The Buddy Holly Story– "Live" On Film

MODERN RECORDING

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VOL. 4 NO. 4
JANJARY 1979

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JANUARY 1979
VOL. 4 NO. 4

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THE FEATURES

COMING NEXT ISSUE!
Bob Dylan "Live"
An Interview with Elvin Bishop
Deciphering Mixer Specs

THE STAPLES

Cover Photo by Doug Hanewinckel

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LETTERS TO THE EDITOR

Noise Reduction: Imparts Coloration?

I am often reading comments in *MR* that noise reduction (compander type) colors the recording. The most recent comment made at Criteria Recording Studios by Mr. Kurt Kinzel at the recording of the Marshall Tucker Band *(MR,* June 1978) is such an example.

Noise reduction, Dolby or dbx cannot (unless it is faulty) in itself, color or distort a recording; however, it will magnify phase and EQ error on a mis-aligned machine.

This magnification is more severe with dbx (as is the noise reduction rate) because it expands recorded material at a 1:2 ratio, hence doubling any error in EQ. Dolby expands at a lower ratio and at any error will show accordingly.

The pre-emphasis added to the record mode of Dolby and dbx is completely removed in the playback mode, and in no way becomes a permanent feature in either part or whole of the decoded material.

We use dbx, so to ensure accurate performance of machines and are checked daily to be in phase and as flat as possible between 50 Hz and 16 kHz.

The ear generally cannot detect changes in EQ of less than 2 dB, so EQ on record to playback, using noise reduction should be kept within these parameters. Our machines (Scully) are flat + or − ½ dB in the above ranges.

The only color you'll hear on a good, clean, well-aligned machine with noise reduction is what you add—and neither tape, producer or musician will hiss at you!

—John St. John
President
TRAKS, Inc.
Miami, Fla.

Hmmm. Kurt's "comment," as interpreted by the writer of the session story in question, was no more than: "...he feels you lose some 'realism' if they [the drum, vocal and acoustic guitar tracks] are Dolbyed."

The subject of coloration through the use of noise reduction is a controversial one—Kurt, though, did not really touch upon it. We did ask him for a response nonetheless, which follows:

I do not really understand why Mr. St. John is trying to present a defense of Dolbys, especially if he uses dbx. However, I will try to re-state my personal beliefs and practical experience concerning Dolbys, since I have had very little experience with dbx.

I have used Dolbys on everything I have recorded in a studio since I got my start in multi-track recording seven years ago at the Record Plant in Sausalito. I found noise reduction to be essential when dealing with 16 to 24 tracks of tape hiss. We were using Scotch 206 tape at the time, and I still do quite often. The tape manufacturers have managed to improve the signal to noise ratio of the tape itself, but not enough for me. I like my projects to be as quiet as possible, but not at the expense of the overall fidelity. Believe me when I tell you that if you set up a drummer

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in the studio with eight or more mics and get the best possible EQ or lack of it on the drums and cymbals, then record it to two machines simultaneously, one Dolby and one not, the non-Dolby one will sound more *real*, as if you were hearing the drums "live." If you can not hear any difference, try a better set of monitor speakers. The main reason for this difference in fidelity is the change in transient response between Dolby and non-Dolby.

While we were at Criteria, The MCI 24 track alignment and the Dolby alignment were checked and maximized each day. In my home base studio, Capricorn Sound, we use an Automated Processes console and all Studer machines, which I consider to be the most stable. With proper alignment, the aforementioned experiment has the same results.

I now record with a combination of Dolby and non-Dolby. I try to maximize both fidelity and low noise on each song I record. I have since learned that several high fidelity music producer/engineer teams use these same methods.

In practice we all do what sounds best to us at the time. We should not let technical specifications stand in the way of making something sound as good as it can to our ears. Ears are the Supreme Court of sound. And believe me, the Marshall Tucker Band has 16 very sensitive ears in the studio.

—Kurt H. Kinzel
Engineer, Marshall Tucker Band
and Capricorn Studios
Macon, Ga.

David *Whitman*, Engineer

Engineer on the Paul Stanley solo album (see article, Just One Kiss, in our November 1978 issue) done at Electric Lady Studios in New York was David Whitman; not *David Lewis, as we had erroneously stated. Mr. Whitman was assisted by Peter Lewis.*

—*Ed.*

MR Job Service

Well, it has finally been a while now where I'm holding a little ground of my own and I have you to thank for all the benefits. It's like a story.

I picked up a copy of your magazine in the middle of May '78 with the big desire to be an engineer. I had attended recording schools, taken piano lessons, studied electronics and read a lot of

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books, but your magazine was the first positive step towards a hit of good luck. It had a review of a session, as usual, but it was full of all kinds of information and I thought it was simply wonderful. After reading the review, I wrote a letter. The letter was addressed to one of the engineers who had done the session and who eventually got me a job at the studio. To say the least, I was stunned. After all the knuckles were worn, all the resumes sent out or delivered, after sitting in on anything and everything, it all came down to your review and a letter to the right person. I will always be extremely grateful.

Since then, I have subscribed to the magazine and treasure each issue like a great book. However, after turning on some of the staff engineers to some information and some producers regarding "The Making of a Record," those issues have been snatched out of my sight. I'd really like replacements—are the issues from May to September of last year still available?

My above story is just something I wanted to share with you and any women like myself who have been discouraged about a career in this field. I was real happy when it finally came together and now I don't know what is worse—being employed and learning from mistakes or not doing a session and just reading. Anyway, I am grateful. Many, many thanks.

—Name withheld by request

The back issues you'd like are all available except for July. "The Making of a Record," though, is being reprinted in its three-part entirety in Modern Recording's 1979 Buyer's Guide, *which you can order using the form in this issue. And congratulations. We're pleased to have played a part in furthering your career.*

In Defense of U.K.

I was glad to see your review of *U.K.* in the October issue's Groove Views (pp. 86-8). However, I feel that Mr. Podolinsky did not give credit where some credit is due.

First off, Edward Jobson played keyboards and strings with quite an adventurous group himself—Roxy Music—and to say, as G.P. does, that Mr. Jobson "rounds out" U.K. is a huge understatement. Mr. Podolinsky said himself that Jobson had "a hand in the writing of all eight pieces..." Both his keyboard and violin solos are stunning ("Nevermore," "Time to Kill," "Thirty Years," etc.).

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I agree that Allan Holdsworth did not have enough room to solo on *U.K.*, but I also suggest that this could be because of his late arrival to the group. I caught a recent performance of the band in Philadelphia, and Jobson and Wetton were the obvious leaders, with Bruford supplying his amazing rhythm. Holdsworth preferred to stand behind a rather large amplifier, playing his occasional solos. However, on some of their new material, which I assume will appear on the next U.K. album, Holdsworth *shined.* He was even better than he was with either Soft Machine or Tony Williams, and maybe a little better than his *Velvet Darkness* solo album (on CTI).

Thank you for recognizing such a wonderful group. They're refreshing, but to say they need a new keyboardist...?!

—David Rowe
Ithaca, N.Y.

Another Ted Nash

It had to happen sooner or later (although a few fans have already wandered into jazz clubs expecting Ted Nash, "a member of the early Les Brown band"). I'm referring to the review by J.K. in the October issue's Groove Views, from which the above quote is taken, referring to a solo on the last Don Ellis album. The Ted to whom J.K. refers is not the elder and not even the son of the Les Brown reed player, Ted Nash (although we did name him after the older Ted). That seems to have been our first mistake, as it has begun to be a source of constant confusion, for older and younger alike. The Ted Nash on the Don Ellis album is the 18-year old (then 17-year old) son of Dick Nash, trombone player. It certainly is not the fault of your reviewer, as it is not made clear on the liner notes, but I felt compelled to set the record straight... perhaps because I'm the younger Ted's mother.

Incidentally, Ted Nash, the older, is alive and well in the studios of Los Angeles. Ted Nash, the younger, his nephew, is (hopefully) alive and well in New York City. In case you're interested, his album on Concord was released in October, and a profile in Downbeat is probably out by now. Do I sound like a proud mother? I am!

—Barbara M. Nash
Tarxana, Ca.

Support for Deaf School

First, I'd like to commend you on all the fine and helpful articles presented in your publication every month. I thought "The Making of a Record" was great! But I'm afraid I must take a stand against Gil Podolinsky's review of Deaf School's *English Boys/Working Girls* in the September '78 issue.

I must say that I feel offended that G.P. thought so little of Deaf School after all the hours of enjoyable listening they have given me. I do agree with Mr. Podolinsky in the sense that this album was not as good as it should have been, but to call Deaf School "your basic punk" is absurd (if not stupid). Going by their (the group's) track record, they have obviously proven themselves to be schooled and creative musicians with a unique outlook on their environment, which is so rare in today's music. I could continue to describe what I didn't like about Mr. Podolinsky's review of Deaf School (or about his review of Ian Dury's *New Boots and Panties* in the August issue, for that matter), but I wouldn't waste my time or yours.

Perhaps G.P. has a personal vendetta against punk and related music; that's too bad—he doesn't know what he's missing. I'd like to recommend that Gil listen to Deaf School's *Second Honeymoon* album; he may come to his senses.

—Davee Hames
New Britain, Ct.

Photoplay

Captions for two photos accompanying our "Building a Mic Splitter" article in the December 1978 issue were inadvertently switched, possibly causing our readership undue mental stress. The correction: That photo labeled "Photo 3" is actually Photo 2, and vice versa.

That little reference to "Photo 6" on the same page (62) in question may have caused some anxiety as well, but to set the record straight, there really is no "Photo 6" in this article. Power supply, input and output connections are made to the terminals as shown in Photos 2 and 3 (it doesn't matter which is which, in this case), or in Figure 2, on page 60. —*Ed.*

"good acoustics"

Imagine if all clubs were built for live music; that clubowners spent as much on sound systems as they do on decor; and all you had to do was set-up and play. Well, forget it. There is only one Hollywood Bowl and chances are it's not your next gig. More likely, the acoustics at your next room will be just as bad as the last, maybe worse. More likely, the next clubowner's "vocal smasher" is older than the last one, and as usual it will be you and your group that suffers. All too familiar? Well relax. Acoustic, with over a decade of live music experience, is introducing an exciting new line of Sound Re-enforcement products, designed for turning problems into opportunities. Quiet, versatile mixers with low distortion amps built-in for fast, easy set-ups. Features like dual-sensing overload indicators, 9-band graphic equalizers, built-in reverb and light bar output displays. Rack mountable power amps that boast fan cooling, and extensive circuit safeguards. Even the compact solid-plywood speaker systems include a driver protection circuit that will handle power overloads without program interruption. Acoustic has carefully matched these components to perform in the most adverse conditions, and continues to offer the exclusive Lifetime Protection Plan. So why suffer through another night of feedback and blown horns? Don't expect "good acoustics," take them with you.

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CIRCLE 54 ON READER SERVICE CARD

Pitch Variation Control

Can a TEAC 3340S be easily modified to include a control for pitch variation? I have owned a number of tape decks in the past and no two of them have ever run at exactly the same speeds. This has left me with a collection of tapes which are all either a little bit too fast or too slow.

More manufacturers should include pitch variation on more of their decks. This is a feature which is essential to those of us with perfect pitch yet unfortunately it is difficult to find on most consumer decks.

By the way, you people have a really great mag.

—Rich Bates
Springfield, Ma.

Briefly, no. A TEAC 3340S, according to a representative of the firm, cannot be easily modified to include the pitch variation control you want. As a matter of fact, the 3340S has been discontinued. Its replacement in TEAC's line, the model 3440, does have a pitch variation feature.

Safe to Say, Floyd Stands Alone

Before I get down to business, I would like to congratulate you on a fantastic magazine that has helped me tremendously towards launching my career as a recording engineer. This is exemplified by the fact that I have just renewed my subscription for two years.

The main reason for my writing is that I'd like to respond to a comment made regarding Pink Floyd, in the review of Alan Parsons' new album, *Pyramid, (MR,* November 1978, pp. 98-9*)*. Gil Podolinsky made a statement therein that indicates he does not recognize the talents of one of today's most famous and respected groups. He belittles the group by saying, "His (Parsons') breakthrough came with the monumental Pink Floyd album, *Dark Side of the Moon.* I contend that it is monumental due to Parsons' contributions. A simple comparison of their work prior and post will bear witness to this."

To me, that statement is nothing but sheer biased opinion. I feel extremely safe in saying that thousands of people, including myself, believe Pink Floyd can and does stand on its own without Parsons' help.

—Carl A. Sandler, Jr.
Louisville, Ky.

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CIRCLE 77 ON READER SERVICE CARD

Underground Outfit?

Can you provide me with the address of MCI, a producer of tape recorders and mixing consoles? They are mentioned frequently in your magazine, but they do not advertise. Are they some kind of underground oufit?

—S.A. Elosh, Jr.
Campbell, Ohio

Far from it. MCI, Inc., at 4007 N.E. 6th Ave., Ft. Lauderdale, Florida 33334 (phone) 305-566-2853, is one of the major manufacturers of professional recording equipment. A recent innovative development was introduced by MCI at the 61st Annual Audio Engineering Society Convention in November: the first microprocessor-controlled, 3-speed, 16-24-32 track recorder capable of using 3-inch tape; the JH-32 multitrack master recorder.

Kreisler Recordings

For years I have wanted to obtain recorded works of Fritz Kreisler, but have been unsuccessful. The mention of his name in Sedgwick Clark's review *(Modern Recording,* May 1978, Collection: "Clara Rockmore, theremin") has spurred me to inquire of you as to where one might find his recordings, if indeed they do exist. Your assistance is much appreciated.

—Fred R. Burgess
Broadway, N.C.

We had only to look at our Schwann-1 *and* Schwann-2 Record and Tape Guides *to ascertain that recordings of Kreisler works are indeed in existence. There are approximately a dozen different recordings available. If you can't find the latest* Schwanns *at your record dealer, send $2.50 for either or $4.50 for both to ABC-Schwann, Single Copy Subs. Dept., 2160 Patterson St., Cincinnati, Ohio 45214 to find artist, label, number and price information.*

Wireless Communique

Musical Newsicals of MR's *October 1978 issue quoted an out-of-date price range for the Nasty Cordless guitar system described there. We've been advised and would like to pass on that the new prices range from $330 (for the Nasty Black transmitter) to $1800 (for the Nasty Blue combiner system).*

—*Ed.*

Direct Box

Recently, in the Talkback section of *Modern Recording,* a reference was made concerning an article written by Peter Weiss which appeared in the April 1978 issue of *MR.* The article regarded the use of direct boxes for recording electric pianos and similar instruments.

Please advise if a reprint or back issue can be purchased, so that I might obtain a copy of this article (which I missed).

Thank you, in advance, for your help.

—Dean Wilhite
Audiotrak
Kansas City, Mo.

The article you refer to was entitled "Building a Direct Box," and consisted of schematics and instructions for construction of two different types of direct box, also known as a "guitar coil" or "bridging box." It included suggestions on how either type may best be used, as well as tips on applications. It was a very popular article, and contributed in a big way to our having been "sold out" on that particular issue. So the cruel fact is; yes, we have no April 1978s. Sorry.

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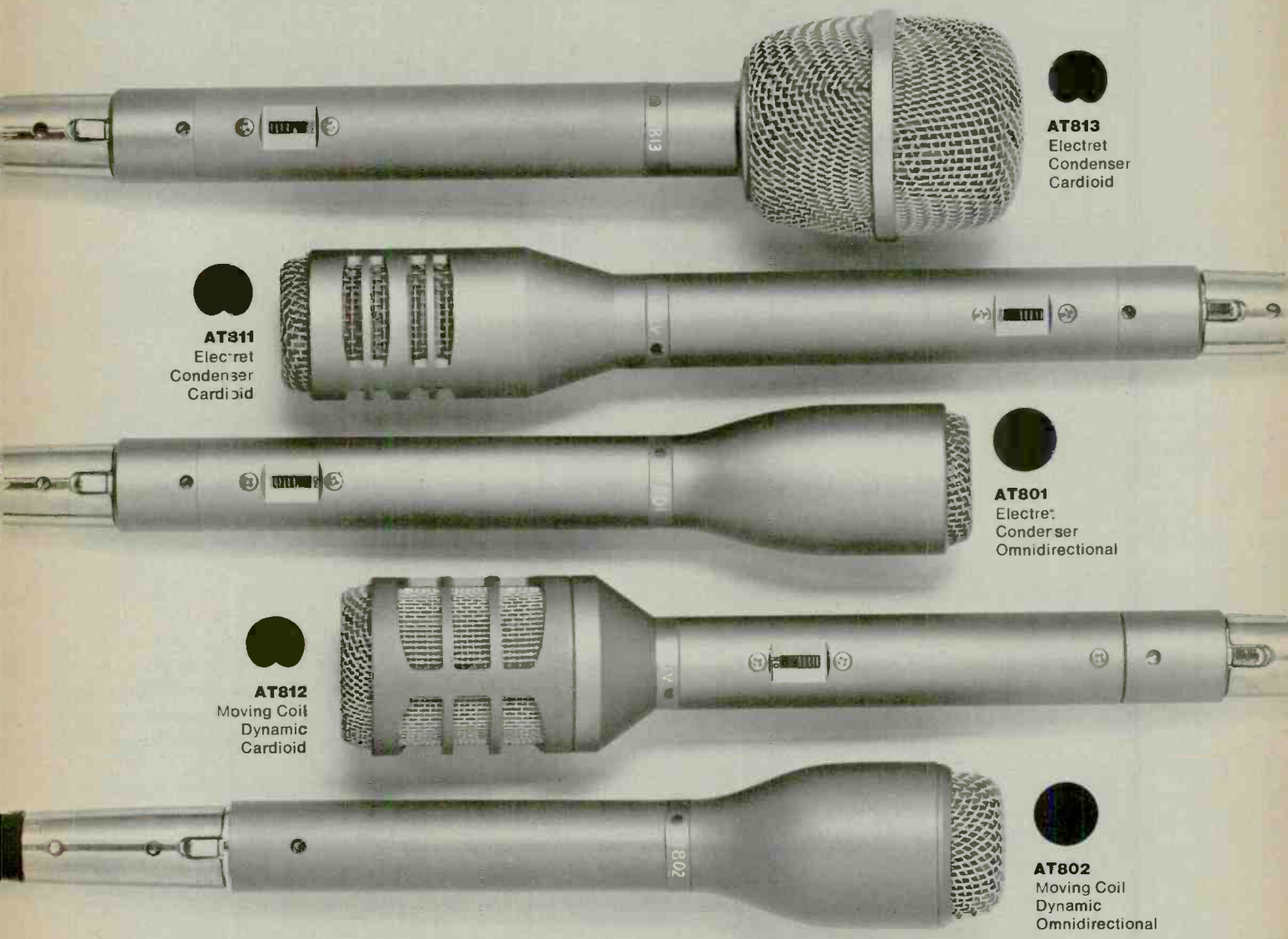

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CIRCLE 79 ON READER SERVICE CARD

The cheery fact is, though, that yes, we did reprint that very same article in our new 1979 Buyer's Guide, *which you can buy directly off the newsstand or directly through us. Current subscribers to* MR *may purchase copies by sending $1.75 per; for non-subscribers, each copy is $2.75. Send a check or money order to:* Modern Recording's 1979 Buyer's Guide, *14 Vanderventer Ave., Port Washington, N.Y. 11050, including your clearly printed name, address, city, state and zip code.*

Fuzzy Photo Fazes Fan

In one of the photos of the construction of the 15 volt Power Supply in your October issue (Photo 2), the diode bands cannot be seen. Also, the capacitor markings are not quite clear. Do they point to where the transformer is or to where the two wires connect?

—Jim King
Pittsburgh, Pa.

The diodes are connected such that their bands are on the ends away from the transformer. The arrows on the capacitors point towards the transformer. (The symbols in the arrows of the C1 and C2 capacitors are -1.)

More on Cleaning Up Your Act

I'd like to add to the answer given Mr. David Albulet in "Letters to the Editor," *MR*, November '78 (p. 6) regarding proper cleaning of recording machines.

This topic has been a thing of controversy for many years. I have been involved in recording for some years and have tried many things, but after a long time I've found a method that has worked well for me. This method is the following:

Proper tape head cleaning is done in a number of steps. These are: Clean heads and metal parts (guides, etc.) with isopropyl alcohol. After the heads are clean, I clean them again with a silicone spray used on a cotton swab (for ¼-inch machines) or on a soft cleaning cloth for the larger tape machines. I have found that the silicone removes oxide even when the alcohol seems to have done the cleaning job. There have been no ill effects to any part of the tape heads or tapes used, with this method, which I've used for over four years with good results and clean recordings.

After cleaning the machine, I use a cloth tape to polish the heads and other metal parts. This cloth tape is a cotton binding tape used in fabric manufacturing and sewing, and is available in many sizes. I use ¼-inch, ½-inch and 1-inch sizes for our machines. This cotton binding tape is sold at most fabric shops and department stores, is inexpensive and comes in spools. I load it onto standard 7-inch tape reels and run these reels through the machines after cleaning for about one or two minutes.

With respect to the rubber pinch rollers, I clean them with isopropyl alcohol. However, after this, I soak the rubber parts in warm water to keep them from getting dried out. Many people may not agree with this, but I have never had any problem with rubber parts by using warm water on them!

Most importantly, never rush through a cleaning job. With proper cleaning and care, your machine will last many years.

—Philip J. McCue, Mgr.
Nova Records, Inc.
Kearny, N.J.

If you want the condenser microphone sound on stage, Electro-Voice gives you that option.

The PL76 and PL77 condenser cardioid microphones are fast becoming the number one choices of vocalists who want to make the "studio-condenser" sound a part of their act. Both mikes give you condenser performance in a package that competes with dynamic microphone durability. Their gutsy bass-boosting proximity effect adds presence to any voice. The PL76 is powered by a 4.5 volt battery. The PL77 is similar except that it is also phantom powerable. The "77's" output is 4 dB down from the "76's" to allow for more flexibility at the mixing board, and it has a recessed on/off switch that many sound men prefer.

For those desiring the more traditional dynamic sound, the PL91 and PL95 fit the bill perfectly. The PL91, with its mid bass-boost and clear highs is a joy to work with. The PL95, the "pro's choice" in a dynamic cardioid, offers the best gain-before-feedback of any dynamic mike in the business – a test we invite you to make.

Electro-Voice also offers four superb instrument microphones. The PL5 dynamic omni is the mike to use when high sound pressure levels are encountered, as you would find when miking bass drums or amplified guitars, basses or synthesizers.

The PL6, with its patented Variable-D construction gives you cardioid (directional) performance without up-close bass boost – perfect for miking brass, reeds, percussion or piano. The PL11, even though it's a directional mike, maintains its response curve off axis. "Leaked" sound from off-axis instruments are faithfully reproduced – not colored in any way.

E-V's PL9 dynamic omni has one of the flattest frequency response curves in the business – from 40 to 18,000 Hz. And its small size lets you mike instruments you couldn't get near with other mikes offering this performance.

All E-V Pro-Line microphones come with super-tough Memraflex grille screens that resist denting. Designed to keep your mikes looking like new for a long time. All have a non-reflecting gray finish that won't compete for attention under bright stage lights.

