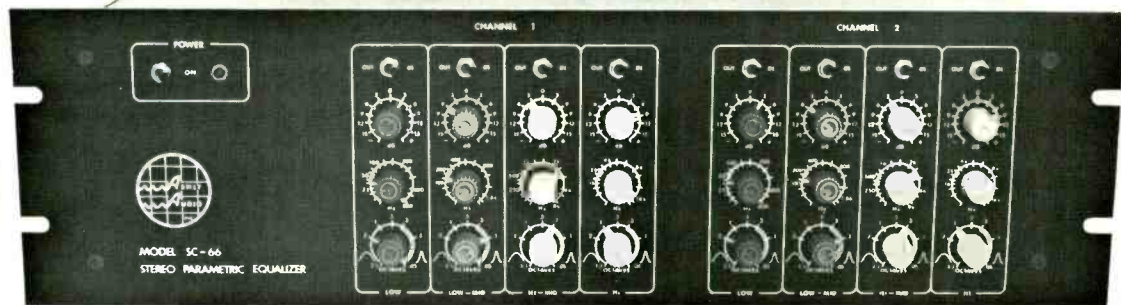
We wanted to prove to ourselves that you could cut a record in a living room on a 3340, so we hired Dick Rosemini (Musician/Producer/Engineer Extraordinaire), and he combined his talent with that of the "Hello People" and cut our *Home Made with TEAC* album. It's available for 3 bucks from TEAC.

Some other albums cut on 3340's that I am aware of are: *Unteberger* by Unterberger (from Italy) on Warner Bros. T 56272, *Coconut* by Electronic System on Omega International 333.316-Y, *Change* by Marlo Zappa on EMI 3E 05433862, *Finest Finger* by Sensation

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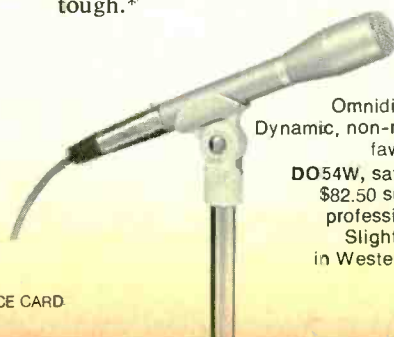
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Of course the DO54 fits our 3/4" microphone options, like the security clamp (when you can't control access to the mike), a very neat stud mount adapter with switch, a most effective shock mount, and super Acoustifoam[®] windscreen.

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MR 1-77

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Fix on Poldor 2448048, and *Electric Mind Waves* by Elektrikus, PDU/EMI PLDA6050. Some TEAC Tascam series albums are: *Microphone Fever* by Rick Ruskin on Tokoma, cut on the 70H8; *Success & Failure* by Dalton & dubarri on ABC, cut on the 90-16. These are just some examples that I am aware of.

The input/output level of your equipment (-10dB) is only relatively related to the strength of the recorded magnetism on the tape. A tape recorded on a -10dB two track is compatible for playback with a +4dB two track and vice-versa. The -10dB refers to the input and output voltage of the recorder's electronics. The magnetism this produces at the record head is the same for both systems, hence the tape produced is compatible.

As for your last question, I think the specific book you are looking for hasn't yet been written. There are some very good books on recording (not really for a novice... but you are probably less of a novice than you might think): *Modern Recording Techniques*, by Runstein—Howard W. Sams; *Audio Cyclopedia*, by Tremaine—Howard W. Sams; *Microphone Design & Application*, by Lou Burroughs; *Recording Studio Handbook*, by John Woram; *TEAC White Paper* on tape technology available for the asking.

Also, remember you are reading the most musician/engineer/producer (the new breed) oriented pages I know of.

—Theo Mayer

Manager, Training Dept.
TEAC Corporation of America
Montebello, CA.

Floating Inputs/Outputs

I have a couple of questions I would like for you to answer. This is my problem.

I am using a Tascam 5 mixing board and TEAC 3340S. I am trying to patch UREI 1176LN limiting amp between the two. The line output of the board 10K Ohm or greater and the recorder input 50K Ohm or greater.

The 1176LN limiter has 600 Ohm, bridged-T control (floating) and output designed to work into a 600 Ohm load.

(1) Could you tell me what would be the best transformers and specs, and if possible, recommend some manufacturers and part numbers?

(2) Could you explain what a 600 Ohm bridged-T control (floating) input and a floating output means?

(3) What disadvantages would I suffer if I did not use the transformers?

—Carlos E. Grier
Montgomery, Ala.

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Any critic who wants to do a completely fair and impartial test of a tape recorder is very fussy about the tape he uses.

Because a flawed tape can lead to some very misleading results.

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A tape that's noisy makes it hard to measure how quiet the recorder is.

A tape that doesn't have a wide enough bias latitude can make you question the bias settings.

And a tape that doesn't sound consistently the same, from end to end, from tape to tape, can make you question the stability of the electronics.

If a cassette or 8-track jams, it can suggest some nasty, but erroneous comments about the drive mechanism.

And if a cassette or 8-track introduces wow and flutter, it's apt to produce some test results that anyone can argue with.

Fortunately, we test every inch of every Maxell cassette, 8-track and reel-to-reel tape to make sure



they don't have the problems that plague other tapes.

So it's not surprising that most critics end up with our tape in their tape recorders.

It's one way to guarantee the equipment will get a fair hearing.

Maxell. The tape that's too good for most equipment.

Maxell Corporation of America, 130 West Commercial Ave., Moonachie, New Jersey 07074.



Circle 72 on Reader Service Card

This problem occurs frequently when interfacing professional equipment to "semi-pro" equipment. In order to obtain the audio level necessary to drive the 1176LN a line amplifier will be required. Transformers do not give power gain.

Two companies with which I am familiar manufacture line amplifiers specifically for installation in boards like the Tascam. They can be powered from the existing Tascam power supply.

(1) Sescom Inc. — P.O. Box 590, Gardena, Ca. 90247, manufactures the LA2 plug-in amplifier which sells for \$45.50.

(2) Audio Concepts — 7138 Santa Monica Blvd., Hollywood, Ca. 90043, makes a P. C. card line amplifier with a +24dBm output for \$89.00.

One of the above will solve the board to limiter problem.

For best noise performance a 600 ohm 20 dB fixed pad should be inserted between the 1176LN output and the TEAC 3340's input. These are available from Shure Bros. and from Sescom.

In answer to your questions 2 & 3, the term "floating" means that neither side of the input or output is tied to the chassis. The option is left to the user, allowing greater grounding flexibility.

Without the transformers one side of the signal path will be grounded to the chassis and power line neutral. This can cause hum problems.

—Brad Plunkett
UREI
North Hollywood, CA.

Tape Head Alignment

Is there a simple way to effectively align tape deck heads (cassette and open-reel) without paying \$30.00—\$50.00, or owning scopes, meters, oscillators, etc?

—Lloyd Truman
Van Nuys, CA.

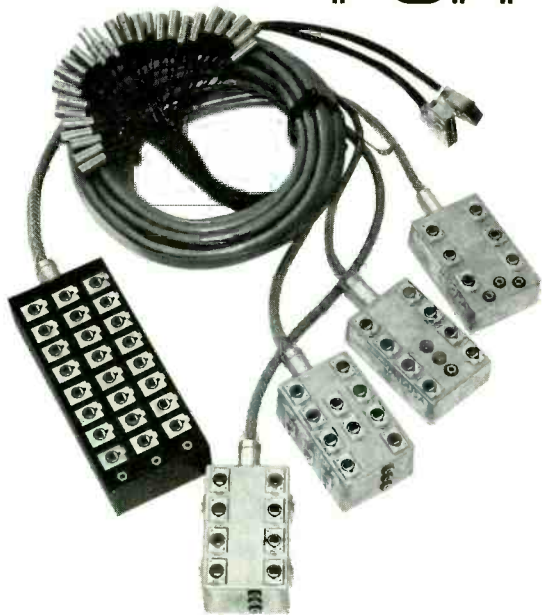
First we must make sure that both heads are perfectly vertical with respect to the tape in the front to rear plane. This can be easily checked by inking the surfaces of the heads with a dark color felt-tipped pen. The tape is then run through the machine and the pattern observed should have vertical edges. A trapezoidal pattern indicates that the head is tilted and adjustment must be made using the screws located at the front and rear of the head until a proper pattern is achieved. Now the height of the play head can be adjusted. This requires the use of an alignment tape as

a first preference, or as a second choice a commercially recorded tape. The height should be adjusted by turning both the front and rear screws equal amounts to maintain the vertical position, so that maximum output is obtained from both channels and a minimum output from the reverse direction of the tape. The azimuth is adjusted with the screw at the side of the head for maximum output of the high frequencies either as observed on the meters when using an alignment tape, or by adjusting for the sharpest sound when using a music tape.

Now that the play head is correctly adjusted the record head can be aligned, using the play head as a reference. If the recorder's meters can indicate the playback from the tape while recording, adjust the height of the record head while recording a 1 kHz signal for maximum reading of both channels on the meters. Adjust the azimuth while recording a 10 kHz tone for maximum indication on both meters, or if using a music source adjust for the sharpest sound while listening to the off-tape monitoring.

—Richard Salmon
Uher of America
Inglewood, CA.

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and Revox products without equal in their respective fields. Consider the Revox A77 - a studio quality machine, compactly presented and offering features unique in its price class, with total indifference to minor fluctuations in mains supply voltage or periodicity.

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CIRCLE 77 ON READER SERVICE CARD

www.americanradiohistory.com

THE **PRODUCT** SCENE

By Norman Eisenberg

RECENT UHER ACCESSORIES

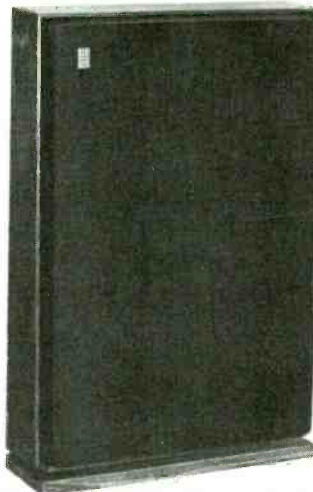
The Mix 500, also known as model A124, by Uher is a console with "professional features" for the amateur studio. Designed to match all tape recorders, and operating either from internal dry batteries or from external power, the Mix 500 can connect up to five sound sources simultaneously in mono mode, or two stereo sources and one mono sound source when switched to stereo mode. It has five amplifier channels, each controlled by a slider fitted with a click-free muting switch. Cross-fading and relative settings are facilitated by the calibrations for each slider. Microphones of 200-600 ohm impedance, and cables up to 100 meters, may be used without significant signal loss. A built-in level tone generator permits lining up and balancing of connected equipment; it also serves as a power source check. The center (mono only) channel is



fitted with a pan-pot to produce left-to-right direction effects. Output level choices are 30 mV (for hookup to the radio/diode input sockets of recorders using DIN standards) and 500 mV (for connection to hi-fi amplifiers, P.A. systems, or Disco equipment). Price of the Mix-500 is \$186.

CIRCLE 17 ON READER SERVICE CARD

KOSS ANNOUNCES SPEAKER LINES



Koss, the head-phone manufacturer, has announced two speaker systems of unusual design. The Model One is a full-range electrostatic designed as a four-way system, with separate diaphragms covering the frequency ranges of 32Hz to 250 Hz; 250 Hz to 1600 Hz; 1600 Hz to 6500 Hz; and 6500 Hz to 20,000 Hz. Instead of an AC cord to plug in to energize the unit, the Model One depends on a combination of built-in battery power and the output of the user's audio amplifier. The Model One requires a minimum driving amplifier power of 75 watts (RMS at 8 ohms) and is rated for a maximum power of 300 watts (RMS at 4 ohms), corresponding to maximum recommended room sizes, respectively, of 2500 cubic feet and 5000 cubic feet. Weighing 150 pounds, the Model One stands 49 inches high and is 10 inches deep across the bottom.

The Koss Model Two, an even newer speaker system, is the industry's first "reverse hybrid" in that it uses an electrostatic woofer and midrange combined with a dynamic tweeter. Crossover frequencies are 250 Hz and 2500 Hz; power requirements are 75 watts minimum to 300 watts maximum. The Model Two weighs 82 pounds and is 41 inches high and 11 1/2 inches deep across the bottom.

CIRCLE 8 ON READER SERVICE CARD

NEW ELECTROSTATIC HEADPHONES

Infinity Systems Inc. has introduced the ES-1 Headphone System, an electrostatic model using Polyurethin as the diaphragm material. The system consists of the headset and a walnut-cased adaptor that houses power supply and matching transformers. The adaptor also will accommodate an additional headset via front-panel connectors. Rated specifications include response within ± 2 dB from 20 Hz to 25 kHz; less than 0.3% harmonic distortion at 100 dB/SPL signal output; source impedance of

4 to 16 ohms. The signal cord is 98 inches long; the headset weighs 9 ounces. Announced price is \$275.



CIRCLE 16 ON READER SERVICE CARD

STEREO EQUALIZER

The model 4100 stereo equalizer from White Instruments offers ten bands on two channels, with center frequencies from 31.5 Hz to 16 kHz. Continuously variable controls provide 10 dB of boost or cut. A special circuit utilizing all negative feedback provides equal EQ in both boost and cut positions. In addition, each channel has a variable low-cut control to provide 12 dB/octave of roll-off adjustable from 20 Hz to 160 Hz. Each channel has input level attenuators and overload indicators. An EQ in/out switch and a power switch control both channels simultaneously. Maximum output before clipping is rated at +18 dBm. The output circuits can drive loads as low as 600 ohms. Noise and hum are given as better than -92 dBm; distortion is rated at less than 0.1% to +18 dBm output. Measuring 18½ inches across, the model 4100 may be powered from either 115 volts or 230 volts AC and has a suggested retail price of \$599. A rack mount with security cover is optional.



CIRCLE 4 ON READER SERVICE CARD

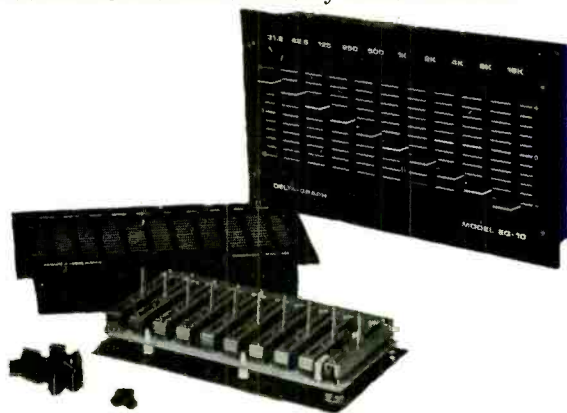
NEW DRIVER IN FULL RANGE ESS SPEAKER

The Heil air-motion transformer—featured for some time in speaker systems by ESS, Inc.—is now joined with another Heil invention, a new kind of low-frequency driver, to form the latest speaker system from ESS, known as the Transar/A.T.D. Departing radically from conventional speaker design, the new Heil low-frequency system consists of five vertically-stacked “Lexan” diaphragms interconnected by four drive rods. Optimum performance is claimed with the use of current-source amplification which effectively places the driver “inside the amplifier’s feedback loop.” The Transar system is suggested for use with ESS’s current-source amp for low-frequency elements, with an integral electronic crossover for direct bi-amp access to the high-frequency air-motion transformers.

CIRCLE 1 ON READER SERVICE CARD

DELTA-GRAPH EQUALIZER

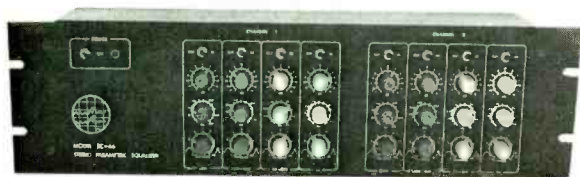
The model EQ-10 by Delta-Graph Electronics is a graphic equalizer system based on individual-channel ten-band octave equalizer modules which can be used to form mono, stereo, quad, eight-channel and multi-track equalizers. Available now in do-it-yourself kit form, the product reportedly will also be sold soon in factory-wired versions.



Dimensioned for standard rack mounting, the unit also may be housed in an optional walnut case, or in any console, wall-mounting, etc. Input/output configurations permit balanced, unbalanced, and floating-ground hookups. Sliders have center “click” detents, low-noise elements and are fully shielded. All active circuit elements are contained in three IC packages of advanced design. Prices start at \$56 for a single module kit.

CIRCLE 13 ON READER SERVICE CARD

PARAMETRIC EQUALIZER



Ashly Audio is offering a stereo four-band parametric equalizer. Known as model SC-66, the unit features a wide range of bandwidth adjustment, and it may be set sharp enough to equalize a single musical note. Distortion is rated at less than 0.05% with noise down at -87 dBV. Four overlapping bands cover the audio range from 16 Hz to 23,000 Hz, and the device has its own power supply. Suggested applications of the SC-66 include feedback control, acoustical correction, improvement of mic and speaker response, and generation of special effects. List price is \$599.

Ashly Audio also makes a series of professional mic mixers (SM series) priced from \$750 and available in various configurations. These are described in a brochure available from the manufacturer.

CIRCLE 7 ON READER SERVICE CARD

CONDENSER HEADPHONES

Audio Technica, initially known for phono pickups, has announced a new condenser headphone using electret elements.

Named the model AT-705, the headset uses permanently polarized diaphragms that need no external power source. A small adapter helps match impedances and also contains a speaker/headphone selector switch. Ear cups are lightweight open-back design. The AT-705, which is spec'd to cover the range from 20 Hz to 22 kHz, is priced at "less than \$90."



CIRCLE 14 ON READER SERVICE CARD

NEW ITEMS FROM ALTEC

From Altec there's news of additional products in its commercial sound line. One is the model 1628A automatic microphone mixer. An eight-channel device, the 1628A utilizes patented circuitry to electronically adjust individual mic gain and mix gain in response to changing channel-to-system-signal ratio. According to Altec, this makes it possible to provide maximum gain without feedback to each single mic or combination of mics. The effect is "as if a human operator were to monitor and adjust individual channel gains, constantly compensating . . ."



Also from Altec is a new equalizer, the model 1650. This unit contains 28 active band rejection filters at 1/3-octave center frequencies from 31.5 Hz to 16 kHz. Each filter provides up to 15 dB attenuation at its center frequency and is skirted to crossover with adjacent sections at -7 dB. High and low pass filters roll off at 18 dB/octave with continuously variable 3 dB down points. The 1650 has balanced operation with 150-ohm or 600-ohm output impedance and dual level gain, making it compatible for use in high- or low-level systems



Altec's third new item is the model 1590C/CTH 200-watt power amplifier. The 1590 features a switchable high-pass filter for use in speech systems. Output transformer taps provide connections for 70V, 100V, 140V, and 200V line-distribution systems. Frequency response is rated within ± 1 dB from 20 Hz to 20 kHz, and harmonic distortion is given as less than 1%. Designed for use "where uninterrupted operation is a must," the 1590 operates from a 120- or 240-volt AC source, or a negative-grounded 28 volt DC source.

CIRCLE 5 ON READER SERVICE CARD

NEW MIC ATTENUATOR

Sescom, Inc. is offering what it claims to be the first adjustable, bridging microphone attenuator with six positions. Designated Model IL-18, the in-line attenuator is adjustable in six steps: 0 dB, 10 dB, 15 dB, 20 dB, 25 dB, and 30 dB. Circuitry employs 1% non-inductive precision resistors. Price is \$25.



CIRCLE 6 ON READER SERVICE CARD

AUDIO BRIEFS

Dynaco—at present the only outfit exclusively devoted to audio kits—has a handsome 24-page free catalogue. Illustrated in color, it goes into considerable detail about all of Dynaco's current offerings which include preamps, power amps, tuners, speaker systems, and accessories. We note that this company now is offering a universal panel mount for standard 19-inch rack setups. A while most of Dynaco's products are solid-state, there are still three units using vacuum tubes for those aficionados who prefer them.

Teac is now marketing a line of rugged, low-capacitance audio cables featuring removable rip stops. Made by Belden Cable to Teac's specifications, the cable will be available in stereo pairs in lengths of three, five, 10, and 20 feet with a retail price spread from \$6 to under \$12. Teac also will be marketing kits of eight cables for studio use, color-coded and intended for use with mixers, big boards, and other sophisticated gear. Another goody from Teac is a new tape-recorder cleaning kit. Non-alcoholic, it will sell for under \$5.

Bozak has consolidated its speaker offerings in an attractive little booklet. Included are descriptions of the company's giant, the Concert Grand model B-310B, its somewhat smaller Symphony Series, the Monitor C, described as a system of "studio precision in fine furniture," and a line of compact speakers. Also shown is the Bard, a weatherproof speaker that looks like a kettle-drum. For do-it-yourselfers and custom rig builders, there are individual drivers and crossover networks, and bi-amp networks.

Crown's product offerings—tape recorders in various configurations, preamp, output control center, power amps in several output ratings, variable-frequency electronic crossover, speaker system—all are described in a color-illustrated booklet available from the manufacturer.

WHAT IS A PROFESSIONAL AMPLIFIER?

How can one gauge the ultimate dependability of one amplifier? In our lab and use tests (for the Lab Report section of MR) we try to make some kind of educated guess on this point, based on close examination of an amplifier's innards—it circuit parts, how they are laid out and wired inside the chassis—as well as of the measurements we get on our bench instruments. We then let the unit "cook" for a while, driving different loads and handling different input signals. Of necessity (such as meeting publication deadlines), this proving process is limited in time duration, if not in operating condition variables.

So we have to rely on additional insights, and some of these can be shared with the prospective buyer who can use his eyes and ear when contemplating the purchase of a new amplifier. For one thing, look for reasonably heavy-gauge chassis metal, and massive heat sinks. For solid-state gear, perhaps the most vital single factor contributing to reliability is assurance that the power transistors will be operating at low temperatures. Check out too the power supply—take a hard look at the transformer and the capacitors. The former should be fairly big; the latter should be of industrial grade with high temp ratings (a really high temp rating is 85 degrees C). Note their voltage ratings too, and try to determine (from the product literature) if they are being operated at least 10 percent below that rating.

Scan the published specs and related data for particular bits of information that may not readily be of interest to the average hi-fi buyer but which are important to the professional user—such as built-in protection against overload or abnormal loads. Fuses may not be the answer here—some form of current-limiting usually is the preferred technique to safeguard modern semiconductor circuitry.

Another item to look for is some kind of delay circuit that prevents full application of power-supply current the moment the unit is turned on. Yet another might be the option to bridge the output channels (if it is a stereo amp) to get double power for special monophonic applications. Still another would be the kind of internal circuit construction used—modular boards are desirable because they make repair relatively fast and simple.

Once you are satisfied as to these points, you can indulge in arguing with yourself or your friends about such more common matters as response, distortion, noise level, overload recovery, and whether meters are better than LEDs.



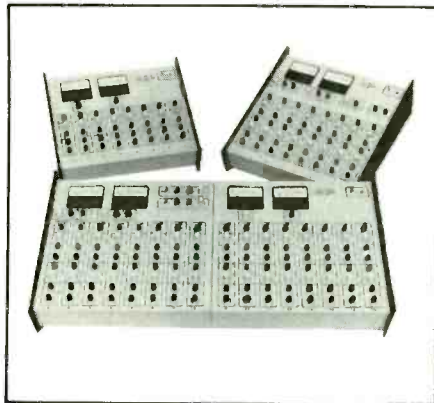
MUSICAL

NEWSIGALS

SOUND REINFORCEMENT EQUIPMENT. . . Uni-Sync's Trouper series of "live" music mixing systems are extremely portable, expansible/contractible sound reinforcement consoles. Each system consists of a self contained output control module plus zero to three input expander modules for a maximum of 38 inputs. Each module is standard rack mountable (19" x 15 $\frac{3}{4}$ " x 5") and weighs less than 30 lbs. in the optional heavy duty carrying case. The Trouper III output control module (\$2,325.00) features house and monitor level faders, 4 subgroup level controls, headphone and echo level faders, preview selector (metered preview signal can be "pre" or "post" group and master faders), VU meters and LED peak indicator, two announce inputs with house and monitor level controls, two auxiliary inputs (background music or special effects) with house and monitor level controls, and 4 regular mic inputs with controls (subgroup assignment switches input attenuation, peak indicator LED's, monitor and echo send, 3 band graphic EQ, solo switch, and input level faders). The Trouper III input expander modules (\$1975.00) feature 10 mic inputs with complete controls for each and single cable connector to output module. The Trouper II system (output \$1,500.00, input \$1450.00) is identical with the following functions omitted: group assignment, group controls, individual solo, and mid EQ. The Trouper IV system (output \$2885.00, input \$2675.00) boasts the feature of the III with peak limiting, 3-level peak indicators, and up to 70 dB switch attenuation on each input. All input and output modules are compatibly interconnectable (Uni-Sync, 5559 Caheunga Blvd., No. Hollywood, CA 91601).

The Ashly SM Series of mic mixers was "designed to fill the void between low priced mixers and studio consoles." Interchangeable components give the customer the opportunity to specify the

desired number of inputs (8 or 16), outputs (2, 3, or 4) and the type of EQ. Operating level is established by using a



variable preamp gain control at the input rather than the conventional pad. Ashly claims this improves signal/noise and transient response. The EQ is offered as two-place lo and hi shelving or as three-place, with the addition of a mid peak dip control and includes an LED indicator to monitor headroom in the mic preamp. The two output mixers have independent faders for basic main/monitor mixing while the 4 out mixers are available with two additional send controls (pre or post faders) or, for stereo applications, with level and pan controls replacing main level 1 and main level 2 controls. The four output mixers are provided with two line level returns for inserting effects into the main mix or for coupling additional mixers. VU meters indicate output levels for all outputs on the 16-in models while only main 1 and 2 are metered on the 8-in models. Options include headphone amp and 2 or 3 way electronic crossover for multi-amping. The SM series ranges in price from \$750.00 for 8 in/2 out with two way EQ to \$2463.00 for 16 in/4 out with three way EQ. (Ashly Audio, 1099 Jay St., Rochester, N.Y. 14611).

A number of new speakers and systems from Heil Sound: The Twin

Front Load Stack (\$1188.00) features fiberglas front-loaded horn coupled to the front of two 15" Klipsch-type woofers with a rear folded reflex area. The 461 Midrange fiberglas horn contains the Heil HD800 60 watt driver, 800 Hz passive crossover, removable lid and accompanying hardware. Completing the stack is the Top Hat; two Klipsch-type tweeters coupled into a parabolic fiberglas array. Heil says the fiberglas makes the units much lighter and stronger than wood.

Heil's new "Troff" system (\$1660.00) features molded fiberglas enclosures which contain a front-loaded horn coupled to two 12" transducers plus a rear-folded reflex horn coupled to two tuned Ports. The system includes the new Channel Six Pac Mixer (\$400.00) and Omega 100 stereo Power Amp (\$470.00). For smaller applications the Heil Nashville system (\$570.00) is a portable three piece sound system consisting of an 8 in 4 channel 85 watt amp with bass, treble and reverb controls, and two 10" reflex enclosures. The enclosures have a 10" speaker with whizzer cone for hi-end.

Also from Heil the standard Stage Monitor (\$420.00 per pair) which contains one CM120 Heil "Celeste" 12" speaker and one Heil "Herald" tweeter horn. The Standard comes in clip together pairs complete with sessions hardware (Heil Sound, Heil Industrial Blvd., Marissa, Ill. 62257).