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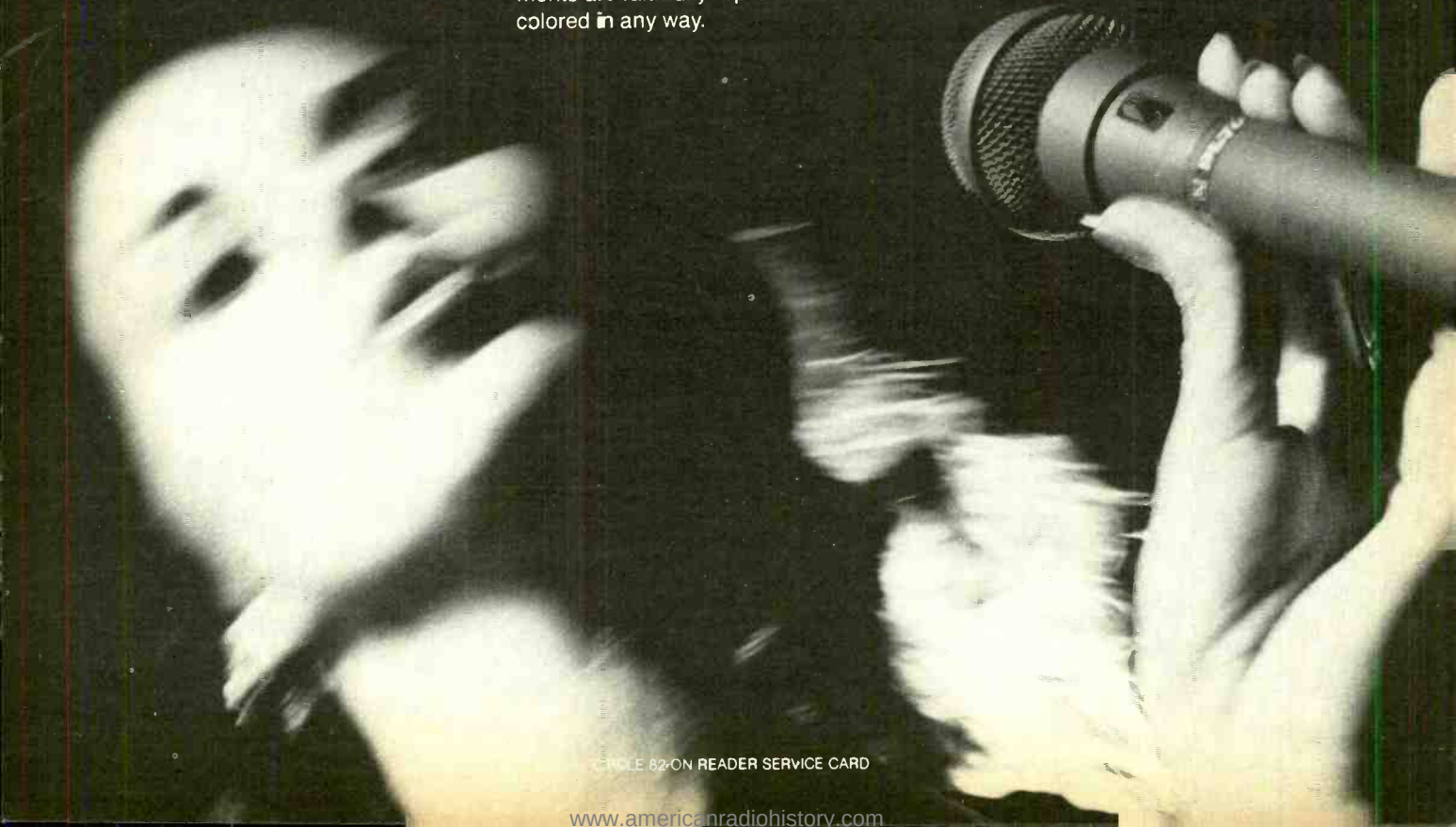

CIRCLE 82 ON READER SERVICE CARD

TALKBACK

"Talkback" questions are answered by professional engineers, many of whose names you have probably seen listed on the credits of major pop albums. Their techniques are their own and might very well differ from another's. Thus, an answer in "Talkback" is certainly not necessarily the last word.

We welcome all questions on the subject of recording, although the large volume of questions received precludes our being able to answer them all. If you feel that we are skirting any issues, fire a letter off to the editor right away. "Talkback" is the Modern Recording *reader's technical forum.*

Figuring Out the 421

I recently acquired an old Sennheiser MD 421 LH mic and would like to find out some things about it. It's pretty beat up, which is why I got it as cheaply as I did (free!).

First, the cord connector on the end is a little smaller than the standard 3-pin male connector, so the female jacks on my cords don't fit. Do you know where I can get a female jack that will fit it correctly?

Also, there's a knurled plastic ring around the end, between the connector and the body of the mic. On this ring are the letters "S" and "M." The ring can be turned so that one of the letters stops at a marker on the body of the mic. What might be the purpose of this ring and how do I utilize it to my advantage?

And, finally, what type of mic stand would this mic use? On the bottom of my 421 there's a slot with a ridge on either side, like something would slide in there. Is such a mic stand available?

Thanks for a fantastic magazine. I've been reading it for a year and a half now, and you seem to be the right people to answer this for me.

—Doug Llewellyn
Chester, N. Y.

The ⟨⟨LH⟩⟩ behind the model number MD 421 stands for low and high impedance. The user can select the suitable microphone impedance by proper electrical connections. For low-impedance (200 Ω) balanced circuits, the microphone must be connected between pins 2 and 3, the shield must lead to the shell of the microphone's connector. For unbalanced high-impedance use, pin 1 is the hot audio line, the shield of the cable must go to pin 2 *and* to the shell of the mic's connector.

A 3-pin female DIN connector can be ordered through most hi-fi dealers.

The plastic ring at the end of the MD 421 activates a continuously variable bass control. The extreme position marked ⟨⟨M⟩⟩ (for music) causes a full pickup of low frequencies, whereas in the other extreme ⟨⟨S⟩⟩ (for speech), the low end is rolled off to avoid boominess when using the microphone at close talking distances, sometimes referred to as proximity effect.

The MD 421 requires a special microphone stand adapter, model MZA 421, which can also be ordered as a replacement part through your dealer.

—Horst A. Ankermann
Vice President
Sennheiser Electronic Corp.
New York, N.Y.

Picture This

In your opinion, as a general rule, are imported discs superior to their domestic counterparts made here in the U.S.? If so, is it due to superior mastering, pressing or the use of pure, often colored vinyl? Does the physical coloring of the disc influence S/N rations, frequency response or decibel levels, or is the effect purely aesthetic?

Concerning picture discs, what exactly is the production procedure for making them? Are printed (paper) cover reproductions embedded between two sheets of clear vinyl, or is the vinyl stamped with ink and heated until the colors merge into the vinyl? What is the history of picture discs from a developmental as well as a technical standpoint? Do you feel they will become as common as posters or go the opposite route and become collectors' items? Can you compare the fidelity of picture discs with that of conventional discs? Can loss of fidelity be attributed to a more shallow groove? I have also heard that picture discs create excessive stylus wear due to the pigments in the vinyl. Is this actually the case, and if it is, how extensive can the damage be? Also, will the picture eventually wear away with extensive playing?

—Al Willen
Long Island City, N.Y.

Where are these discs imported from? There are some perfectly horrendous discs from some countries and from others come the finest discs I have ever heard. If you read *MR* regularly you know my opinion of the domestic product. Of the better imported product, I would say that they outshine our efforts because they care about their product. They take the time to insure that they have manufactured the finest record they are capable of. This attitude is evident from the musician in the studio all the way clear through to the personnel in the pressing plants. We use pure vinyl too ("pure" also includes coloring,

anti-static, stabilizer chemicals etc., as far as record vinyl goes); but we break our necks trying to produce quality and when you go after the buck you have to forget about quality, or so it seems.

Pure polyvinylchloride is clear, so any disc other than a clear one has some sort of pigment in it. The omnipresent black discs are colored with carbon black. Some say it reduces noise and wear, some say it increases noise and wear. Others say it doesn't make enough difference to worry about. I suspect that the truth is somewhere between these last two. But color cannot affect frequency response or disc level. The only question is S/N ratio. The reason for coloring a disc is to hide air bubbles beneath the surface which tend to have a distressing effect on the consumer who is usually more concerned with how something looks rather than how well it is made.

There are two ways of making a picture disc currently in use today. The cheap, not so good way and the expensive, better way. The cheap way, which is not so cheap, utilizes two plastic-coated printed pieces of paper. These two pieces are placed in the press manually against the stampers and then the biscuit (plastic blob) is inserted. This forms a sandwich and the plastic coating on the printed paper receives the embossed groove. This is similar to the way kiddie records are made. This is the kind of record that is poor in quality and hard on a playback stylus. The more intelligent way of doing it is to put the printed material in the middle (printed on both sides) and then use clear PVC biscuits on each side. This is essentially the same as the record that we have been buying for years, it just has a picture embedded in its center. Fidelity is at least equal to and possibly better than that of conventional black discs since it has no carbon black in it and all the additives must also be clear.

I won't go into the history of these discs here for space reasons and it is probably a dull story anyway. As far as whether they will become commonplace or collectors' items, lacking a crystal ball I must try to deduce this logically. Considering the fact that they are incredibly expensive to make, I lean toward the collectors' item. But the big winners are going to be the ones who figured that out some time ago—unless a new inexpensive process is invented soon, that is.

As far as wear goes, since the graphics are under the plastic in both cases

(but much less so in the cheap method) the picture should not wear away unless you play the record continuously twenty-four hours a day for several years. As to stylus wear, unless you wear the record down to the abrasive paper (with the aforementioned continuous playing) there should be no damage other than the usual. The better discs again are similar to the regular kind in this respect and will wear and cause wear in much the same manner.

—David Moyssiadis
Contributing Editor
Modern Recording

Impedance Mismatch No Problem Here

I have a pair of AKG K-140 stereo dynamic headphones that I use while recording. They are rated at 600 ohms. When I run them off my TEAC 3340S tape deck through my amp, everything is fine. However, I would like to run them directly off the 3340S, which is rated at 8 ohms. Is it necessary to use a transformer in this application? If one is advised, might you suggest the proper one?

—Rick Willett
Zephyr Cove, Nev.

No transformer is required. This is because headphones—with their close coupling to your ears—require only very small amounts of power (typically *milliwatts*) to produce perceptibly "loud" sound. Therefore, headphones do not have to "impedance-match" the amplifier as do loudspeakers; ideally, they should "bridge" the amplifier with a *higher* load impedance than the amplifier normally calls for. Although the headphone outputs of most tape decks (your TEAC 3340S included) do not provide much power to begin with, that power should still be enough to drive 600-ohm headphones like the AKG K-140 to usable monitoring levels—even with the apparent impedance mismatch. This "mismatch" provides an added bonus: Unlike low-impedance headphones (4, 8 or 16 ohms), 600-ohm headphones are inherently less susceptible to overload when driven from a source rated at 8 ohms.

Further, most tape recorders, mixers, and preamplifier headphone outputs are rather high in source impedance (usually 600 ohms as opposed to speaker outputs which are close to zero ohms). If a 4-16 ohm headphone is connected to such an output, it will essentially short-out the audio signal (no damage will occur). Higher impedance headphones (600 ohms or greater) will not short-out or "load" the headphone output and will provide usable volume levels.

—Geoffrey M. Langdon
Technical Manager
AKG Acoustics
Mahwah, N.J.

Multiple Headphone Monitoring

A problem has arisen in regard to the equipment that I plan to buy for my small studio. At present, I plan on purchasing a TEAC Model 2A mixer (6-in/4-out) and an MB-20 meter bridge and wish to send cues via headphones to three musicians. I need to know whether I should use a headphone amp and/or a junction box to connect the headphones to the mixer. Also, can I run long headphone extensions out to the headphones (Sennheiser HD 400s) without the risk of picking up hum or RFI? Your help is appreciated.

—Dale Dvorak
Chelsea, Iowa

Multiple headphone monitoring with the TEAC Model 2A mixing board and the MB-20 meter bridge can be accomplished in a number of ways, depending on your specific application. The simplest method would be to drive a headphone amplifier with the monitor outs of the MB-20. If the amplifier is adequately powered, extended lengths of cable can be safely run without noticeable loss. Hum and RF interference do not usually cause any problems on the output side of an amplifier. This method will provide as many headphone cues as necessary, limited only by the outputs of the headphone amp. The only real shortcoming with this method is that all of the musicians must listen to exactly the same cue mix, perhaps only with a control for individual volume levels.

A more sophisticated way to go would be to use an individual Tascam Model 1 for each headphone cue. The Model 1 is an 8 by 2 stereo line level mixer that would enable each musician to control his own headphone mix. Since the Model 1 has a built in one-watt headphone amp, the need for an external amplifier and junction box is eliminated. In addition to the added flexibility of this method, it might wind up costing you less in the long run. As you enlarge your studio you will certainly find innumerable uses for the submixing capabilities of the Model 1. After carefully considering

You paid a lot for good specs. Now spend a little more and hear them.

Just because you put a great deal of money into your tape deck, it doesn't necessarily mean you'll get a great deal of sound out of it.

Unless of course, you're using the tape that's engineered to get the most out of high-performance equipment. Maxell.

Maxell is specifically designed to give you extended frequency response, the highest possible signal-to-noise ratio and the lowest distortion of any tape in its price range.

Which is why people who own the finest tape decks use Maxell more than any other brand.

Of course, there are other reasons. Like the fact that every Maxell tape has a unique non-abrasive head cleaner. And a full warranty that covers the one thing other manufacturers don't cover. Everything.

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It's sure to make the sound that comes out of your tape deck worth every penny you put into it.

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CIRCLE 88 ON READER SERVICE CARD

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these factors, I think you will agree that the latter of these two methods is the way to go.

—Claude Schnell
Consumer Relations
TEAC Corp. of America
Montebello, Ca.

Insulation Against Frustration

[The following is an unsolicited reader response to the Talkback question "Raising Keyboard S/N," which was printed on page 24 of the October 1978 issue. After checking with Franz Betting of M. Hohner, Inc. (manufacturers of the D-6) and finding that the method was sound and would not result in any unwanted fiery alterations, we decided to pass it along to you as an alternate solution to the method proposed by Richard Robinson in the original piece. For those of you who might be interested in purchasing a Clavinet in the near future, Mr. Betting mentioned that the newer models are being equipped with additional shielding that will help to decrease noise—and frustration.

—Ed.]

I believe I can provide further information to help Joey Daniels relieve his Clavinet noise problem. I was surprised not to see someone else come up with this remedy—it's very easy to do, is low cost and is really quite effective in cutting down noise.

My method is simply this. Remove the preamp which is simply a printed circuit board mounted inside the left side of the instrument. Wrap it all up in insulator-like duct tape. (I used newspaper for the purpose of insulation.) Wrap this in turn in two or three layers of tin foil, leaving the wires free to come through one small opening. Remount the whole bundle and connect a wire with tape from the foil bundle to the framework of the Clavinet using any screw on the inside of the framework.

I realize this solution might seem a bit "homestyle" but after years of frustration with my Clavinet D-6, I have found this method to cut noise effectively—not completely, but dramatically.

Keep up the good work on a most informative publication.

—Kelly Dunn
Austin, Tx.

Driver Protection In Multiamplified Systems

I recently added two 16-ohm JBL 2470 drivers to my sound reinforcement system. I've been told that I should protect my drivers with either fuses or capacitors. Is such protection really necessary? If so, which is better—the capacitors or the fuses? Also, what type and size should be used?

The horns are powered by a QSC 3.6 power amplifier rated at 4 ohms. I know the QSC could handle two more 16-ohm drivers and expect to get two more drivers in the future.

—Michael Cross
El Paso, Tx.

When a sound reinforcement system is bi-amplified (or tri-amplified), protection capacitors should be installed in series with compression drivers to protect them against damage from low frequencies originating in the power amplifier (hum, turn-on transients, turn-off transients, DC offsets, etc.).

Both Mylar dielectric and non-polarized electrolytic capacitors can be used

A mute point.

In most automation systems only the fader level is stored, and muting a channel "erases" the fader level data. We find this unacceptable. ARMS Automation independently stores both fader level and channel status (on/off).

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...Bringing the technology within everyone's reach.

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for this application. Mylar capacitors are much more expensive than electrolytics in large values and are not easy to find. Fortunately, non-polarized electrolytics are quite suitable as long as they meet the following specifications:

1. The minimum breakdown voltage should be 100 volts.

2. The capacitance should be rated at 1 kHz. Often electrolytics are specified at 50 or 60 Hz and their values at the frequencies of interest to us can deviate quite a bit.

3. The rated tolerance should be 10-15%.

4. The temperature rating should be from -20°C to ± 65°C. In our experience, capacitors carrying lower maximum ratings are not of sufficient quality or reliability.

5. The D-factory (related to the internal resistance) should be no higher than 10% at 1 kHz.

There are many capacitor manufacturers throughout the world, and we do not have sufficient information to make recommendations on specific brands. The above specifications will insure that the capacitor will be fully suitable for driver protection.

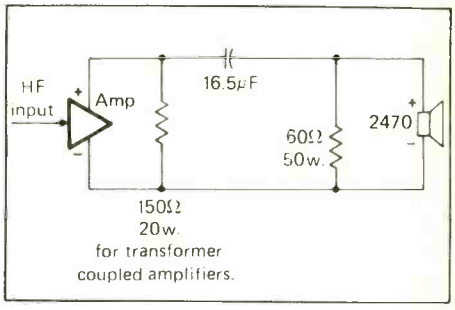
The following is a list of the capacitor values which can be used for driver protection in multiamplified systems. Capacitor size for other frequencies can be determined using the formula C=159,000/ZF, where C is capacitance in F and Z is impedance in ohms, and F is one half the crossover frequency in hertz.

	Crossover frequency (Hz)		
Value (μF)	4Ω	8Ω	12Ω
72.0	1100	550	275
52.0	1500	750	400
36.0	2000	1100	500
24.0	3000	1600	800
20.0	4000	2000	1000
16.5	5000	2500	1200
13.5	6000	3000	1500
12.0	7000	3500	1700
10.0	8000	4000	2000
8.0	10,000	5000	2500
7.0	11,000	6000	3000
6.0	13,000	7000	3500
5.0		8000	4000
4.0		10,000	5000
3.0		13,000	7000

The optimum value cited above assumes that the capacitor is active at approximately one octave below the listed crossover frequency for minimum acoustical interference with crossover region performance. Smaller capacitor values may be required for additional protection in high-power sound reinforcement.

A 50-watt resistor having a value of two or three times the rated impedance of the driver should also be connected across the driver terminals. These capacitors are available from electronic parts suppliers. Note that below the cutoff frequency of the capacitor, the power amplifier will be unterminated. If the power amplifier is equipped with an output transformer, a 20-watt resistor equal to ten times the driver impedance should be installed across the amplifier output terminals.

The figure below shows the typical protection circuit for using a JBL 2470



real to reel...

sounds best on ReVox B77

Real to reel means live performance recording, and that's where the ReVox B77 dramatically demonstrates its superiority over other tape recorders. Only the B77 has the wide dynamic range and generous record headroom you need to capture without compromise the full detail and dimension of live music.

Only the B77 delivers the "ruler-flat" frequency response you get from Willi Studer's legendary head design. Only the B77 combines the convenience of push-button digital logic control of tape motion, professional VU meters with built-in peak level indicators, and a self-contained tape cutter/splicer.

If you're thinking of upgrading your real to reel performance, try the ReVox B77. It's available in half or quarter track, 3¾–7½ or 7½–15 IPS. For complete information and list of demonstrating dealers, circle reader service number or contact us at the address shown below.

REVOX

Studer Revox America, Inc., 1819 Broadway, Nashville, Tennessee 37203 / (615) 329-9576 ▪ In Canada: Studer Revox Canada, Ltd.

CIRCLE 78 ON READER SERVICE CARD

driver in a biamplified system crossing over at 1200 Hz.

Each driver in your system should have its own protection circuit. With the aforementioned high pass filter and prudent use of the system's volume control you should experience reliable operation of your high frequency section.

—Jim Brawley
Applications Engineer
Professional Division
James B. Lansing Sound, Inc.
Northridge, Ca.

Get The Right dbx for the Job

I have a dbx 119 and I would like to know how to hook it up using my Tapco 6200B mixer and my TEAC 3340 so I can get compression on recording and expansion on playback without changing the wiring each time. Would a patch bay help to accomplish this?

—Edward Bowell
Johnson City, N.Y.

The dbx Model 119 stereo dynamic range enhancer is the predecessor to the dbx Model 118. Using either model as an encode/decode system (encode, compress; decode, expand) with a Tapco 6200 B mixer in conjunction with a TEAC 3340 requires patching. In hi-fi systems, none of the dbx dynamic range enhancers require patching as long as there are enough channels available. The TEAC 3340 is a four-channel tape machine.

Using any of the dbx dynamic range enhancers for tape noise reduction will produce marginal results in comparison to any one of the dbx tape noise reduction systems which have been specifically designed for this purpose.

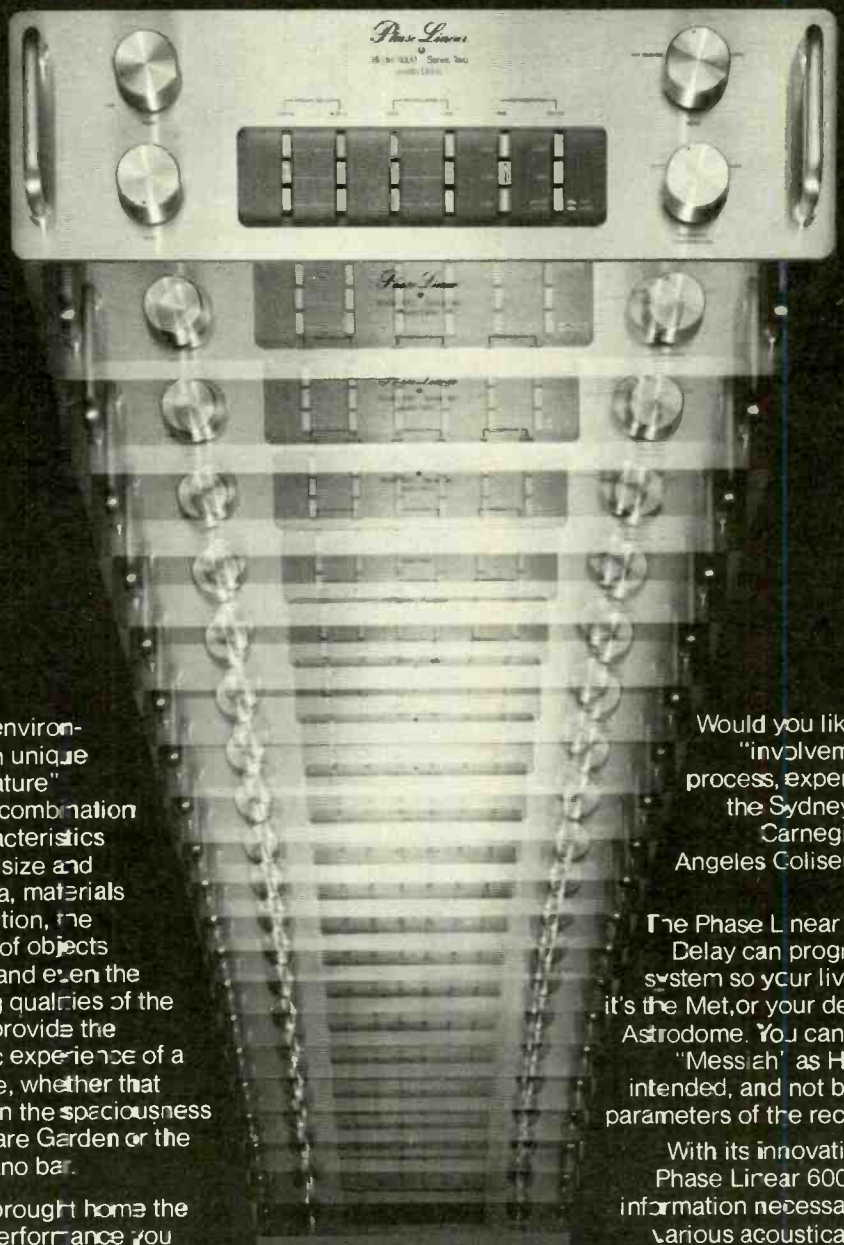
The dbx models 118 and 119 have the two stereo channels electronically linked to maintain the stereo image of stereo programs. This is desirable for stereo dynamic range enhancement purposes, but not for use as a tape noise reduction system where one would be making changes in program materials channel by channel.

The dbx 155 is an independently selectable four-channel tape noise reduction system. It is an ideal studio companion to the TEAC 3340. The dbx 155 will permit one to achieve 30 dB of tape hiss noise reduction plus an added 10 dB in headroom.

—Harold Cohen
Manager, Customer Services
dbx, Inc.
Newton, Ma.

YOU'LL PROBABLY ENJOY YOUR HIGH FIDELITY SYSTEM WITHOUT THE PHASE LINEAR 6000.

THE QUESTION IS, HOW WELL?



Every listening environment has its own unique "acoustical signature" resulting from a combination of physical characteristics and factors. The size and shape of the area, materials used in construction, the "baffling effect" of objects within the area, and even the sound absorbing qualities of the audience, help provide the spatial and sonic experience of a live performance, whether that performance is in the spaciousness of Madison Square Garden or the intimacy of a piano bar.

Have you ever brought home the recording of a performance you particularly enjoyed, only to feel on playback, that it just was not the same as it was in the flesh? You didn't feel as "involved" as you did when you were there?

You were right. It's not the same.

In fact, much of the sonic and spatial "experience" that made you a part of that live performance was lost in the recording process.

So where does this leave you?

Would you like to regain that "involvement," and in the process, experience La Scala, the Sydney Opera House, Carnegie Hall, the Los Angeles Coliseum, or just your favorite disco?

The Phase Linear 6000 Analogue Delay can program your stereo system so your living room thinks it's the Met, or your den thinks it's the Astrodome. You can enjoy Handel's "Messiah" as Handel originally intended, and not be limited by the parameters of the recording process.

With its innovative circuitry, the Phase Linear 6000 recreates the information necessary to reproduce various acoustical environments. Experience in your own home this world of depth and spaciousness that was once unique only to an actual live performance.

In a single page we cannot begin to describe the Phase Linear 6000 Audio Delay and the technology behind it. For detailed explanation of its operation plus a 20-page Owner's Manual, please send $2.00 to: PHASE LINEAR, Dept. (A-6), 20121 - 48th Ave W., Lynnwood, WA 98036, USA.

Phase Linear®

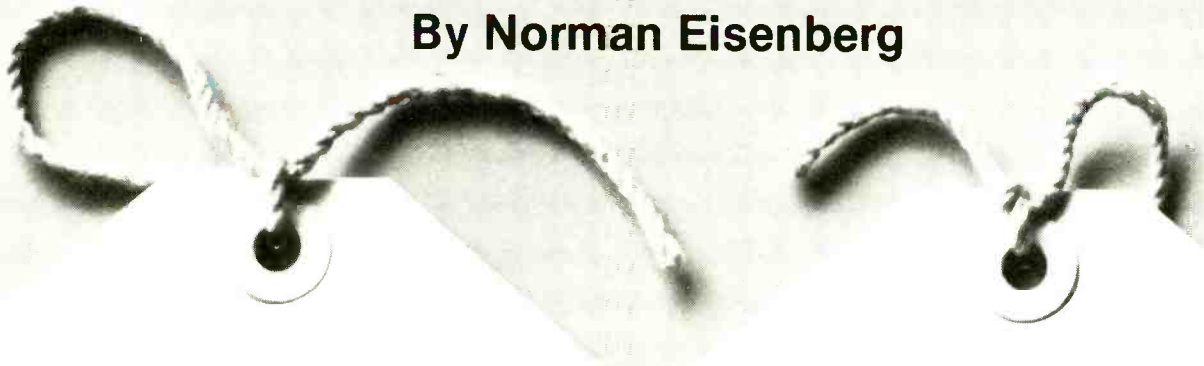
THE POWERFUL DIFFERENCE

DISTRIBUTED IN CANADA BY H. ROY GRAY LTD. AND IN AUSTRALIA BY MEGASOUND PTY. LTD.

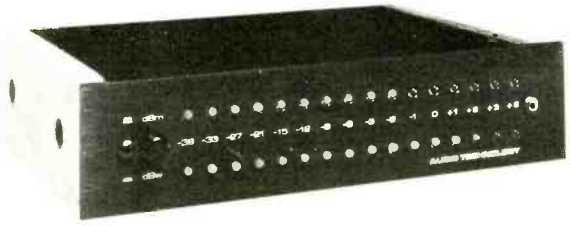
CIRCLE 73 ON READER SERVICE CARD

THE PRODUCT SCENE

By Norman Eisenberg



PEAK LED DISPLAY



Claimed to be the first peak-responding LED display to function as a peak power indicator and a peak line level monitor in one instrument is the Model 510 from Audio Technology.

It has two rows of sixteen LEDs—one row per channel—calibrated in decibels with a total display range from −39 to +6 dB. The 0-dB levels can be adjusted for both line and power indications via rear-panel controls. Input sensitivities for both are switchable. One suggested use in the power mode is to prevent amplifier clipping (the model 510 can respond accurately to peak power output from 0.003 to 400 watts). An application in the line-level mode would be for setting tape-recorder levels after accurately measuring peak signal levels. Price of the model 510 is $129.95; accessories, including rack-mount panel, are extra.

CIRCLE 1 ON READER SERVICE CARD

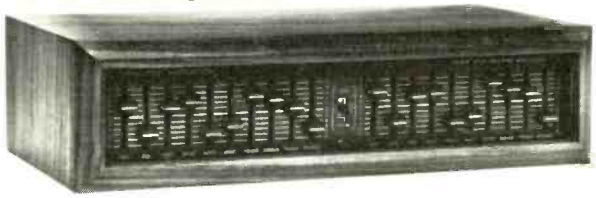
TEAC BROCHURE

"Are You Ready for Multi-Track?" is the title of a brochure offered by TEAC which describes the steps in multi-track recording, explains what equipment is needed and generally serves as an introduction to 4-track and 8-track taping. Mixers, and the use of microphones, are also covered. The booklet is available at TEAC dealers, or it can be obtained free by writing to TEAC.

CIRCLE 2 ON READER SERVICE CARD

SPECTRO TACKLES THE SPECTRUM

A new graphic equalizer from Spectro Acoustics is the model 2102. It includes all of the design and monolithic IC technology of the firm's model 210, but is lower priced. Like the former model, the new unit uses "gyrator synthesized inductors" instead of coils. A stereo unit, the model 2102 provides ±15 dB control over 10 octaves in each channel to cover the full audible spectrum.



CIRCLE 3 ON READER SERVICE CARD

TAPE SWITCHING UNIT

From Superex comes word of a professionally designed tape duplication console. Called the TSB-3, it enables the user to duplicate source material on any or all of up to three tape decks. Duplication may be made while the user monitors and records another program from the audio system. Controls include three input selectors, three output selectors, and one output-line selector.

CIRCLE 4 ON READER SERVICE CARD

EUMIG ENTERS CASSETTE MARKET

Said to be the largest privately-held company in Austria, the Vienna-based firm of Eumig—up to now involved in video, lasers, holography and radio communications—has entered the cassette market. Its new deck, the model CCD, is a three-head top-loader featuring an opto-electronic servo controlled capstan drive system that uses a lightweight disc, photo-etched with 2500 spaced radii, to govern speed. The heads are entirely separate, and record-head azimuth is adjustable using a built-in tone generator and multiple LED peak-reading R/P indicators. With chrome or ferrichrome tape, response is claimed to cover the range from 20 Hz to 20 kHz within ±3 dB. S/N, using the user-adjustable Dolby system, is spec'd at 72 dB. Mixing sliders permit blending mic/line, line/line or an adjustable reverb signal. LEDs show all operating conditions. Operation is via solenoid, logic-assisted controls; a full-function remote-control accessory is included with the model CCD, priced at $1300.

CIRCLE 5 ON READER SERVICE CARD

MICROPHONE SNAKES

"Hydra"—the many-headed serpent of mythology—is the name chosen by Dimension Five for its line of standard and custom microphone snakes. The former group includes models with fixed or detachable cable/fan. All use Switchcraft connectors for individual mic lines and sends.

The black-anodized aluminum chassis/wrap-around tray extends beyond the connectors to prevent possible damage.

CIRCLE 7 ON READER SERVICE CARD

DELTALAB ACOUSTICOMPUTER

From DeltaLab Research, Inc. comes word of its model DL-2 Acousticomputer. Engineered for studio and on-stage use, the device is a combination digital-delay and special-effects processor. The DL-2 provides well-known functions such as echo, ADT, chorusing, vibrato, flanging, reverb, etc., plus new effects said to be unavailable in any other

device. Bandwidth is rated at 20 Hz to 15 kHz at all delay settings with 90-dB dynamic range. The DL-2 has two independent channels. In serial (mono) mode, delays up to 240 ms are available. VCO is built in. An optional memory-expansion feature is scheduled for availability in the spring of 1979. Price of the DL-2 is $1500.

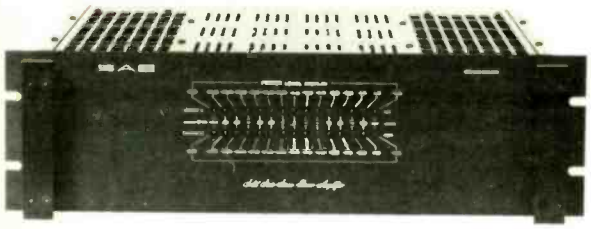
CIRCLE 8 ON READER SERVICE CARD

AKAI VIDEOCASSETTE SYSTEM

Said to be the lowest-priced portable videocassette yet offered in the U.S. is Akai's new VT-300SE, priced at $1095. The system consists of Akai's model VT-300 monochrome camera and the VT-300 recorder. The latter uses ½-inch, 30-minute videocassettes. The camera includes a detachable viewfinder, 12mm C-mount lens and a built-in omni mic with automatic recording level adjustment.

CIRCLE 9 ON READER SERVICE CARD

SAE ADDS AMPLIFIER



Scientific Audio Products (SAE) has added the model 2300 power amplifier to its line. Rated for 150 watts per channel (minimum RMS, into 8 ohms, 20 Hz to 20 kHz, no more than 0.05% THD), the new amp is priced at $700. Like other SAE amplifiers, the model 2300 incorporates full complementary circuits to ensure maximum power output and stability into any complex speaker load along with very low steady-state and transient distortion characteristics. Its toroid transformer is claimed to be very efficient, and to have no stray magnetic field, and to have extremely low internal noise. The amp includes thermal protection as well as signal relays to protect speakers from low-frequency information that might damage them; electronic protection safeguards against transient overload and short circuits. An LED array, which monitors amplifier power output, is said to provide an accurate representation of complex musical waveforms.

CIRCLE 10 ON READER SERVICE CARD

APHEX ATTENUATOR

A voltage-controlled attenuator, described by one of its developers as "the first high-speed, low-noise, low-distortion VCA," has been introduced by Aphex Systems Ltd. Audio applications include filters, equalizers, noise-reduction systems, automated disc mastering, compressors, expanders, limiters, console automation, synthesizers, leveling amplifiers, DC-controlled public-address systems, oscillators and tape recording functions. According to the developer, "a state of the art recording studio could use as many as one thousand of the VCAs." Additional applications in general electronics include computers and test equipment. The new VCA boasts specifications—among others—that include a bandwidth within ±0.1 dB of DC to 200 kHz; THD of 0.004%; noise (worst case) of −90 dBm; and slew rate of greater than 10 V/μsec.

CIRCLE 11 ON READER SERVICE CARD

JVC USES DOLBY IN LOW COST DECK

JVC, which has offered its ANRS (automatic noise reduction system) in place of Dolby in its cassette recorders, now has a cassette deck with Dolby-B. It's also a budget model, priced at $180. Known as the KD-A1, the new front-loader features selectable bias and EQ, end-of-tape auto-stop, automatic input selector for mic and line inputs, dual rotary controls for left and right channels, two VU meters and electronically governed DC motor. With chrome tape, frequency response is spec'd as 30 Hz to 16 kHz. S/N ratio is 57 dB; with the Dolby on, this improves to 10 dB above 5 kHz. Rated THD at zero VU, 1 kHz, is 0.5 percent.

CIRCLE 12 ON READER SERVICE CARD

DIGITAL PROGRESS

First deliveries of the 3M Digital Audio Mastering System (involving a 32-track, two-machine setup) will be made to four studios, according to 3M. The studios are: A&M Records, Record Plant [west], Sound 80 and Warner Brothers. This will be the first actual delivery of the system that was shown in prototype at the AES show last year in New York.

Meanwhile, the first commercial classical disc recorded in the U.S. by digital processing has been released on the Telarc label, according to its distributor Audio-Technica. The release features the Cleveland Symphonic Winds in a program of music by Holst, Handel (The Royal Fireworks suite) and Bach. The album was recorded in Severance Hall, Cleveland, last April using a Soundstream digital tape recorder developed by Dr. Thomas Stockham.

CIRCLE 13 ON READER SERVICE CARD

HEATHKIT GOES RACK-MOUNT

From Heath Company, the world's largest manufacturer of electronic kits, comes the first models in a series of pro-style rack-mounted components. One is the model AA-1600 power amplifier; the other is the model AD-1701 graphic output indicator. The amp is rated for audio output of 125 watts per channel (minimum RMS, 8-ohm loads, 20 Hz to 20 kHz, less than 0.05% distortion). Featured are a thermal circuit protection device, an 8-second turn-on delay and a high-temp LED indicator. Amp and power supply circuit boards are preassembled for ease of construction.

The AD-1701 is designed to provide "a more accurate, precise indication of stereo system output than conventional meters or displays." It uses two rows of 15 LEDs (30 in all) for left and right channels. A switch chooses display of either peak or average signal levels, and another control adjusts the range for output levels up to 250 watts. Response time is said to be extremely fast, with a peak-hold circuit to provide displays of the shortest musical transients. The AA-1600 amplifier is priced at $360; the AD-1701 at $190. Heath will send more info on these units plus a free copy of its full catalog on written request.

CIRCLE 14 ON READER SERVICE CARD

CLEAN CONTACTS

A new solvent for cleaning electrical contacts has been announced by LPS Research Laboratories. Known as LPS, it is described as having excellent penetrating and wetting action, with complete evaporation leaving no residue. It also is said to be non-explosive, non-flammable and non-toxic.

CIRCLE 15 ON READER SERVICE CARD

NOVELTY OR INNOVATION?

Among the various products seen regularly at trade shows are some that seem like genuine innovations and others that may be little more than novelty.

At that, the dividing line may well be determined by an individual in terms of personal interest and need. For instance, take the high-output moving-coil phono cartridge. The Dynavector 10X introduced here recently by ESS, Inc. is the first I have personally used that provides a signal level high enough to feed directly into the magnetic phono input on an amplifier without the need of an intervening booster (transformer or "pre-preamp"). Its list price of $120 puts it into competition with top-ranking moving-magnet pickups, but makes it distinctly less costly than other moving-coil pickups. It is a very good pickup, with smooth response across the audio band, good channel separation, and tenacious tracking ability.

Those who are convinced that moving-coil design in general is superior will regard this model as a genuine innovation; others will call it a novelty. I have no feeling one way or the other—but I do recommend that anyone in the market for a new phono pickup audition this model.

Microprocessing is another "on-the-fence" kind of development. We've seen it in some recorders and in at least one tuner by Sherwood and of course in the Accutrac turntables. Essentially, microprocessing "tells the rest of the set what to do." It is a kind of built-in memory feature that permits programming a device for functions that would otherwise have to be managed manually. Does it add to the cost of the device? Undoubtedly. Does it improve its performance? Not really. What it is, from the user's standpoint, is probably the most impressive "convenience" feature yet devised for audio gear, but again—only you can decide whether *for your purposes and your inclinations* it is a novelty or a real innovation.

There also are a few new ideas waiting in the wings and how they stand up under performance tests remains to be learned. One is the fast-speed cassette announced by B.I.C. Another is the ribbon tweeter that suddenly has turned up in two high-priced speaker systems, the Acoustique 3A and the Sequerra "Pyramid." Stay tuned.

MUSICAL NEWSICALS

MUSICAL INSTRUMENTS

Spector Guitars has announced a new, hand crafted, limited production electric bass with a sculpted, contoured body which wraps around the musician. The instrument is made of selected hardwoods, and features a

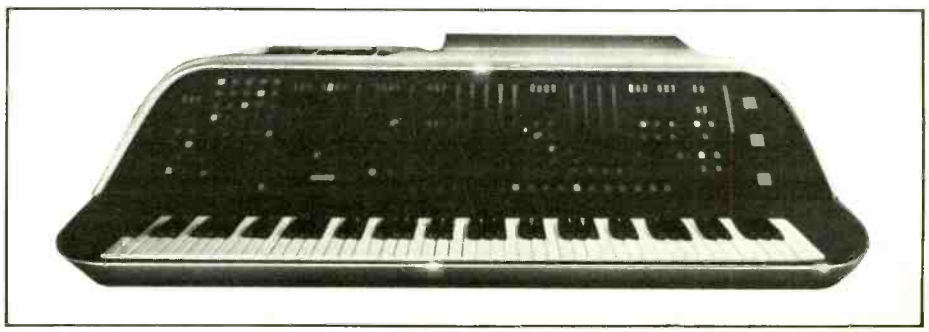
one-piece neck which joins the body at the 24th fret. Top quality components are used throughout, including Series I DiMarzio Pickup, Badass bridge, gold-plated Schaller tuning machines, and Strap-Lok strap buttons.

CIRCLE 16 ON READER SERVICE CARD

SYNTHESIZERS

Nearly every new synthesizer model that comes along calls itself "revolutionary" at some point in its press releases, but the new Coupland Digital Synthesizer from Micor Audio Products Division probably has a legitimate claim to the use of the word. The thing that makes the Coupland so different is that it is the first commercially available performing synthesizer that is totally digital in its design and operation. Outwardly, the Coupland looks very much like any other synthesizer although its controls and displays are much more sophisticated than the typical performance instrument; the unit measures 52″ × 36″ × 15″ high, weighs in at a hefty 175 pounds and features a full 88-note keyboard. The control panel does not use pots like conventional synthesizers, but rather touch-sensitive strips with liquid crystal bar graph and numerical displays in addition to pushbutton select switches.

The heart of any synthesizer is its waveform sources, or oscillators in the case of conventional synthesizers. In the case of the Coupland, the waveforms are digitally synthesized and numerically controlled; rather than starting with a particular waveform and then modifying its shape (and sound) via filters and other controllers, the Coupland generates exactly the waveform specified by the operator. The controls to specify each waveform are necessarily extensive and include choice of basic waveshape, phase relationship to other waveform generators, envelope timing and shape, modulation and frequency. The synthesizer comes with at least four waveform generators, but may be equipped with eight or twelve generators for greater versatility; each generator is fully polyphonic with up to sixteen simultaneous notes. The basic waveshapes available are a variable-width pulse (duty cycle selectable from 0% to 50%), noise or a Fourier mode in which a sine wave and its specific harmonics (up to 256 of them) may be specified to generate any arbitrary waveshape. The waveform's envelope is controllable for timing in five stages rather than the conventional four-stage ADSR circuitry plus amplitude and frequency. The waveform may be amplitude modulated from 0% to 100% and/or frequency modulated from 0% to 25% (in .1% increments) by one of the two built-in LFOs, an external analog signal, footpedals or another waveform generator; if an LFO is used, the phase angle may be specified so that the LFO may be used for several functions with greater flexibility. Frequencies are, of course, controlled by the keyboard; base frequency, or frequency of the lowest key is settable from 1.28 Hz to 9999 Hz, and the tempering of the keyboard is variable over the incredible range of .01 to 9998 keys per octave with a preset of twelve keys for normal tempering. The keyboard itself is velocity sensitive, and the sensitivity is individually settable for each waveform generator, and the keyboard may be sub-divided for each waveform generator. Several real-time functions are controlled by



footpedals; rocker-type pedals control volume (overall amplitude), amplitude modulation and LFO frequency, and a return-to-center pedal controls frequency modulation for pitch bend up or down, plus there are foot switches for timing envelope and forward and backward initiations of the control sequence. The unit also features comprehensive programmability and cassette storage/retrieval. All settings may be stored as a preset and up to twenty presets may be preloaded and recalled numerically. Up to twenty control sequences may be stored, accessed, updated or replayed at command, or up to twenty open-length segments may be entered directly from the keyboard and recorded on cassette to be played back intact or edited/modified in real time. The cassette unit itself is a dual unit to facilitate copying or updating without destroying the original, or to allow recording of control settings on one cassette and keyboard information on the other.

CIRCLE 17 ON READER SERVICE CARD

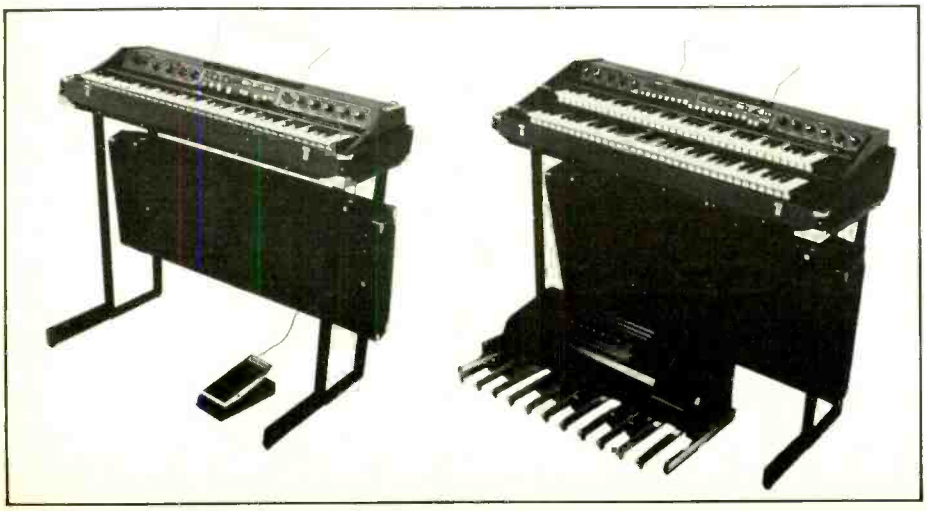
KEYBOARD INSTRUMENTS

Music Technology Inc. has announced the addition of two new portable organ models to their Crumar line. Both the T-1 and the T-2 are said to authentically recreate the tone wheel sound of the Hammond B-3 organ without the portability problems of the Hammond, and with several more modern features including a variable synthesizer bass section, pitch bend and LED indicators. The T-1 model has a 61-note keyboard, while the T-2 is a double manual version. Both models are furnished with carrying cases.