INSTRUMENTS. . . The new Guild B-50 flat-top acoustic bass (\$750.00) is essentially a large properly balanced acoustic guitar (almost 4' overall with a 31" scale). This hand made instrument has spruce top, mahogany sides and back, and is equipped with Guild Phosphor Bronze acoustic bass strings. Guild expects the flat-top bass to become popular with strolling entertainers, upright bass players in chamber jazz and lounge combos, and with non-electric groups

seeking a new look and sound (Guild Musical Instruments, 225 W. Grand St., Elizabeth, N.J. 07202).



Said to be the finest commercially available synthesizer on which four notes can be played simultaneously, the new Oberheim Polyphonic Synthesizer Programmer is designed to operate in conjunction with Oberheim's four- and eight-voice units. Settings can be made from a central panel and may be stored in a memory. The unit is described as four complete synthesizers controlled by one 49-note keyboard which can generate independent control signals for each expander module. An output mixer allows a stereo pan to be generated. Pan pots may be used to produce a stereo spread, and the electronics may be expanded to eight voices.

The new Polymoog keyboard (\$4495.00) is a polyphonic synthesizer with the capability of playing any number of notes simultaneously through the use of an electronic chip which serves two VCA's, a VCF, and a contour generator under each key. This also provides each key with independent volume response, attack and brightness depending upon how the key is struck. This makes the Polymoog the first totally electronic keyboard with "piano touch." Like other synthesizers, the Polymoog can be programmed, plus it can also be set to any of eight pre-sets (piano,



strings, harpsichord, organ, vibes, funk, brass, and clav.) with four additional sliders delivering variations on the pre-sets. The Polymoog has a signal/noise of

90 dB and it is compatible with most other synthesizers (Norlin Music, 7373 N. Cicero, Lincolnwood, Ill. 60646). Optional poly pedal available (\$295.00).

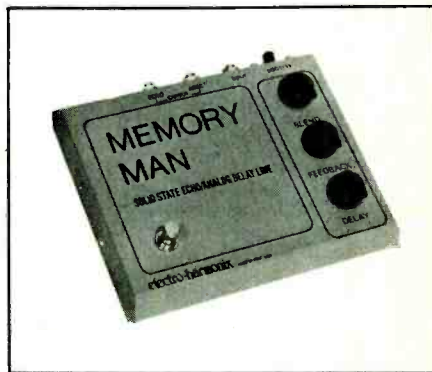
AMPS... Kustom has three new amplifiers designed for both the beginning musician and the professional guitarist. The Kustom V Lead Amplifier features dual inputs (single channel), reverb control, one 12" speaker and 35 watts RMS. The Kustom V Bass Amplifier (\$149.00) puts out 35 watts RMS, through a 12" bass speaker. Both amplifiers are small, portable and are equipped with line output capability, allowing the signal to be fed either into a recording studio board or into a sound reinforcement mixer. The Kustom V Public Address Amplifier (\$289.00) features 4 channels and 130 watts RMS, individual gain, high and low EQ, reverb and master volume and reverb controls. The unit includes an inter-connect for coupling and it is compatible with most Kustom PA system columns (Kustom Electronics, 1010 West Chestnut, Chanute, Kansas 66720).

Yamaha's G50 (\$279-389), B50 (\$355), G100 (\$499-599) and B100 (\$280-499) series of guitar and bass amps feature FET circuitry which the company claims provides the tonal characteristics of tube amps with solid state electronics. This is achieved through the duplication of triode tubes' natural tendency to emphasize even ordered harmonics rather than odd numbered overtones brought out by conventional transistors. Other features include continuously variable distortion and brightness controls (except on B50s), independent bass, mid and treble controls, wide range tremolo with separate speed and intensity controls, and pre-set volume for rapid accurate level changes. The amps are available in a wide variety of power and speaker configurations with 50 or 100 watts through various combinations of 10", 12" and 15" speakers (Yamaha, Box 6600, Buena Park, CA., 90620).

ACCESSORIES... Two new effects pedals from Morley: The Pro Phaser or PFA unit (\$219.95) features four continuously variable controls which allow individual adjustment of phase travel, phase centering, harmonic content and phase rate (normal or auto) from 1/10 to 10 per second. The unit's indicator lamp displays phase rate and depth while the adjusted signal level produces constant output regardless of mode so there is no loss of volume between straight through and phased signal. The

Morley PWA Auto-Wah Pedal (\$149.95) incorporates three related effects onto one pedal: volume, wah and automatic wah. The unit uses LED devices to control functions enabling the user to set the role of sweep (1/3 to 15 per second) while the continuously variable controls can be set for length of sweep and center point. LED's indicate auto vs. conventional mode and wah vs. volume effect (Morley Electronics, 2301 W. Victory Blvd., Burbank, Calif. 91506).

The Memory Man (\$230.00) is a compact electronic echo/analog delay line. Electro-Harmonix' new unit can produce delays from 5-320 milli-seconds with no



moving parts. Stereo outputs enable the musician to send echo to one amp and direct to another providing an intense stereo effect. The Memory Man's variable delay and repeat controls allow the production of effects including slapback, long repeating echoes and automatic double tracking (Electro-Harmonix, 27 W. 23rd St., N.Y., N.Y. 10010).

Sescom's Split Matcher (\$38.15) is a direct box which allows the guitarist to plug directly into any PA system, mixer or recording console rather than miking the speaker system. The unit features a balanced lo-impedance output with a ground lift switch, amp/pickup switch and filter switch for bass guitar (Sescom, P.O. Box 590, Gardena, Calif. 90247).

The Boss Triple Tier Stand for keyboards (\$149.95) is designed for the multiple keyboard musician. This chrome plated heavy-gauge steel stand allows independent adjustment of each keyboard's height and angle, and it is designed for rapid set-up and breakdown (Beckman Musical Instruments, 2117 Yates Ave., L.A., CA. 90040).

The Badass Bass Bridge (\$40.00) is a massive weight bridge designed to provide for substantial gains in attack and sustain.

(Leo Quan Badass Musical Products, Berkeley, CA).



By Don Ketteler

Photos by Peter Cunningham

New York City's Bottom Line cabaret opened in 1974. Since that time it has become a leading spot for performers in search of quality sound and relaxed setting.

Mr. Ketteler, who operates the club's sound system presents here the background and basic working situations at the Bottom Line. MR is considering making this the first in a series of articles dealing with sound reinforcement systems in action. We would appreciate your comments.

Before discussing the particulars of sound reinforcement at The Bottom Line, let's consider the physical accommodations which were built to allow and to facilitate maximum production quality.

The Physical Construction

The stage itself had to be acoustically treated to control feedback precipitated by multiple stage reflections and to keep band levels from running amuck. In order to eliminate as much reflected sound as possible, the stage is fully carpeted and has an upstage wall designed as a full frequency acoustical trap (See Figure 1).

The backstage side of this wall utilizes two adjoining layers of gypsum sheeting, one 3/4" and one 5/8". Latex backed carpet covers the stage side of the wall, and the cavity formed by gypsum and carpet is filled with fiberglass. This construction enables high

frequencies to be absorbed by the pile of the carpet while lows are partially absorbed by the vibration they initiate in the flexible carpeting. The fiberglass filler dampens this vibration and further absorbs residual low frequency energy in the cavity, while the latex backing serves as an airtight membrane to confine the rear radiation.

Design parameters regarding the audience's environment were incorporated to achieve a "live" sound with a minimum of standing waves. To contain low frequencies, acoustical traps were included on approximately 40% of the surface area opposite the reinforcement system. These fiberglass filled cavities are covered with 1/4" pegboard. Both the pegboard's pliable character and its holes, which act as an acoustical resistance, admit and trap prescribed frequencies, while resulting in the absorption of low frequencies and the reflection of hi's. Another 20% of the surface was finished with semi-absorbent rough wood to diffuse the sound and the remainder was left as a hard surface. This combination keeps the sound "live" while controlling the mush and boominess which multiple reflections and low frequency standing waves create. The room is further treated with wall to wall carpeting to minimize floor to ceiling standing waves. These measures were taken with the audience's absorptive and diffusive characteristics in mind.

Consideration regarding both physical construction and personal comfort was given to the dressing rooms, which are totally isolated units having no rigid contact (including electrical and plumbing fittings) with the building. Each room sits on closed-cell

neoprene of a density calculated to compress thirty percent under the weight of the room. The wall studs are staggered and the inner and outer walls are independent of one another (See figure 2). The air space separating the two is filled with fiberglass. The dressing rooms are entered through a sound lock with seventy-five cubic feet of dead air space.

The objective acoustic attenuation for the dressing rooms falls around 50 dB, assuming a backstage SPL of 110 dB and normal conversation at 60 to 70 dB. This design provision allows those in the dressing room to think, tune or practice and yet not be interrupted by on-stage levels.

Sound Reinforcement

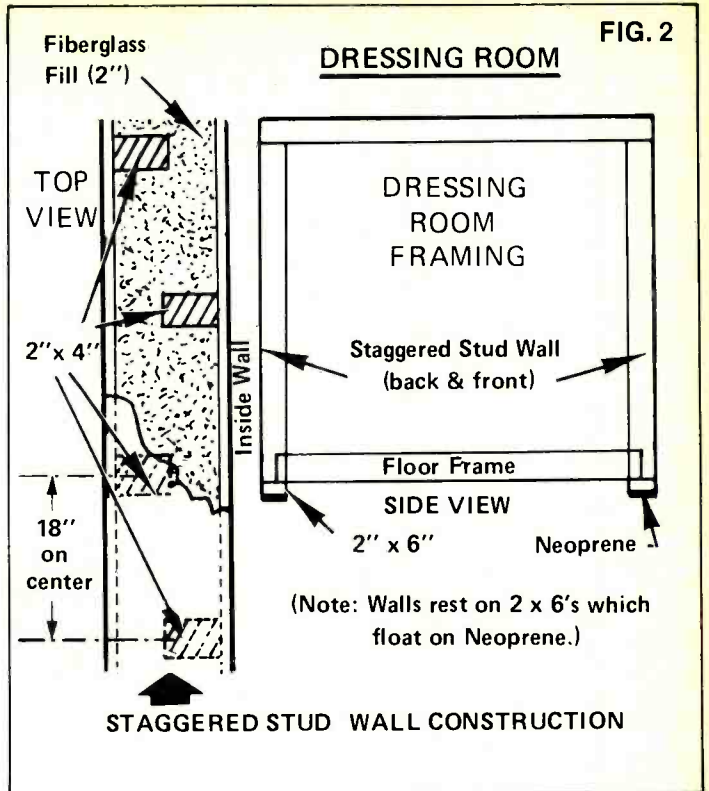
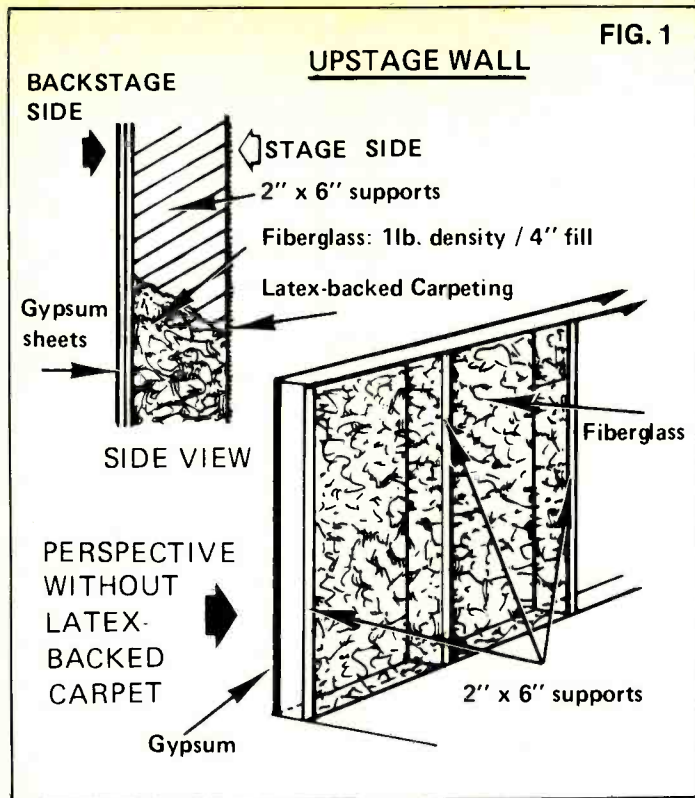
Reinforcement, by definition, means to make stronger or more compelling. This presupposes that the music is not loud enough to be heard everywhere it's intended to be as in the case of a large auditorium. Sound reinforcement at The Bottom Line, however, does not enjoy such simplicity.

It seems everytime a group loads in at the club, the stage crew has the dubious pleasure of lugging in enough equipment for a Madison Square Garden performance. Failing to recognize the limitations of a small room often leads to sound levels being generated in excess of 120 dB SPL into every nook and cranny—with no reinforcement. This makes my job difficult.

Comparatively small volumes in musical reinforcement, as opposed to the gargantuan proportions of an auditorium, demand a different approach. In the larger context, standard

OK, what's the bottom line?





Dimensions and inner construction specs of upstage wall and dressing room.

operating procedure for mixing dictates that the console be far enough from the stage for the mixer to not be overly influenced by the performers, yet close enough to keep in touch with the music. His job is to reproduce a reasonable facsimile of how the band would sound if they could provide adequate coverage to the entire listening area on their own. The group, under these conditions, has little control over their balance and only partial control of their sound. This arrangement can only be successful when left in the hands of someone totally familiar with the group's material and how they want it to sound. This success is qualified because it disregards the spontaneity and flexibility of the performance—which suffers.

In smaller rooms the reinforcement system's dominance diminishes. Sometimes it disappears. When a group cranks massive amounts of wattage into an area of small volume the system may be at their mercy. Under these conditions, we lose control of the instrumental music and reinforcement becomes selective. The *music* is loud enough to be heard everywhere it should, but not so for the vocals. The situation becomes a search for an acceptable balance between the band's instruments on stage and their vocals in the system. This may prove to be

awkward in many ways. If there are many vocal mics in the sound field compounding the instrumental bleed problem, or a particularly soft-spoken vocalist who is unable to put as much signal into the mic as the amplifier behind him or her, the instrumental music is inadvertently integrated into the reinforced sound. Even under ideal conditions there can only be so much gain before feedback—if the band is above your thresholds you must grin and bear it. Diplomacy becomes one of the handiest tools in your kit. Tell the band recent nuclear tests in the vicinity registered readings 5 dB below those on the floor during their last show.

The assets a smaller environment provide, usually outweigh the potential abuse inflicted by irrational and obviously bedazzled musicians. No one mixing a show in a large hall can predict spontaneity or foresee extemporaneous arrangements—therefore, what you hear is a mixer's interpretation. In the smaller club though, the band is in control and accountable for most of what you hear. This direct contact goes beyond being a musical advantage. It also provides the magic of physical nearness to the creative act. Nothing can quite reproduce what it's like to see expressions, mannerisms, and even mistakes which the intimacy of the club setting allows. It is the au-

dience and artist literally face to face.

Although there is ample power available at The Bottom Line for the reinforcement system to be competitive with the instruments of a band, it becomes more increasingly difficult to use as the number of open microphones increases. Keep in mind the dimensions of the room and their restrictions. It is only 37 feet from the front of a 12' x 22' stage to the wall behind the mixer. The club has 3400 square feet of floor space in the listening area, and a ceiling height of 16'3". Any microphone becomes susceptible to exaggerated amounts of sound level and inevitably hears too much of itself—causing immediate feedback.

At this point I exchange disgusted looks with the band's manager who, while removing small patches of hair from his scalp, wants to know why he can't hear the vocals and why I purposely allow the system to squeal and howl so much. Feedback in such a limited environment has an amplified potential for nagging recurrence.

Given the incredible range of talent and musical idioms that pass through the club, the degree of reinforcement difficulty changes greatly. Acts vary from single vocals with no monitoring, to folk ensembles with multiple vocalists and acoustic instrumentation, to hard-core rock and roll. Surprisingly,



Mighty Clouds of Joy perform for "Bottomliners."

rock music reinforcement/monitoring does not necessarily pose the problem that large acoustic acts, which might require excessive amounts of monitor and house gain in many channels do. The reason for this seeming contradiction is the significantly lower vocal and instrumental levels at the microphone for acoustic acts, versus the high level for a typical rock and roll act. Consequently, more gain is required to achieve house levels. These characteristics combined with the low ambient performing level, which will not mask any instability in the reinforcement system, exemplify why maximum control of the signal is imperative. Control is obtained by the insertion of 1/3 octave filters and a parametric equalizer in both the house and monitor circuits. Both processing instruments provide such extensive notching, filtering and contouring capabilities that I have yet to work a show I considered unredeemable.

With some experience and an understanding of acoustical phenomena, one can control unstable frequencies without audibly affecting the signal. Remember, the ear's sensitivity to bandwidths of 1/3 octave or less is limited. With the parametric, which has bandwidth control from 1/4 to 3 octaves, and a 1/3 octave filter set, one may selectively reduce the gain of the system within troublesome bandwidths without discernibly affecting the program material. This sort of signal treatment is critical and poten-

tially detrimental if the technician gets caught in the great circle of feedback filtering—filters down, gain up, filters down, gain up. . . .

One must develop the ability to recognize the point of diminishing returns and not remove more than the minimum required to control feedback. The aim is to deliver intelligible information through the monitors for the performer and aesthetic information through the main system for the audience.

Overfiltering does allow you to run your master at 7 instead of 5, but there is no advantage in that increase if it has been obtained with excessive signal manipulation and at the expense of the above-mentioned considerations. This manipulation manifests itself not necessarily as clipping, or harmonic or intermodulation distortion, but as an artificially processed sound. Listen and make sure you can differentiate and recognize where to draw the line—in this area, experience is the only teacher.

The Monitoring System

Monitoring the stage well probably provides more return work for reinforcement companies than any other single aspect of the job. Good stage monitors and flexibility in monitor mixing are no longer casual additions to a system, but a necessary complement. Monitors are serious business. Musicians are demanding, critical and

sometimes unrealistic as the search for the ultimate monitoring system continues—The Bottom Line is hardly an exception.

On a stage 12' x 22' there just isn't a lot of additional room for massive monitors. After the equipment of two bands has been shoved here and there, we find vacant floor space and sight lines at a premium. Vocal mics for lead singers and standing musicians are usually at the downstage apron with the performer right behind, approximately two feet from the edge of the stage. There is certainly no space in front of him to put a monitor of any size.

What we have done, with thoughts towards maximum flexibility and quality in sound coverage within this limited space, is to hang a bi-amped monitor system among the front stage lights. This puts two EV TL-806 low frequency speaker systems and a JBL 2440 driver and 2350 horn about eight feet from downstage center at ear level. Therefore, the stage is less restricted and more visually appealing, and does not compromise our monitoring capabilities.

There is, however, no way that two 12" cone-drivers and one high-compression driver can satisfactorily cover the entire stage area under demanding conditions. Filling out the monitor requirements are four passively crossed Community Light & Sound NC-12 boxes that are placed (wherever necessary) on the stage in a short throw, minimum coverage situation. These either reinforce the overheads in a high-level context, or put information in places insufficiently covered by them—as in the stage corners.

With these distribution arrangements, and the flexibility of our console, we can provide three independent monitor mixes—one bi-amped and two full-range.

Console Capabilities

The mixing console at The Bottom Line was custom-built and designed by John Chester of Chaos Audio in New York City. It was felt with the board, as with the system generally, that because of the constant use and the peculiar acoustic environment of the club, we would require something tailored to our needs, and dependable both electronically and mechanically.

The board has 15 input channels and 5 submasters. Each input channel includes an input sensitivity/pad control with 0 to 40 dB of gain from mic level,

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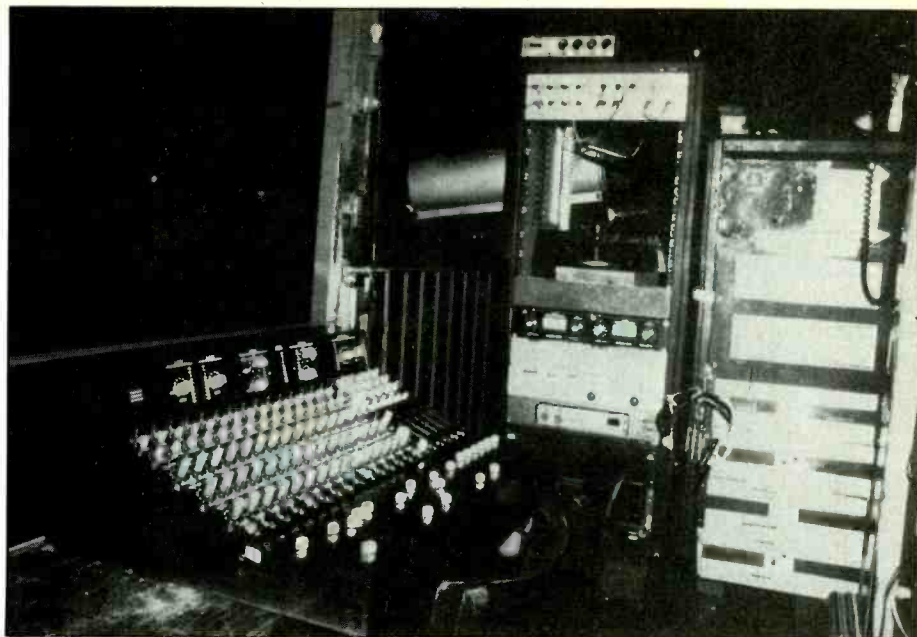
CIRCLE 76 ON READER SERVICE CARD

mute switch and overload indicator, which monitors the mic preamp and tone control amplifier. The overload indicator design includes a 1/10-second latching circuit so that one may see overloading transients before one hears them. The preamps and combining amps are all discrete circuitry to keep noise at an absolute minimum.

Besides the send to any one of the five submasters there are also four other independent sends labeled monitor one and monitor two and stereo. Monitor two is pre-fader while the other three are selectable. These busses are electronically equivalent except for the additional panning ability in the stereo circuitry. They may be used as they are labeled, but are not limited to these functions. They may be incorporated as special effects sends, extra monitor sends, as the source for a stereo tape of the performance etc.

Each input also has a two-band, peaking equalizer. The low-frequency inflection point is 130 Hz. The hi's are selectable at either 4 kHz or 12 kHz via a toggle selector switch.

It was felt that extensive tone control on the inputs was an unnecessary expense if it was available on the submasters, which include Automated Processes 3-band reciprocal equalization, with selectable center frequency and shelving. Traditionally, submasters are used to facilitate control by grouping horns, vocals, drums or whatever onto one fader and overall equalizer. This does happen. But because of the previously mentioned peculiar reinforcement circumstances at



The console is designed and custom built by Chaos Audio.

The Bottom Line, it is not unusual to exaggerate control by having only one input assigned to a sub-master.

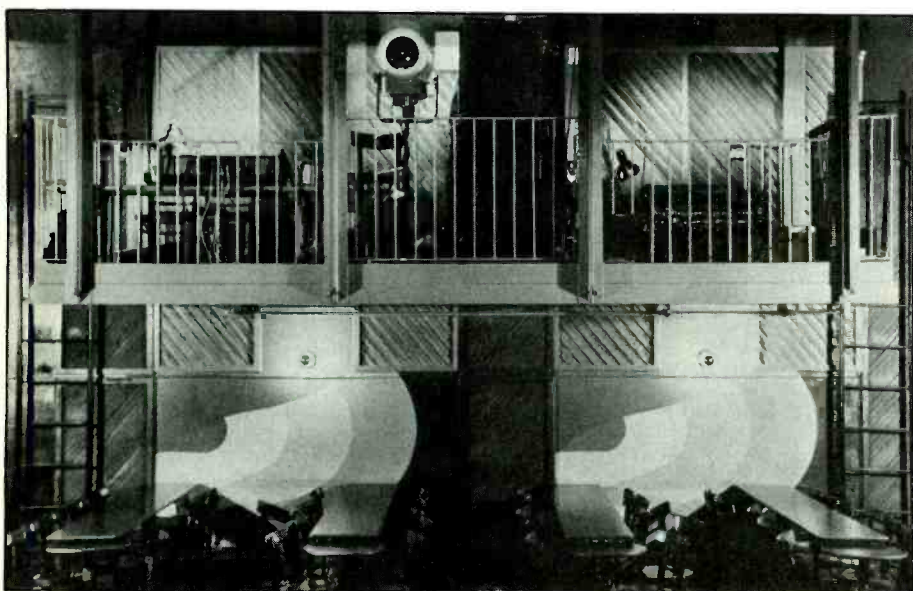
Along these lines, we also wanted separate accessibility to the sub-master tone and fader. With this ability, made possible by connectors on the back panel, we may insert the equalizer into a monitor send, or something completely divorced from the board, while not disabling the submaster's grouping capability. Since reinforcement at the club is selective, this set-up allows more control of a specific signal while sacrificing only the tone control of some group of instruments in need of little or no support.

Most interfacing points on the board

are monitorable by means of meters and/or headphones. In addition to having their own overload indicator, all inputs and submasters come up on a solo buss—post-tone, pre-fader. All solo functions are independent of other board operations. The solo buss has its own meter and a position on the headphone selector switch. Other headphone positions select—main, monitor 1, monitor 2, left, right, stereo left and right, aux 1, aux 2 and external. The auxiliary inputs are separate 100 kHz ohm line level-inputs which may be used for additional mixers or tape decks. They share a tone control and operate independently of the main output fader, so that we can utilize them for music or announcements without turning on present microphones.

The external headphone position is accessible via line-level input connectors on the back panel of the console. With it, we may plug any external signal source into the headphone system and listen to it. We use it to listen to the parametric and 1/3 octave filters.

The submaster combining amp, which normally corresponds with the input to the Automated Processes equalizer, is monitored by an overload circuit and indicator LED. The equalizer's output goes to the submaster fader whose solo button allows the operator to both see and hear the signal spacing via the solo buss. All five submasters are adjacent and have their own output meter above the fader enabling one to visually compare the relative levels of the groups that combine to determine the complete



A view of the sound "perch" from the stage.



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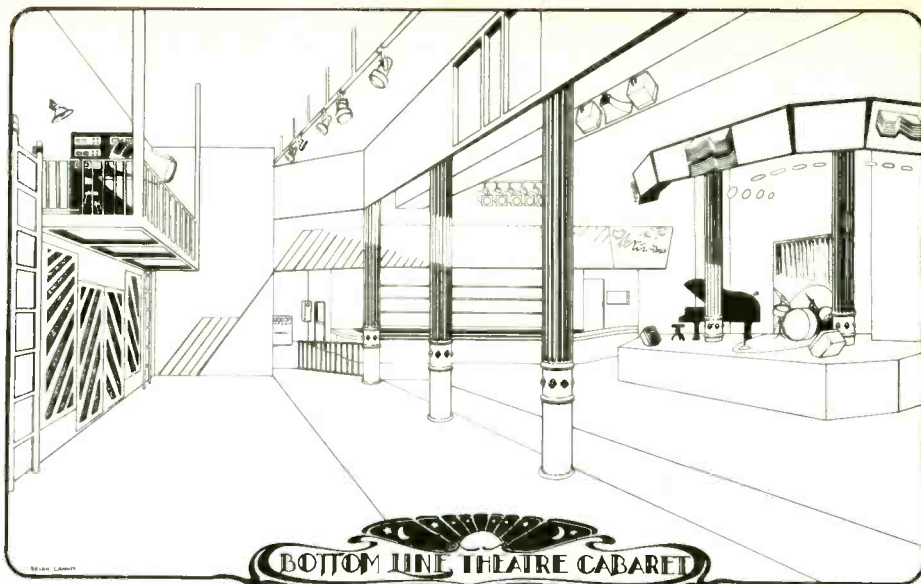
CIRCLE 39 ON READER SERVICE CARD

output signal. The submasters are then combined and appear up top on a separate output/meter section. This panel includes meters and masters for stereo left, stereo right, monitor 1, monitor 2, the solo meter and the main meter. The stereo and monitor combining amps are also monitored by overload indicators which alert the operator if there is too much signal being assigned.