CIRCLE 18 ON READER SERVICE CARD

New from PAIA Electronics is an advanced combo organ, the Organtua, which was designed by noted musical electronics specialist Craig Anderton. The Organtua has three individual ranks of tone generators for a much thicker sound than is possible with the usual single voice combo organ. The three ranks may be detuned slightly for flanging or chorusing effects, or they may be tuned to wider intervals, such as 4ths or 5ths to simulate drawbar effects. Each of the three ranks may then be offset up to 5 octaves in octave steps using the octave switches. The master rank has a voltage controlled clock to allow pitch bending, two types of vibrato and percussion effects, while the two slave ranks are synchronized to the master clock or to an alternate tunable clock. Footpedals are available for pitch bend, vibrato, slave rank switching and an octave transposition switch which simultaneously raises all three ranks one octave. The Organtua is available in kit form or pre-wired.

CIRCLE 19 ON READER SERVICE CARD



SOUND REINFORCEMENT EQUIPMENT

The Marlboro Sound Works division of Musical Instrument Corp. of America has added two professional quality microphones to their product line. The M900 model is their new top of the line mic, and is a dynamic, cardioid design featuring wide, uniform frequency response and an integral, spherical windscreen. The model M500 is a similar model without the pop filter.

CIRCLE 20 ON READER SERVICE CARD

In a bit of business news, it has been announced that Gulton Industries, Inc. will be acquiring Technical Audio Products Corporation, better known as TAPCO. Gulton is, of course, the parent corporation of Electro-Voice, and it was announced that TAPCO will be operated as a subsidiary of Electro-Voice. This will round out E-V's line of speakers and microphones with TAPCO's mixers, amplifiers and signal processing equipment.

CIRCLE 21 ON READER SERVICE CARD

News comes from Electro-Voice, Inc. of two new music speaker systems designed for permanent installation. The new models are the PI 12-2 and the PI 15-3, which are based on the recent S 12-2 and S 15-3 stage models. Both models boast extended low-frequency response and excellent, 120° high-frequency dispersion. The PI 15-3 is a three-way design using E-V's exclusive ported cone-type midrange driver for uncolored, high-efficiency midrange response. Both systems incorporate a new High Frequency Auto Limiting circuit to protect the ST350A tweeter without reducing the power output of the overall system; both

models are rated at 100 watts continuous power input. The basic difference between the stage models and the new permanent installation models is that the PI models lack the aluminum edge stripping, carrying handles and casters of the stage versions, and that they carry a correspondingly lower price tag.

CIRCLE 22 ON READER SERVICE CARD

MUSICAL INSTRUMENT ACCESSORIES

An analog echo unit, which produces echo effects electronically with no moving parts, is new from Roland-Corp US. The DC-10 produces a wide range of effects from a single repeat to a large hall type of reverberation to sustained echos and chorus effects similar to phase shifters, and may be bypassed instantly with the included footswitch. A three-position input selector (−20, −35, −50 dB) and a two-position output selector facilitate connecting the unit into virtually any amplification system for hi-fi, P.A., or musical instrument applications.

CIRCLE 23 ON READER SERVICE CARD

Musical Research Laboratories now offers the LOC-1 Line Output Converter. This unit is a high-level direct box made to plug into the extension

speaker jack of an amplifier to provide a line-level output to feed to a P.A. system or recording console. List price for the unit is $9.95.

CIRCLE 25 ON READER SERVICE CARD

Overlend has introduced the EMG line of musical instrument pickups which features an internal preamplifier. The preamp, which is designated as the EMG-IIP, has a frequency response given as 20 Hz to 20 kHz, and features a low impedance output for elimination of treble loss even with very long cable runs between instrument and amplifier. The preamp has a high output level (peaks of over 3 volts) for amplifier overdrive capability and maximum dynamic range, which is given as greater than 90 dB, as well as improved sustain. Another

added advantage of the EMG pickups is that they allow the strings to "float" with respect to the amplifier's ground, eliminating the shock hazard from improperly grounded amps. All models come with pre-wired volume and tone controls and all necessary hardware and accessories. Currently available models include direct replacements for humbucking and mini-humbucking pickups plus complete two and three pickup systems for Precision basses and Stratocasters.

CIRCLE 26 ON READER SERVICE CARD

Ross Musical Products has added a new professional phaser with adjustable regeneration to their product line. The unity-gain device is said to have a 90 dB dynamic range, input impedance of 500 K ohms, and output impedance of 10 K ohms. Sweep rate is variable from 1 to 8 Hz and the regeneration ratio is variable from 0% to 80% for added depth of effect.

CIRCLE 27 ON READER SERVICE CARD

Calzone Case Co. is one of the newer names on the professional quality road case scene. Their catalog lists a wide variety of custom fit models for amp heads and cabinets, keyboard instruments, synthesizers and mixing consoles, universal and custom pre-cut foam-lined cases for guitars, mic cases, trap cases, attaché cases, accessory cases with steel trays and drawers, and amp racks in any size you might need. In addition, Calzone will build any custom case you can specify on a quotation basis. Standard construction is ¼-inch plywood covered with a formica-type laminate which is almost impervious to staining, scuffing or tearing. All edges and corners are formed with extruded aluminum channel made to Calzone's specs, and the flight hardware (handles and catches) are by Sessions.

CIRCLE 28 ON READER SERVICE CARD

Music Man, Inc. has announced the introduction of a complete line of guitar and bass strings which will be available both in sets and individually for custom-gauged sets. Guitar strings will be offered in diameters from .007 through .056. Bass strings range from .040 through .115 and are available in flat-wound, round-wound and half-round (bright) compound windings.

CIRCLE 29 ON READER SERVICE CARD

DiMarzio Pickups, Inc. has broadened their product line with the introduction of the DiMarzio Brass Bass Bridge. The new model is a high-mass, solid brass replacement bridge for Fender Jazz and Precision style basses, and is said to outweigh other replacement bridges by almost 2:1 for greater sustain and high-frequency performance. The bridge will adapt to either 3- or 5-hole mountings, and will accommodate all string gauges.

CIRCLE 30 ON READER SERVICE CARD

Everything You Need to be a Star.

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CIRCLE 74 ON READER SERVICE CARD

the Buddy "Live"

Even if it did not have as its subject one of rock and roll's legendary and truly seminal figures, *The Buddy Holly Story* would still be a remarkable film. Remarkable because, for the first time in a non-documentary work, virtually all the musical performances were recorded "live" *while the scenes were being filmed*, rather than added later in the comfort and safety of a motion picture "dubbing room."

Although the film has drawn critical fire for taking liberties with some of the historical details of Holly's brief career (the most obvious being the omission of producer Norman Petty), it can hardly be faulted from the standpoint of musical accuracy.

The film is chock-full of scenes of Gary Busey (as Buddy Holly) and band performing in concert halls, recording studios, and in *the* archetypal garage rehearsal room, and producer Fred Bauer and director Steve Rash hoped the film could convey the raw simplicity and power of Holly's music as convincingly as possible. So they hired as music director their old friend Joe Renzetti (session guitarist and arranger on such early 60s Cameo-Parkway hits as "Mashed Potatoes," "Let's Twist Again" and "Bristol Stomp"), and gave him the job of duplicating both the look and the sound of 1950's rock and roll in a film for 1970's audiences.

Renzetti's task was eased somewhat by the fact that Busey and bassist Charles Martin Smith had musical backgrounds (Busey has toured as a drummer with Leon Russell). Actor Don Stroud, cast as the Crickets' drummer, had no experience, but

Holly Story on Film

by Rob Lewis

mastered the parts Renzetti wrote for him (updating what he calls the "rather inept" percussion work on some Holly records).

The real problems in filming the performances "live" arose in trying to get a high-quality, authentic "live" sound—without spoiling the authenticity of the visuals, and in coping with long-established Hollywood production practices completely alien to "live" music recording.

The Dubbing Process

A brief digression is in order here. Normally, when a movie is shot, the lines spoken by the actors are simultaneously recorded as a "dialogue" track. All music and sound effects are added later, in the post-production phase, where additionally any dialogue lines that were "blown"—as by an actor's misreading or a noise on the set—can be re-recorded (or "looped," in film industry parlance). In the "dubbing" process, separate dialogue, music and sound effects tracks are recorded on 35mm film base that has been coated with a magnetic emulsion; these separate tracks are then mounted on a bank of playback machines ("dubbers") which are all linked to the film projector via the sprocket-wheel drive mechanisms to maintain perfect, frame-by-frame synchronization between sound and picture. The sound mixer then watches the film while adjusting level, equalization and panning of the various tracks to follow the action on the screen. The final film mix is recorded on another reel of magnetic stock,

Scene from Columbia Picture's *The Buddy Holly Story* showing Holly and the Crickets listening to a playback, circa 1958.

either in mono or in 2-, 4- or 6-channel stereo, depending on the particular system in use.

Capturing Yesterday's Sound . . . Today

To capture the "live" sound, yet retain control during the dubbing process, Renzetti planned to take a 24-track remote recording setup to all the theaters and recording studios around Los Angeles that were used as locations for the film. But one problem remained: how to get a decently clean, tight sound with acceptable isolation between instruments without a forest of mic stands around the band's setup (which, though it's the norm with performing bands today, would have been thought *highly* strange in 1957!)

Renzetti enlisted the aid of Joel Fein and Al Williams, two engineers with extensive experience in P.A., studio and "live " location work, and the three succeeded in hiding the recording apparatus so well that watching the film, one has no idea there is a multi-track session in progress.

In the scheme they worked out, Charles Martin Smith's standup acoustic bass was taken direct, using a Barcus-Berry pickup and concealed cord. A Shure SM57 dynamic mic on a short desk stand aimed into the rear of Busey's open-back guitar amplifier captured that instrument unseen.

Kick drum and tom-toms were picked up by dynamic mics (SM57, AKG D1000E or Sennheiser 421) installed inside the drums (with both drumheads in place).

To get the rest of the drum kit, miniature Sony ECM-50 lavalier condenser microphones were taped to the stands supporting the cymbals, snare and hi-hat, with the cords carefully routed out of camera view.

Through careful equalization (for example, removing low frequencies picked up by the cymbal mics), better isolation between tracks was achieved in spite of the omnidirectional pickup pattern of the tiny ECM-50s. Where necessary, their rolled-off bass response (a feature designed to improve voice pickup when the mic is used in "tie tack" applications, resting against the resonant chest cavity) was compensated with EQ. The dynamic mics used for kick and toms were chosen for their tolerance to high SPLs and their ability to deemphasize the resonances and stray noises that result from placing them inside the drums.

That left vocals. Since the use of the latest microphones was out, Fein and Williams rounded up a collection of vintage models (some still in production after more than 20 years), including Shure and E-V dynamics, RCA 77-DX ribbon mics and Neumann U-47 condensers with tube preamps. As most engineers know, some of these mics are still regarded very highly for certain applications, and

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Arranger Joe Renzetti (right) offering Holly (Gary Busey) some pointers.

fetch premium prices on the used market, but Renzetti and company were astonished to find a recording studio in Los Angeles that used the RCA ribbon mics to the exclusion of virtually all else. On camera, the mics look completely authentic. On tape, they give the vocals a subtle color that recalls the sound of two decades ago.

In the film's concert hall scenes, the producers faced the necessity of providing a high-quality P.A. system (to encourage reactions in the mostly non-professional audience) as well as a top-notch stage monitor system for the performers, without any of it being visible on camera (monitors being a modern-day luxury!). Using Tycobrahe equipment, Fein and Williams were able to improvise a workable system with speakers positioned out of view overhead, in the wings and in the footlights.

To capture the ambience of each hall, a total of six U-87 room mics were used: two set left and right of the stage, two halfway back and two at the rear of the hall. During the mixdown, digital delay was added to these ambience tracks to enhance the sense of space, and when these ambient sounds are played through the rear "surround" speakers in theaters so equipped, the "live" concert effect is quite remarkable.

Ah, Hollywood

With the technical problems thus solved, there remained a logistic one—dealing with the established Hollywood filmmaking practices. Motion picture soundmen are accustomed to the luxury of being able to fix any audio problems in post-production, and, as Renzetti says, "The film crews think nothing of spending hours getting their lighting and camera angles right, but if you ask them for 10 minutes to check the sound, they look at you like you're crazy!" In anticipation of this sort of problem, the music backing tracks had already been prerecorded by the band in the studio, and were available for use with the "live" vocals if it proved impractical to get a satisfactory instrumental sound. As it turned out, only one scene—involving an impractically large number of on-camera musicians—had to be done this way. In all other scenes, Busey and band are playing and singing "live" on camera (although in a few spots, for artistic reasons, the editors decided to use the picture from one "take" and the music from another).

When it came time to do the final sound mix for the film, it was necessary to transfer the 24-track audio master tape to the 35mm magnetic stock used by the dubbing machines. Since each dubber can record a maximum of three tracks across the width of the "full coat" stock, a total of eight dubbers were needed just for the 24 tracks of music—plus additional machines for dialogue, sound effects, and score (background music)—for a total of as many as sixteen dubbers, all running back and forth in lockstep with the film projector as the mix was finalized. Besides the standard signal processing available at Sam Goldwyn Studios, where the mix was done, additional outboard limiters, parametric equalizers and digital delay units were brought in.

The mixdown was done following the standard Cinemascope audio format, which provides four magnetic tracks on the completed film, assigned to Left Front, Center Front, Right Front and Rear "Surround" speakers in the theater. (Because of the extreme variation in theater seating positions, the use of a "phantom" center channel as in conventional stereo records will not work, it would only be correctly perceived by viewers seated close to the center line of the theater; thus the use of a discrete center channel, complete with speaker behind the screen.) For the standard mono optical sound release version, the four tracks were simply summed, which unfortunately sacrifices much of the "live" illusion provided by the rear-channel ambience.

But heard in a stereo-equipped theater, *The Buddy Holly Story* stands as a good example of what a fresh idea, along with plenty of dedication and attention to detail, can accomplish in the area of sight and sound on film.

Notes On the Sound Track Album

The Buddy Holly Story sound track album, released on American International Records, Inc., was produced from the same master as the film music, but with a slightly different approach. As engineer Fein says, "We wanted the album to support the film, in the sense of taking the listener back to the experience of seeing it in the theater. Still, we're aware that people are accustomed to a "tight," close-miked sound on records today. And without the visual cues of the picture to go along with the music, just duplicating the sound of the film on the album might not be effective. So we mixed with less recorded ambience and more board echo, and EQ'd for a tighter, brighter sound. It was a matter of trying to maintain the integrity of the music and era, yet make it less unfamiliar to present-day ears."

Three hours set-up time. Four amps, a bunch of mics, monitors, etc...and what did you get?

Spaghetti.

Now you're laughing. But maybe the fact that you can relate to this picture means something. Chances are that if you've ever played in a band, engineered, or had the pleasure of setting up equipment you probably know this scene all too well. The fact is, though, it's not funny when you consider that the groups livelihood depends on that equipment. And when you think of all the money you spent on mics, amps, monitors, and the rest of it, you can get sick. It's too bad, but the entire system is no stronger than its weakest link.

As the complexity of your music system increases so can your headaches. The overall success of your show can be jeopardized by bad connectors, cables and a big mess on stage. And what about the time element? A well organized act not only looks but sounds better. Being efficient saves time, and that saves money.

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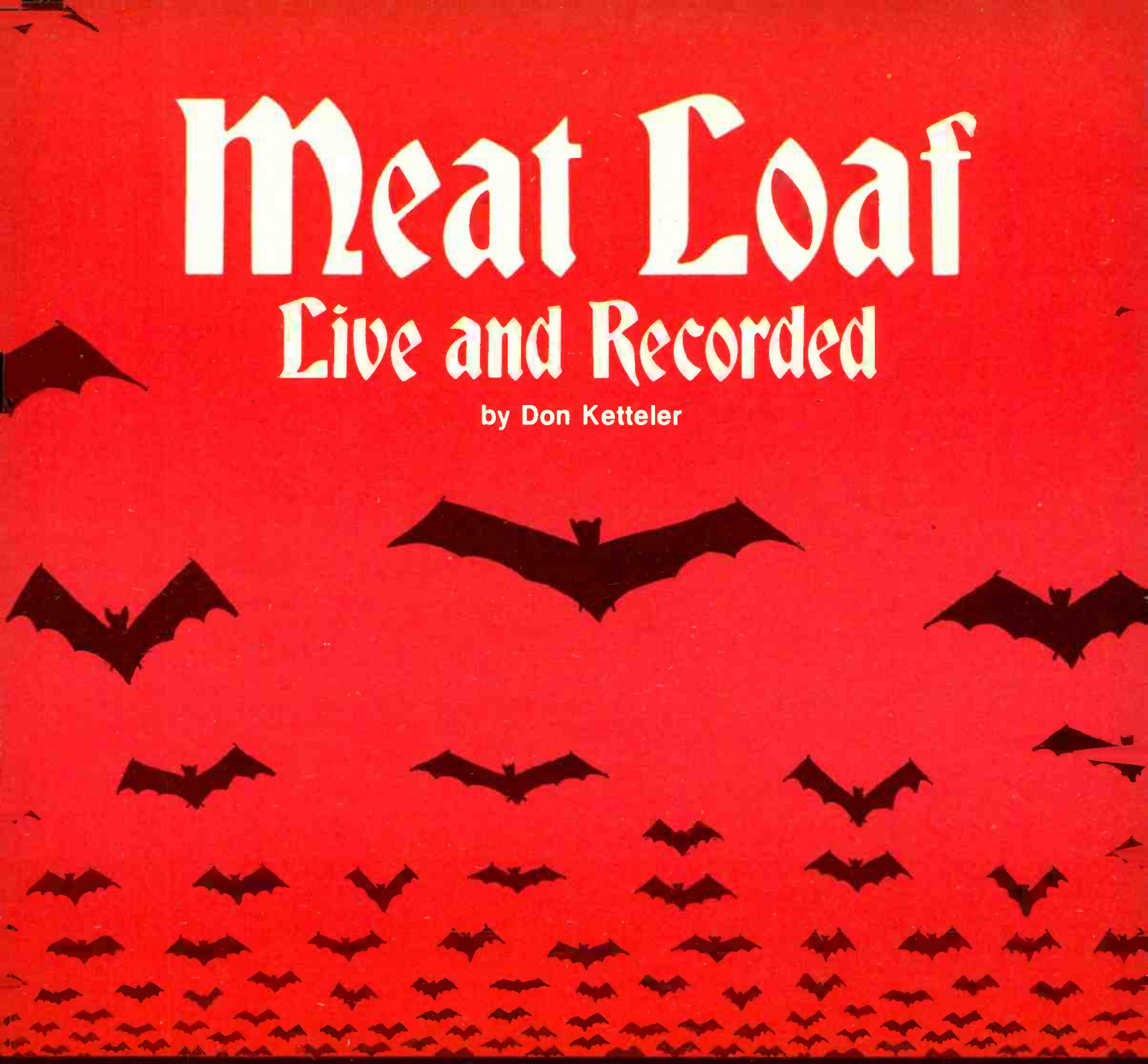
CIRCLE 90 ON READER SERVICE CARD

Meat Loaf
Live and Recorded

by Don Ketteler



...Live

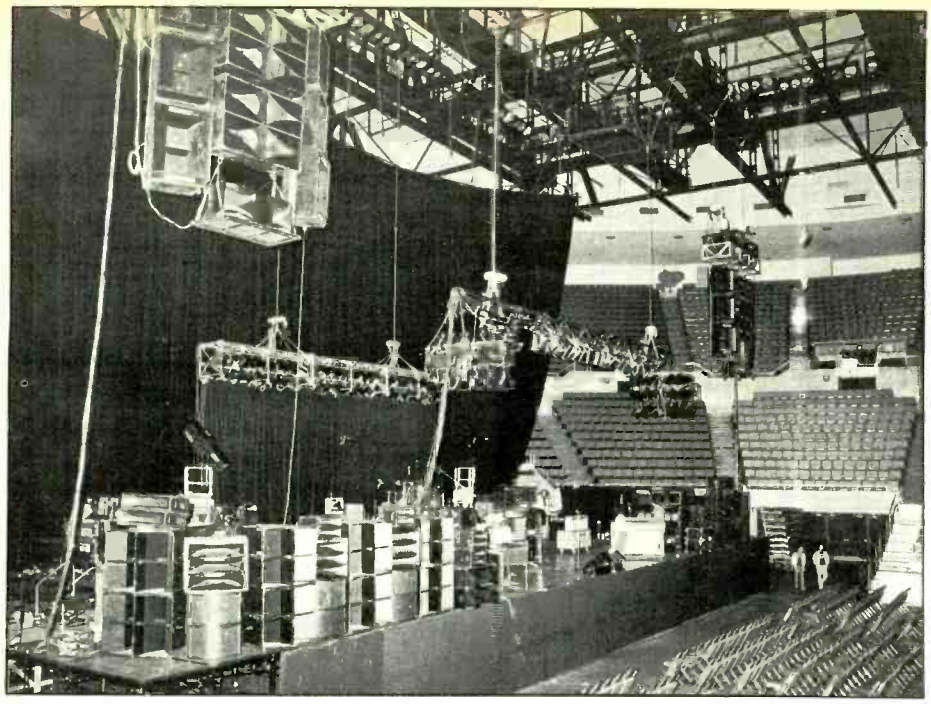
Preparing for any show in a large multi-purpose venue with a non-permanent stage necessitates in-person advancing [doing preliminary legwork]. One major concern at this particular concert was the supplemental hanging P.A. gear. Although flying (hanging) extra gear was a foregone conclusion because of the improved viewing it allows and because of the extreme vertical coverage demanded by the confines of the Nassau Coliseum, by advancing the date I could pinpoint the degree of difficulty of rigging points for the flying system which would keep it in phase with the stage system and allow for good coverage. ("Rigging points," by the way, is the art of attaching steel cable to the structural beams of the building and securing to them electric chain hoists to lift, in this instance, the flying P.A. grid.) So then, personally seeing and familiarizing myself with the Coliseum allowed me to project how Meat Loaf's production considerations such as light and sound console placement; rigging points for sound grids and lighting trusses; truck loading and unloading procedures; soundwing specifications; and sight line problems, would be dealt with on the day of the show. All of these problems are, incidentally, simplified and minimized by having a good road crew. In this instance I have Tom Tully, Michael Scopino and Beric Wikens to thank.

One complication shared by coliseums, gymnasiums, field houses, pavilions, hockey arenas, etc., is that, although as concert venues they allow high attendance, they all have acoustic characteristics that range from mediocre to hopeless. Because such venues have huge dimensions and are fitted with appropriately stark building materials, the transient sound engineer is left with expansive distances into which the sound must travel, and, *sans* audience, little but concrete, hard

wood and steel as boundary surfaces. Consequently, with the higher sound pressure level from the P.A. because of the large internal volume of the building and the dominance of hard surfaces, reverberation time is sickeningly long. This is to say nothing of the standing wave potential and the mid to high frequency chatter off all those seats and the roof. There are forms of salvation, however, and finding them is directly related to your popularity.