All meters on the console are LED type with 10 indicators from -30 to +6 vu. I consider the extended range, particularly from -30 to -20 vu, a necessity in making intelligent decisions concerning the mix. There is too much pertinent information in that range, whether it be the real level of a soft passage or the noise from special effects gadgets, to be ignored. Complete monitoring ability on the console will give you more information, which in turn will allow you to do a better job.

"The Bottom Line Is . . ."

In wrapping up, I'd like to comment on the choice of equipment at The Bottom Line and why it was chosen.



At the club, reliability, suitability and to some extent, as always, cost were the major factors in determining equipment choice. For instance, speakers were chosen for their dispersion characteristics and the ability to deliver clean levels of 110 to 120dB SPL on the floor. Amps were selected to yield required, but safe levels to the


transducer, and only one to a speaker is used. The processing equipment is necessary, not extravagant and along with the console, provides control.

The Bottom Line is open 340 plus nights a year, with two or three new acts a week. Our equipment must be reliable, and it must be capable of doing just about anything—well.

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The Clair Brothers, based in Lititz, Pa., is a sound reinforcement company which began in business twelve years ago. It is an oddity in the hype-oriented rock world, neither advertising nor seeking clients. Their business comes by word-of-mouth from satisfied customers like Led Zeppelin,

Elvis, Peter Frampton, Elton John and the Beach Boys. Clair Bros. has been responsible for many of the important changes in touring sound systems and presently is one of the busiest sound companies in the U.S. MR interviewed Roy Clair while he was on tour with YES.

Modern Recording: How did your interest in sound reinforcement begin?

Roy Clair: It started as a hobby. My brother and I did the high school's hops during the early days of sound equipment.

MR: Like using University bell horns, 30 watt drivers and Bogen amps?

RC: Yeah, well no. Even then we were one of the first to start experimenting with high fidelity. We used some Altec bass bottoms and the like—things that weren't being used at the time. We started doing local and then national bands. In those days, groups normally used the hall's system. We went on to do sound for shows at our university. A group came and liked the job we did and started taking us throughout the country before it was "in" to carry your own sound system around. That was twelve years ago and the group was The Four Seasons. We've been in business ever since.

MR: How do you account for the fact that although you've been in business for twelve years, you're not exactly a household word?

RC: Clair Bros. has never, and will never, do any advertising. We're a very non-commercial company. In most cases, every place we go when people ask who's doing the sound and they're told, "Clair Bros." they say, "Who?" Yet, we're probably the busiest sound company right now. Our name isn't on any of our cabinets. We have no literature. We have no pro-

paganda. When people come to our shop, they're very impressed because it's neat and businesslike. Not make-shift and not what most people associate with rock and roll—a dingy barn or a dilapidated garage or something. We have a factory complete with offices, loading docks, electronic testing facilities, complete woodworking shop and spray booth. Everything is immaculate. It's just that that's the way Clair Bros. is—if you're going to do something, do it right.

MR: How many people comprise Clair Bros.?

RC: Sixty-five. We have ten touring systems, although only seven engineers. All our systems are different, depending upon the needs of the artist. In a sense they're interchangeable to the extent that what works best for the artist's sound is the factor. We have two basic systems: a bass reflex and a horn system. We presently have five shows out on the road—Yes, Elton John, Chicago, Beach Boys and Elvis. Right now we're doing a lot of outdoor shows, which need more systems because each show incorporates four systems.

MR: Care to make a comparison between indoor and outdoor conditions?

RC: Well, outdoor is easier because there are no acoustics to contend with, it just goes out. You do need more equipment because of that. Bass reflex systems work well outdoors. Yes is a good example of that. Indoors, a bass reflex system is unacceptable for their

sound, but outdoors it works well.

MR: I'll come back to that statement, but first, how did your association with Yes come about?

RC: There are about five sound companies in the U.S., and Yes, as they grew in stature, sophistication and popularity had the opportunity to use them all. Apparently our sound system suited them best. We started working with them four years ago, handling their first solo headlining tour, the "live" album, etc. We do their sound worldwide—Australia, Japan, England—anywhere.

MR: Any problem going from country to country?

RC: No. Nowadays it's all pretty much perfected. At one time you had the problem of going to another country and discovering they only had 220 instead of 110, but with generators, transformers, it's all taken care of. Plus, bands themselves are very businesslike today, using advance men to troubleshoot, so that between what they come up with and what we already know, it's covered.

MR: What problems does Yes create for you?

RC: I would categorize their show, not the music, but sound reinforcement, with The Who, Led Zeppelin and Genesis. A lot of sound at low distortion. In comparison, Led Zeppelin is a simple show to do—just bass, drums and guitar. Yes has a difficulty factor in that it's very busy music with the system working very hard at all times. So, the system has to be very rugged

and capable of good separation. Hence, the better the acoustics, the better Yes will sound.

MR: Getting back to your earlier statement, you said that a bass reflex system isn't compatible with Yes' sound, leaving me to conclude that they use a horn system. What's lacking in the bass reflex?

RC: Yes uses a horn system because a bass reflex system won't handle the low end. Most groups aren't fussy about the low end, 40, 80, 150 cycles. We carry a lot of gear for those frequencies.

MR: Such as?

RC: Well, primarily we're the only company crazy enough to carry around 'W' boxes. They're an RCA-Harry Olson enclosure designed in 1935. I redesigned it to make it more efficient. They're very big, very heavy but there's no other way to produce a 40 cycle note with a particular size horn. It's a full length, seven foot deep folded bass horn.

MR: What comprises the rest of the system?

RC: For the rest of the cabinets and concept, we're virtually pioneers. We're the first to come up with the 12 inch cone, putting a 200-watt cone where there used to be only a 100-watt cone. It's the same, only twice the power in the same size. We're the first to use a four-way system.

MR: Is that like quad?

RC: No, it has nothing to do with quad. It has to do with crossover networks, taking a frequency range from 40 cycles to 20,000 cycles and dividing it into four separate areas. You get different speaker cabinets doing different things. For example, if Chris Squire and Steve Howe hit notes simultaneously, one speaker doesn't have to do both functions at the same time because we have two speaker cabinets to handle each person. But before, there were only three-way and two-way systems with one speaker trying to do all that.

MR: Please continue describing the system.

RC: Right. OK, we use ninety-six 12-inch and twenty-four 18-inch speakers for low- and mid-range; compression drivers for mid range and compression drivers for high frequencies. We use ten 'W' boxes on this indoor tour, and normally twenty-four outdoors.

MR: What type of speaker?

RC: Oh, all JBL. The 18's are K151's and the other are JBL 075's or 2405's, whichever you want to call them.

MR: All standard, then?

RC: Oh yeah, they [JBL] won't make anything special for you.

MR: What about the weight factor?

RC: The system weighs about 15,000 pounds. The most important factor for a touring sound company, and I can't stress it enough, is to get the most

volume for as little weight as possible. When you get down to it, that's the greatest art of all because the group has to pay for the shipping of equipment. Clair Bros. is known for being able to condense a lot of watts into a small area. The 'W' boxes, for example, need a lot of volume.

MR: What's your power source?

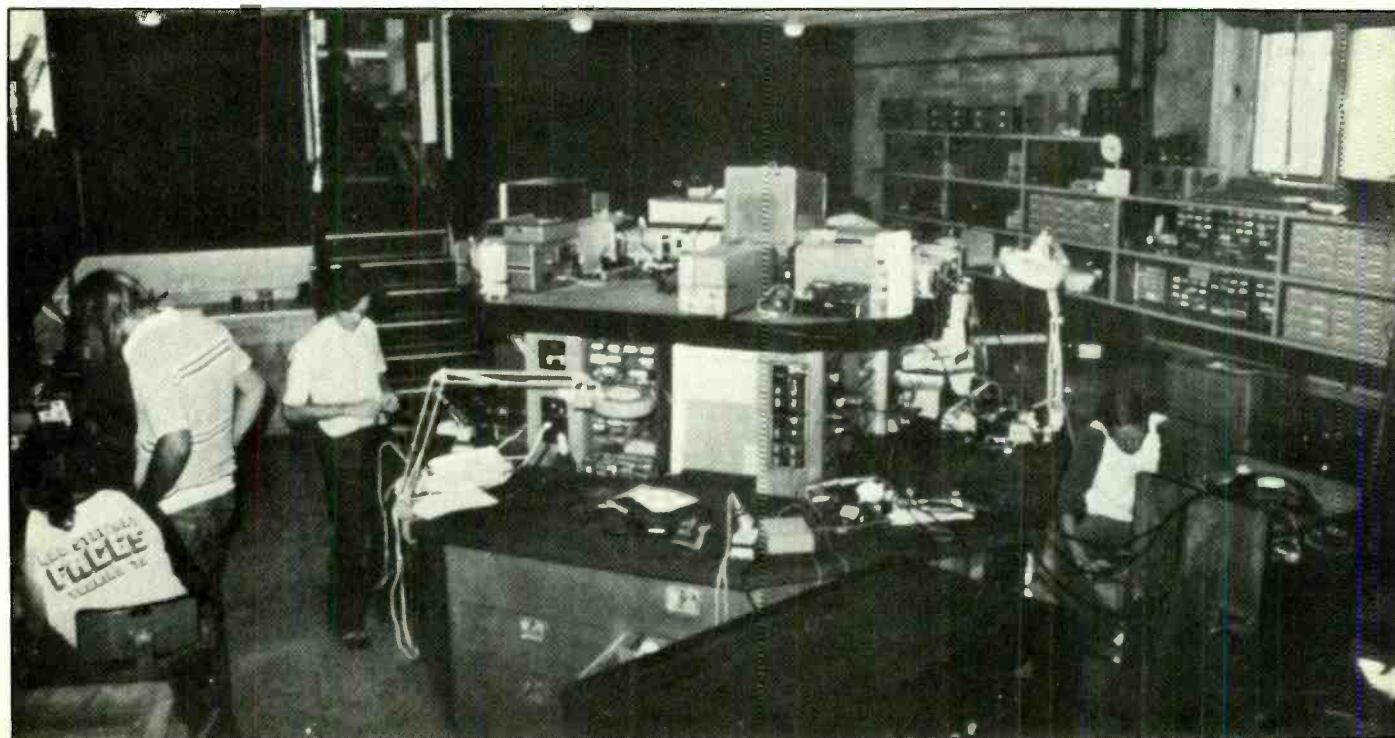
RC: We use twenty-four 700-watt Phase Linear amps. They're stereo, so that's like 48 X 700 watts, with an outdoor potential of four times that amount.

MR: What type of board do you use? Is it specially designed?

RC: A P.A. sound board is specially designed for audio, but not necessarily for the group in question, or Yes in particular. Everyone in the industry now needs almost the same capabilities. No group is unique as far as boards are concerned. What is unique is the equipment used in conjunction with the board. This particular board does have a few specialties added with Yes in mind. It has six returns, which is out of the ordinary but needed because Yes uses a lot of digital delays, AKG, echo, tape return, BX-20's, etc. It's 32-channel. Other than that, the necessities for a good road board are good EQ, good pre-amp and summing amp.

MR: Summing?

RC: That's just another name for combining networks. Really, other



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than that, they're all the same and don't have to be unique. It's very difficult to use a recording board for concert situations.

MR: What's the difference between a studio and P.A. board?

RC: Fall back functions. There is more in a studio board than you need. A 32-channel studio board costs, approximately, \$100,000. Whereas, a 32-channel P.A. board may not cost half as much.

MR: What type is this system's board?

RC: Midas; it's an English board. I heard it in England and bought one to check out the specs. It fulfills the requirements for a good board, which is to say, it doesn't overload, has separation and is capable of putting out so many amps without distorting.

MR: What does it cost?

RC: Usually, a P.A. board costs a "grand" a channel, but the Midas, a 32-channel board, was in the neighborhood of \$24,000. Again, the most important thing is the basic sound. *Then* you can get into the gimmickry, like panning, etc.

MR: Do all your systems use the Midas board?

RC: No, we have other consoles. We do have seven Midas boards, though. Shortly we'll be coming out with our own console.

MR: Which leads to the question of whether Clair Bros. sells its equipment to other companies.

RC: I won't say that we won't sell, but up to now when you're busy renting—to contemplate selling. . . .

MR: You have to be concerned with a retail factory?

RC: No, we have the factory and storage space. It's just that when you sell, you have to maintain, and we don't have time to maintain others' equipment when we hardly have time to service our own. We have sold a system to Montreal for the Olympic Games to be used in the stadium. That was one of the first systems we ever sold. To my knowledge, since I was not there, there were no problems installing it.

MR: Is Clair Bros. contemplating getting into the recording studio aspect of the business?

RC: Possibly, but on a remote mobile level, if at all. It all depends on the new console.

MR: When is it due?

RC: Well, it was going to be ready for the Yes tour, then for Elton John. It was to have been ready in May.

MR: What have you incorporated in to it that isn't in, say, the Midas?

RC: The new board is really sophisticated. The quality and engineering is amazing, equal to none. To begin with, there's a sensing device which will sense clipping at any point of the console. If anything is clipping, you'll know it. No guessing. I mean, it's *there*. A light goes on. A light will go on when you plug in a mike, so you don't even have to test it. It will have a phantom power supply, as the Midas does. It will have a sophisticated metering device for each channel, using a very expensive new meter which hasn't been introduced on the market yet. It will be able to tell you the RMS and peak at the same time, for each instrument, by varying degrees of light. You'll be able to mix by the meters if you wish. The metal work is outstanding. It folds up in a case. Push one button, it pulls out. Another button and it folds out. It eliminates your having to pack it away. It does it itself. It's all very mechanically sound, working on a stress principle. It's expandable, to fifty channels, or down to eight. Modules can be added or subtracted with ease.

MR: In using the Midas board with Yes, for example, how many of the 32 channels do you use?

RC: Twenty-eight.

MR: Yes is known to use anywhere from twenty-four to thirty keyboards during a performance. What problems does this create for mixing?

RC: None, actually, for it's first mixed down on stage, mixed down to six channels which they send us, so it's actually very easy.

MR: How large a crew do you need for such a system?

RC: Usually, this system is handled by three people. It's an economic fact that when you're in competition with other companies, you're always trying to cut costs. However, on this tour we have five people, which is a lot for a tour this size.

MR: Do Yes personnel handle any technical aspects other than lights?

RC: Yeah. Each member of Yes has a roadie assigned to him to related tasks. For example, Patrick Moraz's [keyboards] roadie is the one who mixes the keyboards down on stage and sends us six channels.

MR: How does this tour's system differ from last year's system?

RC: Well, last year's tour featured a floor system mounted on risers. Eddie Offord ran the system. Eddie was, uh [contained amusement] unique. [Of-

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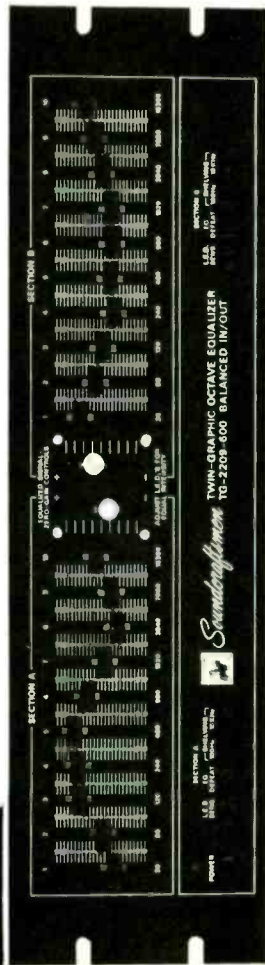
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ford, MR Oct/Nov. '75, is no longer associated with Yes, at least not on a touring basis.] This system is a hanging system which is more usual than unusual. We come in, hang the system, set up our amps, mics and monitor system. The monitor system for Yes is quite sophisticated. It has seven separate monitor mixes. Each member has his own mix, plus one member has three different mixes. The monitor mixer is manned by one of our people. His job is almost as important as the houseman's—pleasing the group on stage, which is totally independent of the house sound. John Restori and Neil Kern do the house sound for Yes. One person could handle it, but with so much going on in Yes, two are better.

MR: What kind of mics do you use?

RC: We use an assortment. We're probably the only sound company that does. We use Shure, Sennheiser, AKG, some Neumanns, some Beyer.

MR: Jon Anderson [lead vocalist, Yes] has a higher than normal vocal range. What mic works best for him "live"?

RC: A Shure SM58. Obviously, I think everyone would use condensers if they had the wherewithal to afford them. Condensers are a very expensive mic. The problem with a condenser is that the quality is such that they can't distinguish Jon's voice from the drums and instruments behind him. So, we use an SM58 because it has good rejection and close proximity when he gets on it. It's a good dynamic mic for vocals. The feedback susceptibility to monitors is low with the SM58. There are other dynamic mics you could use but they wouldn't function as well in front of a monitor.

MR: Do you use SM58's for all vocals?

RC: Right.

MR: What about instrument mics?

RC: Sennheiser 421's and 441's. The quality is good, very flat. They could be used for vocals if their feedback susceptibility weren't so great. You have to compromise.

MR: On drums?

RC: On the snare, AKG condenser. Overheads, two Sennheiser condensers, 441 and 421; the toms and front are Sennheisers as well.

MR: What do you use the Neumanns on?

RC: Grand piano, if there's not a lot of leakage, if we can close the lid.

MR: Any trouble with acoustic instruments?

RC: No, because we use Barcus-

Berry pick-ups on the acoustic guitars. We EQ them to get them to sound pretty good and loud enough for people to hear. Outdoors is no problem, but it's more difficult indoors.

MR: Next stop, how much does all this genius cost?

RC: It varies. The basic fee depends upon the wattage and the size of the system. The going price today is approximately \$2,500 a night, plus extras. Extras—right—could be anything. Plus, there's the cost of hanging the system, transport, hotel, meals, unions, etc.

MR: Do halls like the Seattle Coliseum present any problems?

RC: Well, all coliseums tend to accentuate the low end.

MR: How do you compensate?

RC: I have an acoustic analyzer. It's an instrument that I put white noise through. It specs out the hall, tells me graphically what's wrong and I compensate with graphic EQ. I use the analyzer throughout the gig in case any instruments have bad peaks, then I just pull them out. It's a visual aid and I've had quite a bit of success with it in past situations.

MR: How reliant are you upon a full house to enhance the sound?

RC: Most definitely, people help considerably in sound absorption. An empty hall is a nightmare. When a group wants to do a sound check in an empty hall I get very upset because you can't accomplish anything. Yes is a very professional group and knows that trying to do a soundcheck in such a situation is futile. They just tune and check their instruments.

MR: How much wear and tear is there on a system?

RC: A lot. Quite a bit of equipment has to be replaced. This system was brand new when the Yes tour started in May. All the speakers were brand new, as well as a lot of the compression drivers. I won't necessarily have to replace them all, but I'll have to do a lot of reconing in our factories. The wooden cabinets will have a lot of fatigue and will need patching and fixing.

MR: Why do you use wood rather than a composite?

RC: Composite substances are hard to mold. Some people have gone to fiberglass, which is easy to mold but difficult to work with, which is to say, only a select few will handle it because of the irritabilities—noxious fumes, etc. We are set up to work with wood. When made correctly, wood cabinets are non-resonant; they don't rattle.

Fiberglas has a tendency to resonate.

MR: Do you glue, screw...?

RC: We do a lot of gluing and stapling. We have automatic staple guns which have a glue substance applied with the staple, so they won't come out. Screws take too long, plus plywood and screws don't really mix. There is no engrain in plywood for a screw to hold. We take a lot of pride in our cabinet making and have quite a reputation for it. You can take your hand and hammer on any part of the cabinet and get a solid sound. That comes from a lot of stiffening and bracing. If it sounds hollow, it will reproduce sound that way.

MR: Who does your designing?

RC: I do most of the designing because I'm interested in woodworking and most designs come from woodworking. The basic designs are actually laid out in audio encyclopedias, so to deviate from them would be silly since they've already gone through the various stages of development. The only difference is that in the '30's and '40's they weren't made with power in mind.

MR: How long do you need to prepare for a tour?

RC: Well, any sound company can rally in a week, but the longer you give us, the more prepared and organized we'll be. We'll do a tour, or a show regardless of size, as long as it's financially feasible. We turned down a Bowie tour because he had a specially designed stage-set that was ridiculous in terms of where they wanted the sound system.

MR: In your preparation, do you listen to the records of the artist whose tour you're about to undertake?

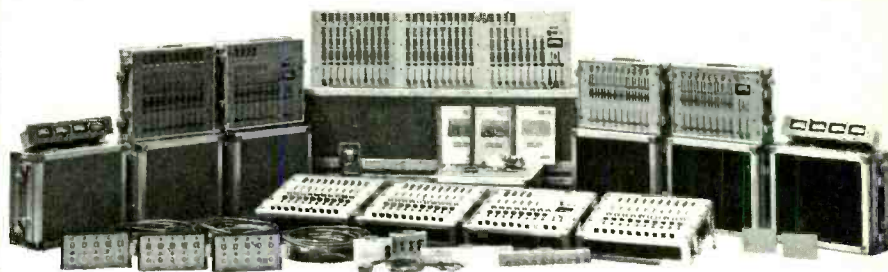
RC: Yeah, it helps to know the music and when the solos come in. Any one of my engineers is familiar with his artists.

MR: You make it sound so simple.

RC: Well, I'd like to make it sound more difficult. Actually, it's difficult for those who haven't been associated for a length of time with sound reinforcement because you can make numerous drastic and costly mistakes at the beginning, so therefore they don't get the other chance of doing it methodically and correctly. You've got to remember that we've been doing it for twelve years. So what appears to be hard for some, like when we forced all of them into four-way systems to stay in the business, we've already mastered. Now we're working on the fine points.



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Early this year, engineers at Sony Corporation came up with what they considered a major advance in recording technology—a king-sized cassette which not only could record and play back music with the fidelity of open reel tape, but which, unlike the conventional cassette, is easy to edit, can be automated and preprogrammed. In short, a cassette which has distinct advantages over the standard compact cassette.

Sony then persuaded two of its affiliates, Meriton and Aiwa, to back the system. It offered licenses to other Japanese manufacturers, and Teac, JVC and Panasonic responded. Before long, the backers were proclaiming a

new tape system which ultimately might replace the compact cassette for high fidelity music reproduction.

Unfortunately, so far the backers of the system have had trouble conveying their enthusiasm to others. Of Japan's four largest blank tape manufacturers, three—Fuji, TDK and Maxell—have decided to wait until there's a demand for Elcasetts before tooling up to make them. The fourth manufacturer—Sony, is busy grinding out three kinds of Elcasetts for sale

**WHAT
&
WHY?**

by Bob Angus

Built-in
reel locks?

is wide
wide the speed??

player/changer was more adept at pulling tape out of the cassettes and devouring it than at changing or playing, and the idea died. When it reappeared nearly six years later, it had undergone some startling transformations.

The new cassette, produced by Philips of the Netherlands, was a shrunken version of the old. Instead of recording at 3¾ ips, the ¾ inch tape travelled at 1 ½ ips. Philips introduced the cassette as a dictation system and tried to discourage its use for music reproduction. But before long, cassettes were not only carrying music, but doing so stereophonically. And over the course of the next decade, the quality of cassette reproduction improved to the point where in some respects it rivaled that of records.

The compact cassette is not an ideal medium for professional use, despite the incursions it is making into broadcast studios and even recording studios. For one thing, the slow tape speed means a lower signal-to-noise ratio than is absolutely necessary. For another, the width of the tape restricts the use of things like cue tracks. The tape, because of its size and inaccessibility when it's in the recording deck, is difficult to edit. And there are mechanical problems such as uneven tape bulking, a less-than-perfect tape guidance system which can result in mistracking, and more.

So the engineers at BASF got busy a few years ago and came up with Unisette, a large cassette using quarter-inch tape and a recording speed of 3¾ ips (shades of Virgil Grantham). To overcome the tape bulking problem, they introduced an internal braking system which holds the hubs locked in place until released by the player. A magnetic stripe on the label could be used for automated programming. Tape accessibility was improved, and a series of punchouts similar to those provided on the compact cassette to prevent accidental erasure were added.

Then BASF set out to find someone to build equipment which could use it. The first company they approached, Studer, expressed interest and began work on a prototype. BASF already was having some equipment made to its specifications by Aiwa in Japan, and Aiwa agreed to make equipment if BASF would buy it.

A third manufacturer in Britain was reported interested, but failed to follow up. The result: by the spring of 1976, when the Sony-Technics-Teac consortium began talking about a rival cassette, there was not a single Unisette recorder on the market. When the Elcaset finally appeared, it proved to be ¼ inch deeper than the Unisette— just enough to make the two systems incompatible.

Actually, there are a number of other differences. Like Unisette, the Elcaset uses a series of pushout tabs—some 12 altogether, to govern such functions as bias and equalization, erasure lock, noise reduction and side detection. Unlike Unisette, the Elcaset's business end includes two hinged flaps which protect the tape when the cassette is not in use, but which swing out of the way when recording or playing so that the tape can be pulled out of the shell and threaded past the recorder head. The pressure assembly thus is part of the recorder, rather than being part of the cassette. The reasons for this include ease of editing, reduction of mechanical problems including wow & flutter and azimuth misadjustment. The availability of a cue track in each direction replaces Unisette's idea of magnetically-coded labels. Like the conventional cassette, the track layout is compatible for mono and stereo, and because of the increased tape width, the possibilities for compatible four-channel are greatly improved.

To see how all this works out in practice, let's take a look at the two Sony recorders, the only ones available at press time. The EL-5 is a two-head,

for its own name and that of Paris, Inc. When the public got its first look at the system at the Toronto hi-fi show late this year, the reaction was a polite yawn, followed by the inevitable question, "Who needs it?"

For the magnetic recording industry, the Elcaset became a reality recently when Superscope offered two Sony models for sale in the United States, priced at \$630 and \$900. Teac's first Elcaset model should be available shortly after the first of the year, followed by models from JVC and Technics.

Past and Present

The man who started it all was Virgil Grantham, an engineer with RCA's record division in Indianapolis. Back in 1957, somebody at RCA came up with the idea of encasing recording tape in a shell, eliminating the need for handling and threading, and the possibility of tape spill. Grantham came up with a cassette the size of a paperback novel, containing two hubs and a length of quarter-inch tape. Because the cassette could be stacked, the powers that be at RCA went to work on a changer/tape player which would drop them in sequence. Tape speed, incidentally, was 3¾ inches per second.

It soon became evident that the



Sony Model EL-5 Elcaset.

two-channel machine which claims a frequency response of 25-20,000 cps ± 3 dB with chromium dioxide tape. Wow & flutter is rated at 0.06% WRMS. Other specifications were not available at press time. The EL-7 has three heads, claims a frequency response of 25-22,000 cps ± 3 dB and wow & flutter of 0.04%. Teac and Technics have promised a number of interesting features on their recorders, but no details were available. As you can see from these figures, frequency response is superior to that currently available from cassette equipment, if not from open-reel decks.

The Question is Raised

So the logical question becomes, who needs it? According to Teac, the Elcaset may eliminate all but the most expensive, most sophisticated open-reel recorders and wipe out the most sophisticated of the compact cassette decks. Asked who he thought would buy his highly-sophisticated Model 860 compact cassette deck once Elcaset equipment becomes available, Teac's George DeRado replied, "nobody." DeRado and his counterparts at Technics and Sony believe that the Elcaset at 3 $\frac{3}{4}$ ips can do virtually anything open-reel can do at 7 $\frac{1}{2}$ or 15 inches per second, and that the convenience of not having to thread the machine will lure people who might otherwise buy open reel. The obvious sonic superiority of Elcaset over the best compact cassette equipment is expected to hurt sales of the Nakamichi 1000, Teac 860 and other equipment.

Officials at JVC and Sony, however, have much more ambitious plans. They intend to replace the compact cassette with Elcaset as a home entertainment medium, and have begun try-

ing to persuade record companies around the world to join them. Both companies produce records and prerecorded tape in Japan. Sony is affiliated with Columbia Records, JVC with RCA. Sony has assigned an executive, Hiroshi Kanai, to the project of building a suitable catalogue of music on Elcaset. One of his first assignments was to visit the CBS Records convention in Los Angeles last summer to convince Columbia to try the idea in the United States. CBS officials gave him a polite hearing, then turned to other topics.

JVC is several months behind with its music-on-Elcaset project, according to Toshio Inouye, the man who's directing JVC's Elcaset research. However, JVC officials have tried to talk RCA into giving Elcaset a whirl in the U.S. "There's no way we're going to introduce a new tape format at this stage," a spokesman for RCA told MR. "We're having enough trouble with sales in the formats we've got, and until the videodisc gets launched, we're not interested in anything else." A presentation was likewise said to have been made to Decca Records' chief

engineer Arthur Haddy in London with equally unsatisfactory results.

Another answer to the question of "why Elcaset?" comes from JVC's Inouye: "In the past, all of the standards for tape recording have been set outside Japan. The width of the tape, the tape speed, the design of the recorder for open-reel were all established in Europe or in the United States. When the compact cassette came along, the standards for tape width and speed, even for the tolerances in the cassette shell, were set by Philips, which licensed us to make the equipment. For the first time, the standards for a tape system are being set in Japan."

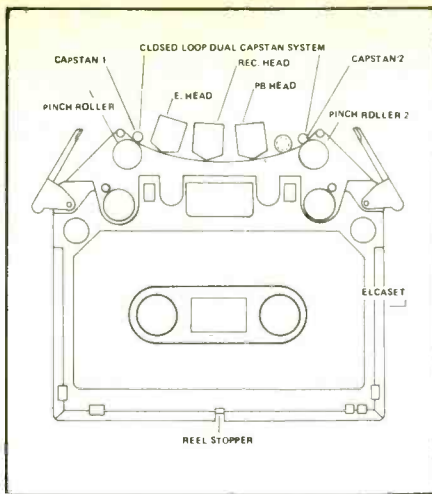
Like Philips, the Elcaset consortium has made a point of making licenses available to anybody who wants one, in order to encourage adoption of the system. Like the Philips agreement, that covering Elcaset spells out the smallest details, including hub diameter, use of pushouts, and fixes the recording speed at 3 $\frac{3}{4}$ inches per second. "What?" said the chief engineer at Teac when I called the fact to his attention. "Can that be right?" He had listed as one of the objections to the conventional cassette the establishment of a 1 $\frac{1}{8}$ inches per second as its only speed.

What About the Tape?

When it comes to blank tape, as we mentioned earlier, the situation is equally bleak for the system. Sony currently is making three types of Elcasets—one using chromium dioxide, one using a low noise conventional iron oxide, and one using ferrichrome. Each type requires a different bias and equalization, and coding on the cassette itself triggers adjustments



Technics Model RS-7500US.



Sony's Elcaset.

within the recorder. While prices weren't firm at press time, a ferric oxide C-60 was expected to sell for about \$6.95. "Mass production of these cassettes won't bring down the price all that much," warns George Saddler of Fuji Tape. "Remember, you've got almost four times as much tape and twice as much plastic as in a conventional cassette."

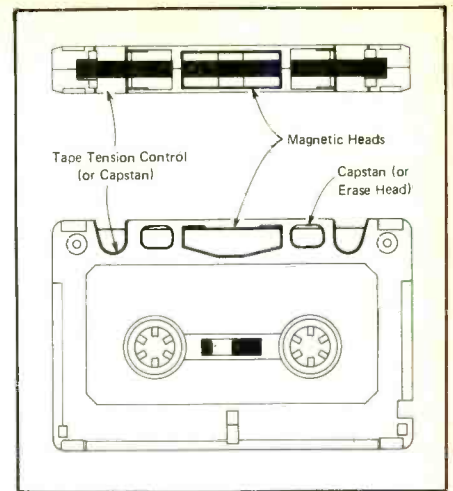
Saddler points out that since the Elcaset uses standard open-reel tape,

it may not be long before independent producers begin making Elcaset shells and buying his or somebody else's tape to put into them. "But it costs a great deal of money to make a mold, and we've got to be convinced that there's going to be a demand for these things before we invest that kind of money," Saddler explains.

The Elcafrisbee?

Other Japanese manufacturers have been just as slow to jump on the Elcaset bandwagon as the tape-makers. "We are not making Elcaset, but we will be interested to see what Sony, Teac and the others do with it," a spokesman for Pioneer president Yuzo Ishizuka told MR. Officials at Sansui, Kenwood and other companies generally agree. Meanwhile, officials at BASF are close-mouthed about the future of their Unisette and the possibility that they might scrap it in favor of the Elcaset.

The Elcaset has had two exposures so far in North America. At the Consumer Electronics Show in Chicago, it attracted flocks of curious dealers and



BASF's Unisette.

reporters to the Teac, Technics and Superscope displays. Most of those who saw it were non-committal about its future, posing the question which heads this article. The public got its first look in Toronto, where Technics showed the mock-up it had displayed in Chicago. Showgoers there seemed more impressed with the company's new loudspeaker line, and with another exhibitor who was giving away frisbees.



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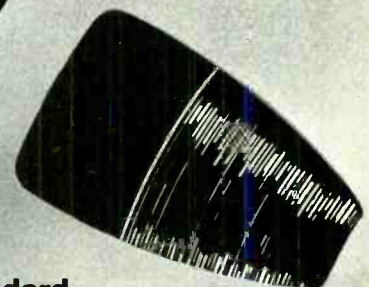


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The Studio Layout

The recording is over. Producer David Rubinson sits down and lights up a cigar. It's 4:00 A.M. and he has been at Wally Heider Recording Studios since nine in the morning, working on Phoebe Snow's new album during the daylight hours and shifting into Santana at night. But, then again, this is not exactly out of the ordinary. "I've been on a very difficult schedule lately. Everybody has been recording. Everybody. The Pointers, Herbie Hancock, Phoebe and Wah Wah Watson."

Well, who needs sleep? After all, what's so difficult about undergoing a two-week span of rehearsing Santana in San Francisco from 11 A.M. to 5 P.M., flying to Los Angeles at 5:30 P.M. to record Phoebe Snow at 7:30 that same evening and then back to San Francisco and Santana on a 3:15 A.M. flight? A philosophical attitude helps. "It isn't easy, but the point is that when things are ready to be recorded, they should be done."

The time Santana spent in the rehearsal studio was designed to facilitate the recording process because this album is being recorded "live." The way Rubinson likes best and the way he says engineer Fred Catero shows his true professionalism. "If you want to see Fred Catero at his very best watch him on a night like tonight or at the Phoebe session tomorrow—thirty mics wide open, with everybody playing all at once, and getting a good sound on every instrument. Making sure that the inter-dynamic dynamics of all the instruments on all the tracks are working constantly."

Such is the case this Wednesday night as Catero sits calmly behind the 28 input, 28 out MCI board, overlooking the crowded 20'x 34' Studio "C." Rubinson adds that this is his favorite room to do tracks in. "You can control the ambience of the room very well. You can liven and deaden portions of the room, the bass is nice and above all you can get a "live" sound."

A chief reason for the "live" sound in Studio "C" is the parquet hardwood floor. Also, as David stated, the room can be tuned through the use of large plywood panels. These asymmetrical boards are hard (reflective) on one side and soft (absorbent) on the other. Carpeting, baffles and foam pads of various sizes are also used to tune the room. The room, being relatively small creates an intimate atmosphere for a "live" session like tonight's.

While Rubinson conducts an organizational band meeting, Mike Lerner and second engineer Chris Minto (aka Dr. D.) help Fred explore his new 24-track MCI tape machine. Fred and David both are ecstatic over the new tape machine, and this is the first session on which it has ever been used.

Soon the musicians trickle in, along with Mike Carpenter and the amiable Joel, core of the road team. The band is composed of Pablo Tellez, bass, Gaylord Birch, drums, Tom Coster, keyboards, Leon Patillo, keyboards and lead vocals, Jose "Chepito" Areas, timbales, Raul Rekow, congas and of course, Carlos. Everybody in the band plays percussion and sings background vocals.

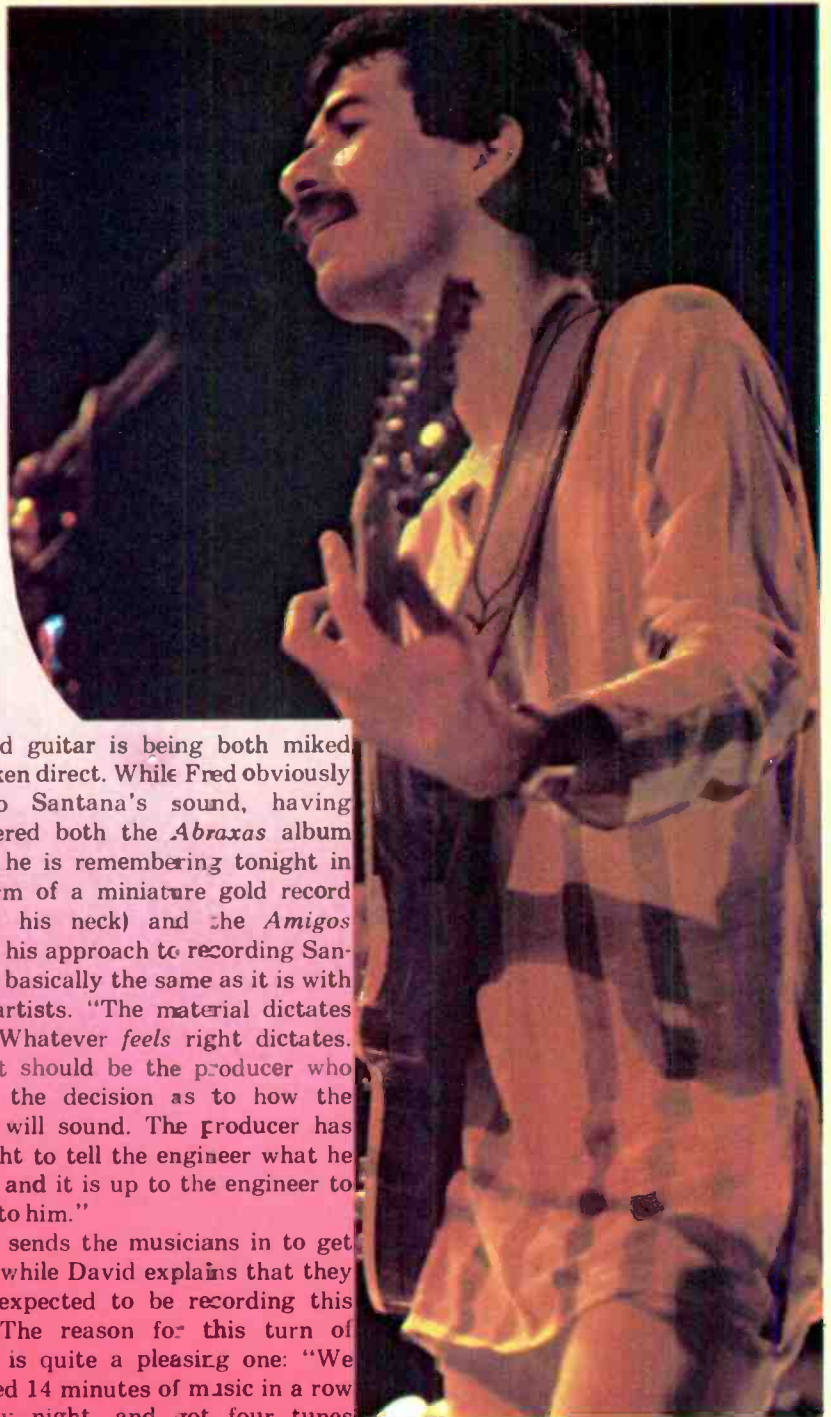
The studio's Steinway piano has been moved out—replaced by Tom Coster's keyboard set-up: Moog synthesizer, Hammond organ, Arp Odyssey synthesizer, Wurlitzer piano, two Fender Rhodes electric pianos and a string synthesizer. There are two mics on the Leslie speakers and eight other inputs running direct.

Nearest Coster is Pablo, bass player and author of "Give Me Love," the tune the group is recording tonight. Pablo wants some "riva" on his headphones, and the multilingual Catero obliges with the necessary "reverb." The bass is being recorded by direct input into the console.

Gaylord is fortunate to be the recipient of Catero's unmatched skill at setting up and miking drums. Fred is not worried about drum noise leaking on to the other tracks. On the contrary, the key is to prevent leakage from the other instruments on to the drum tracks, as it is the quality of the rhythm tracks which determine what is or isn't a "take." These are the tracks which must be preserved. "Everyone plays with the drummer," adds Fred. "He is the heart of the song."

Not one to keep his recording techniques trade secrets, Catero gladly explains his approach and reasoning. The first point he makes is that it is not always the most expensive mic which gets the desired sound. "You use condenser mics overhead for the cymbals because the cymbals are very high frequency and the dynamic mics won't do it. One listen will let you know,

By Robert Moselle
Photos by Ben Delaney



Another important thing about miking drums, or about miking anything when you are using more than one mic, is to check for phase relationship between mics. This is more important than which mics you choose because whenever you use more than one mic, unless the mics are exactly the same distance from the source, there is going to be phase cancellation of various frequencies. It's an acoustic phasing phenomenon having to do with the length of the wave. Since every frequency has a different wave length, by computing that frequency and the speed of sound, and by knowing the distance of the mics from the source you can estimate which frequency will be cancelled. You don't sit there with a slide rule, but you listen and pick the sound which is best, by reversing the phases if necessary. I had to reverse the phase of the snare and bass drum tonight, because the bass drum was picking up the low tom-tom. By reversing the phase of the bass drum I was able to get a much bigger tom-tom sound."

"The last thing you do is fool around with the controls. First check microphone placement, and make sure the musician has the correct sound in the room. If he can't get the sound, then you come into the control room and try and get it."

The timbales and congas are opposite the drums, and the microphones are suspended around them like a giant mobile.

Carlos Santana sits on a stool in the far corner of the studio. His nylon-

stringed guitar is being both miked and taken direct. While Fred obviously is into Santana's sound, having engineered both the *Abraxas* album (which he is remembering tonight in the form of a miniature gold record around his neck) and the *Amigos* album, his approach to recording Santana is basically the same as it is with other artists. "The material dictates itself. Whatever feels right dictates. Plus, it should be the producer who makes the decision as to how the record will sound. The producer has the right to tell the engineer what he wants, and it is up to the engineer to give it to him."

Fred sends the musicians in to get ready, while David explains that they never expected to be recording this song. The reason for this turn of events is quite a pleasing one: "We recorded 14 minutes of music in a row Monday night, and got four tunes down on Tuesday night."

Take 1

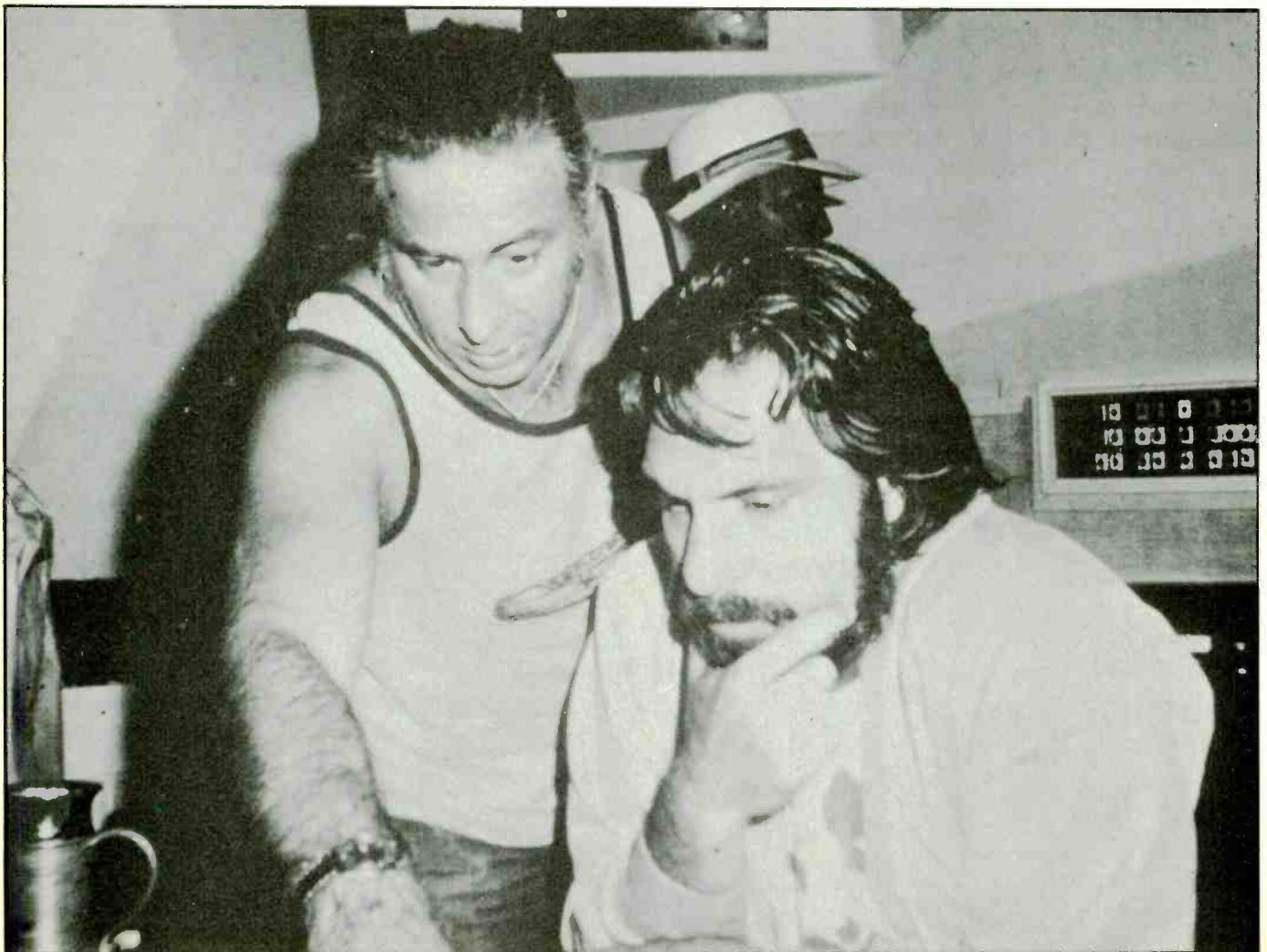
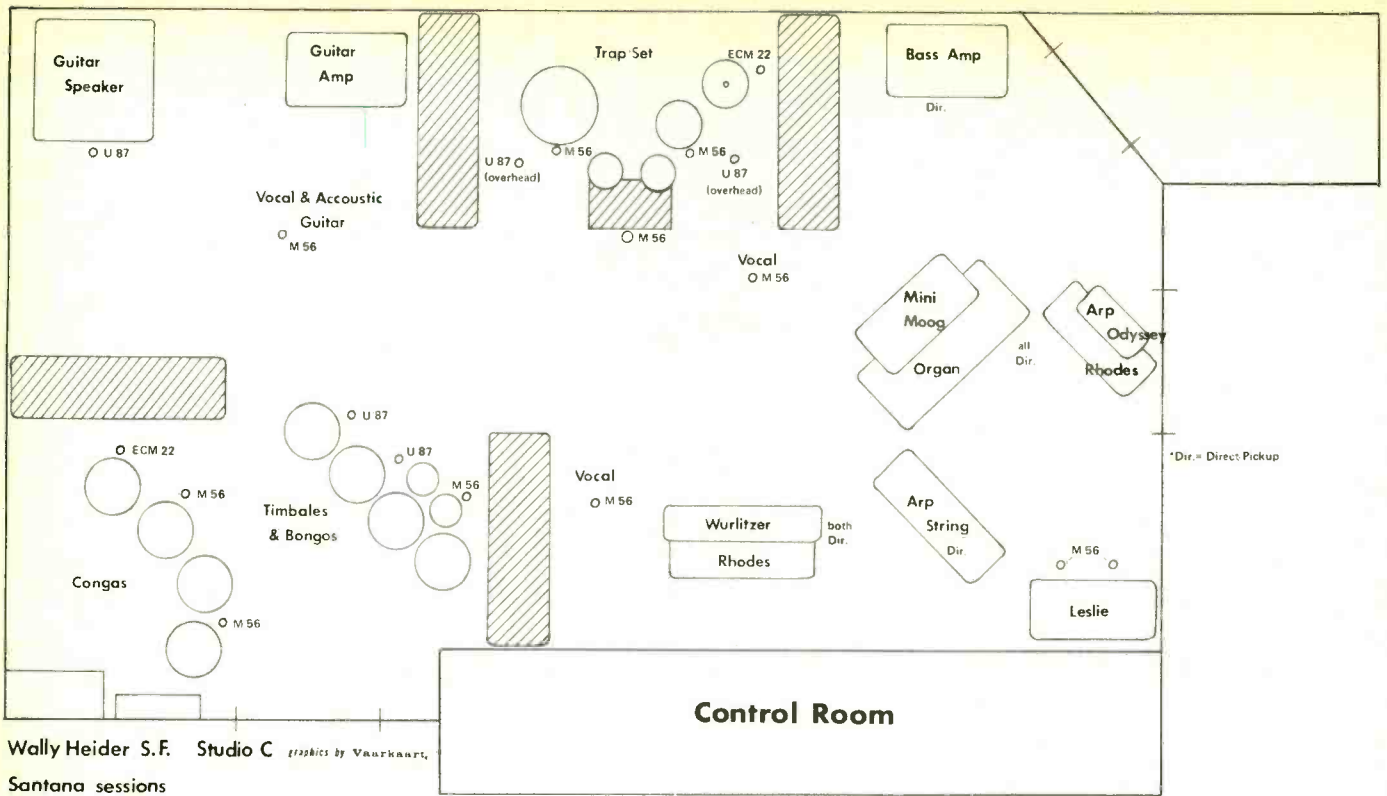
"We're ready" comes the cry from the studio. "Rolling" is the reply. "Give Me Love" is the elusive goal.

It's a smooth version of this mellow song with a Latin overtone. The band comes back into the control room to listen to the playback, singing along in high spirits. Rubinson who had been out in the studio cueing various musicians, comes back into the control room. The food has arrived from "Little Joe's," and it's time for a break.

"This album is going to be a little different from *Amigos*, says Rubinson.

"because we're doing everything right now. There's not going to be a lot of overdubbing. We're recording everything but the final vocals and a guitar solo here and there. What we're really doing is capturing an event in the studio."

The second take is cut short after thirty seconds, but the third take is a totally different story. Rubinson is in the control room this time. Suddenly he becomes very excited. "Did you see what just happened? Something just happened out there that could never happen in an overdub situation. The musicians were communicating. The energy transfer was incredible." The



"Pair Extraordinaire"—Engineer Fred Catero (left) and Producer Dayid Rubinson (right)

band is jamming on the song, producing the most dynamic music of the night.

The jam trickles to an end, and Carlos leads the musicians back into the control room, apparently feeling something was not exactly right. Rubinson, however, knows that something unique has just occurred. "What we're really trying to get is a heart-beat. To tell you the truth, I don't care if all I get is the basics. The bass drum, congas and bass are all I need to get. If it's going right, those instruments will be playing along with Santana really well, so if a solo happens, like tonight, everyone *feels* it and we can get the *real* solo. Then you can put the rest of the layers over it."

Take 4 is abbreviated at mid-point, and the tape keeps rolling for Take 5. Both this and the next take are uneventful, but nobody is upset. The previous two nights were so bountiful that the law of averages was bound to enter into the picture. Indeed, the band had not rehearsed this song for quite a while, and with "live" recording one must assume these risks. Rubinson is still high on this method, preferring it to the now more standard overdubbing approach. "The 'live' recording method is a lot freer and more spontaneous. I work completely differently with Phoebe, LaBelle and

the Pointer Sisters. With them we literally write out the rhythm tracks."

Communication

"I perform a completely different function with Phoebe. In that situation I am the means by which the musicians understand what Phoebe is going to do. We use session men, and with them you first have to have them understand the structure of the song, which is why we write out the charts. You must then have them relate to the song, and then play what you need within a time structure which is very short. To get them to play *expressively* and *sensitively* is a whole different process than people remembering the chart in a self-contained group."

"This relates to the two ways a recording studio should function. First is the old, traditional way which is as a real-time storage device for an event. The other conceptual way a studio functions is as the event itself, which is as a *means* of expressing a series of events which don't coincide, and where the use of the tape itself becomes a performance. With 'live' recording the energy transfer, the *synergy*, is much greater than when you're trying to overdub. You can feel it."

"There's a whole style of making records today which is very *cold*, like someone put down a 'pulse' on a

rhythm machine and everybody played along. Something like what happened tonight on Take 3, something magical, cannot occur with overdubbing." No, David Rubinson did not produce "Disco Duck."

During the Santana sessions Rubinson is rarely in the control room, but instead is out in the studio with the band. "It's not up to Carlos to have to count sixteen bars and come back in. This way I can cue him, and he can get more into the music without worrying when to come back in. I don't have to conduct a Santana or a Herbie Hancock because we've already rehearsed the tunes."

What Rubinson and Catero are doing is combining two basic disciplines. "We are using the studio," says David, "to capture a real-time event, a well-rehearsed but spontaneous energy exchange, and then using the 24-track tape to best advantage after that—splicing it, cutting it together. Then if we have to put on a guitar solo we can, or if we want to put a whole different keyboard idea on, we can. Some of the keyboard work done tonight will later be split apart onto acoustic piano and Arp."

There's time for some coffee, one of Rubinson's great loves. "This is my one idiosyncrasy. I bring my coffee brewer with me wherever I go." He also buys his French Roast in fifty-



pound lots.