Pre-People Sound Check

It seems that every discipline has its cliches. From "We'll fix it in the mix," to the ubiquitous "Your check's in the



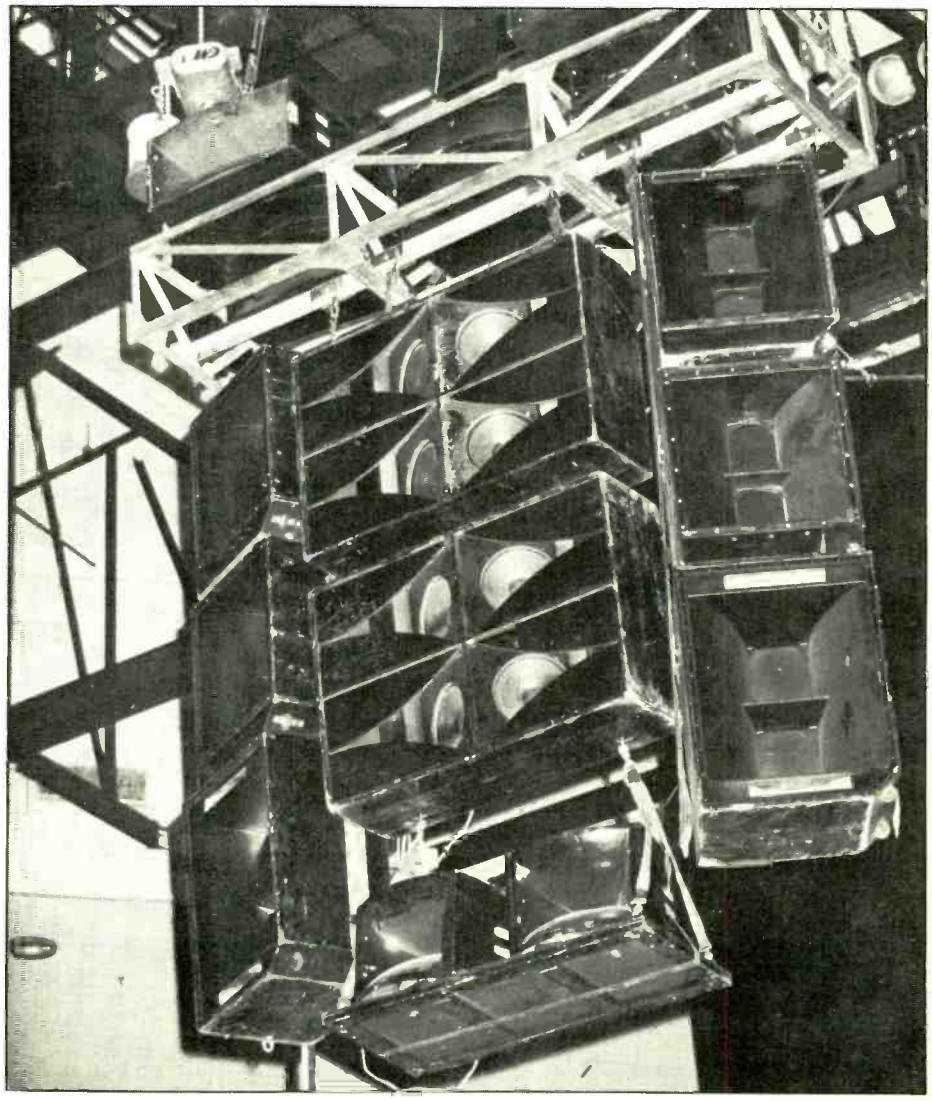
View of Tasco's four-way stage P.A. set-up installed at the Coliseum.

mail." Concert reinforcement, not to be left out, has at its core the axiom, "It'll clean up when the audience is in." Said in the midst of an afternoon's horrific sound check, its validity depends mostly on the physical makeup of the room. In rooms with plush, padded seating, non-parallel absorptive surfaces, a carpeted and raked floor, acoustic-tiled ceilings, i.e., in rooms where the reverberation time is relatively unchanged by the audience, the cliche holds little water. In Nassau Coliseum, however, it is definitely an axiom to be heeded.

The single most important change in Nassau before and during the show is that, except for the aisles, there are potentially people from floor to ceiling. This changes the acoustic boundaries of the room from undesirable reverberant material to people, who have good absorptive and diffusive qualities. People on the floor help break up floor-to-ceiling standing waves, and well-aimed sound remains more contained and controlled working into the audience rather than concrete walls and hard wooden seats. It was certainly comforting to know that we had sold out.

Given this acoustic environment for an afternoon, pre-people sound check, I concentrate my efforts on system balance and console considerations. First, before working with the band, I check the system for a crossover balance and feedback susceptibility. The crossover initially is set with a tape by John Vassey, Tasco sound company's house engineer, to a balance he feels is proper for the room and the system. I then scrutinize the system by listening to familiar tapes and my voice with a Shure SM57. A discussion and/or argument between John and myself may then ensue, after which a balance is arrived at which hopefully will not have to change throughout the course of the sound check and show.

Further adjustments are made on the 1/3-octave equalizer. Using a mic at the console—and after turning off the top three bands of the crossover—I drive the system into feedback in its lowest band-pass region (up to 350 Hz). I find the unstable bands in the low end by selectively reducing their gain on the equalizer until the system again stabilizes. If it takes more than 6 dB of gain to cause feedback in these sensitive bands after the system is returned to a stable operating mode, I'll simply note the frequencies and not lower the system gain at them unless



Maryland Sound's five-way "flying" P.A. system suspended over the Coliseum.

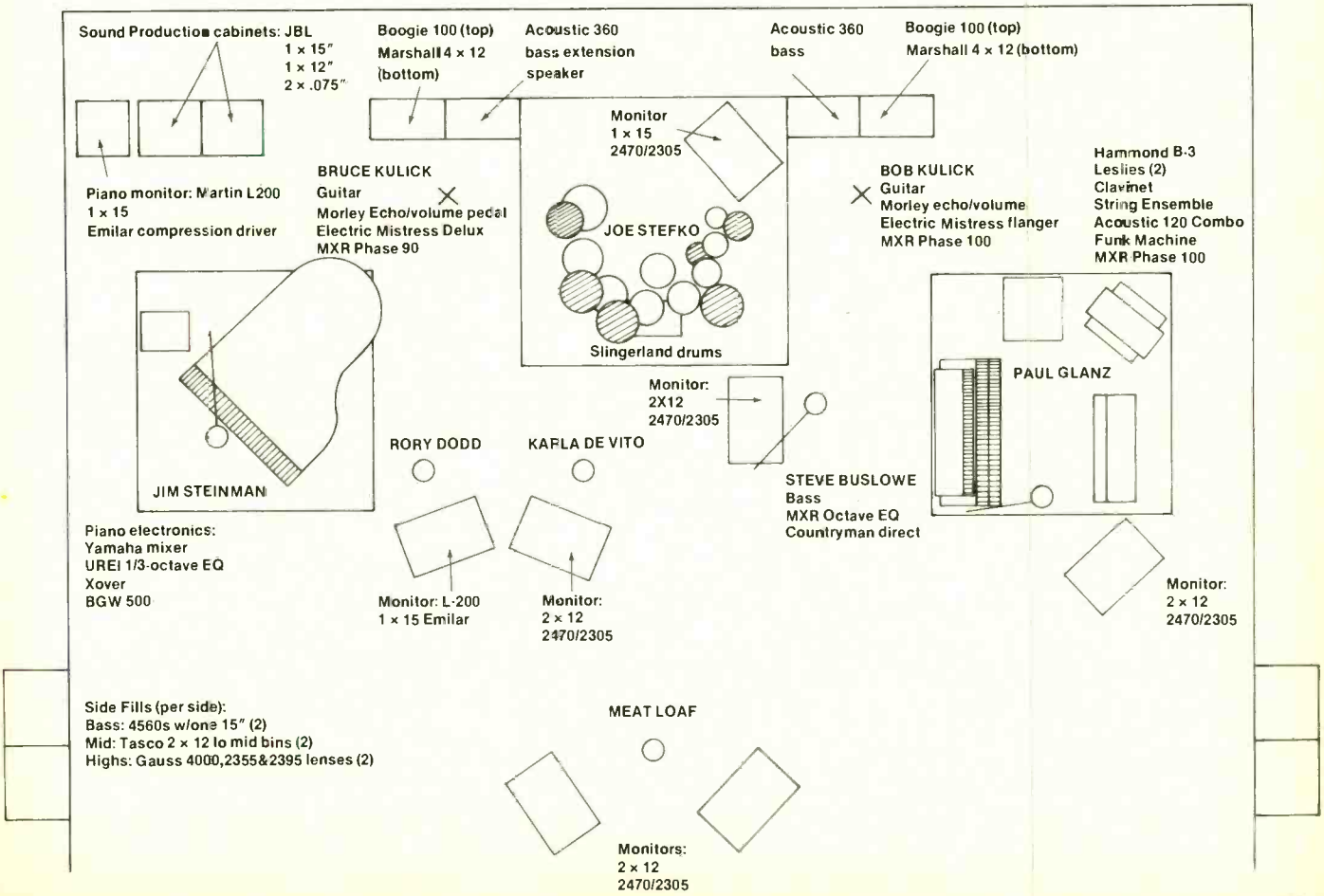
they become a problem during the show or the sound check. In regard to the higher frequencies, to find trouble spots I'll generally play a tape and *boost* frequency ranges on the 1/3 octave I feel the room is accenting. Boosting, rather than cutting at the higher frequencies works better for me as it allows locating peaks more easily. A troublesome band tends to jump out, whereas a stable band does not become so menacingly out of balance. Again, I may or may not change the system's gain at those frequencies depending on the severity and whether or not I feel the problem will persist after the audience is in.

After all this muddling about is finished, I'll again play a tape and switch the system EQ (the 1/3-octave equalizers) in and out and speculate whether at show time this is the spectrum balance that will be most appropriate. For, it goes without saying, to proceed from here and do a sound check with the system improperly set is rather futile in any room.

Instrumental Problems

For the sound check, as a matter of course, I go through every input at the Midas 32 × 8 stereo console individually with the band members and make

Meat Loaf's sound mixer Don Ketteler checking the Coliseum's response.



sure that all input gain settings are proper. This usually takes, along with whatever tone work I do, *approximately* thirty minutes. This one-on-one time with the band members isolates each instrument or input and allows the band member and me to establish a rapport and a chance to discuss particulars of his sound and/or changes that need to be made. For instance, the most nagging problem of the tour had been the piano and its amplification system. Jim Steinman simply needed it louder than could be provided with stock equipment. After several agonizing months of hearing piano feedback and inordinate amounts of time spent on reducing it, we turned to Sound Productions, a Dallas-based business that specializes in keyboards. They provided us, along with our Helpinstill pickup already in use, a customized biamped system. It included: a Yamaha 6-channel mixer, which provided an active input for each pickup to give both tone and drive capability; a Urei 1/3-octave equalizer to tailor the overall tone and combat feedback; an electronic crossover; and an amplifier. After trying several amplifiers, the one we were eventually most happy with was a BGW 500. This drove two three-way speaker cabinets each containing, a JBL 2205, two JBL K120s and two JBL 2402s. I must add that I've yet to see a person or an instrument with such extreme problematic stage demands to be met, or that administered the abuse as that the piano set-up endured. It may not have been hi-fi, but it lived to tell about it.

The piano was actually only one of the several interesting instrumental particulars which bear mentioning. Let's next talk about the guitars. The guitars presented two problems. One was that to get "the sound" their stage level forced everyone else's to unacceptable volumes. Bob and Bruce Kulick, our guitarists, felt we could help the volume problem and maintain the sound with Boogie amplifiers and Marshall 4×12 bottoms. The Boogies are tube amps that have specialized presence and tone controls and several accessible and controllable gain stages. This design allows you to selectively overdrive, or not, certain stages. So, they could overdrive stage two with stage one, and by turning the master down have a gutsy sound that you could converse over. Don't get me wrong, the band could still get that "Concorde take-off" effect on stage, but it helped. This approach also helped solve the second problem, which they shared with our keyboardist Paul Galnz, gadget noise.

Gadgets, all those outboard signal manipulation boxes which phase and flange and echo and wah, were the source of most of my troublesome electronic noise. This noise has several origins and complications. Gadgets are almost universally unbalanced, have components that are inexpensive and basic circuits that are simply designed and create multiple grounding problems (when using lots of them). In short, they cause problems. These are notwithstanding the spurious noises generated by the extreme signal manipulation and distortion. Nevertheless, take heart; there are means to improve upon the problems.

Assuming you can't talk the artists out of using gadgets (most desirable answer), do the best you can electronically with what you've got. Use good cable, connectors and workmanship in interfacing them and make sure the grounding scheme is consistent. (With Paul's clavinet and String Ensemble,

...Recorded

When Cleveland International recording artist Meat Loaf decided to arrange a "live" radio broadcast in New York, it was not surprising that he asked Jimmy Iovine to become involved with the project as mixing engineer. Iovine, who is currently one of the hottest producer/engineers on the New York scene on the basis of his recent work with Bruce Springsteen and Patti Smith, among others, had worked with Meat Loaf previously when he remixed several of the tunes from the group's debut album, *Bat Out of Hell*, and he had kept in touch with the band over the months as their album climbed its way up the charts.

Originally, the show to be broadcast was the group's appearance at the Dr. Pepper Music Festival in New York's Central Park. Arrangements had been made with a two-track remote recording truck operating out of Pennsylvania to use their facilities to mix the stereo broadcast. Unfortunately, this was not to be as the truck experienced technical difficulties and was unable to make the Central Park gig, and the broadcast had to be cancelled that day. The broadcast was subsequently rescheduled for the band's concert at the Nassau Coliseum on Long Island three days later.

The group, wishing to avoid another cancellation, took Iovine's advice and hired the remote recording facilities of New York's Record Plant Studios—a brand new, state-of-the-art recording truck. One consequence of using the Record Plant truck was that the gig became a multi-track recording date as well as a "live" broadcast. As Iovine puts it, "You're paying the price of a 24-track truck, you might as well use

Jimmy Iovine (l) and Record Plant's Director of Remote Recording Dave Hewitt.

I'm going to have directs installed in the instrument itself. This is to balance the feed immediately and also to eliminate the antenna effect the cords often encourage and you pick up if you're taking a feed somewhere off the amplifier.) Speaking of directs, I must include a comment about the bass guitar feed. I don't recommend transformers for this job. After having little luck achieving a quality signal for Steve, I tried the all-electronic FET Countryman direct box. The difference in low-end response was apparent, as was an overall improvement in the cleanliness of the signal. Presently I'm blending both the direct and a mic on the bass as well as using a limiter and octave band EQ at the board to fully exploit the bass—the music's foundation—in the mix.

Special considerations for the drums included cutting a hole in the front head so I could insert a mic to get the sound I was looking for, and Joey could keep the backward pressure the front head creates on his beater. I also use mics both over and under the snare, out of phase, for getting both body and snap out of the drum.

Vocal Adjustments

From the instruments, I move on to checking the vocal input levels by having them repeatedly sing an acapella section of the show. Tim Dailey, our monitor mixer, then gets into the act as the band plays selected segments of songs that allow me to assess the sound system and its interaction with the room and lets Tim adjust the monitors to their critical balance. But more on the monitors momentarily. Of the singers who don't play, only Rory Dodd, who contributed to and has been with Meat and Jim through the album, doesn't use outboard gear at the board. On both Meat and Karla I use Urei 1176 limiters to control the range of their dynamics, and occasionally, I'll throw an equalizer on either of them to correct some fleeting tone discrepancy.

Preaching a Guessing Game

I think the popular misconception that the sound check exists to practice mixing bears refuting at this point. The sound check is just that, a period of time during which the sound engineer checks the sound. The mix, that is, the balance and tone of the instruments and the vocals, once conceptualized, doesn't change for all intents and purposes. It is a given and the sound check is the time you use to circumvent any problems that are compromising it, keeping in mind the acoustic environment for the sound check is radically different than it will be for the show (i.e., the sound check is an educated guessing game). Anyway, this is a personal plea. To all those armchair mixers at sound checks, lay off. And to all those mixers who "rehearse" during the sound check, good luck. Okay. Enough of this preaching. Now that there's music happening I can move along.

I make sure my effects and their sends and returns are working and set properly. I also check and cue tape inserts (you know, Phil Rizzuto and, "Holy cow, I think he's gonna make it . . . "). As much time as it takes is spent on making sure of even and complimentary coverage between the two stage stacks (no, they don't automatically sound exactly alike) and, at Nassau, the flying system as well. This is a real pain in the *derriere* as it involves much leg work. Running around and up and down the bleachers of the Coli-

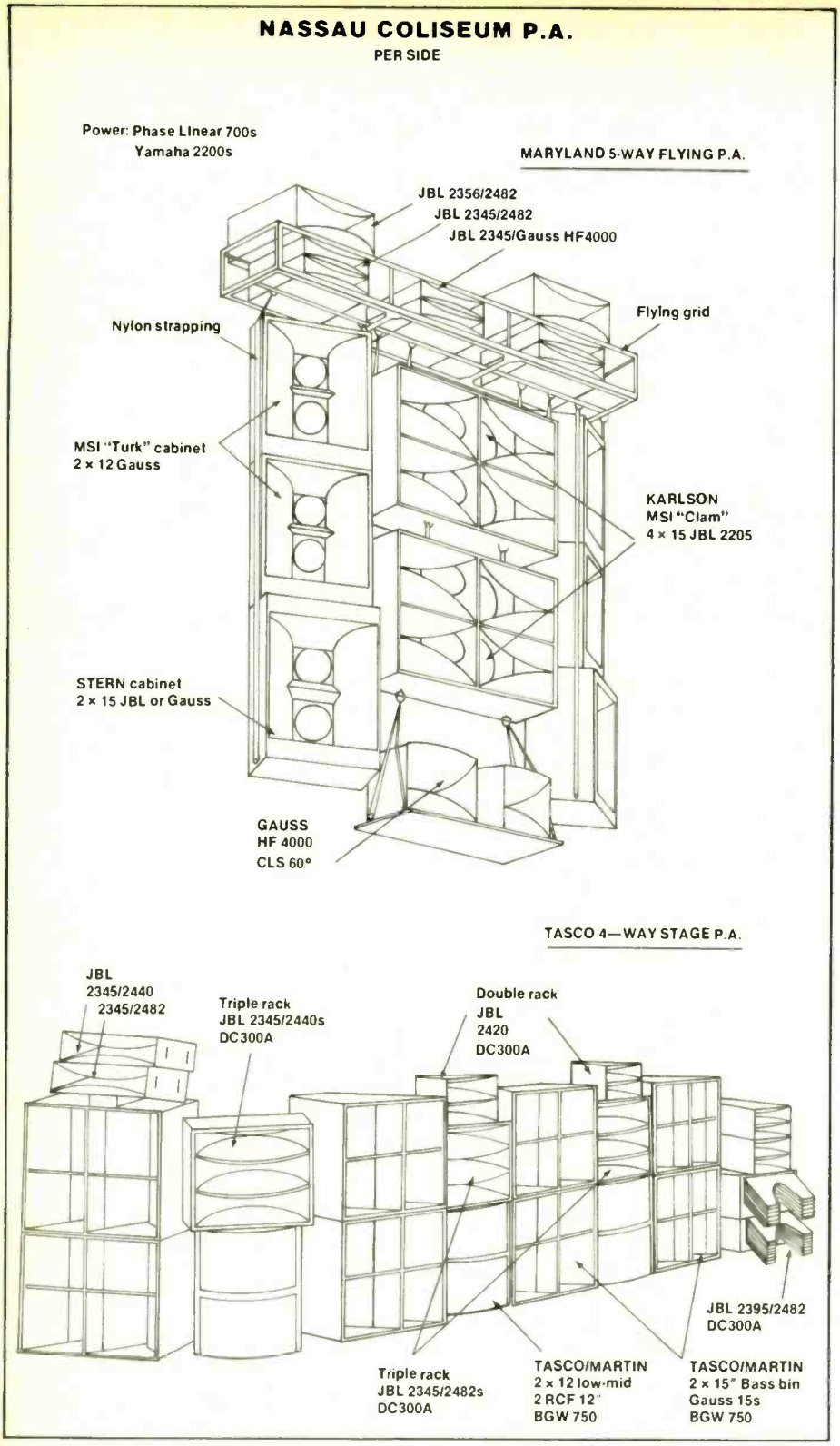
it. All it costs is the price of a few reels of tape. Even if you never use the tapes, you really don't lose much."

The new Record Plant Remote truck was called in on the date with about three days notice. While this may seem like a rather short time, it was actually quite generous by the truck's standards. David Hewitt, Director of Remote Recording for Record Plant, explains that unless there is construction or maintenance in progress the truck is kept essentially ready to roll except for onloading tape and any special microphones or outboard equipment required by the particular client. "In fact," says Hewitt, "it's possible that we could have covered the original Central Park date if anyone had known early in the day that the truck from Pennsylvania wasn't going to make it."

The Record Plant's new truck is a truly impressive piece of equipment, and is understandably Hewitt's pride and joy. The truck is built on a stretched Peterbilt cab-over-engine, 10-wheel chassis, which is powered by a 900-cubic-inch, turbocharged, Cummins 350 diesel engine. When asked if this isn't overkill, Hewitt smiles and says, "The best electronic equipment in the world does you no good if you can't get it to the gig because your truck won't go. We decided to go first class all the way because that's the only way that makes sense. Of course, by the time we got done we'd spent nearly $400,000, but for a clientele that appreciates quality and reliability like ours does we think the expenditure was justified." Atop the Peterbilt chassis sits the business end of the rig, a 28-foot long black box which houses one of the finest recording control rooms ever on wheels. The box is larger in all dimensions than that of the original Record Plant Remote truck (which is still on the road, incidentally) and this extra room mostly alleviates the cramped feeling associated with remote trucks. The control room is still cozy—the mixing console comes within about ten inches of stretching across the whole width—but there was enough room to design

(continued on page 54)

The Record Plant remote truck in position at Nassau Coliseum.



seum, I felt as if I were in training. The object is finding the points where the different sound sources overlap, and adjust for a smooth and unnoticeable transition. Again, this is tough because what you hear in the afternoon is not what you'll hear that night. Experience tells you what changes to anticipate, and opening acts become white mice in the maze of show time system adjustments.

Meat's Monitors

Monitor considerations for Meat Loaf could easily be the topic of a separate article. From set-up to equipment choice to ringing and mixing approach, all the result of years of experience and observation applied to the particular demands of the Meat Loaf show. This necessarily limits this mention to a mere description and perhaps vague application of the monitoring.

Tim uses a Midas 24 × 8 monitor mixing console. He assigns 17 inputs to 10 outputs (the last two being echo sends). These are processed through six Klark-Teknik 1/3-octave equalizers and one Klark-Teknik stereo octave band EQ. The equalizers are inserted in submaster break points rather than after outputs so they are not called upon to drive the next stage. (Because monitor equalization may involve extreme attenuation at many frequency bands for feedback control, the tendency, if inserted after the board's output, is to overdrive the equalizer's input to get enough output from it to drive crossovers or power amplifiers.) All of the monitors except the side fills, which are two separate mixes and have independent 3- and 4-way crossovers, are passively crossed two-way cabinets. Crown DC-300As power the entire monitor system.

With this equipment and his techniques, Tim supplies the performers with the musical information they need to do the show. Some of the mixes are changing throughout the show, and all of them require constant scrutiny. It's a job I don't envy, and one that if not up to snuff can seriously compromise the program.

"Live Mixing"

What I'm looking for in the way of a mix has a couple of basics. First, I try and set up an instrument balance that acts as a foundation, a constant musical framework, for particulars to stand out from. (Those particulars might be vocals or highlighted instrument passages, or whatever.) The trick is to establish a foundation whose own parts are discernable and is at such a level that you've the headroom to get out in front whatever it is you want out there. This approach is complicated by the band size. The more people, the more the framework infringes on headroom and the greater the need for a delicately balanced mix.

I also make it as easy as possible on myself by gathering and utilizing as much information as possible. Your ears are your best friends at the console, but don't limit mixing decisions on info just from them. At every console there are generally dozens of meters and indicators bursting with information that can benefit the mix. Keep your eye on them with special attention to thoughtfully assigned submasters and the PFL. Combining and monitoring inputs intelligently and

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Mixing Meat Loaf can be compared only to dropping acid and taking medical school entrance exams—difficult. For many reasons, it's one of the hardest mixes I've run across.

First of all, there are lots of people. Nine band members, six vocalists and six instrumentalists (obviously, some both play and sing). Everyone is important or they wouldn't be there, so they need to be heard. But, it's nothing short of a struggle to do that for nine people and their instruments, particularly with so many open microphones. All those mics give me problems with both bleed and feedback. The vocal mics are the bleeders. There are many of them and all seem to be strategically placed in front of a guitar amp, the drum kit, a piano amp . . . something louder in the mic than their voice. I even have serious problems with the bleed from the monitors into the vocal mics, making them sound in the house the way they sound in the monitors. The kindest comment I can conjure up regarding this unfortunate circumstance is that it's an undesirable and inappropriate sort of tone for general consumption.

Feedback problems come mostly from the drum kit because there are so many mics with relatively low input levels and, occasionally, a vocal mic. 90% of these feedback problems are low frequencies and if I need the overall gain, I use the 1/3 octave to lower system gain at problem frequencies. I don't like to do this unless there is a legitimate peak in the system response for it usually means some sort of tonal sacrifice for some other instrument or voice. To help avoid this alternative, I put the eleven kit mics, sans kick, snare and hi-hat, onto a separate submaster and mix it dynamically. That is, up when necessary and I can get away with it, and down when they're causing problems.

Perhaps the most difficult aspect of the mix is the highly dynamic nature of Meat Loaf, the band and the show. The overall texture of presentation changes dramatically within a song, and from one to the next. It's constantly demanding to keep up with this sort of activity both within the band and between the stage and the audience. So, in twenty-five words or less, I'd describe the mix as challenging because it's a large band with loads of microphones playing complex and dynamic music—*loud.*

(continued from page 51)

in such niceties as a couch in front of the console where clients' guests can sit to listen and watch the closed circuit video without getting in the way of the engineers or producer. This guest space has the added advantage of separating the console and the monitor speakers for a more natural monitoring environment. The walls of the truck control room are surfaced with a combination of solid walnut tongue-and-groove paneling and felt-covered sound absorbing surfaces. The equipment complement includes a custom-design Automated Processes (API), 44-input recording console with a free-standing patchbay some four feet high and nearly as wide, a pair of 24-track recorders and original-type (JBL drivers) Westlake monitor speakers with Crown amplification. For the Meat Loaf project the truck was using the MCI JH-114s from the original truck since the brand new Ampex MM-1200s had not yet arrived from the factory.

At Nassau Coliseum, the truck parked in the underground service area outside the coliseum proper where various service vehicles and the giant trash dumpsters are stored. From there, cables were run down a long ramp/corridor which opens onto the back of the arena and from there onto the back of the stage—a total run of some 350 feet. This posed no particular problem since the truck when fully equipped carries over 1000 feet of main snake cable on electric reelers, plus several shorter jumper snakes. All the snake cables connect via lever-locking, zero-insertion force, multi-pin connectors made by AMP, which show signs of becoming an informal "industry standard" among recording trucks and P.A. companies. Previously, most snakes were connected via mil spec Amphenol MS-series connectors which may be good enough for the military but which don't hold up well enough under rock and roll use, hence the move to the "rock-and-roll spec" AMP connectors. At the truck end, the main snake connects to a switch panel in the patch bay which has individual selector toggle switches to allow use of a second 48-pair snake in parallel with the first, and individual phantom power on/off switches for forty-eight mic lines. In addition to the main snake is an auxiliary snake carrying

Engineer Jimmy Iovine (l) and Record Plant's Chief Engineer Shelly Yakus inside remote.

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various high-level feeds, intercom lines and such, and has piggy-backed coax cables for one or two on-stage closed circuit video cameras.

At the stage end the main snake terminates in an elaborate, custom-built mic splitter box which provides one direct-connected output and two transformer-isolated splits from each microphone input. The transformers in the splitter box are the latest model Dean Jensen units which feature superb frequency response, transient response, phase linearity and freedom from ringing, and which are generally regarded as the finest audio transformers available. In theory, an active splitter box using differential-input amplifiers can provide greater isolation between splits, but as Hewitt puts it, "I just haven't seen an active splitter system which can out-perform a good transformer under all possible situations of actual use. Besides, you just can't beat a transformer for reliability." As it turns out, Tasco Sound, who was furnishing the primary P.A. for Meat Loaf, uses an elaborate active splitter system for their own monitor mixer/house mixer splits, and originally Record Plant was to take a split from their system. After running a couple of quick tests it was established that the truck was getting a better signal from its own splitter box so the Tasco crew agreed to take their splits from the Record Plant box and let the truck have the direct feed.

Limited Mic Problems

In many remote recording situations the choice of microphones becomes a problem. The P.A. company generally has its own choice of mics and miking positions that it has been using for weeks or even months, and often will be very resistant to changing its set-up to suit the recording engineer. For the most part, this problem never arose with Meat Loaf. According to Hewitt, it worked out that Don Ketteler—Meat Loaf's sound engineer—was already using mics that were his first or second choices. The one mic that was actually changed was a vocal mic that just didn't sound right in the truck. The miking of the drum kit, which Iovine is particularly picky about, also required some changes, but these were accomplished by adding extra mics for truck use only. For example, the P.A. had two mics on the snare drum, one top and one bottom, which is Iovine's normal practice, but the positioning used wasn't giving Iovine the sound he was looking for. Iovine's positioning, on the other hand, just didn't cut it in the P.A. so the obvious solution was two additional mics. Likewise the P.A. had four overhead mics over the corners of the drum kit while Iovine prefers only two, one over each side of the kit. By the time they were done there were perhaps eighteen mics on the drum kit. Hewitt jokes, "It must have been tough for the poor drummer to figure out which mics to hit with his drumsticks," referring to the beating that drum mics will sometimes receive at the hands of an over-energetic drummer.

The only other difference between truck and P.A. practice was in relation to the direct signals from the clavinet and string synthesizer. Both these instruments were running to one amplifier on stage, and a direct feed was being taken from a speaker-level direct box connected to the amplifier's output. That hookup resulted in too much noise and distortion to suit Hewitt and Iovine, so two direct boxes were inserted between the instruments and the amp resulting in cleaner signals and individual control of the two instruments.

In addition to the stage mics, it is always necessary on a "live" recording to mic the audience. This is even more important for a "live" broadcast because without a good audience sound the broadcast will sound flat and lack excitement, and there is obviously no opportunity to "fix it in the mix" with an applause loop since it's all happening right then. At Nassau Coliseum, Hewitt used his basic large arena mic scheme which uses a total of five mics. Two Newmann U87s were hung over the front of the audience pointing downward as the main audience mics. A pair of AKG 452s hanging about halfway back added depth and space, and a Sennheiser shotgun hanging over the stage but pointing out into the house served to fill in the center of the stereo image from the other four mics. In the future, Hewitt expects to make heavy use of the brand new Shure SM 81 condenser mic for audience miking. Besides being smaller and easier to hang, the Shure is very rugged and much less expensive to replace or repair in the event of theft or droppage, both of which are very real threats with audience mics.

Loops, Buzzes & Noises

A perennial source of problems on a "live" recording date is ground loops and other grounding problems which lead to hum both in the P.A. and in the truck. To minimize grounding problems, the truck's power distribution and grounding schemes were very carefully thought out. General AC power for lights, heat, air conditioning and such has a totally separate distribution from "tech power" which goes to any device connected with audio. The tech power network is transformer isolated from the incoming line and the secondary of the transformer is left floating so that the truck has no audio ground of its own. The allows the truck to tie itself to the P.A. system ground which it "sees" through the shields of the mic snake. Since both truck and P.A. are theoretically sitting at the same ground potential at that point, there can theoretically be no ground loops between them. Theory and practice seldom agree, however, so the mic splitter box is equipped with ground lift switches on both isolated splits of each mic line in case problems arise. These ninety-six locking toggle switches either tie or lift the connection of pin 1 of the XLR for the isolated output to the pin 1 ground connection on the direct output which goes back to the truck and its console ground. A classic source of ground loops is the direct box since it is connected to an amplifier's ground which is likely to be diferent from P.A. (and hence truck) ground; for this reason all direct boxes are equipped with a ground lift switch of their own. For the really stubborn loops, the only cure is persistance and a volt/ohm meter. According to Hewitt, second engineer David "dB" Brown has become a whiz at tracking down ground problems with his trusty digital voltmeter, and truck stage manager Phil Gitomer's background of several years in the P.A. business has proved invaluable on many occasions.

In many cases the toughest problems to solve are the various buzzes and noises that get picked up in the mics and cables which are not related to ground loop problems, partly because the solutions can be obscure and partly because the whole subject can become politically sensitive. The most common sources of buzzes are radio or TV transmissions or the radio-frequency "hash" generated by defective or inadequately suppressed solid-state lighting dimmers. The solution may be as simple as changing mic cables or re-routing them, or it

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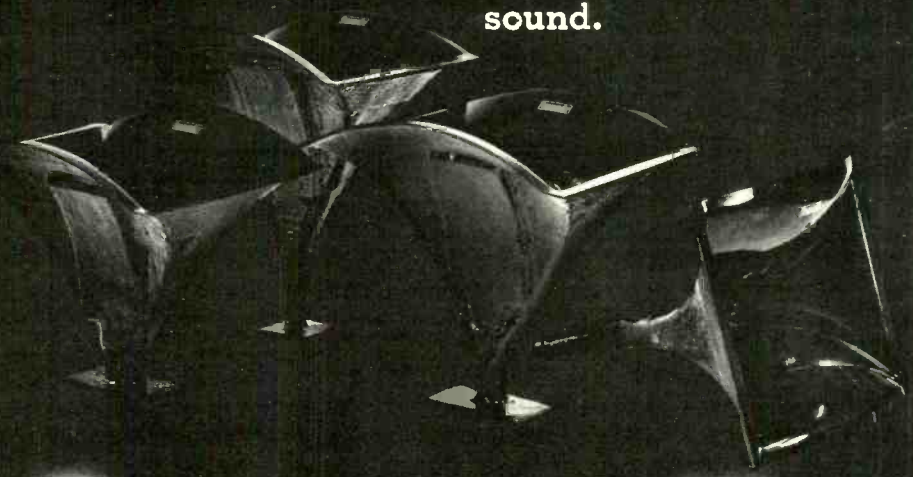

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may be frustratingly difficult to eliminate the interference. Record Plant uses two special types of Belden microphone cable which are 100% shielded (as opposed to about 75% to 85% shielding in normal mic cable) and this has dramatically reduced the number and severity of radio and TV interference problems according to Hewitt, but since any cable is subject to physical damage which reduces the effectiveness of the shielding, replacing the cable is sometimes the solution. Additionally, the cables used on mics that are shared between P.A. and truck usually belong to the P.A. company and may not be of the 100% shielded type. Re-routing the cables can sometimes yield an improvement, but is just as likely to make matters worse since the cable is acting as an antenna. If dimmer buzz seems to be the culprit, things can get very touchy politically—lighting companies tend to be very sensitive on the subject of dimmer buzz since they are often made the scapegoat even if they are not at fault, but even the best dimmers can go south for the winter and cause no end of grief. Even a "normal" amount of buzzes and noise can strain relations between a recording truck and a P.A. company. Hewitt explains the situation this way: "Say you've got a P.A. company that's been doing a perfectly adequate job for the band for some time, but now all of a sudden here's this recording truck with a crew who keeps coming to you with complaints about various noises you've never heard. You're going to tend to blame the truck itself for the problems when in reality it's just a matter of the truck being able to solo individual mics on big speakers in a quiet environment rather than listening to them over a P.A. or a pair of headphones in a noisy auditorium. In other words, the noises may have been there but since it was impossible to hear them, they weren't a problem. But beyond all that, you're concerned that these truck engineers are making you look bad in front of your client, the band. It can get very touchy."

All things considered, the set up for Meat Loaf was generally free of major problems. In a remote recording situation, problems are often just a matter of poor communication or a lack of cooperation between the various parties involved. Hewitt has nothing but praise for everyone involved at Nassau Coliseum that day. "The lighting company and both sound companies (Maryland Sound provided additional speakers and amps) were very professional, the union crews were great, and the promoter's stage manager, Michael Ahearn, did a fine job of keeping everything running smoothly. With the kind of cooperation we got it's hard to have real problems."

Make Sure to Phone Ahead

The one problem that did arise was entirely beyond the control of anyone involved with the show itself. Any remote broadcast relies on some sort of land link to get the signal back to the broadcaster's studio. This usually takes the form of special, equalized phone lines which are rented from the telephone company by the hour or by the day. Unfortunately, the phone company is not really geared to providing this kind of service, and they usually require about a week's notice to provide their highest quality, or Class A, lines which are equalized to have frequency response to 16 kHz. On three days notice the best telco could do was a pair of 8 kHz lines, and as it was they didn't make connection until half an hour before show time. Then ten minutes later one of the two lines was lost somewhere in Brooklyn. This break was remedied finally just as Hewitt's crew was completing their final microphone tap-out less than five minutes before show time. "For a while it looked like it was going to be 'back to mono' time. The phone guys even made me get off the phone in the truck. It was wild," says dedicated telephone addict Iovine referring to the regular dial phone installed in the truck for communications in the event of line trouble. (Later, Iovine would quip that "the best thing about doing a broadcast is that there's a phone in the truck.") Hewitt's only comment is that, "We'll probably have less trouble getting audio to Europe by satellite when we do the Jethro Tull Broadcast to the World from Madison Square Garden in a few weeks (October '78) than we had getting sound from Long Island to Manhattan for Meat Loaf."

When showtime rolled around it was business as usual in the Record Plant truck. The only difference between a broadcast date like this Meat Loaf one and a regular record date is that a mult of the control room monitor mix is patched out into the phone lines through a distribution amp. The patch is done before any of the solo or muting functions so that the engineer is still able to solo inputs in place in his monitors without disturbing the broadcast mix. Hewitt explains, "I just let Jimmy take care of the basic sounds and the monitor mix while I kept an eye on the bus levels so that we hit the machine with appropriate levels. The bus assignments were completely conventional—six tracks for drums, two tracks for audience and individual tracks for all the other instruments and vocals. Jimmy probably got a little more involved with EQ'ing the mics than he would have if we were just recording 'live' tracks, but we didn't get fancy with outboard equipment or anything. I think we had a Teletronix LA2A limiter and a tube-type Pultec on the lead vocal, a noise gate and a Pultec on the snare and an 1176 limiter on the piano, but that's about all. The only thing we used that isn't pretty much 'standard equipment' for the truck was an AKG BX-10 spring echo chamber we rented for the date. On something like this it's best to keep things as simple as possible, first because it will usually sound better as it is and second because there are plenty of things to go wrong in the middle of the show without getting dozens of limiters and DDLs involved."

Record Plant's Chief Engineer Shelly Yakus accompanied Iovine to Nassau Coliseum for the date. Yakus has worked frequently as engineer on projects produced by Iovine, including albums by Patti Smith, Mark Farner and Golden Earring in recent months. Iovine respects Yakus' judgements — "He's wild, but he's got great ears." For the broadcast, Yakus was basically a second set of ears, and spent most of the evening running back and forth between the truck and a limousine parked outside the hall which had an FM radio in it so that he could hear what it sounded like over the air. Hewitt had considered bringing a radio for the truck, but reception would have been extremely difficult inside a metal truck inside a concrete and steel building. In fact, the truck's walls have lead sheeting in them both for RF shielding and to improve sound isolation between the truck and the outside world.

The show came off without any major hitches and was an artistic success for the band, and a commercial success for the radio station, but it was all in a day's work for David Hewitt and Record Plant Remote.

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STAGE MONITORS

By Lothar A. Krause, Jr.

As stressed in part one [Nov. '78] of this series of articles, the on-stage monitor system is probably the single most important sub-system involved in high-level sound reinforcement systems. The first section of this article shall be devoted to the on-stage or floor monitor systems. These systems may be referred to as "dedicated" systems because there will in most instances be specific requirements as to the mix directed to each of the speaker systems. Side fill monitor systems on the other hand often have an overall mix and as the name implies they provide a more general coverage or fill of sound from the sides of the stage.

Let's for the moment consider some of the requirements placed on a typical on-stage floor monitor system. If the lead guitarist/vocalist is playing in front of a typical guitar amplifier-and-speaker combination he has placed himself in front of a virtual wall of sound. A 150- to 200-watt amplifier driving four to eight 12-inch speakers is capable of generating very high sound pressure levels. What further complicates this already bad situation is that in most instances the amplifier is being driven into partial or complete distortion. This may not seem like a complicating factor because the typical line of thought is that a watt of power is a watt of power regardless of how much distortion is present. This is true if you are measuring the average voltage across a resistor using an A.C. voltmeter. What fouls up this perfectly valid law of physics is that you are not playing your music to a resistor. A watt of power containing 75% distortion will sound much louder than a watt of clean power. Your total system containing the guitar, amplifier and the associated speakers will seem to be much louder than a meter would indicate due to the non-linear response of the human hearing system.

The hearing system is actually working in the most sensitive part of its frequency response range when you are listening to an amplified guitar system. The fact that distortion is present is what makes a single note seem louder than the meter would indicate. Distortion may be of even or odd order type depending on the spectral content of the resultant wave form. What all of this means is that if you looked at a single note that has been distorted (regardless of how) on a spectrum analyzer you would see that there are a considerable number of new frequencies being generated. Nearly all of these new frequencies are within the human hearing range and the more frequencies you have the louder the note will appear. Please give this concept a little thought as it directly relates to the power handling requirements of the monitor systems discussed in this paper. The more signals you have—i.e., vocals, instruments, percussion, etc., the greater the total power requirement from the power amplifier and the dissipation factor from the speaker components.

It should now be obvious that the floor monitor must be capable of reproducing very high sound pressure levels. It is interesting to note that the only positive aspect of the human hearing system with regard to on-stage monitor systems is that the ear is somewhat directive. You can hear things in front or to the sides much more readily than sounds from the rear. It works out that in most practical applications your monitor slants are in front and the instrument amplifiers are to the rear. If you did not have this front-to-back rejection the whole concept of floor monitors would cease to be valid.

The problems that are incurred with on-stage monitor systems fall principally into two categories: speaker systems, and the problems unique to these components, and power amplifiers. I have heard that there is only one way to correctly design a proper monitor system, and this is to take the power figure you think you need and then multiply that number by a factor of 10. This may seem like a gross exaggeration but consider the typical on-stage monitor system as used by local groups. Chances are that they have one or two inefficient 12-inch speakers mounted in some kind of box and powered by a 100- to 150-watt amplifier. They always seem to wonder why they cannot hear their vocal parts when the lead guitarist turns up his 200-watt amplifier. Now that we have touched on some of the generalities let's get into what can be done to compensate for some specific problems.

Speaker Systems

As mentioned in previous writings (mine and others) a speaker system is a carefully designed precision instrument. You cannot simply put two 12-inch speakers in a box and have a good monitor system. A correctly designed floor monitor system does not come easily or cheaply. There are too many stringent requirements placed on speaker systems designed for this high SPL musical application. One of the most important requirements is having the proper dispersion characteristic in the system. If you give the problem a little thought, the only way you are going to be able to obtain the required sound pressure levels required by most rock and roll bands is to focus or aim the sound pressure waves or field. The basic idea is to point the sound energy at a specific area and try to keep all of the energy within that defined area or pattern. The tighter the dispersion characteristic of the speaker system

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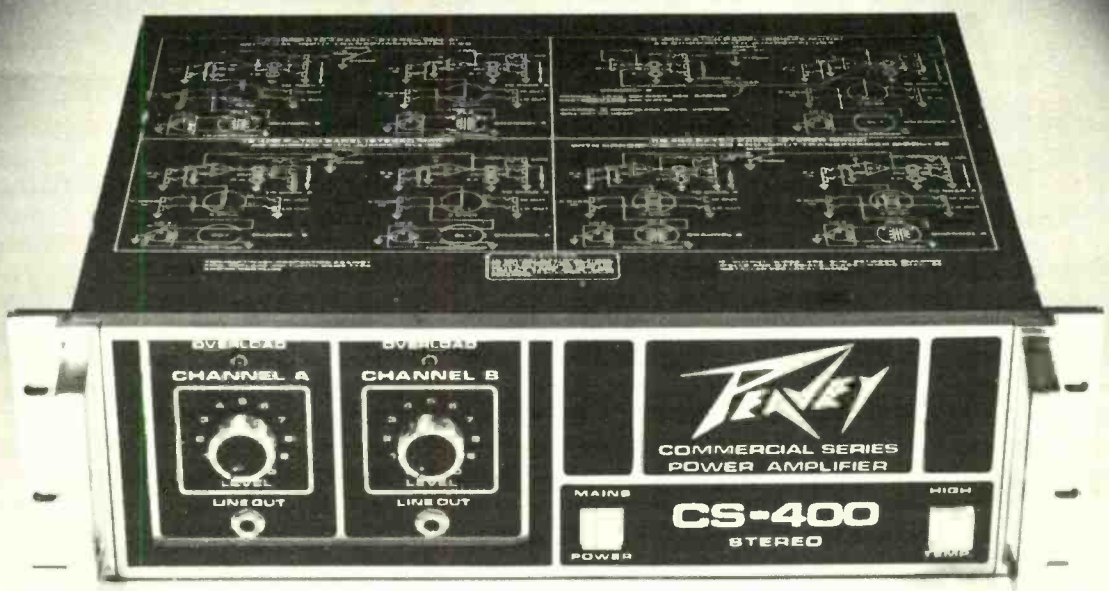

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the higher the sound pressure level will be at any given point within the area covered. This is why a typical professional monitor system will exhibit dispersion characteristics of 30, 60 or 90 degrees in the vertical and/or horizontal planes. A good example of a quality monitor system is one that has a 30-degree horizontal and a 60-degree vertical dispersion characteristic.

There is also another benefit from having a speaker system with tightly controlled dispersion characteristics—feedback is much more easily controlled. It allows the speaker to be aimed away from the microphone, or in the case of a microphone with a cardioid pattern, the system is aimed at the pattern null at the rear of the microphone. This is probably the single most important advantage of using a controlled pattern speaker system and cardioid microphone combination.

Speaker system efficiency is also very important. Inefficient speakers belong in hi-fi systems — not stage monitors. In order for a monitor system to function properly you must strive for as much acoustical output as possible with a given electrical power input. Always keep in mind that power is heat and whatever is not being radiated as sound is being dissipated as heat in your speaker system voice coils and crossover networks. Achieving high efficiency in relatively small enclosures is a very difficult design problem. You cannot design away the basic laws of physics and that is the reason you often see specifications that state the monitor system has a low-end roll of approximately 100 Hz. Because you are in most instances trying to hear vocal parts this low-end cutoff is not a problem, and in some respects it is beneficial. There is no way you can put a bass guitar thru a typical floor monitor speaker system. The cabinet volume will simply not allow the efficient reproduction of these low fundamental notes. A typical bass guitar player is using two 15-inch speakers in a very large enclosure or an 18-inch speaker in a folded horn enclosure. The amplifier is often rated from 300 to 400 watts and the resulting sound pressure level is quite high. I am only mentioning this as I have seen people try to take a direct send from the bass amplifier and put it thru the floor monitor system. They supplemented the local speaker reconing shop's income for a while until someone told them the error of their ways.

The use of quality compression drivers and correctly matched horn or lens assemblies is probably the only way you are going to be able to achieve the required sound pressure levels from on-stage monitor systems. You are limited on the low end by the enclosure design, but in the critical midrange you can have a very efficient system. You will find that in most monitor systems the horn drivers selected will not always have the most extended frequency response that is available. There is a good reason for this and it is that extended-range drivers often tend to be fragile. When you are dumping three or four hundred watts of power into a speaker system, fragile components do not live very long.