Fred relaxes by telling the true, if somewhat sardonic story of the lady who put her damp cat in a microwave oven to dry it off, and then had a heart attack when she found it with its insides burned out.

This accomplished, Fred and the able Minto set the MCI auto-locator to the exact desired spot on the tape, and almost instantaneously the band is listening to a playback of Take 3. They head back into the studio, and Rubinson, looking out over the studio, offers a few comments on the inimitable Santana. "I think Carlos is one of the three greatest guitar players I've ever heard, with one of the greatest senses of phrasing, timing and syncopation. The thing which most people do not realize about Santana is that he is a killer rhythm guitarist. Three quarters of what makes him great is his rhythm guitar. Listen to 'Oye Como Va' or 'Dance Sister Dance' (which Rubinson co-wrote). It'll shock you! He's playing bass on 'Dance Sister Dance' and on four tunes on this album."

Santana picks up the bass for a little while before the next take, while Rubinson sits behind the drums, play-

ing the rhythm track of "Give Me Love." Neither of the next takes, however, after Carlos and David have resumed their regular stations, is really what Rubinson is looking for. The recording over, Chris runs off cassette copies of Take 3 and the previous night's takes.

Rubinson rubs his eyes, and begins to talk about the role of a producer. As he speaks, tonight's session presents itself as a testimony to his words.

"The producer must be able to relate to anyone involved in the production of a record, in that person's language. You can't explain bass and pitch to a session bass player 'soulfully.' You tell him you need a sforzando on the 'C' at Bar 61. With LaBelle you talk a different language. Now you're talking 'oohs' and 'wows,' or 'Patti, take it from the cut-chorus.' Finally you have to be able to say, 'Fred, it sounds too light—we have a real strange peak at 500 cycles on the snare. What'ya think?'"

"So to me there's a soulful, musical, down language, a literate language, and a technical language. People need to communicate to the other side, and you have to translate and relate."

Communication is the name of the game. It's only fitting that the next time I saw David Rubinson he communicated these words to me: "You should have been here an hour ago. We got it on the first take."



MXR presents "live" flanging

The MXR flanger is the first studio quality flanger in a compact and durable case designed for live performance applications in severe environments where durability and immediate control by the performer is important. The MXR flanger offers control of a variety of effects and is designed to give you "live flanging" "when you need it, where you need it".

Recognizing that flanging differs from phasing, the MXR flanger utilizes an actual time-delay, whereas phasing does not. As a result, the notches produced by flanging are harmonically related, while those produced by phasing are evenly spaced over the frequency spectrum. The MXR flanger operates according to the time-delay principle and creates at the longest delay time 16 milliseconds over 150 notches. The audible effect is one of enhanced "tonality".

With the MXR flanger a variety of operating effects can be obtained, ranging

from classic flanging, to quivering vibrato, to vocal doubling. The MXR flanger is designed to accept a wide variety of inputs. Typical applications include: guitar, piano, organ, electric bass and vocal microphones. The MXR flanger represents the latest in advanced circuit design and reliable construction techniques, and like all MXR products is unsurpassed in performance, versatility, and ruggedness. All of this for the price of \$199.95. See the MXR flanger at your nearest MXR dealer or direct inquiries to MXR, 277 N. Goodman St., Rochester, New York 14607, (716) 442-5320.

MXR Professional Products Group



CIRCLE 70 ON READER SERVICE CARD

10 sound reasons to buy our new receiver. Plus its sound.



Sony's new, more powerful STR-6800SD receiver should get a warm reception. Because it not only looks different from other receivers, it is different.

It has some features found in more expensive separate components — and other features found nowhere else at all.

1. The most-used controls all in one place.

Electronically, it would have been convenient for us to scatter the level control, tuning knob and input and tape selectors all over our receiver. Instead we grouped them in the upper right-hand corner — so they're convenient for you.

2. A dial pointer that doubles in length when it's close to a station. Together with the signal strength meter and the center channel meter, this Sony innovation constitutes a system that helps you tune faster and more accurately.

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Flick it down and volume drops. Flick it back up and volume goes back up to where it was. And this muting switch is right where it should be — right next to the level control.

4. A stepped level control to keep both channels equal.

It guarantees unprecedented accuracy — to within 1/2 db instead of 1 db. And it guarantees it over the whole volume range instead of just in mid-volume.

5. MOS FET front end electronics unitized tuning.

The 4-gang tuning section and all its associated electronic parts are mounted on one sub-assembly. So

temperature differences don't affect these circuits — the receiver tunes the same whether it's cold or warmed up. And, with MOS FET, the receiver has a very wide dynamic range.

6. Dolby noise reduction system.

As more and more stations broadcast in Dolby, you can really use a Dolby system. And ours has a definite advantage: Instead of being an optional extra, it's built in — operated from the front panel.

7. Phase locked loop. It gives you greater stereo separation and less distortion.



And more. To these specifications (remember, we state them conservatively), add Sony's proven reliability. And you get a receiver that produces a sound that'll make you understand why you have ears.

That's the STR-5800SD at \$500. Or, for less power and a few less features—but no loss of fidelity—the STR-5800SD at \$500 and the STR-4800SD at \$400 (all suggested retail prices).
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8. LEC (low emitter concentration) transistor. This piece of advanced design in the preamp phono stage assures you tight RIAA equalization plus low noise, low distortion and a wide dynamic range. It's a Sony exclusive.

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loudness compensation, for bass boost and for mid-range presence.

10. Sony's most powerful receiver. It delivers 80 watts minimum RMS continuous power per channel at 8 ohms from 20 Hz to 20,000 Hz with no more than 0.15% total harmonic distortion. It has a direct-coupled power amplifier with true complementary symmetry output stages.



SONY

Ambient Sound

BY LEN FELDMAN

Those Unused Microphone Inputs

Thousands upon thousands of high fidelity equipment enthusiasts own either stereo cassette or open-reel tape decks. As we have said previously in this column, the *electrical* performance of a good cassette deck or home-type open-reel machine very often rivals that of studio or professional equipment. Where the professional machine has it over the home variety is in the area of long-term mechanical ruggedness, editing capability, sophistication of transport and tape motion. The higher speeds of the open-reel machine also result in sometimes superior frequency response, improved headroom and somewhat better dynamic range. But, when the recording job to be done is a simple dubbing, in real-time, from a disc to tape, or the transcription of an FM program (usually consisting of a disc being played at the broadcast studio anyway), even a medium priced Dolby (or other noise reduction system) equipped stereo cassette deck is capable of laying down the program on tape with as good frequency response and as great a dynamic range as are found in most discs. This suggests (and rightly so) that most recordings made by home users are limited in quality by the program source, rather than by the tape deck itself. It further suggests that, given better program sources, the tape results attainable with even a modestly priced home tape deck might actually be superior in fidelity to that obtainable from any disc played on even the very best turntable system. But where can the average home recordist find a "better" program source?

How About Live Recording?

Some thoughts on the subject of home versus studio recording were recently voiced by Mr. E. Nakamichi, the president of a company that bears his name, and of its American subsidiary, Nakamichi Research (U.S.A.) Inc. The occasion was the opening of what Mr. Nakamichi calls his "Sound Research Center" on the upper floor of his Long Island based company. He pointed out that the microphone inputs on his and other manufacturer's consumer-type tape decks are rarely, if ever used and that this constitutes an under-utilization of

the full capabilities of most home machines. To underline the exciting possibilities inherent in "live" microphone recording, he had built a special room with non-parallel walls, acoustically treated and furnished for musical listening and "live" performances. Adjoining this room, and separated by a large see-through glass panel, is what Nakamichi calls his taping room and control console. The use of the words "recording studio," or "control room" have been scrupulously avoided because he regards the installation as one which any amateur recordist could fashion in his or her own home. Indeed, except for one small dual-channel reverb unit found in the taping room, the rest of the equipment was strictly audiophile gear (mostly Nakamichi's own models, as might be expected).

Those of us attending the opening (which included a "live" recording session by a trio of talented young performers) were presented with a "position paper." A brief quotation from that paper will point up what Nakamichi is hoping to convey with his new facility.

"Most modern discs are the products of the latest generation of studio recording techniques that often process the original signal beyond recognition. While such techniques stand on their own creative merits, the resulting recordings are virtually useless as a source material for (hi-fi) component evaluation. The listener is never aware of the conditions of the original recording, such as the number and type of microphones used, microphone positioning and mix levels. In most critical listening situations, therefore, the only safe conclusion a listener can make is that a given disc, played over a given combination of components, produces what the listener perceives to be 'accurate' reproduction. A different disc may lead to a completely different set of conclusions about the same component system."

Mr. Nakamichi believes that the cassette medium offers greater dynamic range and better overall performance than LP discs. Furthermore, he is convinced that the average audio consumer is capable of making recordings that are superior in sound quality to discs without having to invest large sums of money in recording equipment.

After the formal part of the presentation, a few of us remained to chat with Mr. Nakamichi and discovered

that his thoughts extend far beyond the construction and opening of his personal listening room. He pointed out that two important groups within the music industry have been going their separate ways with no real interface between them. The fact is that, each could do much to help the other while at the same time enlarging the scope of their specific hobbies and of music as an art form in general. Specifically, there are literally thousands of amateur musical performing groups in this country alone who have probably never had any of their performances recorded on tape. By the same token, there are thousands of audio enthusiasts who own the necessary equipment with which to create



Nakamichi calls it a "sound room."

credible "live" recordings if they could find something that is both "alive" and willing to be recorded.

Nakamichi sees his "Sound Research Center" as the first of what he hopes will be hundreds of similar installations. As he rightly pointed out, a well furnished listening room in an audio dealer's store is just a step away from being a room in which young musicians could play music and have their efforts recorded on equipment that is already "on the shelves". He hopes to interest some of his own dealers around the country in creating such dual-purpose rooms in which music could be both played and reproduced via the tape medium.

We can envision several advantages that would accrue to an audio dealer who follows Mr. Nakamichi's suggestion. He could schedule "'live' recording sessions", using mailing lists of his steady customers to provide an audience for the aspiring musicians. With a fairly simply mic array, real-time recordings could be made and immediately played back. The audience would then be able to judge reproduced quality (and components) within minutes of having heard the "live" performance—a far superior sort of "A-B" test than is usually performed in audio shops when selecting speaker systems and other hi-fi components.

Naturally, certain precautions would have to be taken by dealers if this becomes a normal means of sound evaluation. The "live" recordings could not be offered for sale to consumers without getting into serious trouble with copyright laws and musician's

unions. Amateur musicians and music students would see this as no problem, however, and would be eager to demonstrate their skills for such ready-made audiences at no charge—just for the experience.

The question also arose as to how the "professional" recording studios would react to such usurpation of their domain. Nakamichi quickly explained that his objective is not to do recording studios out of their hard-earned clients. On the contrary, he believes that if more amateur musical groups were given an opportunity to "perform on tape", using amateur but high quality recording equipment, the industry as a whole would be the better for it. Many more of these amateurs would then be likely to attain levels of performance that would warrant their going to the true "professional" recording studio for more serious and commercially oriented recording work. It was an argument that was difficult to counter.

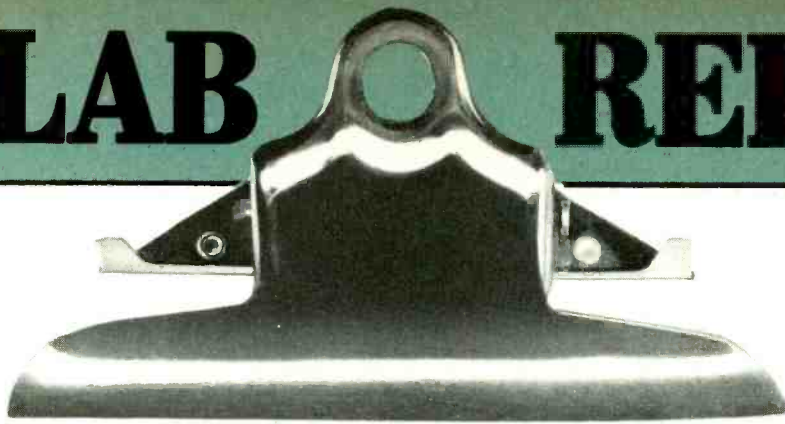
While ideally it would be nice if every serious amateur recordist could turn his favorite listening room at home into a recording *and* listening center (we hope to provide some tips on modifying your home listening room into an acoustically satisfactory recording room in a future column), many may find funds limited or living conditions restricted. There is nothing however to prevent a recordist from going to where the music is, if the music can't come to the recordist. If you are interested in doing real-time, "live" recording



Nakamichi "taping room."

work it isn't necessary to go into the field with a complex 8-in-2-out mixing console, dozens of microphones and a long, trailing AC power cord. You'd be amazed at the results you can obtain with a maximum of three microphones (a stereo pair, and a third, "blend" mic for center channel fill). An inexpensive passive (non-powered) little mixer should make the three-point pickup possible if your tape deck is not equipped for that many microphone inputs.

We're not suggesting that you can become a top recording engineer overnight; that takes years of on-the-job experience. What we are suggesting is that a fuller utilization of "amateur" recording equipment you already own may well increase your enjoyment of that equipment, and music, which is after all probably why you got involved with audio in the first place.



NORMAN EISENBERG AND LEN FELDMAN



Studer A68 Power Amplifier

General Description: Studer, a Swiss-based manufacturer known in the past for professional tape recorders, has introduced the model A68, described as a "professional studio" power amplifier. The unit is designed to fit into a sound system just before the speakers—that is, following a preamp-control or signal-processing device capable of delivering about 0.7-volt of signal. A stereo amplifier, the A68 may be readily switched for bridged-channel monophonic output. In stereo, each channel is rated for 100 watts output into 8-ohm loads, or 175 watts into 4-ohm loads. In mono, the combined power output into an 8-ohm load is rated at 350 watts. No 4-ohm operation is indicated in the mono mode.

The front panel is black metal, with flanged white side-pieces to permit rack-mounting. Handles match the flanges visually. The panel has a power off/on switch, a green lamp indicator for line on, a red indicator for overload. Individual channel level controls are screw-driver adjustments hidden behind little removable "buttons." Two stereo headphone output jacks also are located on the front panel.

The rear of the A68 contains signal inputs, which are balanced or "floating" XLR type connectors. Speaker signals are taken from color-coded binding posts using either banana plugs or stripped leads. The rear also contains a fuse-holder, a grounding post, a line voltage selector (to permit using the amplifier on 100, 120, 140, 200, 220, or 240 volts AC), and the AC power connector (a three-pin type with grounding terminal; a suitable power cord is supplied with the unit). The switch to change from stereo to mono operation is

located between the input-signal connectors. When run at maximum, the A68 is rated to consume up to 1000 watts of power from the line.

Examination of the A68 indicates extremely rugged construction and the use of high-grade circuit parts very well laid out inside the metal case. Both sides and some portions of the rear of the chassis are given over to huge heat-sinks. A generously designed power pack supplies the driver and output-stage transistors; a separate power pack feeds the other amplification stages. A built-in electronic protection system monitors power dissipation of the output transistors constantly and will mute the amplifier should temperature rise above a predetermined value. A special feature of this protective system is speaker muting in the event of DC overload.

Test Results: Specifications for the A68, while perhaps "modest" in today's arena of super-amplifiers, were met easily in MR's lab tests except for rated distortion of 0.1% with respect to power bandwidth—this was achieved down to 50 Hz, increasing to about 0.3% at 20 Hz. However, Studer specs the amp from 30 Hz to 15 kHz which, for frequency response, was well confirmed in MR's tests. Rated distortion of 0.1% at normal operating levels was far exceeded by a mere 0.04% measured in our lab. Hum and noise, claimed to be 100 dB down, turned out to be 98 dB down which is close enough and certainly an excellent figure in any event. IM distortion up to rated output was measured as 0.12%

Plainly, the emphasis in the A68 is on ruggedness of

construction to permit the unit to perform for long uninterrupted periods without any malfunction. Ease of servicing is a major consideration here: each amplifier module, for instance, is linked to the main chassis and connected by means of edge connectors which can be removed quickly in the event of trouble.

MR found that temperature rise was minimal, even under continuous output test conditions, and feels that the A68 certainly could be counted on for its intended use as a long-running amplifier—probably for 16 or more hours a day without straining a bit.

General Info: Studer A68 dimensions: 19 inches wide; 13.2 inches deep; 5¼ inches high. Advertised price is \$900.



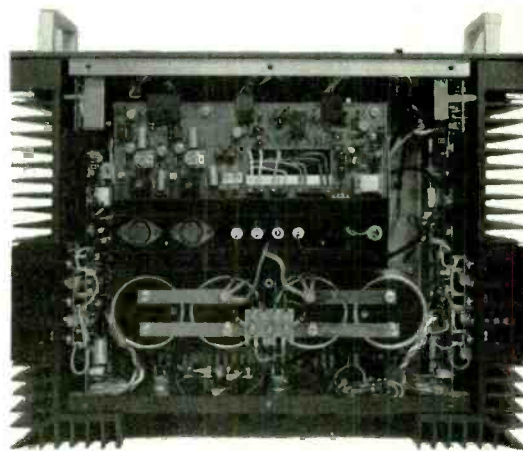
Studer A68: View of rear panel.

Individual Comment by N.E.: I appreciate the rugged quality of the A68; you get the feeling that it can be counted on to run faithfully, no matter what, like a true audio “work horse.” For many professional users this quality may be more important than extremely high response specs. In listening tests I discerned no audible distortion, although I was not quite sure of the ultimate crispness of reproduction vis-a-vis other amplifiers in this price class. I did not like the action of the power off/on switch; it moved stiffly and made a clunking sound (not reproduced over the speakers to be sure, but somehow “out of class” for a \$900 amplifier).

Individual Comment by L.F.: It is interesting to note the differences in design emphasis and specifications which makers of professional amplifiers stress, as compared with the “super-specmanship” used by home-equipment hi-fi producers. For example, the frequency range claimed for the Studer A68 (which is intended primarily for studio monitoring and PA work) extends only from 30 Hz to 15 kHz. Power output is stated in a manner which would seem terse to the audiophile familiar with the elaborate wording required by the FTC power disclosure rule enacted some time ago to protect consumers against false power claims. Since this amplifier is in the professional category, that rule does not apply to it, and we are simply told that rated power in stereo is 100 watts per channel for 8 ohm loads; 175 watts per channel for 4-

ohm loads and 350 watts when the two channels are strapped for mono operation. It is presumed that the professional user will be able to figure out for himself or herself that these power output ratings apply over the useful audio range and that the power figures are quoted so that THD will not exceed the rating given elsewhere.

The speaker outputs are not spaced at ¼ inch distances to accommodate standard GR plugs, but that is not a serious problem. Because inputs are balanced, the mono bridging circuit is simple; input phase of the right-channel circuit is inverted and connected in parallel with the left channel input and output is then taken across the two “hot” (red-colored) output posts, with no connection made to the “common” black posts. In listening tests, despite its relatively limited bandwidth, the Studer A-68 produced remarkably good transient response, with no audible evidence of harmonic distortion. I suspect that the low order of overall loop feedback in the design (26 dB) is in part responsible for this. While the rated distortion of 0.1% was realizable only down to frequencies of around 50 Hz (increasing to around 0.3% at 20 Hz), this did not seem to impair bass reproduction in the slightest, as far as my ears could detect.



Studer A68: Internal view. 60,000 mfd of capacitance filters main supply voltage.

STUDER A68 AMPLIFIER: Vital Statistics

PERFORMANCE CHARACTERISTIC	LAB MEASUREMENT
Continuous power/channel (1 kHz)	133 watts
Continuous power/channel (20 Hz to 20 kHz)	see text
Power bandwidth	50 Hz to 37 kHz
Frequency response (+0, -0.5 dB)	15 Hz to 15 kHz
Damping factor	75
THD	0.04%
IM Distortion	0.12%
Residual hum and noise	-98 dB
Input sensitivity	0.775 V (variable)

CIRCLE 12 ON READER SERVICE CARD

Eventide Harmonizer Model H-910



General Description: The H-910 Harmonizer, from Eventide Clockworks, Inc., is a multipurpose device designed for numerous applications in sound-reinforcement work, recording, performance, and ordinary playback. It combines a full-fledged digital delay line, a pitch-changer over a two-octave range, and an anti-feedback device that permits boosting sound levels without running afoul of energy buildup due to room resonance. The device can effectively alter the speed of tapes, and the various functions may be used simultaneously to generate a variety of special sonic effects, described by the manufacturer as "previously unobtainable" and the "wildest effects on record."

The input is rated for a nominal impedance of 10K, balanced; the output is 150 ohms which is suited for driving loads of 600 ohms or higher. The pitch variation feature is continuously variable, and an optional digital readout indicates precise ratios. The front panel, sized for rack mounting, contains all operating controls and indicators. There are four knobs for input level, feedback, manual, and anti-feedback. The input level varies the audio input signal to the device and is used with an indicator lamp that responds to peaks. The feedback control can add reverb in controlled amounts to the delayed output of the unit. The reverb period is controlled by separate delay switches; the decay time is varied by the feedback control knob. This knob also can be used for unusual special effects via use of the pitch change buttons.

The manual knob, which is operative in the pitch-change mode only, may be used to vary the pitch-ratio between input and output over a range of two musical octaves. Also operative only in the pitch-change mode is the anti-feedback control knob. Centered between the feedback and manual knobs is the digital readout of pitch ratio.

Below these controls are several pushbuttons, grouped as to function. A line control button switches the Harmonizer in and out of the audio circuit, enabling the device to be bypassed without power turned on. Next is a delay-only button and LED indicator. When pressed in, it defeats the pitch-change capability of the device and permits it to function strictly as a delay line. Next to this switch is a group of four buttons for "add'l delay." When the delay-only button is activated (in), the printed legends beneath the "add'l delay" group become relevant. When the delay-only switch is left out, only the two righthand buttons in the "add'l delay" group are activated, and then the legends above these switches are relevant. An "output

2" group of four buttons controls the delay of the second output; it operates regardless of the setting of the delay-only switch.

A third group of four pushbuttons, called "pitch control select" (with LED indicator), may be used for manual control (using the knob previously mentioned), for anti-feedback (using that knob), for keyboard (using an external keyboard which itself may be an optional Eventide device, or a synthesizer or other oscillator), or for "CV" which designates an external variable voltage source that may be interfaced with the Harmonizer. The final pushbutton on the front panel is for power off/on.

At the rear of the device is the AC power socket, and a terminal strip with 12 pairs of screw connectors for input and output signals, remote control hookups (re CV and keyboard) and grounding.

Details of functions and features are covered thoroughly in the owner's manual, which MR advises studying by anyone seriously interested in this device and its unprecedented sophistication and uses.

Test Results: In terms of published specification, the Eventide Harmonizer easily confirmed or exceeded the manufacturer's claims. Its full dynamic range was a few dB better than stated; its distortion somewhat less than claimed; its frequency response a bit wider than spec'd. But these figures do not really tell the story since the Harmonizer must be used to be appreciated. The range and versatility of its signal handling capabilities are enormous and make it a very effective tool for the pro and semipro and even the serious student of sound or of music.

For instance, suppose you are into multi-track recording and are faced with the problem of a soloist who records a track slightly off-key (several days after all the accompanying musical tracks have been laid down). With the Harmonizer, it is possible to vary that particular track's musical pitch by precisely calibrated amounts (read out on the optional digital indicator as fractions or multiples of "unity" pitch), and not change the real-time synchronization of that track vis-a-vis the other tracks.

To take another case: say you have prepared a commercial for on-the-air use and you have come up with a perfect take that runs 63 seconds instead of the 60 seconds allotted. You need not try for another perfect take at all. Simply speed up the master tape when dubbing the copy for on-the-air use, and interpose the Harmonizer to reduce the pitch of the announcer's voice to

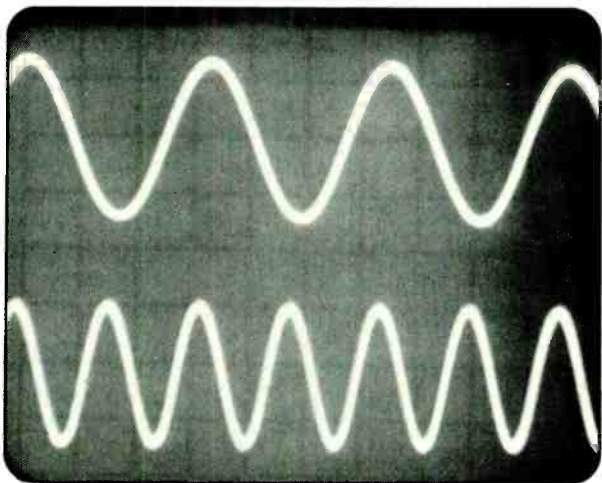
exactly what it would have been had you played the tape at the same speed at which it was recorded.

By way of documenting the "impossible," MR took some 'scope photos of input signals fed into and retrieved from the H-910. Please refer to the accompanying waveform pix. In each case the upper trace is the input signal; the lower trace, the output signal. Only one audio generator was used! In the test shown by photo number 1, a 1-kHz signal was fed into the Harmonizer, and the manual pitch control was set for a pitch ratio of 2. As the photo shows, out came a perfect 2-kHz sinewave signal, a full octave higher in pitch than the input.

Reversing the process, as shown in photo no. 2, we introduced a 4-kHz signal into the Harmonizer and adjusted the pitch control until the readout was 0.5 (indicating that the input was divided frequency in half, or reduced by one octave), and—as the photo shows—we obtained a 2-kHz signal.

These two changes represent the extremes of range of the pitch-change option, and are only a small portion of the total repertoire of signal handling of which the Harmonizer is capable.

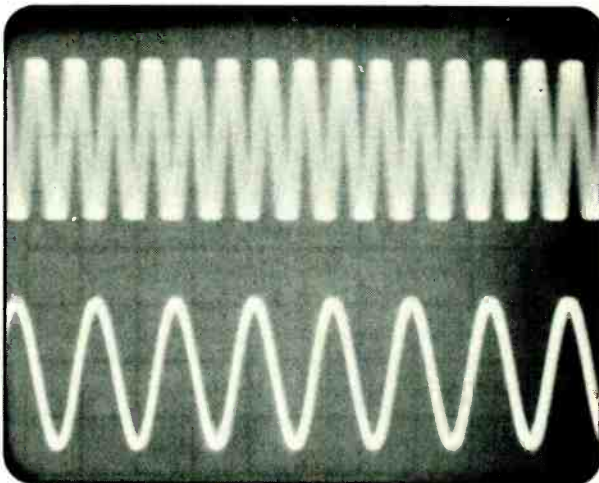
General Info: Eventide Model H-910 Harmonizer dimensions: front panel, 19 by 3½ inches; depth behind panel, 9 inches. Price without digital readout, \$1500. With digital readout, add \$125. Operates on 115 VAC, 50/60 Hz, or on 230 VAC 50/60 Hz.



Eventide H-910: Input signal (upper trace); output signal (lower trace) doubled (one octave higher).

Joint Comment by L.F. and N.E.: We can think of so many applications for this device that space does not permit our listing them. One possibility that comes to mind is the development of speeded-up "talking books" recordings, based on the idea that the human mind can absorb information at a faster rate than even the best actor can achieve by reading aloud. Unfortunately, if a taped voice is played back at double

speed, the result is the familiar "chipmunk sound." However, with the H-910 one could record speech at, say, 3¾ ips speed. During playback and dubbing, the signal from the tape could be passed through an H-910 set for 0.5 pitch change, while still making the dub at 3¾ ips. Now, if the material is played at 7½ ips, the announcer will be speaking twice as rapidly but with the



Eventide H-910: Input signal (upper trace); output signal (lower trace) halved (one octave lower).

same pitch and timbre as before. If twice the speed isn't enough, repeat the process—this time going from 7½ ips to 15 ips, and you will have a voice speaking four times as rapidly as in real life, but with perfect clarity and normal pitch.

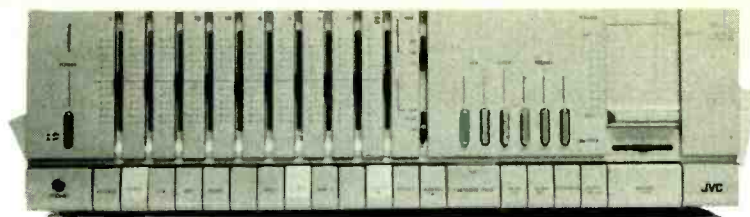
For the creative recordist, or sound-show manipulator, or serious student of musical sonics and speech patterns the Harmonizer also has unexplored potential for both investigating and creating a myriad of possibilities. We do recommend getting it with the built-in digital readout of pitch ratio which we found to be totally accurate. Unless you are blessed with "perfect pitch," you'll save a lot of time and effort when using the pitch-changing feature of the H-910 by relying on that readout option.

EVENTIDE H-910 HARMONIZER: Vital Statistics

PERFORMANCE CHARACTERISTIC	LAB MEASUREMENT
Input characteristics	Impedance, 10 K ohms, balanced. Level for full dynamic range from -10 dBm to +25 dBm.
Output characteristics	150 ohms; suited for driving 600 ohms or greater at +18 dBm. With transformer, 600 ohms balanced at +22 dBm.
Distortion at 1 kHz	0.15%
Dynamic range, clipping to noise floor	94 dB
Pitch variation	1 octave up; 1 octave down. Continuously variable. Digital readout shows precise ratio.
Delay: pitch change mode	0, 30, 60 milliseconds.
delay-only mode	0 to 112.5 milliseconds in 7.5 ms steps
optional output	0 to 82.5 ms in 7.5 ms steps
Frequency response (at any delay, unity pitch ratio)	±1 dB, 18 Hz to 12 kHz
Nominal power dissipation	25 watts

CIRCLE 2 ON READER SERVICE CARD

JVC Model JP-S7 Preamplifier



General Description: The JVC Model JP-S7 is a stereo preamplifier/control unit with more than usual versatility. Its most prominent single feature is a ten-octave frequency equalizer (JVC calls this the "S.E.A."—the letters standing for "Sound Effect Amplifier") which essentially is a graphic equalizer that handles both channels simultaneously. Nominal "center frequencies" are 32, 63, 125, 250, 500, 1000, 2000, 4000, 8000, for nine octaves while the final top octave has a choice of 12000, 16000, or 20000 Hz. Each of the ten bands is adjustable over a 24-dB range ± 12 dB) by means of individual sliders which have detents at each 2-dB step. The multiband equalizer, which replaces conventional tone controls here, may be switched out of the circuit if desired.

Input signal selectors provide for three phono inputs, a tuner, and two auxiliary (high-level) options. There also are two tape input and output facilities, with source/tape monitor and switching that provides dubbing from tape deck 1 to 2, and from 2 to 1. The phono input has an adjustable loading circuit with individual controls for resistive values and for capacitance values. Two filters are provided, at 18 Hz, and at 9 kHz. In addition, there are four screwdriver level adjustments (at the rear, above their respective signal jacks) for two of the phono inputs and for both auxiliary inputs. Both of the tape connections have DIN jacks as well as standard pin jacks. The preamp has two sets of outputs and one of them also has its own screwdriver level adjustment.

The main volume control is a vertical, relatively long slider calibrated in ten steps. Under it is a horizontal slider for channel balance, and under that is a -20 dB muting switch. In addition, there's a switch that may be used to defeat 14 dB of internal gain. Modes of operation include normal stereo, reverse-channel stereo, left plus right mono, left channel only, and right channel only. There also are a loudness contour switch and a stereo headphone output jack.

Oddly enough, all these controls are provided with no knobs at all. Instead, everything is worked out in terms of sliders and pushbuttons.

The unit is supplied in an integral metal case whose front panel presents a subdued appearance despite the numerous controls and options found on it. Across the top of the unit is a block diagram of the device, showing the signal path from inputs to outputs. The rear apron, in addition to the signal jacks, has four grounding posts, the AC power cord, and four convenience outlets of which two are switched by the front panel off/on switch. Designed to operate on 120 VAC 50/60

Hz, the JP-S7 draws 27 watts from the power line.

Test Results: To begin with, the 10-band equalizer—while obviously limited in ultimate usefulness in that it operates on both channels at once instead of providing completely separate adjustments for each channel—is a vast improvement over conventional tone controls. In the JVC JP-S7, the equalizer was found by MR to deliver the lowest-distortion signal, even when the sliders were moved way off their flat position settings, of any 10-band equalizer yet tested. Actual measurements were a very low 0.0045% for THD, and 0.005% for IM, regardless of control settings. These are truly "state of the art" figures.

Other normal preamp performance characteristics were consistently excellent, and well within manufacturer's specifications. The RIAA phono equalization ran within ± 0.1 dB; hum and noise on phono were 75 dB down (or 85 dB down by an "A" weighted measurement), while hum and noise on the other inputs were 95 dB down. Overall frequency response extended from 10 Hz to 70 kHz within -1 dB. The preamp was found to deliver a maximum output signal of 9 volts, and its numerous adjustments permit interfacing with a broad selection of external equipment.

Dynamic range is excellent, and the 14-dB gain option permits operating the master volume control over its most useful range regardless of input levels. The refinements provided by the individual level adjustments on high-level and auxiliary inputs, and the adjustments on two of the phono inputs not only enable the user to balance various input level sources, but also make the use of the optional loudness-contour control more meaningful since it can be better correlated for "equal loudness contours" as heard by the individual listener. Another helpful refinement is the output level control associated with one of the stereo pairs of signal output jacks. This adjustment permits matching the output level of the preamp to the input requirements of any power amplifier in terms of providing optimum signal-to-noise and dynamic range of the combination. The added set of output jacks also can be used for feeding ancillary equipment, or for driving two separate stereo setups at once.

In terms of construction, quality of internal parts, and circuit layout, it is obvious that JVC has done a first-rate job. For a preamp, the JP-S7 is fairly large and its size truly reflects not only the number of controls on the front panel but also the amply-designed circuitry behind it. It seems clear to MR that JVC has set out to prove that it can produce top-performing

“high end” equipment to rival some of the “esoteric” products being offered by others these days, and that they have succeeded in doing so with this model.

General Info: Dimensions are 22 $\frac{1}{8}$ inches wide; 6 $\frac{5}{8}$ inches high; 11 inches deep. Weight is 19 pounds. Advertised price is \$700.

Individual Comment by L.F.: Some of the frequency-sweep photos we took during tests of the JP-S7 preamp are worth describing in detail. Note the photo showing the superimposed response curves taken with each control set to maximum boost and cut individually. You will see that maximum boost or cut of each of these evenly spaced octave control's response curves has a total spread of around 24 dB (each vertical division on the 'scope face is equal to 10 dB of amplitude change, and sweep from left to right embraces the audio band from 20 Hz to 20 kHz). In another 'scope photo, which shows net overall response when all levers are set to maximum and minimum positions, the displacement of the overall curve still is about ± 12 dB, indicating minimal interaction between adjacent controls. This is important when trying to achieve a precise and subtle equalization characteristic. The closeup photo of the equalizer section on the front panel shows an arbitrary adjustment pattern; the resultant 'scope photo of the response thus obtained indicates very close correlation between the physical contour of the slider handles and the audio contour of the output signal.

Of course, in this unit a single slider controls the equalization at a given frequency for both left and right channels. Purists will argue that if a good job of “room voicing” is to be done, there should be separate sliders for each channel. Indeed, the actual circuits in the preamp are separate on each channel so it must be presumed that lack of panel space prevented JVC from providing two sliders for each center frequency. If this poses a problem for potential users, they will have to look to other devices which do offer individual channel adjustments. Also, some users may feel the need for additional in-and-out circuitry beyond the two tape in-and-out connections—for possible use with such add-on devices as noise-reduction units, expanders, etc. On the other hand, the two tape dubbing features are most welcome, and I do like the no-knobs design since sliders and pushbuttons do afford the user a sense of precision that is not felt (at least for me) when using knobs. The optional phono pickup loading controls also are a nice touch for the disc perfectionist.

Individual Comment by N.E.: I must admit that at first I was put off by the appearance of the JP-S7 preamp which looked like a huge slab of cold metal with indentations and markings. However, after hooking it up and using it I began to like this beast which has proven to be a really low-noise, low-distortion, sensitive control center that strikes me as one of the best audio “front ends” around. I agree that for room-voicing it falls short vis-a-vis those equalizers which

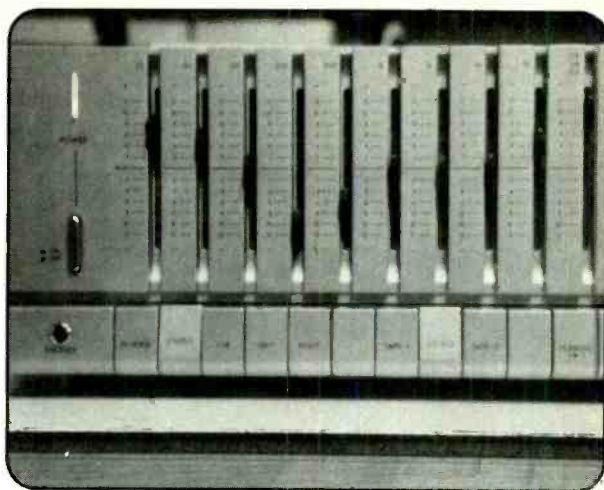


FIG. 1

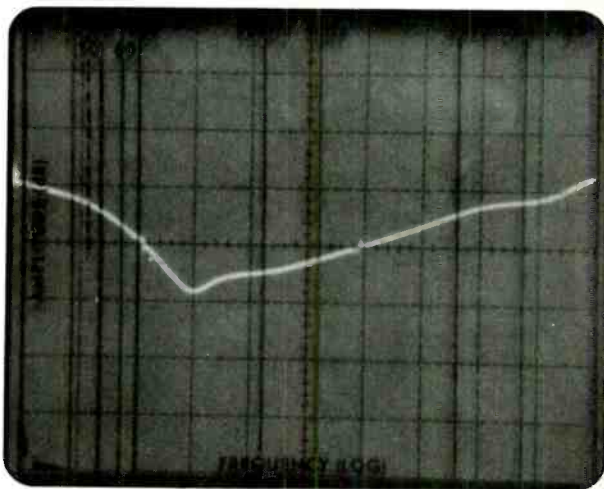


FIG. 2

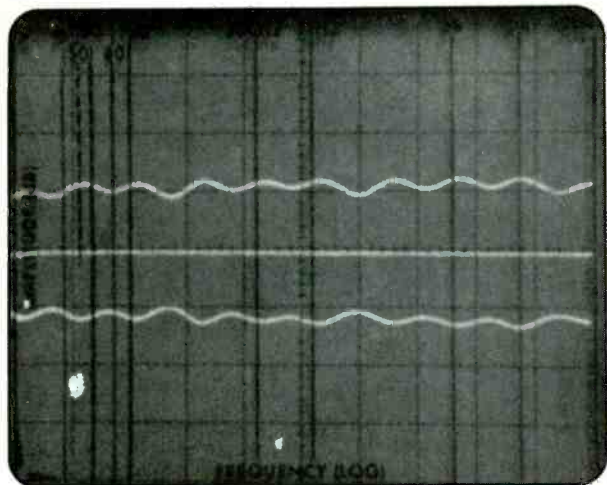
JVC JP-S7: With octave controls set as shown (fig. 1) in close-up photo, response curve shown in 'scope photo (fig. 2) was obtained.

offer separate adjustments on each channel. However, it does a remarkable job of speaker-equalizing and program-source clarification, for instance in bringing up vocalists on some recordings or in taming an overly “hot” top-end response on others, or in letting you focus aurally on a rhythm section, and so on. It does this remarkably well, giving you the feeling you have “moved closer” to the particular instrumental or vocal material you want to hear—or conversely, putting different elements of a given musical program in somewhat different acoustic perspective than provided by a recording.

Being a preamp, the JP-S7 has relatively little need for returning processed signals to itself since such signals normally are fed to the next stage of amplification, namely the power or basic amplifier. At that, it does have the two tape monitor functions and either of them can be used to send signals out of and return them to the preamp. Not to be overlooked either is the second set of main signal outputs which have their own level control and thus can be used to feed signals

into a tape recorder with pre-processing via the equalizer and filters if desired (the normal tape feed jacks come before these circuits, as they do in all regular preamps).

Also interesting is the fact that while the pushbut-



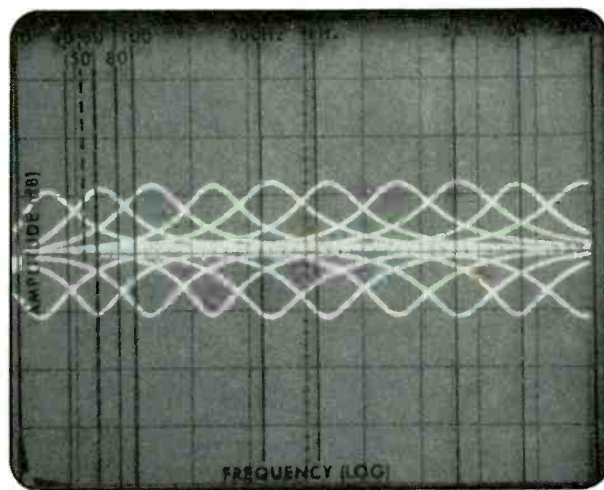
JVC JP-S7: Response curves (upper and lower) obtained when all equalizer controls were set to maximum or minimum positions. Center trace obtained with all controls set to mid-point.

tons "defeat" one another when pushed in, it is possible to engage more than one at the same time in which case all signal sources thus selected will be fed through the preamp at once. In this regard, the JP-S7 can serve to mix signals, with their individual levels of course being controlled from the sources themselves.

The headphone output is a definite plus since it enables you to listen to programs privately without the need for a power amp. The jack is "live" at all times, so if you want to hear only over headphones you have to silence, or disconnect, the power amp to which the JP-S7 is connected.

While the question of knobs versus sliders may well

be debated far into the night, I personally prefer for either-or functions knobs or switches since they are more easily viewed in terms of "yes-or-no" or "on-or-off" conditions. However, for variable functions—such as gain or channel balance—I do prefer sliders.



JVC JP-S7: Range of individual octave-band controls.

JVC JP-S7 PREAMPLIFIER: Vital Statistics

PERFORMANCE CHARACTERISTIC	LAB MEASUREMENT
Frequency response	+0, -1 dB, 10 Hz to 70 kHz
RIAA equalization accuracy	±0.1 dB
THD (for 1 volt out)	0.0045%
IM (for 1 volt out)	0.005%
Hum and noise, phono	85 dB "A" wtd
Hum and noise, all other inputs	95 dB "A" wtd
Input sensitivity, phono	2.0 mV, any input
Input sensitivity, other inputs	200 mV
Phono overload	380 mV, any input
Low filter cut	-3 dB at 18 Hz (6 dB/octave)
High filter cut	-3 dB at 9 kHz (6 dB/octave)
Maximum output	9 volts
Muting switch amount	20 dB

CIRCLE 9 ON READER SERVICE CARD



Bose 901 Series III Speaker System

General Description: The Bose 901 Series III is the newest version of a speaker system that was introduced some eight years ago and which incorporates several unusual and interrelated design concepts. Instead of conventional woofer-and-tweeter treatment, the 901 employs nine identical drivers (each about 4½ inches in diameter) based on the idea that the size of such drivers is well suited for treble reproduction while

the combined radiating surface area of all nine makes for ample low-frequency capability. Using nine similar drivers in a closely coupled pattern also is said to have some side benefits—one is called “resonance splitting” and refers to the tendency for driver resonance to be changed to different frequencies thus smoothing the response. The other is known as “response averaging,” whereby any irregularity in driver response is averaged with the other drivers to become only one-ninth of the total power radiated.

The number and size of drivers is directly related to the manner of their deployment in the specially shaped enclosure. That is to say, only one driver faces the front, while eight face the rear which consists of two angled panels. The effect of this arrangement is to permit only one driver to radiate directly into the listening area, while the energy from the remaining eight drivers is reflected from rear and side walls of the room. This dispersion creates a high ratio of reflected to direct sound, such as is experienced at a “live” performance, and is credited with lending stereo playback a convincing sense of ambience, depth, and breadth while also retaining good stereo imaging and directional clues.

To correct for any response quirks caused by the driver design and configuration, the system employs an active equalizer (a separately housed electronic device) that is patched into the playback system before the power amplifier, and effectively contours the preamp-output signal for balance of the system's output across the audio band.

While these basic concepts are retained in the new version of the 901, the Series III represents considerable change throughout the system. To begin with, the drivers are completely new. They are made by Bose and have a new magnet structure, an aluminum helical voice coil, new cone, and new molded injection frame. The net effect of these changes is a driver that not only can be built more precisely than in the past, but one that is considerably more efficient than the original one, with an estimated power requirement for equivalent loudness that is one-third less than what was formerly required.

To properly load these new drivers, the enclosure has been internally redesigned to include three reactive air columns—one for each group of four drivers on the rear panels, and one for the lone front driver. The controlled air-loading reduces the cone excursion otherwise needed for the deepest bass, thus improving efficiency without increasing distortion. The rear-wave energy from these internal chambers is allowed to emerge through specially designed “jet” openings at the rear.

Of necessity, these changes involve a redesign of the equalizer circuit, and the new Active Equalizer provides for more complex contouring for a more precise smoothing of the response, plus added control options that make speaker placement somewhat less critical than in the past.

The 901 Series III is sold as a stereo pair with the equalizer. Input impedance is 8 ohms. Each speaker system can handle 250 watts, although 70 watts is

given as the maximum power needed for full dynamic range in home listening situations, and as little as 10 watts will drive the system to ample listening levels. The equalizer is intended for connection between preamp and power amp, or into the tape monitor jacks of an integrated unit (such as a receiver) in which case a set of suitable jacks on the equalizer replace the tape jacks preempted by the hookup. The equalizer, which is self-powered, has its own AC line cord. Controls include a “below 40” switch that may be used to introduce an 8 dB decrease at 40 Hz; a mid-bass contour slider (continuously adjustable with center detent, and a range of +3, -5 dB from 80 Hz to 260 Hz; and a high-frequency contour (similar type slider with a ± 2.5 dB range above 4 kHz). There also is a switch to replace the tape-monitor control on an amplifier or receiver if you patch the equalizer into the tape monitor circuit.

Test Results: There is no doubt that Bose has “got it all together” by providing a speaker system which retains all the virtues of the older model and adds to them the additional factors of higher efficiency, smoother response, and greater latitude in placing the pair in a room. Efficiency is such in the new model that one can achieve equivalent loudness levels (to the old one) with as much as a three-to-one reduction in amplifier driving power. A listening situation, for instance, that required amplifier power of 48 watts for the old 901, needed 16 watts with the new version.

Response was exemplary across the audio band, with a smooth and evenly distributed output that spanned the range from below 30 Hz to beyond the limits of audibility. There was some frequency doubling at above 40 Hz, but only when we drove the 901 abnormally hard. The entire bass line up through the midbass and lower midrange remained well-defined and solid. Midrange and highs were extremely smooth, with no significant dips or peaks, and with the broad even dispersion associated with this type of radiation. Highs beyond 12 kHz remained prominent enough, with a rolloff starting at about 16 kHz but with energy available well beyond that frequency. The high-frequency contour option can tailor the very high end by several dB to suit different listening needs. The low-end contouring, available at both “mid-bass” and deep bass frequencies also can vary the output by several dB if desired.

In listening tests, it was readily confirmed that the new 901 responds admirably to a much greater range of equipment than did the old model, and also is less critical of where in a room the pair are located. The optimum reflected-to-direct sound pattern still requires that the installer observe some dimensions—from the sides and rear to the side and back walls, and from the top or bottom of the cabinet to the ceiling or floor—but these distances have more tolerance than in the past. Without paying any attention to these distances at all, relatively little is sacrificed. That is to say, some of the “ambient effect” is lost, but the system still performs as a wide-range, wide-dynamics, eminently clean reproducer. The Bose 901 Series III seems to MR to be

not only one of the very best-sounding speaker systems available, but also highly adaptable in terms of associated equipment and listening environment.

General Info: Dimensions of a single 901 are 21 inches wide; 12 $\frac{5}{16}$ inches high; 13 inches deep. Weight is 35 pounds. Equalizer dimensions are 2 $\frac{5}{16}$ inches high; 5 $\frac{1}{16}$ inches deep; 11 $\frac{1}{16}$ inches wide. Weight is 2 pounds. Price (includes two 901 speaker systems and equalizer): \$734. Additional speakers, less equalizer, \$634 per pair or \$320 singly.

Individual Comment by N.E.: From what I have gathered informationally, a considerable and concerted design effort went into making the new 901, and from what I have heard listening to a pair, the effort is highly successful. These speakers have authority, clarity, dynamic range, frequency range, power capability, and in general an honest uncolored transparent response. They do not "favor" one kind of music over another, nor do they emphasize one kind of musical or vocal sound over another. They are as much at home reproducing rock as chamber music, or a solo guitar as grand opera recordings. Stereo imaging is excellent, and while the pair present an absorbing "sound panorama," they still preserve directional clues as per the recorded material. That is to say, you get a sense of left, right, and center sonic information that is "there" in correct aural focus from a "proscenium effect" to "soloist spotlight effect." Much of this depends of course on placing the pair in the relationships to walls spelled out in the owner's manual. But even without such placement the 901s still are, simply, excellent speakers in terms of the more usual criteria of audio response. However, even if one is willing to forgo the spatiality of the 901 system by ignoring the distances from sides and rear to walls, one still should place them at some elevation off the floor. And despite their dimensions, these are not "bookshelf" speakers in the usual sense. A shelf to support them should be fairly deep and sturdy and not filled with other objects. Bose suggests wall brackets, or chains suspended from the ceiling, or the decorator-type pedestals it sells for an additional \$50 per pair. They also could be placed on moderately low benches, or on top of a long cabinet.

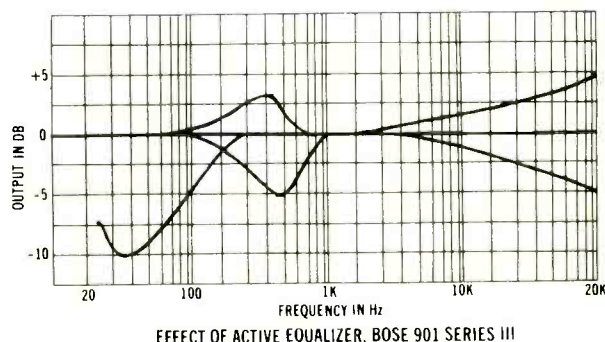
Individual Comment by L.F.: Having had a great deal of pleasurable experience with the early Bose 901 I was prepared for much of the same with the new Series III version. My main objection to the earlier versions had been their very low efficiency. I had always felt that to get maximum performance with the original 901s required driving them with upwards of 100 watts per channel. Now, the Series III is far more efficient than its predecessor. An increase of output of at least 5 dB for a given input has been achieved, and so if I found that say, 100 watts satis-

fied me before, about 35 watts will do the same now.

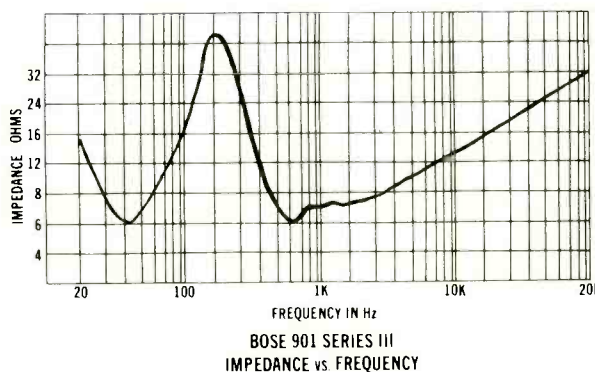
Another improvement I note is the apparent "easing off" of the extreme low-frequency bass equalization requirements in the new version. The new equalizer adds about 5 or so dB to the mid-bass region, and that is a degree of boost that hardly makes unrealistic power demands on a normally good amplifier or receiver. It is of course less of a demand than the 8 to 10 dB involved with using older 901 systems.

Some amount of fussing still remains as far as proper placement is concerned. The older 901's were a joy to hear when properly located in a room, and were less impressive when positioned casually. Placement is still important for the new version, though apparently not as critical as in the past. Whether the use of the vented enclosure has something to do with this I cannot determine, but I did find that the Series III permitted more freedom of location (in the same room, by the way, in which I had listened to earlier models of the 901). Proper vertical positioning still is quite important which means buying the Bose stands or contriving some other means of getting the speakers up from the floor.

With so many manufacturers tending to abandon the low-efficiency bookshelf speaker systems in favor of larger, floor-standing, high-efficiency models, it is gratifying to note that Bose has been able to retain the fairly compact dimensions of the 901 while at the same time achieving higher efficiency—and without giving up anything in the way of excellent stereo imaging, extended response range, and accuracy of reproduction.



Bose 901 Series III: Effect of active equalizer.

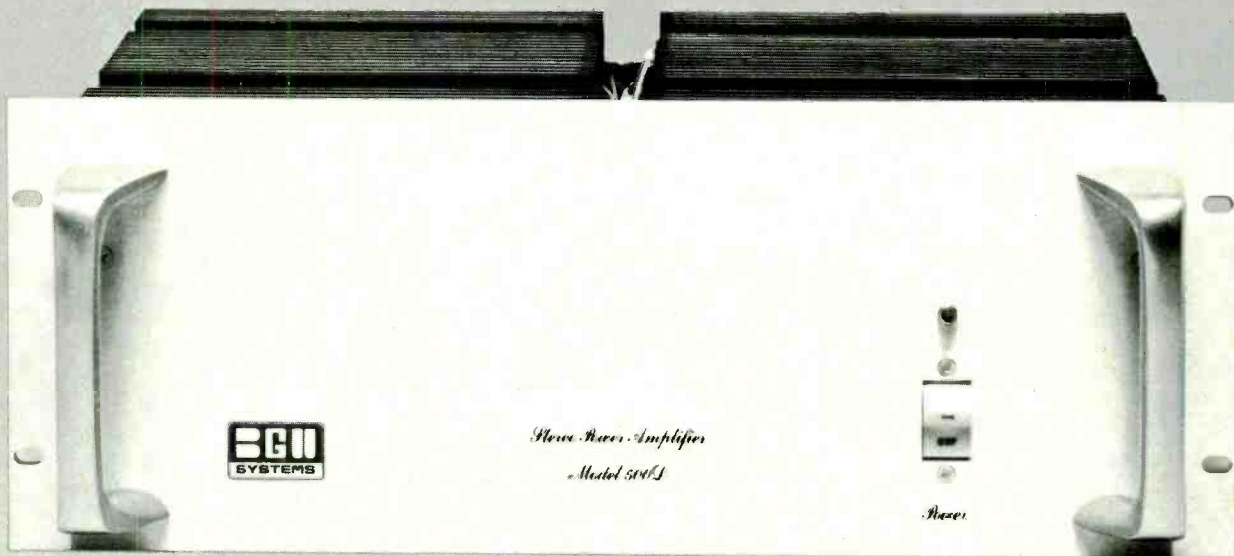


Bose 901 Series III: Impedance vs. frequency.