As a general rule you are better off using as high a crossover frequency as possible. Your low frequency (below the crossover point) cone speaker will usually take much more abuse than the horn driver. There is one point that must be brought to light, and that is that in some applications the determination of the crossover point will be decided due to feedback problems. For the most part, your monitor system pattern is controlled by the dispersion characteristics of your horn/driver combination. I have seen instances where changing from a 800 Hz to a 1500 Hz crossover frequency greatly reduced a bad feedback problem. The reason for this is simple: the horn was much more directive at 1500 Hz than 800 Hz. This will not work in all instances but when everything else fails it would not do any harm as an experiment. *Warning:* Always go *up* in crossover frequency; going below the recommended crossover point for a given driver can have very expensive consequences.

Do not try to get by with using inexpensive speaker components in any type of on-stage monitor system designed for high level sound reinforcement use. They will not take the power, have the required frequency response or in general be reliable enough for professional applications.

Frequency Response

Studio monitors, floor monitors and side-fill monitor systems all have one requirement in common — they must have a smooth frequency response over their operating ranges. The monitor systems designed for high-level sound reinforcement applications are perhaps the most critical of the two groups for the simple reason that you do not usually have feedback problems in a studio control room. If a speaker system exhibits a peak in the frequency response curve the frequency of the peak will be the first frequency at which the system will go into feedback. When referring to a floor monitor system the low end (below 100 Hz) is often all but nonexistent. You can, however, have a very flat response from above 100 Hz to about 12.5 kHz in a correctly designed system. If you are using high-quality components for reasons of power and handling and resulting reliability you will stand a good chance of also having a system with an acceptable frequency response. I have always stressed the importance of a correctly designed speaker system and I will again remind the reader that it is almost impossible for an individual to design a correct speaker system and the required crossover network. Monitor systems are especially critical as they must have flat frequency and linear phase characteristics. You can put together a total system that sounds good, but the chances of your good sounding speaker having monitor system specifications are very small.

As anyone who has purchased a professional studio monitor knows, you purchase a lot of design engineering time. I am not making reference to the multitude of high-fidelity speaker systems that claim all kinds of "professional" performance. They might have a flat response from DC to light, but try to drive one of these fancy boxes to monitor levels with an 800-watt power amplifier. You will very quickly find that they don't last very long. When you get right down to the real world you will find perhaps four or possibly five truly professional studio monitor systems. The same basic principles apply to on-stage monitor systems. High quality on-stage monitor systems do not come cheaply if they can be found at any price.

From a sales standpoint it is hard to justify to a board of directors of a large company why such a small (and often ugly) box should cost so much to build and show such a small net profit. This line of thought is what forced the large sound reinforcement companies into designing and building their own systems. By the time you have purchased a premium bass speaker, a com-

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pression horn driver and the required horn or lens assembly and a high-level crossover network you have spent four or five hundred dollars. Fortunately, some progressive companies have started offering well-designed floor monitor systems; they are expensive, and some of them are more specifications than performance. Carefully examine the data sheets for power handling capabilities (continuous), dispersion characteristics, frequency response and most important, the efficiency rating. You can design a speaker to take 1000 watts — in the form of heat. Unless you are trying to warm the room look for the specifications that tell you how much sound pressure you get out of a system with a given input power. This specification will be the one that separates the hi-fi speakers from the high-level sound reinforcement monitor systems.

Monitor System Power Amplifier Requirements

This is my least favorite topic as it seems that almost daily I receive correspondence from someone who is having problems with excessive distortion, speaker failure or other power amplifier related problems with regard to their monitor system. The basic problem is that they do not have sufficient power available for an on-stage monitor application. The two most obvious effects of not having enough power are speaker failure and excessive distortion. With regard to the speaker reliability aspect, there are a couple of points I would like to stress that apply to all amplifier/speaker combinations — not exclusively to monitor systems.

On the day of this writing I talked to two people who asked the same question, "Why did I blow up a speaker rated at 150 watts with an amplifier rated at 75 watts?" This gets us back to the voltage-across-a-resistor and power-being-a-measure-of-heat arguments. If an amplifier is rated at 100 watts it will deliver 20.0 volts RMS across a 4.0-ohm load. The amplifier will deliver this power over its rated power bandwidth, as an example, 10 Hz to 100 kHz. All this means is that at any frequency in the 10 Hz to 100 kHz range it will deliver 20.0 volts RMS across a 4.0-ohm load. A power dissipation of 100 watts is a lot of heat. If you do not believe me, stick your finger on a 100-watt light bulb. If you have a magic speaker that has a constant impedance of 4.0 ohms and you place 20.0 volts RMS across the voice coil terminals, the voice coils will dissipate 100.0 watts of heat.

Something else to consider is speaker efficiency. To sum up a long technical discussion, you can safely say that a cone speaker is a very inefficient device. Even when a cone speaker is mounted in a correctly designed horn-type enclosure efficiencies of 10.0 percent would be considered excellent. What all of this means is that for the 100 watts of electrical power you put into your speaker system only 10.0 watts are being generated as sound. The remaining 90.0 watts are heating up the voice coil and the air moving around the voice coil. Heat is probably the most damaging element to speaker components. The temperatures in a typical cone loudspeaker are well past the boiling point of water and are often high enough to melt solder. You can easily understand after a little thought why speakers come unwound after

extended high power operation.

The second problem—excessive distortion—is that of excessive cone movement, or excursion. If you apply 100-watts at a frequency of 21.0 Hz to a speaker system, the cone and voice-coil assembly are going to move. When you consider the extremely tight tolerances to which quality speakers are constructed it is easy to visualize what happens to the suspension system of a speaker when it tries to move .50 to .375 inches. It is very difficult to construct a speaker suspension system that will safely allow cone excursions of this degree. No speaker made can be expected to have a long service life when subjected to this type of abuse. The more you move anything the more brittle the moving components become. In other words, something is going to break. To make matters even worse, as a general rule the greater the cone excursion the greater the distortion generated by the speaker itself.

The whole idea behind horn-loaded systems is to obtain high efficiencies. The greater the speaker system efficiency the less power (heat) you will have to apply to obtain a specified sound pressure level. This is the root of the problem with respect to on-stage floor monitor speakers as used for high-level sound reinforcement applications. In a typical floor monitor system you do not have anything that remotely resembles a high efficiency speaker system below the 800 to 1500 Hz crossover point. Due to the physical size (small) of the enclosure the bass system efficiency is very low. What I am trying to explain is that it takes a tremendous amount of power to obtain the sound pressure levels associated with high-level sound reinforcement. Fortunately the horn and driver assembly is a very efficient (relatively speaking) combination. We are also lucky that most of the energy in the vocal range will be reproduced by the horn and driver combination. Even with these two positive points going for us it still takes a tremendous amount of power to drive a typical floor monitor.

You are probably thinking that I have forgotten the problem of destroying a speaker rated for 150 watts of power with the amplifier that was rated at 75 watts output. I have not forgotten the basic problem, I have been leading up to the most important factor involved in speaker system reliability. This factor is distortion! If you are trying to obtain very high sound pressure levels you can accomplish your goal by these means: 1) efficient speaker systems; 2) power amplifiers with adequate power capabilities; and 3) excessive distortion (unfortunately the most common practice). This "use" of excessive distortion may seem ridiculous in this day and age of super specifications but it is an unfortunate fact that a distorted 100 watts seems much louder than an undistorted 200 watts. This distortion is the prime reason that monitor systems tend to "blow up" more often than other parts of sound reinforcement systems.

As a general rule most people tend to grossly under power their monitor speaker systems. For the ultimate in reliability it is imperative that your power amplifier not be allowed to clip or run out of total available power. If you are using a typical floor monitor containing a 12- or 15-inch bass speaker and a high-quality horn and

driver combination, I would recommend the use of an amplifier with a minimum of 400 watts RMS available power. Read the preceding sentence twice as the key word is *available*! You will probably not use the total 400-watt capacity of the power amplifier on a continuous basis, but you will use the whole load on the high-level transients. These high-level transients are what destroy speaker systems that are powered by 100 to 200-watt amplifiers. The distortion generated by an amplifier being driven into clipping is the worst possible enemy of speaker systems. The higher the available power the less chance of damage you will have with your monitor systems.

It is important that you use some common sense when using high-power amplifiers. Remember that the monitor system is quite inefficient below the crossover point. Roll off the low end equalization as much as possible as you cannot radiate a 20.0 Hz note from a floor monitor so why try to make the cone move an inch or more? Do not try to cover the whole stage with one floor monitor. The whole idea is to move air and the more cone surface you have the more air you will move with a given input. *If* you have access to a quality limiter and *If* you know how to correctly use it, put it in the floor monitor system. You can increase your average power by the use of a limiter or compressor. You can also foul things up if you do not know how to correctly adjust the unit.

If you have any doubt as to your power requirements have a qualified technician check the monitor power amplifier outputs with a 'scope. If excessive clipping is noted, get a larger power amplifier. You will be surprised at how much longer your monitor system components will last if you use efficient speaker systems, power amplifiers with adequate headroom and some common sense about the mix and equalization.

Monitor System Placement

The correct placement of an on-stage floor monitor system can be the determining factor on the performance of the monitor system as related to feedback problems. As previously stated, monitor systems must have controlled dispersion characteristics and a smooth frequency response over their operating bandwidth. If such a system is placed at the null of the microphone pattern and some common sense is used with regard to reflective surfaces, your chances of having feedback problems will be greatly reduced. You can make any monitor system go into a feedback mode if the system is incorrectly adjusted with regard to gain and equalization. You can avoid having high system gains and using special equalization by proper monitor placement. Try to place the monitor system as close to the artist requiring the system as possible and reduce the gain accordingly. Always place the monitor speaker system at the null of the microphone pickup pattern if at all possible. All microphones are not created equal and there are certain types that will allow you to have very high sound pressure levels before feedback. Do not take some "expert's" word on what is good or bad, try different types of microphones and you will soon form your own conclusions. A $500 dollar studio microphone that sounds great on vocals will probably make a very poor choice as far as monitor system feedback is concerned. If you insist on using your imported status symbol use it on the drum set or something else that is not put thru the monitor system.

Try to avoid having any type of hard reflective surface in front of a monitor speaker. Sound is reflected just as light is and each reflection results in a phase shift which then usually results in feedback. One point people often overlook is that monitor system feedback can be mechanical as well as acoustical. The mechanical energy (vibrations) is coupled from the monitor speaker, thru the stage, up the microphone stand and back into the microphone. This mode of feedback is relatively rare due to advances in microphone element suspension design, but if you encounter a low-frequency oscillation that seems to have a resonant sound, try lifting the microphone stand from the floor. If this cures the problem my advice is to switch in a high-pass filter or, better yet, change microphones. If you cannot do either of the above, place the offending monitor speaker on a couple of layers of cardboard. It may sound strange but it does work. Once everything has been properly located do not allow anything to be moved before the performance. Tape, glue, nail or weld each monitor speaker and microphone in place. If you have an artist that must run all over the stage while swinging the microphone by the cable and generally fouling things up, the only thing you can do is keep one hand on the gain control and hope your reflexes are faster than his.

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AN INTERVIEW WITH PRODUCER / ENGINEER Bill SZYMCZYK

By Stan Soocher

Halfway through the making of the latest Eagles album, the band decided to take a break from sessions at Bayshore Recording Studio in Coconut Grove, Florida and tour with their new material. So ace producer and studio owner Bill Szymczyk agreed to sit down with Modern Recording *and delve into his illustrious career. He has worked with everyone from B.B. King to Joe Walsh, Jay Ferguson, Elvin Bishop, J. Geils, the Outlaws and the Michael Stanley Band. In 1977 he won a Grammy as producer of the "Record of the Year," the Eagles'* Hotel California.

During our interview, Bill had engineer Ed Mashal trot out an unfinished tape of the new Eagles' product — working title, What Would Robert Mitchum Do? *Unmixed and without vocals, Bill proceeded to play the tape at full volume from "Malibu Strangler" to "Island of the Hidden Funk." "Notice there's less keyboards and acoustic guitars and more electric guitars. It rocks from top to bottom," he said. "I think we're gonna scare 'em with this one."*

MR: Let's start with your influences as a kid.

BS: As a kid? God, that's about thirty years ago!

The first record I ever bought was a 78 by Eddie Fisher called "Oh, My Poppa." The first album I bought was by the Del Vikings with "Whispering Bells" and "Come Go With Me" on it. I lived in Muskegon, Michigan and as a teenager I hung around this little five thousand watt radio station that had a jazz show at night. They played a lot of big band stuff like Kai Winding and Count Basie. I listened to rock & roll over the radio, but I lost touch with it when I went into the Navy for four years. Then I only got off on the big band records and Stan Freeberg comedy albums. And there's definitely some Stan Freeberg in my work with Joe Walsh. It wasn't until I got out of the service and into the studio that I got back into rock & roll.

I was never a musician, though. I came up through this business strictly through electronics. When I got out of the Navy, I got a job in the Dick Charles Recording Studio in New York in 1963. I learned about music through osmosis. I had to keep the floors clean and change the tubes once every three or four weeks as a general apprentice. It was strictly a demo studio with eight mics in, two out, and two mono tape machines. So when somebody came in to do a piano/vocal demo and no one else was there, I'd do it. I slowly got into engineering three and four pieces and blew a bunch of sessions. But once I did that a few times, I didn't make the same mistakes too many times after.

MR: Who was coming in to make the demos?

BS: They were mostly Donni Kirshner's Screen Gems writers. The first session I saw was Carole King playing piano. We had Howie Greenfield and Neil Sedaka, Barry Mann and Cynthia Weil, Gerry Goffin. Neil Diamond did his guitar/vocal demos of all the tunes we eventually heard on the radio. The studio was so small that the mics were stuck in the piano and they stayed there. I was at Dick Charles for six to eight months.

I didn't really get under way until 1965 when I went to Regent Sound, also in New York. I spent about five years there. We were doing thirty piece dates, all in one shot — singers, horns, strings. Mostly ad agency stuff that you had to do very fast, if not sooner. Shortly after I got to Regent, some of the R & B people I knew, like Van McCoy, started coming in after the ad sessions. I didn't have an assistant, so I had to break down one set-up and get ready for the next, setting up all the microphones, even the chairs, everything. But that brought me closer to the music.

MR: When and how did you actually get into producing?

BS: I got into producing through [recording] demos. Someone would have a tune; I'd go in with an engineer and a musician and do a track. Among the three of us, we'd sing background vocals and take turns singing lead. Just to get our feet wet and learn what we're doing. One song was "Never Let Your Right Hand Know What Your Left Hand is Doing." That was right around the [time of] "Eve of Destruction," and I sang lead with a great growl. I think that came out on Kapp. It cost us $8 to make it and we sold it for a thousand.

The first real production project I did was with a group called Ford Theater out of Boston for ABC. This was when ABC hired engineers directly as staff producers. The Ford Theater album was radical because I threw everything into it that I had learned as an engineer — one trick after another. I was basically throwing

up on tape. It might as well have been a demo for engineering techniques.

Three albums after that I had a hit with B.B. King. "Why I Sing the Blues" came from *Live and Well*. At first I was scared of working with B.B. because he was a legend and I was a rank amateur. But after talking with him for a few weeks before the sessions, I think I won over his confidence. He had never recorded with anyone other than his band, so it was strange putting him in with musicians he didn't already know; after the second or third day he loved it.

Live and Well was recorded half "live" at the Village Gate and the other half in the studio with some fairly hip musicians like Al Kooper and Paul Harris on keyboards and Hugh McCracken on second guitar. I hired Phil Ramone to engineer the "live" portion so I could run around backstage and hang out front. I engineered the studio portion.

MR: But your biggest hit with B.B. King was "The Thrill is Gone." What were those sessions like?

BS: It was on the next album I did, *Completely Well*. We were recording with eight tracks. All the rhythm instruments and the vocal were done "live." A Neumann U-67 was the standard mic for his vocals. We did five or six takes and the tape went on for about twenty minutes because the guys couldn't stop playing; it was so good. I flipped out and kept saying, "We've gotta put strings on this, we've gotta put strings on this," which I did a week later. But I did very little processing on B.B.'s lead guitar. It's his sound recorded straightahead, nice and clean and crisp.

MR: So you didn't get back into the "tricks" until after that?

BS: That's right. I started cranking up toys with the James Gang. I met Joe Walsh in Warren, Ohio in 1967 and, as far as I was concerned, he was a one man army with a bass player and a drummer. He did just about everything — sang all the parts, wrote the songs. And then sixteen tracks came along. Before I felt locked into mono with eight tracks, but now I could do a lot more of it in stereo.

Plus it was the psychedelic era. I was listening to Hendrix and Traffic. Stevie Winwood's vocals, for instance, are quite a bit like Walsh's — high and nasal. I thought Traffic's first album, the Beatles' *Sgt. Pepper's* and Hendrix's *Axis: Bold As Love* were the bible. Hendrix was the first I heard using monster phasing and VSO.

Joe Walsh also had his own ideas. We were in the first wave of electronics taking over pop music. Up until then, the engineer/producers had been pretty straight guys like Tom Dowd and Bones Howe.

MR: Which James Gang songs were breakthroughs for you?

BS: "Take A Look Around" was the first James Gang song I was really satisfied with because it began a series of conceptual tunes where we'd go through two or three different movements within the same song. We were also doing 16 to 16 crossphase. "Tend My Garden" on *Rides Again* and "Mother Says" from Walsh's *Barnstorm* are in the same vein. On *But Seriously, Folks* it's "Life's Been Good," which has an ironic twist to it because it's mostly true, and the truth is funnier than fiction.

MR: What were the special technical ingredients on "Life's Been Good?"

BS: The basic track was Joe's Les Paul, very dry. Then we doubled that. The slide intros were tripled through DDLs—there's three patterns—so it would get progressively huger. That was parts one and three. The synthesizer part in the middle was done four months later with the synthesizer and a Leslie piano as the basic. I put Walsh's vocals through an Eventide digital with extremely long delays. I mixed one vocal in the center, another with a half second delay over on the left, and one with a whole second delay over on the right. Then short delays on the choruses.

MR: Effects aside, you must have been involved in some strange recording situations.

BS: The strangest recording situation I've been in was in Cook County jail with B.B. King. I've never been so paranoid. I asked the guys who were hauling in the equipment what they were in for and one says, "I murdered a cop," and the other one says, "I wiped out my old lady." Geeeezzee!! I was there for two days with guards walking around with me everywhere and inmates clanging on the bars.

MR: Of all the albums you've produced, you must have some favorites.

BS: Actually, I've produced 54 albums since Ford Theater. I really liked an electric jazz guitar piece I did with Howard Roberts on Impulse called *Antelope Freeway*. Then the Dennis Doherty solo album, which turned out sloppy but fun. I did the Doherty album in L.A. with a bunch of the Mamas and Papas-type crowd after they broke up. Steve Barri was producing Mama Cass. Denny was happy-go-lucky, let's get drunk, and play tunes. Sort of a Jimmy Buffet of his time. Barry McGuire and Byron Berliner were on it. Most of it was done "live" with two or three acoustics and Denny and his friends sitting around in a circle playing.

MR: How did you eventually end up in Coconut Grove, Florida?

BS: Well, from 1971 to 1974 I lived in Colorado. I had a record company called Tumbleweed Records which went right down the tubes. Caribou [recording studio] had just opened, so I did the first two albums ever done there—Walsh's *Barnstorm* solo (his first), and Ric Derringer's *All-American Boy*. Then that got crowded and I found myself on planes every Monday going to New York or L.A. or San Francisco. Finally, I moved to Florida to work at Criteria and ended up opening my own place. I like owning a studio because you bring your own attitude in and you leave it here.

MR: You began working with the Eagles during the *On The Border* album after Glyn Johns had recorded a good portion of it in England. Did you feel comfortable about that?

BS: It *was* difficult because Glyn was a personal friend and one of my early idols. Plus, the Eagles threw out everything except "Best Of My Love" and "You Never Cry Like A Lover," so I had to recut most of those tunes. Fortunately the band was well-rehearsed since they'd been playing the songs on the road. The sessions turned out to be fast, fun, and they let me do a lot of what I wanted to do, like changing "On The Border" from a country tune to an R & B tune.

MR: How did your approach to recording differ from Glyn's?

BS: I put a lot less echo on the basic tracks. Glyn put the drums recorded with echo on two tracks, for example. I put the drums on four, recorded without echo. I used limiters more on vocals and lead guitars. Remember Glenn Frey was the lead guitarist until they got Don Felder. I took more time recording those lead guitar parts than anything else. We took eight, ten hours on a solo or a couple of days if we had to. With Don Felder, of course, we got more notes. His immediate nickname was "Fingers." He could play

more notes than the rest of the band put together.

Also, on the background vocals Glyn put up two vocal microphones and recorded them all in one shot in stereo on two tracks; a nice, clean, natural approach. I took the band and put them around one microphone and then doubled and stacked up the tracks so a vocal chorus really hit you. Quite often we've had just a melody vocal and a harmony vocal maybe a third above, very simple. When we hit a chorus on a song like "Lyin' Eyes" from *One Of These Nights*, we have ten or twelve voices.

MR: What Eagles songs have knocked you out?

BS: Believe it or not, one of my favorites is Bernie Leadon's instrumental, "Journey Of The Sorcerer," from *One Of These Nights*. People said it was filler, but I liked the idea of a banjo tune done with strings. That entire album took us from the "B" list and put us on the "A" list.

MR: From a recording standpoint what are the most important tracks for you?

BS: Drums and vocals. I go for a lot of bottom on the drums and in my mix they are the first thing that goes on my board. We spend time on the vocals because a singer like Don Henley has got to sing for a while before his voice gets that raspy quality. But once he hits his stride, we'll get five takes in a row that are killers. Overall, I try to mix each song as two records—an instrumental and then a vocal record. I spend the last two hours making those two work together.

MR: When you recorded the Outlaws on *Hurry Sundown*, it's obvious that you brought this type of control to their music.

BS: The Outlaws weren't concentrating on their songs as much since they were a guitar band. On *Hurry Sundown* I sat down and showed them the basics of the Felder/Walsh guitar parts, sort of a crash course. I believe I cooled them out, broke down the basic tracks for them and showed them how to work the vocals into the guitars. Before I did that, they would just plug in and be turned to ten from the count-off to the fade.

MR: You also changed Elvin Bishop's sound quite a bit.

BS: My associate Allan Blazek has been working closer with him lately. But back in the four-track Regent days I engineered some tracks on Paul Butterfield's *East, West*. I recorded the first vocal Elvin ever sang, a ballad. There are two reasons why I think we hit big with him later. One is Mickey Thomas's incredible vocals. The other is that we gave Elvin a different outlook. Instead of recording him playing the blues again, we made him a little more pop, reggae and R & B. The way I see it, "Fooled Around And Fell In Love" could have been the Chi-Lites.