CIRCLE 15 ON READER SERVICE CARD



50,000 Miles Parts & Labor.



Tear us apart. Modularly.

We think we're realistic. Despite the rugged and proven design of our amps, we're not perfect. Sometimes they need attention like anybody else's.

This ad is not about performance. We know you've accepted us as the company with the most to offer... more studios and music people seem to be making The Big Decision to switch their power amplifier needs to us.

Setting our better performance aside, a big difference between

us and the others is our ease of servicing. Although our three year parts and labor warranty is not unique, our modular design that allows rapid and easy component changeout is. After the 50,000 miles on the road

or the equivalent run of tape in the studio, we survive longer because you can keep us around without a lot of hassles.

A BGW amp is a practical, austere looking piece of gear for good reason. In an environment where only the strong survive, you'll be seeing more austere BGW front panels. 50,000 miles later, if the parts and labor are needed, tear us apart, modularly.

Get our information on a full line of power amps and find out why more roadies are lugging our heavy amps and studio engineers love us.



B.G.W. SYSTEMS
13130 South Yukon Ave.
Hawthorne, CA 90250
(213) 973-8090

CIRCLE 35 ON READER SERVICE CARD

GROOVE VIEWS

POPULAR

BOSTON: Boston. [John Boylan, Tom Scholz, producers; Tom Scholz, Warren Dewey, engineers; recorded at Foxglove Studios, Watertown, Mass.; Capi-

tol Studios, L.A., and the Record Plant, L.A.; mixdown at Westlake Audio; mastering by Wally Traugott at Capitol] Epic PE-34188

Performance: **Ferocity with taste**
Recording: **A sunburst finish**

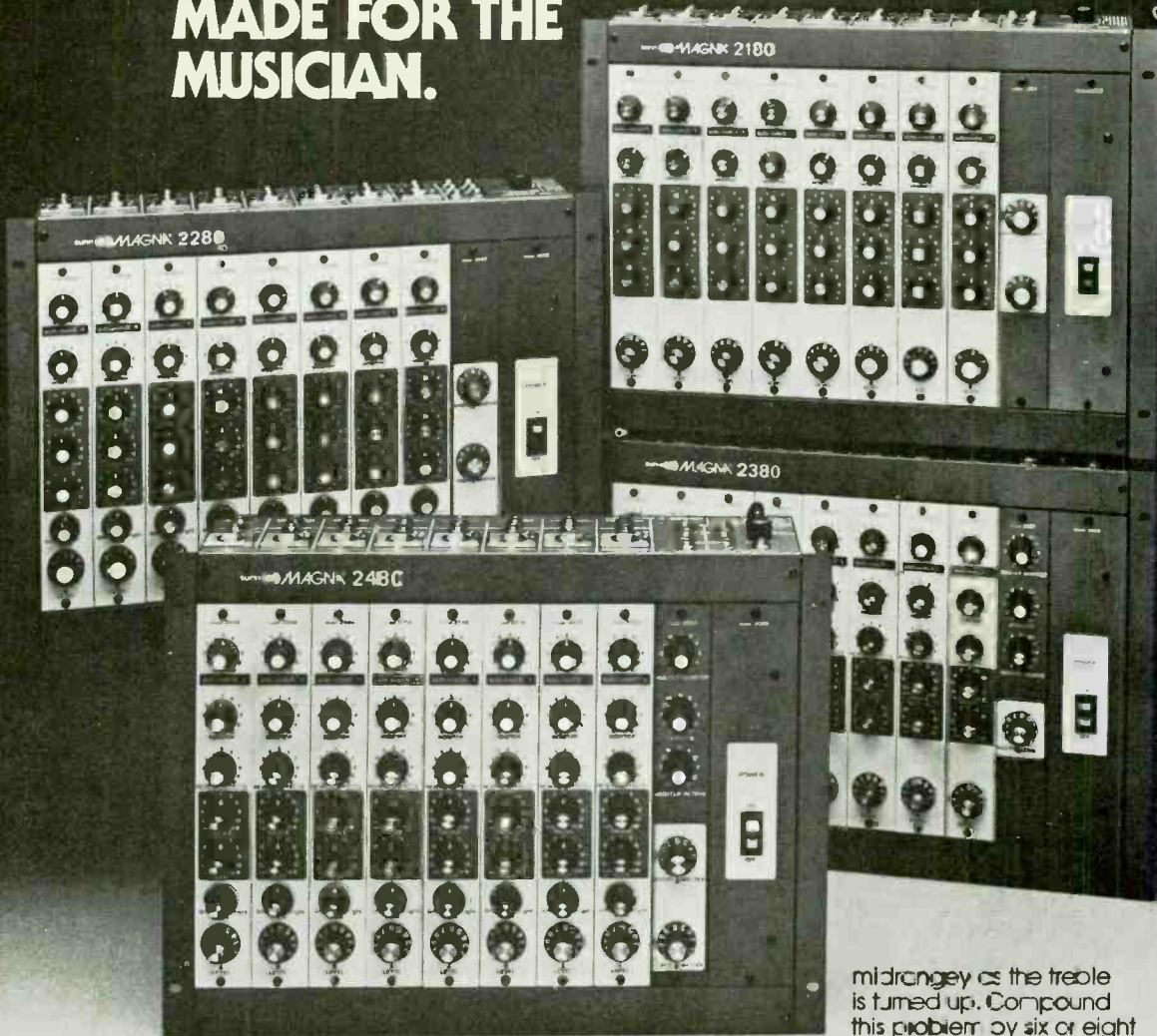
From the album's acoustic opening

passage ("More than A Feeling") to the breakneck doubletime closing passages ("Let Me Take You Home Tonight"), Boston's debut album *kills*. Because the band has a firm grasp on dynamics within song arrangements, the album's much more than your basic heavymetal overdose. Their sound has a sense of immediacy akin to a forty-knot mountain-top December wind that chills to



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the bone and leaves the listener gasping for oxygen.

Boston was born in the studio—literally, and is the brainchild of lead guitarist/bassist/keyboardist Tom Scholz, who holds a Masters in mechanical engineering, from MIT no less. The concept of melodic heavymetal roiled around Scholz's gray matter while he toiled by day in the products design division of an unnamed corporate monster and by night as a member of the Greater Boston North Shore Interchangeable Bar Band. He purchased 12-track equipment (and with his background had no trouble mastering his basement equipment), experimented and ultimately assembled the rest of Boston's lineup—Brad Delp, Barry Goudreau, Fran Sheehan and Sib Hashian. Those 12-track demos kicked according to associates who heard them, but after scoring an Epic contract and re-recording the whole album 24 track, the finished product ranks as one of this year's few truly *exciting* albums.

Unlike most ticket holders in the heavymetal sweepstakes, Scholz recognizes the value of acoustic guitars and vibrant vocal harmonies—which give depth, fullness and aural coloration to Boston's sound. It's an approach that's worked well, to say the least, for other interpreters like Fleetwood Mac, Heart, and (less consistently) Blue Oyster Cult ("Don't Fear The Reaper").

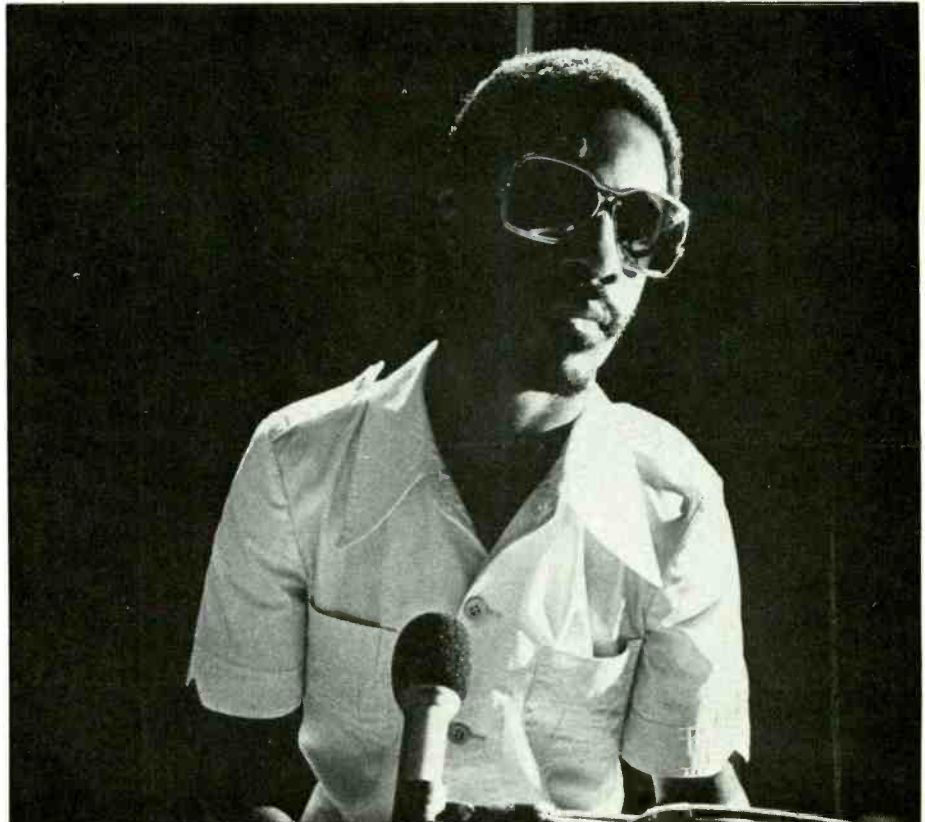
The production is intense without pretensions of mandatory eardrum perforation. The listener is not forced to endure extraneous technological effects. Those that *are* used—echo, multi-track-

ing, etc.—don't leave the trained ear/mind wondering why in hell they were used. There is no clutter, no waste, but there are absolutely no holes either. Everything fits, from tune selections, arrangements and instrumentation to miking, tracking, mixing and mastering. Boston's first album is unabashed high-energy, and the listener is compelled by its forcefulness to crank the volume up as high as it'll go.

S.P.

STEVIE WONDER: *Songs in the Key of Life*. [Stevie Wonder, producer; John Fishback and Gary Olazabal, engineers. Recorded at Crystal Industries, Hollywood, The Hit Factory, N.Y., The Record Plants, Los Angeles and Sausalito, Ca.] Tamala T13-34062.

Performance: **At long last**
Recording: **Very appreciable**



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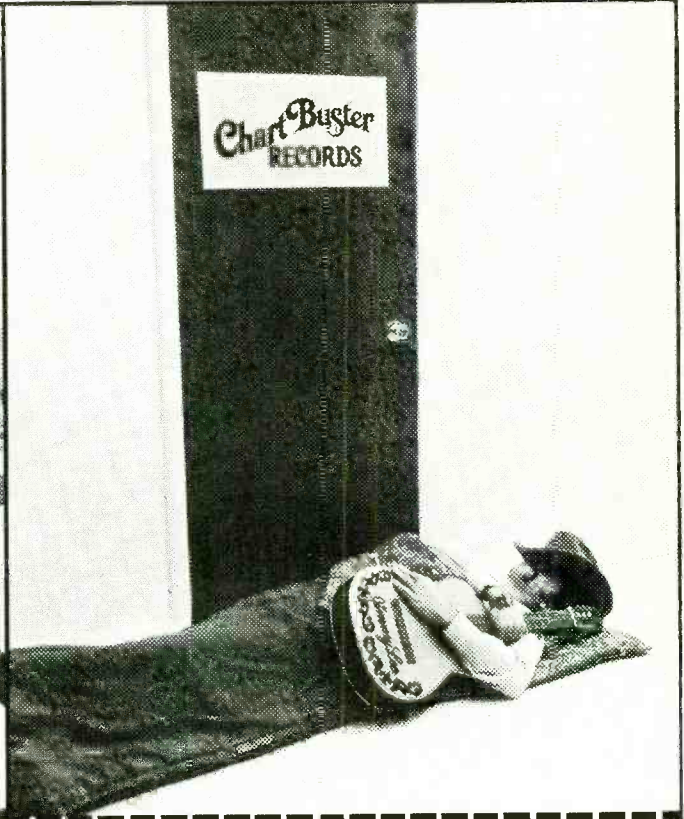


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CIRCLE 25 ON READER SERVICE CARD

When you're faced with an album recorded by a legitimate superstar, and that album is two years overdue—there are many questions to be answered. Obviously, the rumor mills have been working overtime, and you curiously await to see if, (A) the well's gone dry, (B) whether the supposed self-doubts due to pressure show through, (C) he's dead, (D) he's bored, (E) all of the above. So where do you begin?

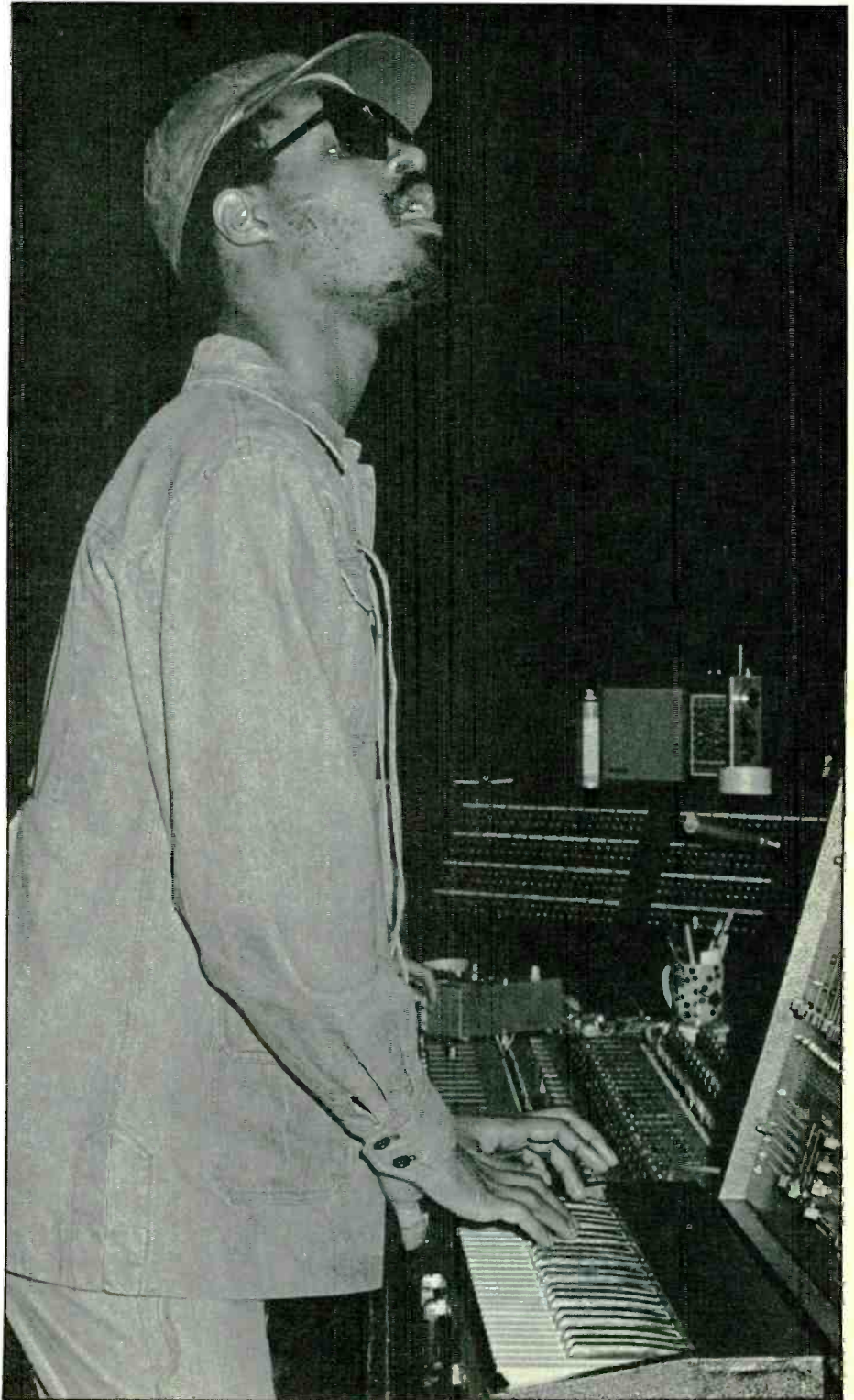
Checking with our cover story on those sessions (MR Dec/Jan '76) the gist of the delay seemed to be that no sooner would Stevie begin work on a new tune than he'd become inspired, shelve the current tune and compose another. As a result, he had to select which of twenty-one tunes (originally 20) would be selected from over thirty possibilities. With most other performers, the problems of time and finance would have created an inconsistent and tired LP. Well, from the early cuts I caught on the radio, I didn't find myself humming a catchy refrain later in the day. Word on the street among musicians was, "It's just another Stevie Wonder album," or "It's nice to see he's getting back to simple things again." With all these verdicts in search of a jury, I settled down with my headphones so as not to miss a single thing.

Well, I'm not disappointed, neither from a musical or technical standpoint. The approach throughout is fresh, with Stevie's vocals clear, distinct and *natural*, and, as always, the featured instrument. Whereas some artists approach lyrics as filler between the solos, lyrics seem to be Wonder's first concern. They are the focal point; everything is created, engineered and mixed around them. Drums also get much attention in his recordings, achieving a complete, deep sound. Rather than a "technique" approach with no frills for the bass, a sliding, from-note-to-note-bass is opted for here. His new \$50,000 Yamaha Polyphonic Synthesizer, said to be the most versatile presently available, is most evident on "Village Ghetto Land," reproducing strings with incredible accuracy. Other interesting things on this album include classical inferences, a return to Stevie's first instrument of notoriety, the harmonica, a vocal backed solely by harp and harmonica, and a couple of pleasantly surprising instrumentals.

Away from the controls, Stevie also succeeded in other aspects of producing not usually discussed. Obviously, there is a risk in releasing a double album plus E.P. package. (Since you asked, it's the first record to be shipped a double plat-

inum.) You can overdo a good thing; some people won't like so many cuts, etc. However, there are tracks here to please everyone, all showing the different sides of the man. Further, if anything, the wait has helped him. With the release of the previous album, we become saturated with Stevie Wonder material from all his albums. Finally, as airplay diminished, people eagerly

anticipated "*Songs*." It's not that Stevie has to worry about sales, but as an artist with so much to say, over-saturation can lead to a reaction of, "it's just another Stevie Wonder album." Personally, I think there's too much junk released, so I applaud an artist who thinks enough of his art, and the listeners, to wait until the right time. G.P.



STEVIE WONDER: Waiting until the right time.

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TOWER OF POWER: *Ain't Nothin' Stoppin' Us Now.* [Emilio Castillo and Tower of Power, producers; Alan Chinowski, Bob Edwards, Jim Gaines, engineers; recorded at Kendun Recorders, Burbank, Calif., Record Plant, Los Angeles, Calif., Record Plant, Sausalito, Calif., CBS Studios, San Francisco, Calif.] Columbia PC 34302.

Performance: **Overdone**
Recording: **Slick city**

This album is a prime example of what can happen to a band that gets *too* professional—it's so slick that eighty percent of the funk that TOP had in their early days is totally absent. They are just *too* tight. In fact, it's so refined that it could be any number of soulful aggregations. TOP had rawness and simplicity, and that's what made them famous. Now they've come up with a very slick and very busy hunk of vinyl. No strings in the early days; these tracks could draw the bears out of the hills.

"Because I Think the World of You" intros with a lot of juice, but it peters out during the first verse. Most of the

ballad work on this album pales in comparison to their earlier stuff. The band has to in the future spend more time gathering better material.

The album's not a total dump—"Can't Stand to See the Slaughter" sticks out as the closest thing to Tower of Power on this album. It's about the only place the horn section has funk; elsewhere the horns are either too poorly arranged or too poorly mixed to have presence overload. Better luck next time—no problem about the skill. S.P.

BOZ SCAGGS: *Silk Degrees* [Joe Wissert, producer; Tom Perry, engineer; recorded at Davlen Sound, Los Angeles, Calif.] Columbia PC 33920.

Performance: **Catchy and danceable**
Recording: **Clear and effective**

What *is* there about Boz Scaggs's voice that is the aural equivalent of Jim Nabor's face? Perhaps it's that distinctive adenoidal quality. In any case, *Silk Degrees* displays Scaggs's flair for writing and performing the catchy tune (he has his writing hand in all but two songs

here), with the phrase or repetitious chorus that clings persistently to the mind, taking the place of safe combinations and telephone numbers hastily memorized at boozy parties.

The crisp, semi-disco arrangements by David Paich, keyboardist and co-author of many of the cuts, are professionally handled by producer Joe Wissert. Wissert has taken some liberties with Scaggs's unusual voice, and variously uses overdubbing, reverb, and multiple aural ground placements for maximum effect. The heavy reverb and midground location of Scaggs's vocal on "Jump Street," for instance, give it a quality appropriate to the toughness of the number, quite unlike the clear, up-front treatment of his solo in the simpler, sweeter "We're All Alone."

Although very well recorded, there are one or two cuts in which the highs fall off a bit, making for slight muddiness most obvious in the cymbals. Since this does not occur throughout, perhaps it was the producer's attempt to effect a better instrumental blend, or compensate electronically for human faults. Or perhaps he merely had an off day. Perfectly understandable.



TOWER OF POWER: Better luck next time.

The overall production optimizes the light, bouncy character of this album. Not quite all-out disco, it nevertheless



BOZ SCAGGS: Distinctive adenoidal quality?

contains a generous amount of danceable material. If Columbia Records heavy TV advertising campaign has not yet whetted your appetite, take it from me, the Dancing Fool—this one's a winner. P.W.



PAT MARTINO: *Starbright*. [Ed Freeman, producer; Michael DeLugg, Alec Head, Ron St. Germain, engineers; recorded and mixed at Media Sound, N.Y.] Warner Bros. BS-2921.

Performance: **A Pat Martino misnomer**
Recording: **Clean**

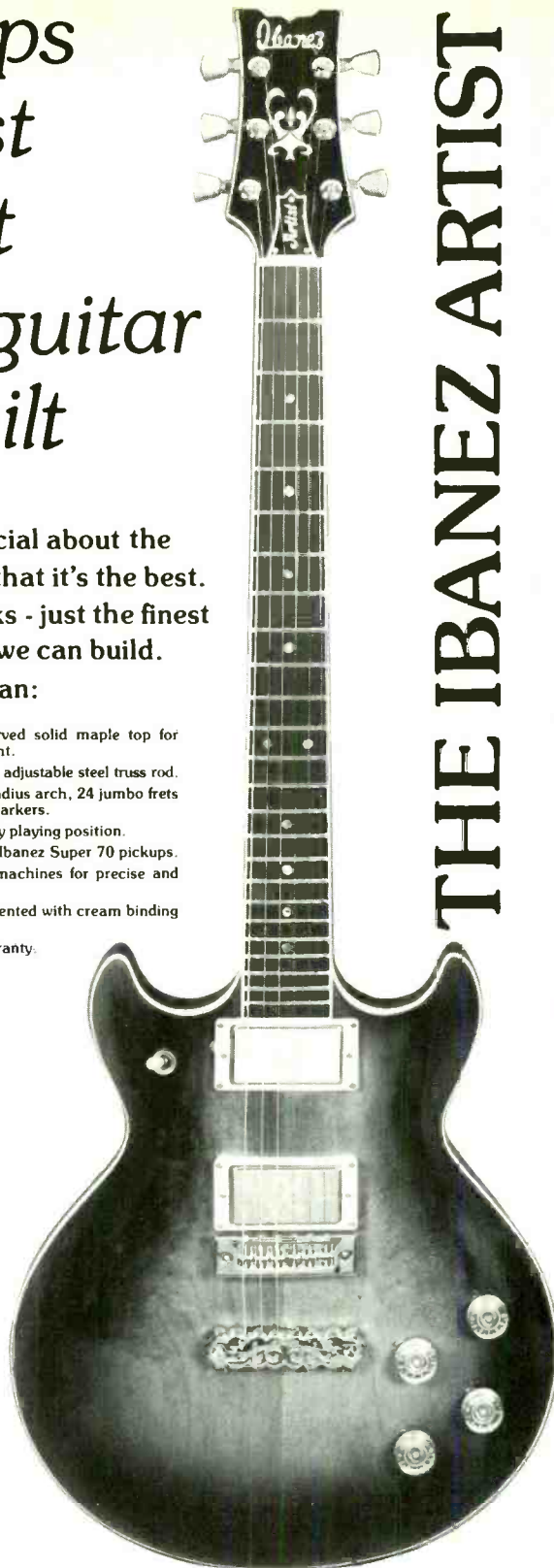
This is the perfect example of how damaging the wrong producer can be. Rather than hearing what the artist does naturally, we're getting producer Freeman's impression of what a jazz/progressive guitarist should sound like. With George Benson all but giving up the guitar to have a hit, Warner Bros. is con-

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By Chas Farrell-Kimbrell

Street Walking & Bird Watching

Streetwalkers and Hummingbird are two separate bands, each with its own unique style and sound. The bands do have two things in common; Scorpio Sound Studios and vocalist/guitarist Bob Tench.

Hummingbird's first album was cut in 1973, but when business details began dragging on, the members began working sessions. By the time the business end was together, all except two of the original tracks produced by Samwell had been scrapped. The members went back into the studio and finally *Hummingbird* was released in mid-'75. The second release *We Can't Go On Meeting Like This*, came about somewhat more easily. The entire album was recorded in four days!

Both Hummingbird albums are filled with very clean, bright music. There's an equal sprinkling of vocals and instrumentals running the gamut of rock, blues, jazz and funk—you name it. If the band seems to have a slight Jeff Beck flavor, your ears are not deceiving you; this *was* until recently the Jeff Beck Group. The line-up is the same on both albums with the exception of a switch from drummer Conrad Isidore to N.Y.C. session drummer, Bernard Purdie for the second album. Purdie lacks the punch of Isidore, but what the overall sound loses in punch it gains in evenness. While Isidore had written five out of nine numbers on the first album making it a bit one sided, the second album is more of a group effort and it shows up in the sound. Half the album is instrumental giving the players plenty of room to run. Lead guitarist Bernie Holland seems to write with the heaviest Jeff Beck influence, strange, since he was not in the Beck group. He did however, write the beautiful "Diamond Dust" found on Beck's *Blow by Blow* album.

The major difference in Hummingbird's sound as opposed to Beck is their non-use of effects. Instead, the band seems to concentrate on getting the truest

possible sound from their instruments with the maximum clarity.

Max Middleton's meandering melodies, while always easily recognizable are never repetitious. His "Gypsy Skys" on the second album is no exception. Clive Chapman penned out two instrumentals on the album each bordering on a disco-riff sound but far enough away to be classed as jazz/R&B. The disco "feel" may be attributable to new drummer Purdie who has been doing a lot of N.Y. session work during this the "Disco Era" (should that be the Disco *Error*?). But all in all, Purdie is perhaps just what this band needed. He is steady and definite and knows when to lay back so the other musicians can expand on their own ideas.

Streetwalkers is a high power band whose main attribute seems to be intensity. Their main fault lies in lyric content (if you have manic depressive, or suicidal tendencies, avoid these albums). Streetwalker's sound and attitude is mostly directed by Roger Chapman and Charlie Whitney. The two formed Streetwalkers after leaving Family. It seems clear to this listener that Streetwalkers is on a one-way street while Chapman/Whitney direct traffic. The bulk of the lyrics revolve around dying, desperation, voodoo, gypsies and other down-head themes. A major problem of the group is that it makes no real use of Bob Tench's voice. A shame, because Tench has what is quite possibly the finest voice in rock. What little background vocal work Tench does is very nearly lost in the shuffle.

The group's overall recorded sound is thick, perhaps even muddy, but it seems to be the sound they want. The final sound quality could not be the fault of the studio, since both groups cut at Scorpio nor could it be the engineer's fault because Dennis Weinreich engineered the bulk of Hummingbird's material and the first Streetwalker's album.

The only real variety on Streetwalker's first album is a nice acoustic piece incorporating a very subtle use of the synthesizer and smoother vocals from Chapman. One other attempt at diversity is "Crawfish" (Weisman/Wise). The version has its moments and you can even hear Tench on the refrain. However, the guitar work loses a lot of excitement because the final recorded sound is hollow. It comes off more like a malfunction than an effect, causing the piece to lack body and punch. Throughout the album, Chapman's vocals tend to stay

at such an intensely frantic level that the intensity backfires into boredom. Chapman seems much like a hurricane—all that power and no control.

Red Card continues much along the same line as the first album with Chapman/Whitney still monopolizing the direction of the band. Down-head lyrics still pervade through a thick, muddy sound. Note also that Streetwalkers is produced by Streetwalkers—they can't even blame their producers. The drums are particularly muddy. The bass guitar continues to rumble leaving the overall sound very bottom heavy. One track does show promise on this otherwise redundant album; "Decadence Code," is musically solid with some real attempt at arrangement. This may, however, be attributed to Wilf Gibson who is responsible for the string arrangements in the song. The band also does an Otis Blackwell tune, "Daddy Rolling Stone" which was mixed to monaural. The question is, why? The mono mix doesn't really seem to add much to the number. If the band had been trying to duplicate an early Sixties or pre-Sixties sound, the mix may have had some real effect. Since the rendering of this oldie was an up-dated arrangement in Streetwalkers power-drive style, the mix seems to lose significance.

Streetwalkers is a band of powerful-playing musicians who seem misguided at best. Perhaps while "streetwalking" they should take up "birdwatching." There's an interesting species of "Hummingbird" that could show them a new street to walk.

HUMMINGBIRD: (1) *Hummingbird*, (2) *We Can't Go on Meeting Like This*.

[Hummingbird, Ian Samwell, producers; Dennis Weinreich, John Punter, Phil McDonald, engineers; recorded at Scorpio Sound, London, England, Air Studios, London, England, Apple Studios, London, England.] A&M SP 4536, A&M 4595.

Performance: **a la Jeff Beck**

Recording: **Natural**

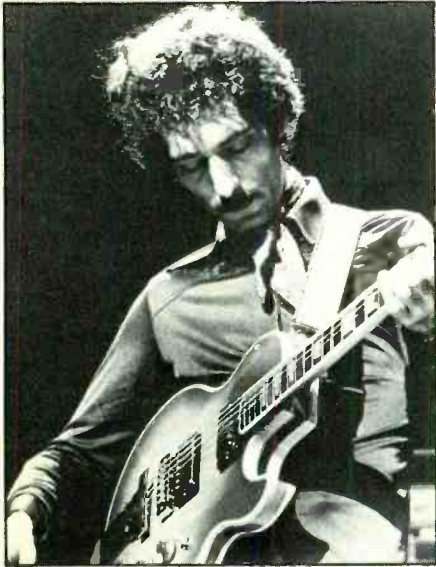
STREETWALKERS: (1) *Streetwalkers*, (2) *Red Card*.

[Streetwalkers, producers; Dennis Weinreich, Ray Hendriksen, engineers; recorded at Scorpio Sound, London, England.] Mercury SRM 1-1060, Mercury SRM 1-1083

Performance: **Intense but depressing**

Recording: **Thick sounding**

tinuing the same tact with reservist Martino. If you've ever had the pleasure of hearing Pat Martino's early recordings on Muse Records, you know that the man is not to be taken lightly. You can't tell it by this record, however. I get the impression that Freeman listened



PAT MARTINO: Out of his element.

to the successful styles of ECM and other artists and implemented them tastelessly. There's the Ralph Towner and Oregon tabla/guitar combination on one track; consistent use of the Stanley Clark bass snap sound, a sound so copied these past few years that Clark no longer plays it. Corea-Jarrett acoustic and Rhodes electric piano moods abound on this album, plus the ever-present, meaningless synthesizer lines. There are two other glaring problems. The first is that when Martino isn't playing what little guitar he's allowed, Freeman has him play synthesizer along with three other keyboardists. Since we've never heard him play synthesizer, and thus has no identifiable style, how do we know who's playing? Secondly, Freeman made the unforgiveable mistake of taking the artist out of his element. Martino is not a rock guitarist, and his attempt at the note-bending characteristics of the style fall flat. The writing level of the album is up and down, with the theft of the Starbright theme from the Midnight Cowboy Soundtrack being totally unappreciated. Pat Martino never gets a chance to cook on this cliché ridden, directionless material, false vinyl idol created in the name of commercial success. To my knowledge, it's the first time the catalog initials fit the category—B.S. G.P.

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Jim Hall, Charlie Haden and Jazz Permanence

By Nat Hentoff

Having been a jazz a&r man (Candid, and some sets for Contemporary), I have a more than passing interest in those still in the arena, as Saul Alinsky used to say. There is one in particular who seems to me to cut the majority of his competitors and who promises to be perhaps the most creative of all of them in the rest of the '70's and beyond. John Snyder is the name, and his terrain is A&M's relatively new jazz label, Horizon. It's not that everything he produces is beyond cavil, but the general level is quite high and he clearly works for the musicians rather than, as Creed Taylor does, to manipulate them. And Snyder goes first-class all the way—sound, packaging, even at times providing transcriptions of solos and scores in the notes.

A splendid case in point is Jim Hall's *Commitment*. Made to last beyond fads, refreshingly free of the slightest pandering, the set is a thoroughly relaxed, diversely colored setting for the most lyrically inventive of all jazz guitarists. A soloist who has developed a style so personal and deeply reflective that he literally is beyond category. Along with electric guitar, an instrument on which no one has nearly so mellow and luminous a tone, Hall is heard for the first time on crisply incisive acoustic guitar. Among his entirely apposite associates, sharing various tracks, are Tommy Flanagan, Ron Carter, Allan Ganley, Don Thompson, and Terry Clarke, among others. The most distinguished sideman is the also uncategorizable flugelhornist expatriate Art Farmer whose sound and sensibility are very much akin to Jim Hall's. It is long past time for Farmer to have an album thoroughly representative of his special skills, and John Snyder would be just the man for that project, in view of what he has allowed to happen here.

Snyder is also a rather rare a&r man, in the jazz context, in that he knows when to let go. Horizon is *his* line but he does not insist on producing every single one

of its releases if it makes sense for someone else to take over. The idea, for instance, for Charlie Haden's *Closeness* came from Ed Michel (best known for his Impulse sessions). And so Michel produced this set, an extraordinary series of duets between Haden, a powerfully original bassist and—in order—Keith Jarrett, Ornette Coleman (for a long time Haden's employer), Alice Coltrane on harp, and percussionist Paul Motian.

Because of the widely contrasting styles and temperaments of the four guests, this, despite its small cast, is one of the most variegated jazz albums in a long time, with Haden characteristically able to fuse authoritatively with each performer while keeping his own voice resiliently personal. The originals range from a tribute by Haden to his wife, "*Ellen David*," to a further witnessing by Haden to national liberation struggles, "*For A Free Portugal*."

An index of the quality of sound on just about all Horizon sets is the utter clarity and wholly natural-sounding resonance in the bass-harp duet. Throughout this set, and Jim Hall's, the engineering is manifestly designed to satisfy musicians' audio needs (which are not always the same as those of a&r men and engineers). In addition to openness of sound, without italics, the criterion is balance, true musical balance, with the controls in the service of the music, not dominating it.

JIM HALL: *Commitment*. [John Snyder, producer; Tony May, engineer; recorded and mixed at Generation Sound Studios, New York City.] Horizon SP-715.

CHARLIE HADEN: *Closeness*. [Ed Michel, producer; Baker Bigsby, engineer, assisted by Geoff Sykes and Tony May; recorded at Generation Sound, New York City, and Kendun Recorders, Burbank, California.] Horizon SP-710.

CLASSICAL

BARTOK: *Piano Concertos No. 1 & 3.*

Stephen Bishop, piano; London Symphony Orchestra, Colin Davis cond. [Recording information not available.] Philips 9500.043.

Performance: **Noteworthy**
Recording: **Oddly balanced**

Recordings of Bartok's music have been scarce in the past year, and these fine performances are especially welcome even though the engineering leaves something to be desired.

Bartok's *Piano Concerto No. 1* was considered quite "modern" in its day (1927) and it still packs a ferocious punch. The percussive possibilities of the solo instrument are aggressively exploited and the orchestral scoring is unusually chamber-like. But no recording I've yet heard has satisfactorily solved the many problems of balance

—all the more annoying in this instance, since the Bishop/Davis collaboration seems to me the finest in the catalogue.

The strings in the First are employed for underpinning or punctuation, rather than for their customary top-line role. But here they make almost no impact, unlike several other recordings used for comparison. The piano is also much too closely balanced. Three different stereo sets failed to produce acceptable results.

There are identical couplings of the First and Third available by Barenboim/Boulez on Angel and Perter Serkin/Ozawa on RCA, the former suffering from an over-balanced piano and solo playing more appropriate to Brahms and the latter receiving a much too soft-edged recorded perspective for music of such bite and brio. Rudolph Serkin's Columbia recording of the First with Szell is absurdly imbalanced in favor of the piano. And Zoltan Kocsis on Hungaroton, although naturally balanced, receives a recording that is otherwise not up to modern standards.

The *Piano Concerto No. 3*, composed in 1945 as he was dying of Leukemia, presents Bartok's friendlier side. Here, Bishop and Davis are better served by

the production, even though the piano is still slightly forward for my concert-hall balance tastes. The performance is excellent, if a bit less "romantic" than commentators lead us to expect, and it joins Anda/Fricsay on DG and Katchen/Kertesz as highly recommended versions.

S.C.

STRAVINSKY: *Oedipus Rex.* Peter Pears, Martha Modl, Heinz Fehfuss, Otto von Rohr, Helmut Krebs, soloists; Jean Cocteau, narrator; The Cologne Radio Symphony Orchestra and Chorus, Igor Stravinsky cond. Odyssey Y33789.

Performance: **The creators' own**
Recording: **Vintage 1951 mono**

STRAVINSKY: *Oedipus Rex.* Rene Kollo, Tatiana Troyanos, Tom Krause, Ezio Flagello, Frank Hoffmeister, David Evitts, soloists; Michael Wager, narrator; Boston Symphony Orchester and Harvard Glee Club, Leonard Bernstein cond. [John McClure, producer; Bud Graham, Larry Keyes, engineers; re-



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Performance: **Lush**

Recording: **Okay**

Stravinsky's "Opera-Oratorio" *Oedipus Rex* will surprise listeners accustomed only to his colorful early ballets, *The Firebird*, *Petrouchka*, and *The Rite of Spring*. *Oedipus Rex*, orchestrated in hues of grey and classically poised in its expression of emotion, is no less a masterpiece than those earlier works, however, and its stature grows with each hearing.

Columbia recently re-released two recordings of this sublime work: Stravinsky's own 1951 recording on the budget Odyssey label, and Leonard Bernstein's performance which was only previously available with Harvard Lectures.

The historical importance of the first recording, which was taped in the concert hall of the Nordwestdeutsch Rundfunk in Cologne on October 8, 1951, is that the composer is conducting and his collaborator on the text, Jean Cocteau, performs the narration.

Cocteau's speeches, dubbed in from a Paris performance eight months later, are peerless—haughty, eloquent and absolutely "right" (even though the score specifies that he should speak in the language of the audience). The soloists receive a forward balance, as was the custom in those days, with some loss of orchestral detail resulting.

Stravinsky's recently remastered 1962 stereo recording has, of course, much better sound; to my taste, it is also better performed, with more detail and vital accents from the orchestra and rhythmic precision from the soloists (with the exception of Peter Pears's noble *Oedipus* in the 1951 recording). Both recordings are highly recommended.

The Bernstein interpretation is well recorded and performed for the most part. The conception, however, is too lush and inappropriately emotional upon occasion for this austere work. Stravinsky has said that he detested the speaker device—especially the final "on t'aimait" which he called "a blot of sentimentality wholly alien to the manner of the work." It is hardly difficult to imagine how the composer would react to Bernstein's recording when the speaker, Michael Wager, gives that line particularly bathetic emphasis. S.C.

GERSHWIN: *Rhapsody in Blue; An American in Paris; Three Preludes; Songs from Oh, Kay! and Tip-Toes.*

George Gershwin, piano; Paul Whiteman and his Concert Orchestra (in the *Rhapsody*); RCA Victor Symphony Orchestra, Nathaniel Shilkret cond. (in *American in Paris*). [Peter Dellheim, re-issue producer; Bernard Keville, remastering engineer.] Victrola AVM 1-1740.

Performance: **The Real Thing**
Recording: **Remarkable resuscitation**

GERSHWIN: *Rhapsody in Blue; An American in Paris.*

George Gershwin, piano; Columbia Jazz Band and New York Philharmonic, Michael Tilson Thomas cond. [Andrew Kazdin, producer; Bud Graham, Milt Cherin, Ray Moore, engineers; recorded at 30th St. Columbia Studio (*Rhapsody*) and Avery Fisher Hall (*American in Paris*), New York.] Columbia XM 34205.

Performance: **Bracing**
Recording: **Excellent**

GERSHWIN: *Rhapsody in Blue (Solo Piano Version); Three Preludes; 13 Songs from George Gershwin's Song Book.*

Andre Watts, piano. [Larry Morton, producer; Stanley Tonkel, Milt Cherin, Marty Greenblatt, engineers; recorded at 30th St. Columbia Studio, New York.] Columbia M 34221.

Performance: **Free**
Recording: **Clattery**

The first of these records deserves best-sellerdom! Gershwin himself participates as pianist (or, in *American in Paris*, as the celesta player) in all these recordings, and the sound is much better than we have a right to expect. Especially revelatory is the *Rhapsody* with Paul Whiteman's Band, which simply eclipses every other performance I've ever heard. Good as the composer's solo work is, Whiteman's instrumentalists will sweep you off your feet with their wild display of virtuosity and humor. The recording, made on June 10, 1924, was abridged to get the work onto two 78 rpm sides, but any complaints about completeness are silenced by what *did* get on disc. *An American in Paris*, recorded on Feb. 4, 1929, is also a marvelous performance, with some unparalleled solo instrumental work. The disc is rounded out by Ger-



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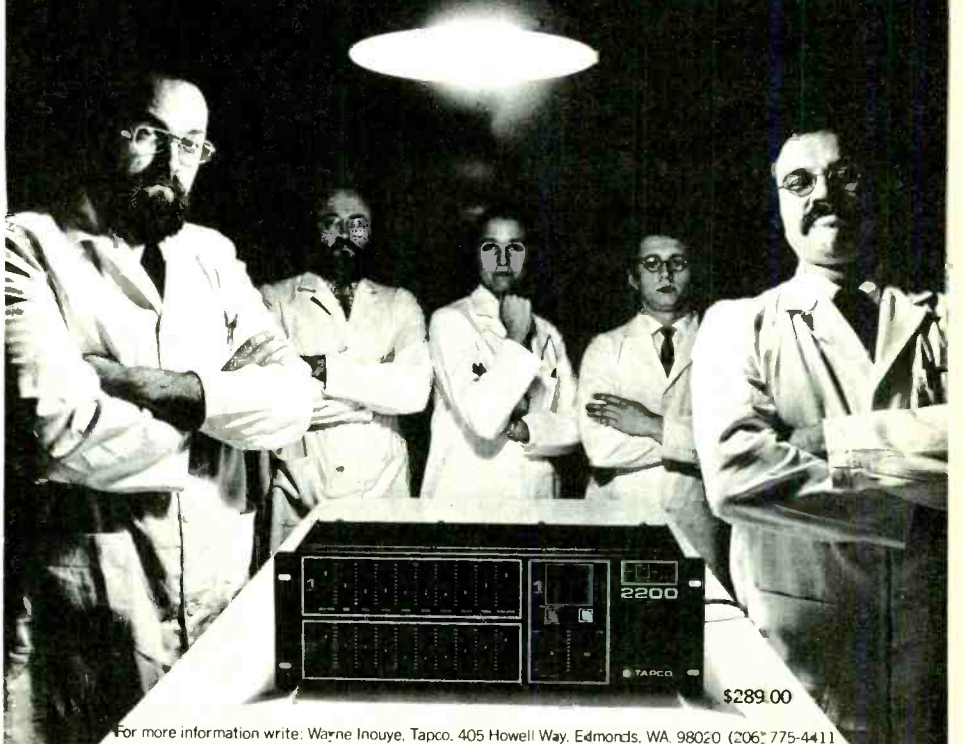
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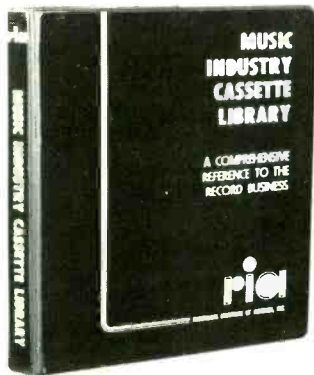
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shwin's own performances of this *Three Preludes* and songs from two of his hit shows.

The second disc has a novel idea: take Gershwin's 1925 piano roll of the *Rhapsody*, record it on a modern player piano, then separately record a jazz band to synchronize with the piano roll, and then put the two together. In effect, the result will be a modern recording of the same instrumental version on the Victrola disc. There's only one small problem: Gershwin had also incorporated a piano reduction of the orchestral part onto the 1925 roll, and therefore all the holes on the roll representing the accompaniment will have to be covered up in order to reproduce the solo part *alone*. The result is a complete artistic and technical success.

The performance itself is—well—bracing! This is the complete, uncut *Rhapsody* (unlike the nine-minute version on Victrola) performed in 13:40; most performances today take two to three minutes longer. Perhaps Gershwin wouldn't have played so quickly if he had had to interact with other musicians, but Michael Tilson Thomas and the Columbia Jazz Band cope admirably with the brisk tempi imposed by the piano roll. The other side of the disc is unjustly neglected on the front cover, for it contains the finest modern reading I know of *An American In Paris*. Thomas takes the middle blues section very slowly to great effect, and his overall timing is nearly three minutes slower than the Shillkret performance on Victrola; yet, both feel completely natural. My only cavil is that the playing time on this disc is very short.

The Andre Watts disc contains the solo piano version of the *Rhapsody in Blue*, with interpolated additions from Gershwin's two-piano reduction. He also plays the *Three Preludes*, taking fully two minutes longer than the composer's five minutes on the Victrola disc. The second side contains 13 of the songs from *George Gershwin's Song Book*. Some may enjoy Watts's free approach, but I find it indulgent and lacking in clarity and rhythmic snap. Nor is the pianist's sentimental approach helped by the clattery sound; instead of that fatuous liner note, the producer should have devoted his time to his nominal duties. William Bolcom's Gershwin disc on Nonesuch is much more to the point, despite an overly close recorded balance. S.C.



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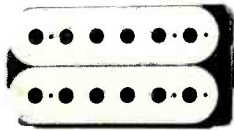
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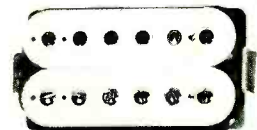
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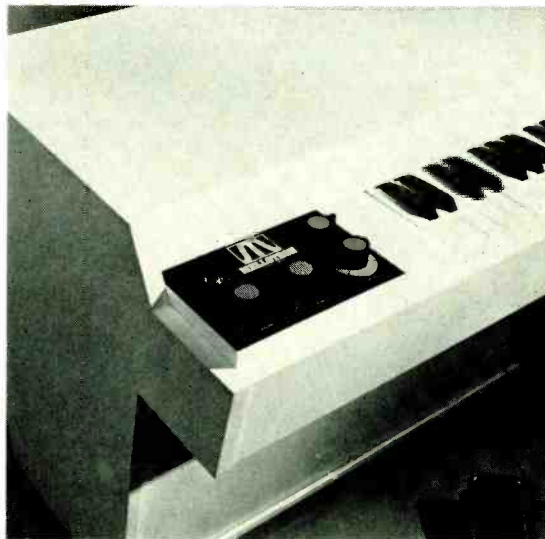
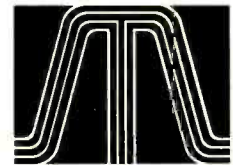
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1. Date of filing: November 26, 1976. 2. Title of Publication: MODERN RECORDING. 3. Frequency of issue: bi-monthly. 4. Location of Known Office of Publication: 14 Vanderventer Ave. Port Washington, N.Y. 11050. 5. Location of the Headquarters or General Business Office of the Publishers: 14 Vanderventer Ave. Port Washington, N.Y. 11050.

6. Name and Address of Publisher, Editor and Managing Editor: Publisher, Vincent P. Testa, 14 Vanderventer Ave. Port Washington, N.Y. 11050. Editor, Hector G. LaFore, 14 Vanderventer Ave. Port Washington, N.Y. 11050. Managing Editor, None.

7. Owner: Cowan Publishing Corporation, 14 Vanderventer Ave. Port Washington, N.Y. 11050. Stockholders Owning or Holding 1 percent or More of Total Amount of Stock: Sanford R. Cowan, 500 Bayview Dr., North Miami Beach, Fla. 33160.

8. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 percent or More of Total Amount of Bonds, Mortgages or Other Securities. None.

9. Paragraphs 7 and 8 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting and the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner. Names and addresses of individuals who are stockholders of a corporation which itself is a stockholder or holder of bonds, mortgages, or other securities of the publishing corporation have been included in paragraphs 7 and 8 when the interest of such individuals are equivalent to 1 percent or more of the stock or securities of the publishing corporation.

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	Average no. copies each issue during preceding 12 months	Single issue nearest to filing date
A. Total no. copies printed (Net Press Run)	47,576	49,875
B. Paid circulation		
1. Sales through dealers and carriers, street vendors and counter sales	21,633	22,731
2. Mail subscriptions	8,749	9,677
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1. Samples, complimentary, and other free copies	6,893	7,645
E. Total distribution (Sum of C and D)	37,275	40,053
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I certify that the statements made by me above are correct and complete.
VINCENT P. TESTA, Publisher

LETTERS (continued from page 8) manufacturers' models of the same generic products such as reverbs, digital delays, noise reduction, et. al.

In your Oct/Nov issue, reviews were done on a cassette tape recorder, a pre-amplifier, an open-reel tape recorder and a reverb unit. Had you focused your reviews on reverb units, for example, I would undoubtedly be in a better position to make an informed decision as to which unit might best fit my specific needs and budget.

As it is, if I were in the market for a reverb, I would have to wait for subsequent reviews in the coming bi-monthly periods to make thoughtful comparisons. By that time, there well might be ten new lines of reverbs to have to evaluate, or inflation may have placed them all out of range!

It is possible to come to some kind of decision based on the manufacturers' specs and informational literature, however, some unbiased evaluations from a test section like yours certainly helps a great deal more.

—J.A. Stewart
Cleveland, Ohio

(We are seriously considering going monthly in the near future, possibly during Spring 1977.)

Sorry, Guys

We received the copies of the next edition of Modern Recording. However, we have found an error on Page 50, first column. First and second lines should read "... be a 12-inch, 15-inch, or 18-inch woofer."

—Brian A. Roth
Ford Audio & Acoustics, Inc.
Oklahoma City, Okla.

Needless to Say

Well, I waited and waited after my initial subscription for my first MR mag. I must tell you it was well worth the wait: I read it cover to cover and found nothing trite or dull, NOT EVEN THE RECORD REVIEWS (which I usually skip in other mags).

Needless to say, I simply cannot live without the back issues #1 and #2. Enclosed is a personal check for \$3.50 to cover these two issues. Also enclosed is one information card so I can receive more info on products that N.E. and L.F. have reviewed.

Keep up the great work!

—Jonathan F. Phillips
Warren, Ohio



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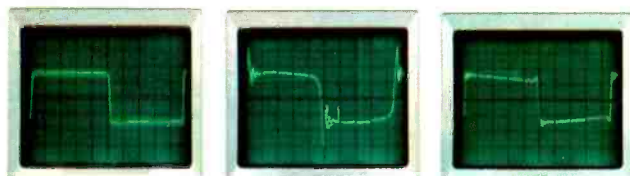
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PHASE COMPENSATOR CIRCUIT.



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Phase Compensator*

Ideally, what you want on recorded tape is a "mirror image" of the original signal. No more. No less. Problem: the very nature of the recording process causes phase distortion. Solution: during playback, Sony's exclusive Phase Compensator Circuit compensates for phase distortion. Result: sound quality that's virtually identical to the original source. (REFER TO OSCILLOSCOPE READINGS.)

SYMPHASE RECORDING.

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This means you can lay down two individually recorded tracks in perfect synchronization with each other. Record head has playback-monitor function in record mode. This eliminates time lag that occurs when monitoring through playback head. Thus both tracks can be first generation, keeping noise levels at minimum. Flashing **Standby Signal** alerts you that the unrecorded channel is record-ready. And **Punch-In Record** puts you into record mode instantly, without stopping tape.

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And to improve the sound of your cassettes both units employ a two-motor drive system. Including an electronically controlled DC motor used exclusively for capstan drive. The results: 0.075% (WRMS) wow and flutter for the RS-671AUS. And 0.07% (WRMS) for the RS-677US.

You also get a quiet S/N ratio of -65dB (CrO₂ tape, above 5kHz). As well as lower distortion and excellent transient response. The reasons: A Technics low-noise pre-amplifier. Selected low-noise transistors. And Dolby.

And both decks also give you an extremely wide frequency response of 30 Hz - 17kHz

(CrO₂ tape). Thanks to the exceptionally narrow gap of our patented HPF heads.

You'll also get quiet, highly accurate recordings, with plenty of dynamic range, because both decks have peak check VU meters. So you can precisely set recording levels for the barest minimum of overload distortion, especially when recording from live sources.

Both decks have memory rewind. Fast-acting silent electronic switching. A lockable pause control. Mike/line mixing. A CrO₂ tape selector. And with the RS-671AUS, you'll get selectors for high and low bias. And with the RS-677US, memory play and solenoid activated remote control.

So when you're ready to improve your system, the RS-671AUS and the RS-677US are ready for you.

*Dolby is a trademark of Dolby Laboratories, Inc. Cabinetry is simulated wood.



Solenoid Remote Control.

Technics

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CIRCLE 59 ON READER SERVICE CARD