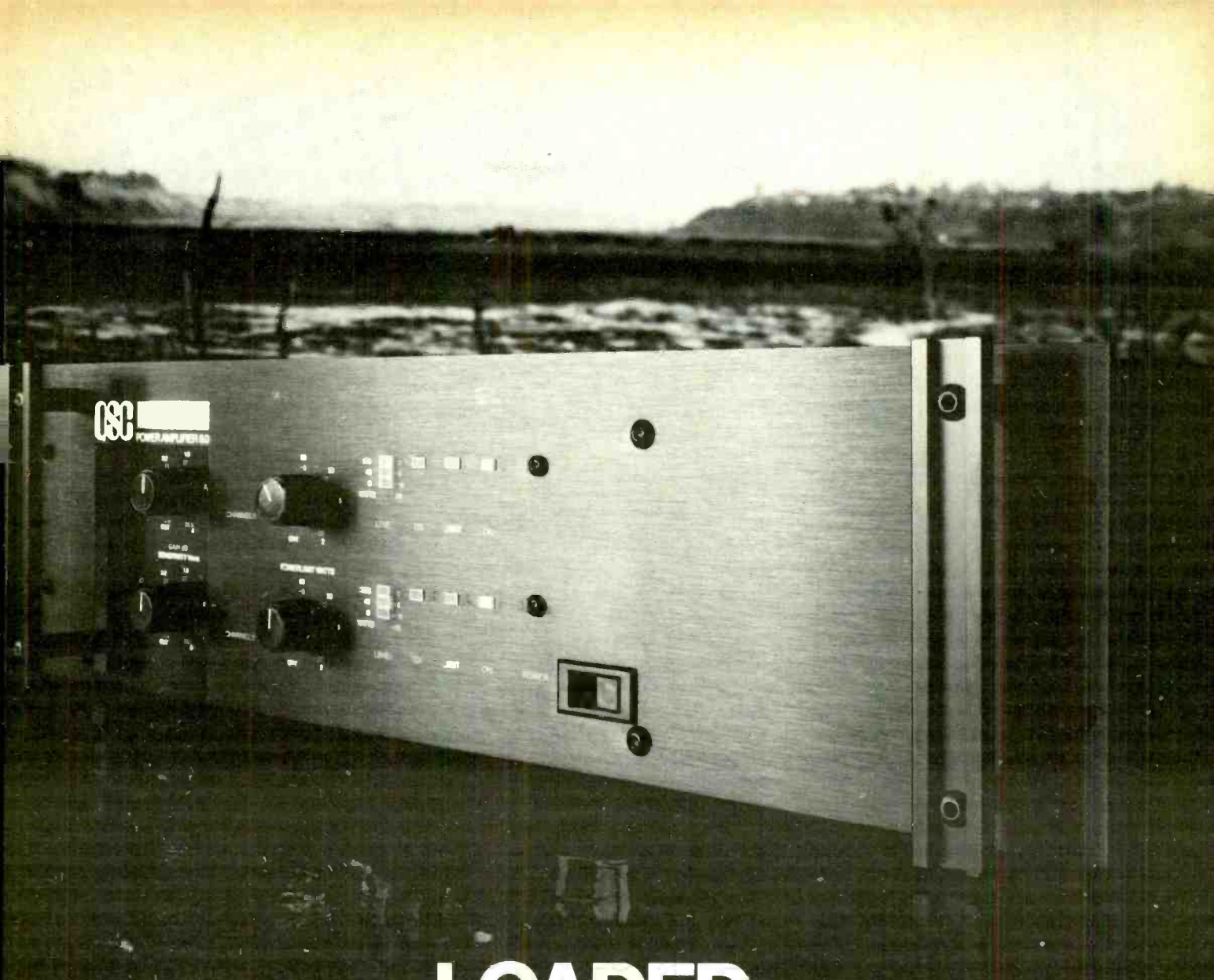
MR: What kind of music are you listening to today?

BS: I listen to disco music for my own personal enjoyment. I love that disco foot on the drums. I don't listen to much rock, per se. Instead, I go out and buy the Raydio album, Con Funk Shun, the Bee Gees and Van McCoy. R & B music in general is a heavy influence on me in terms of production. I'll hear a neat drum pattern on an R & B record and I'll try to teach it to Don Henley in the context of an Eagles record.

MR: When you talk about production, you're looking at it from the standpoint of having progressed from mono to twenty-four track here at Bayshore and beyond. Are you finding it difficult to cope with the rapid technological advances now happening in the recording industry?

BS: The challenge is to walk the fine line between the immediacy of the music and the complexity of the hardware, and not let the hardware suck up the creativity. But I'm not suggesting a return to simplicity because I've done so much with the technology myself. I'm talking about not letting the acts be intimidated by a control room that looks like Mission Control in Houston. We're making records here, not sending someone to the moon. But, on the other hand, I have to get the best and latest equipment because, finally, my records have to sound as good as a band like Fleetwood Mac.

Photo by Jann Zlotkin



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CIRCLE 80 ON READER SERVICE CARD

Ambient Sound

BY LEN FELDMAN

The Wedding of Audio and Video

Perhaps the column should be called Ambient Sights and Sounds this month, because I intend to talk about a little publicized (but extremely important) romance that's going on between the budding home-video industry and the audio industry. The symptoms are to be found everywhere, and I'd like to analyze a few of them.

Talk About Bandwidth!

We, in the tape recording end of the audio business, find it pretty amazing that a stereo cassette deck is occasionally able to record all the audio frequencies, from 20 Hz to 20,000 Hz. When Norman Eisenberg and I come across such a machine in the course of testing products for *Modern Recording*, we get all excited and give a rave review to any machine that can deliver that kind of response at reasonably low distortion and with an acceptable signal-to-noise ratio. Big deal! Do you realize that any one of the available video tape recorders (let's call them VTRs for short) now available for home consumer use can and do record signal frequencies up to and including 4,500,000 Hz (that's the bandwidth required for full color video recording)? Even more surprisingly, you can buy one of those dandy VTRs for well under $1000 these days. That's a good deal less than the cost of some of your better stereo cassette decks, not to mention the cost of a semi-pro open-reel machine.

The key to this super-bandwidth capability, of course, is the fact that the multi-track heads in these machines are spinning at a rapid rate while the tape passes in front of their gaps at a slow rate. But that means that the *relative* speed between the tape and the tape head is tremendous—just how fast depends upon the particular VTR format that you're using.

All of which ties in with the capability of these super-bandwidth machines to record audio using digital techniques, or PCM (Pulse Code Modulation, as some manufacturers prefer to call it). And, if you've been reading this column regularly you already know that when you switch to PCM or digital tape recording, some pretty nice things begin to happen. For one thing, there's no longer any measurable wow and flutter, since the digital code is "fed out" of the system by a precision quartz-controlled clock system after being stored, briefly, in the computer-like decoding circuits associated with PCM recording and playback. Then, too, harmonic distortion is almost at the vanishing point. Figures such as 0.03% have been widely quoted, and when you compare that with the 3% THD that we analog recordists generally regard as acceptable for a maximum record level, it's enough to make you sick!

Finally, there's the matter of dynamic range. In a PCM system, dynamic range is purely a function of the number of "bits" used in the binary code used to sample the analog audio waveform when it is converted to digital form. Every "bit" gives you 6 dB of dynamic range and, if the future PCM tape decks use 13-bit codes, that means a dynamic range capability (in theory, at least) of 78 dB (that's without Dolby, dbx, Telefunken's Telcon, or you name it).

It's not surprising, therefore, that both Sony (whose Betamax VTR system is by now well known) and JVC (whose VHS VTR system is equally, if not better known) have shown add-on boxes which can be used with their respective VTRs for PCM audio recording. At the moment, prices for just the add-on boxes (if you can get anyone to quote a price at all) are hovering near the $4000 mark, but I suspect that once these systems really come to market and start to sell, those prices will plunge pretty quickly.

TV Sound Goes Hi-Fi

It may come as something of a shock to some readers to learn that the audio portion of a TV signal in this country is broadcast via FM. Not only that, but *potential* audio frequency response of TV audio signals extends out to 15,000 Hz, just as it does for FM broadcasting. So why, then, are we subjected to the low-fi sounds from our TV sets that prompt some TV stations to offer "simulcast" concerts in partnership with better local stereo FM stations? That's one of those vicious circles that plagues the industry every now and again. Initially, the audio signals from TV studios were sent to the transmitter (and across the network) via leased telephone lines. The grade of

phone line generally used could not pass much better than a 5 kHz signal. Knowing this, the TV set makers never bothered to incorporate more than a minimal amplifier circuit in their home TV sets and a less-than-minimal unbaffled unenclosed 3-inch (usually) loudspeaker.

But now all of that *could* change. Recently, the networks began sending their audio signals right down the coaxial (wide-bandwidth) cable that carries the video signal, using a system called diplexing, wherein the audio signals are nested in between the video signals. In addition, some TV outlets (such as Public Broadcasting) have been using satellite communication to get their signals around the country, and such satellite transmissions are also capable of high fidelity audio transmission. So now the circle is broken and there's really no excuse for TV set manufacturers *not* to incorporate better sounding audio sections in their TV receivers. The only thing stopping them, of course, is the fact that putting better sound systems into a TV set will increase the price of the set.

So, along come audio manufacturers to fill in the gap. The first component manufacturer to do something about audio sound on TV in this country is Pioneer, who is now offering a TV-audio tuner. Think of it as a TV set without any picture circuitry. All it does is pick up the TV audio channels, in full fidelity FM, and its output (monophonic, for the moment) simply connects to an unused high-level input on your hi-fi system. UHF as well as VHF channels are included, the latter being push-button operated for easy tuning. Besides providing better TV audio, the use of this device will force listener/viewers to position their TV screens right between their pair of stereo speakers —a good step in the right direction, if the wedding of video and audio is to take place.

TV Sound Goes Stereo . . . In Japan, That Is!

The next obvious step in the audio/video romance ought to be stereo sound on TV. The technology needed to do this is not difficult. In fact, way back in the late 1950s when the FCC was considering systems for stereo-FM, a proposal was put forth that they simultaneously consider stereo-TV sound. The idea was rejected because everyone (including the FCC) felt that no one would want such "spread out sound" when viewing a 16-inch (or smaller) screen. It wouldn't make sense for Matt Dillon to come galloping in (aurally) from way out left to far right when visually, all he and his horse did was romp across a few inches worth of black-and-white tube. Ah, but that was before Henry Kloss of Advent (since retired from that company) came up with his giant-screen projection TV. Since then, others have followed, including such electronic giants as GE in this country (with a self-contained giant screen unit) and Panasonic of Japan with their equally large projection TV units. Now, stereo on TV might make a lot more sense, and people such as William Halstead and others are hard at work again, refining earlier schemes for broadcasting TV sound in glorious two-channel stereo.

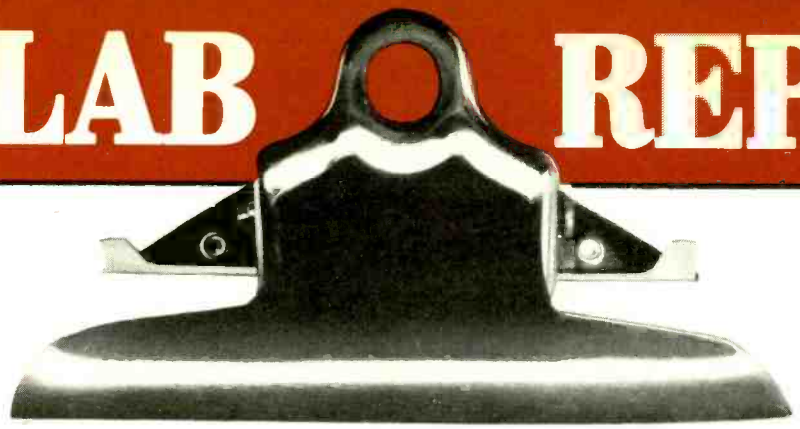
Meanwhile, in Japan, the broadcasting authorities aren't waiting. Just a few weeks ago, they began two-channel audio broadcasting over NHK, the Government-sponsored TV network of Japan. I stress the fact that it is two-channel TV audio because the system is being used in two ways. For one thing, it permits TV stations to broadcast the audio portion of a broadcast bi-lingually. Japan did this, experimentally, way back in 1970, at the time they held their International Expo '70. But of course, any system that can broadcast two bi-lingual audio channels can broadcast stereo programming with equal ease, and that is just what NHK will be doing from now on, whenever the program content lends itself to stereo (music, concerts, etc.).

Creative Audio/Video

If you are creatively involved in audio recording, it won't take you long to realize how much *video* recording could add to your creative efforts. If "live" music recording is your thing now, imagine how much more effective your efforts would be if you could play back both the audio and the visual aspects of a "live" performance. If you are part of a group that has been using audio recording as a means for practicing and perfecting your musical performance, just imagine what it would be like to *watch* your group perform on a TV screen as well as *listen* to the music you all make together. That sort of facility is well within the reach of serious musical groups and others even today. After you've purchased your first VTR (as I have just done) I'm willing to bet that it won't be long before you'll want a matching color camera. It's much the same sort of transition most of us made when we stopped dubbing records and FM programs and purchased our first microphones and mixer.

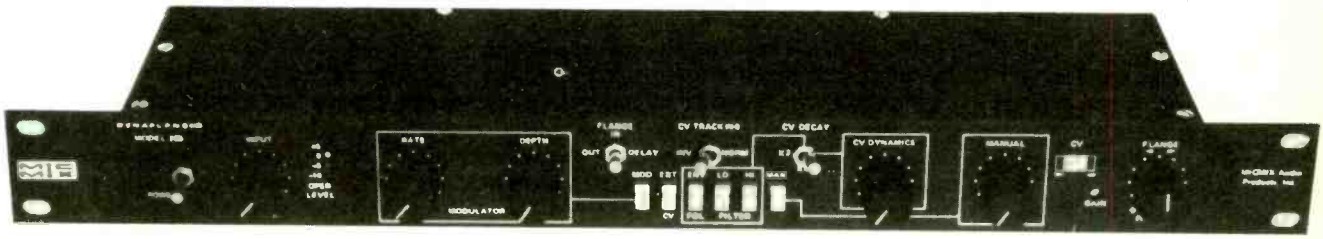
To be sure, the audio track on most home VTRs is, regrettably, a mono tape track, and not a very good one at that. But that is sure to change, and, for the meanwhile, if perfect "lip synch" is not that important it isn't too difficult to keep your stereo tape deck in reasonable synchronization with your VTR during playback, especially if both the audio and video machines have fairly precise tape speeds (the VTR machine *will* have, and what you'll have to do is fool with the audio tape deck until it is in close synch with the video). I wouldn't be surprised if some of our more enterprising readers haven't already worked out a fool-proof electronic method of locking the speed of their tape decks to that of their VTRs. If you have, let us know about it (unless you've got patents being applied for) and we'll tell everyone else about it in a future Ambient Sound column.

Meanwhile, I think it's pretty clear that you active audio hobbyists had better recognize that there's a TV screen looming in your future. And the future really isn't all that far away.



NORMAN EISENBERG AND LEN FELDMAN

Micmix Model 265 Dynaflanger



General Description: The Model 265 Dynaflanger from Micmix Audio Products is a sophisticated electronic device capable of a vast number of acoustic effects by means of its extremely versatile array of controls and interrelated options. Its primary application would be in "live" performance use or in recording "live" performers, although for more "passive" applications the device also conceivably could be used with recorded source material.

The name of the device means that it can create dynamically controlled effects by continuously analyzing program material for either frequency-spectral content or peak amplitudes, and developing corresponding control voltages that are used to vary the delay time of the signal in direct proportion to either the frequency or the amplitude of the program signal. With a pair of these units, it is possible to achieve what Micmix calls "dynamic cross-flanging"—a time-delayed panning flange effect in which the stereo image is shifted with respect to frequency or amplitude.

The actual number of different effects possible with the Dynaflanger would take more space to fully describe than is available here. Among them, which are described in the manufacturer's literature, are: dynamic pitch doubling; dynamic doppler pitch blending; dynamic frequency-enabled flanging; amplitude-enabled flanging; and even the dynamic control of synthesizers. The device permits manual control of all effects, as well as modulator control of effects plus external control of effects, delay-only and complete bypass capabilities. Control voltage (either internally developed or externally supplied) is reversible in its action on the flanging, and the operator can select three different control voltage decay rates, ranging from about half a second to a full two seconds.

Micmix 265: Rear panel view.

The front panel controls are clearly marked and generously laid out for ease of use. A power switch and pilot lamp are at the left, followed by an input level knob and four colored LEDs indicating operating levels. Next are two knobs for adjusting modulator rate and depth. A toggle switch handles flange out, in or delay. Another toggle adjusts tracking of the control voltage (inverted or normal). A third toggle handles the control-voltage decay. Just under these switches are six pushbuttons for activating the modulator, external control voltage, envelope follower, low and high filters and manual control. The last button ties in with a manual control knob, while another knob for control voltage dynamics is related to the control-voltage decay switch. The final knob is the flange-phasing control. A screwdriver adjustment for gain is recessed in the panel just to the left of the flange knob, and above it are four colored indicators for control voltage action.

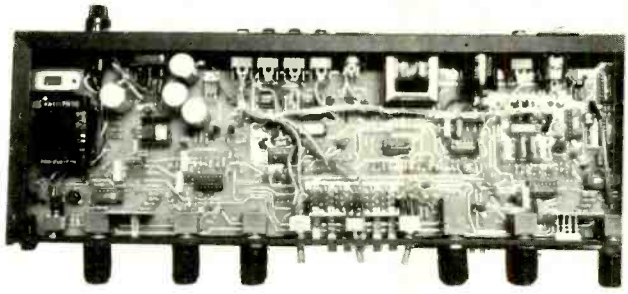
Signal connectors at the rear all are professional types and include a locking receptacle for balanced input, a phone jack for unbalanced input, a locking recessed plug for balanced output and four more phone jacks for unbalanced output, control-voltage output, external control voltage input and flange defeat. The AC power cord is detachable from its socket and is fitted with a three-prong (grounding) plug. Also at the rear is a fuse-holder. The device may be operated on 115/230 volts, 50-60 Hz. The front panel extends beyond the actual chassis width for rack-mounting.

Test Results: In lab tests, the Micmix model 265 met or exceeded published specs, and examination of its innards confirmed its robustness of construction and general professionalism.

The photo of the inside of the chassis discloses the enormous amount of electronics employed here to accomplish all the versatility this unit is capable of. Intelligent circuit layout can be credited with doing all this without introducing undue noise or distortion.

But the real mettle of this instrument is realizable only in terms of actually using it. One ideally should "play" with it for an amount of time, and with a musical instrument input (guitar, drums, even saxophone).

For the record, by the way, 0 dB reference (as indicated by the front-panel LED) is 0.775 volt rms. The Dynaflanger will operate with nominal input levels from 18 dB above to 40 dB below that level. Micmix

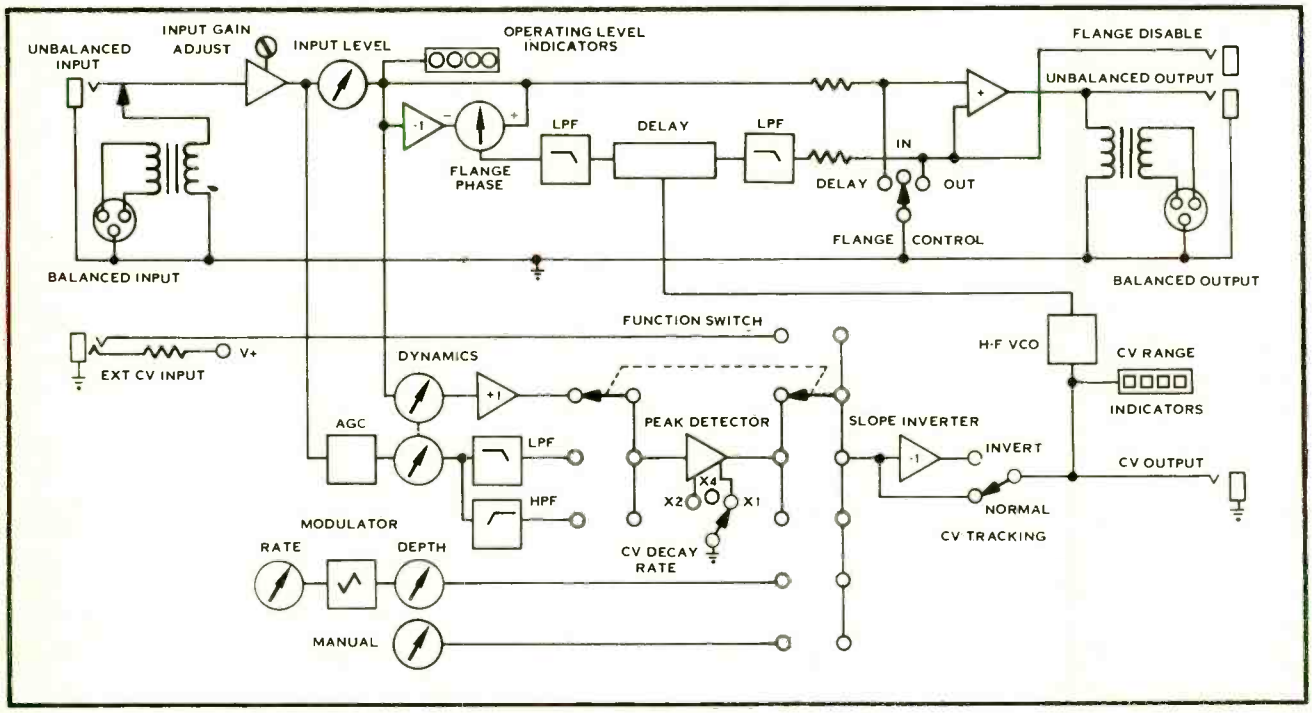


Micmix 265: Internal view.

suggests that to get the best dynamic range from this device (and the best audible flanging effects), the input level control should be adjusted so that the 0 dB light flashes about 80 percent of the time, while the +5 dB light comes on up to 50 percent of the time, depending on the nature of the transients in the particular program material being processed.

General Info: Dimensions are 19 inches wide; 1¾ inches high; 5½ inches deep. Weight is 5½ pounds. Price of the Dynaflanger is $895.

Joint Comment by N.E. and L.F.: As impressed as we were with the capability of one Dynaflanger, we were even more impressed with a pair, which seemed to



Micmix 265: Block diagram of "Dynaflanger's" circuitry.

us to provide the ultimate in controlled and controllable flanging effects. This was a first encounter with a unit in which the control voltage can be created by following or sensing the program material itself. For this reason we spent considerable time with the follower and filter buttons—these are the controls that allow the flanger to do its thing based on the actual program material fed to it. In a sense, the effects created in this manner struck us as more interesting; they somehow seemed to "fit" more types of program material than do the purely manual or repetitively modulated effects which tend to get a little boring after a while (but which are the only ones featured on other flangers we have experienced).

It is literally impossible to list here all that the Dynaflanger can do. For those readers who are involved with flangers and other special effects devices, the accompanying block diagram of the model 265 may suggest some of its many switching combinations and possible effects.

Flanging surely has come a long way since the days of those early tape-flangers that barely scratched the surface of possible musical effects that now can be accomplished electronically.

MICMIX MODEL 265 DYNAFLANGER: Vital Statistics

PERFORMANCE CHARACTERISTIC	MANUFACTURER'S SPEC	LAB MEASUREMENT
Input impedance: balanced	600 ohms	confirmed
unbalanced	47 K ohms	confirmed
Maximum input level (for 0 dB/0.775 V out)	+18 dB	+18 dB
Minimum input level (for 0 dB)	−40 dB	−42 dB
Output impedance:		
balanced, floating	less than 40 ohms	confirmed
unbalanced	less than 10 ohms	8.5 ohms
Maximum output into 600 ohms	+18 dBm	+20 dBm
Frequency response: direct signal	−2 dB, 20 Hz to 20 kHz	−2 dB, 18 Hz to 20 kHz
delayed signal	−3 dB, 20 Hz to 13 kHz	−3 dB, 18 Hz to 12 kHz
Distortion at +18 dBm:		
direct signal 20 Hz	0.2%	0.23%
200 Hz to 20 kHz	0.03%	0.03% (worst case)
IM distortion	0.03%	0.027%
Delayed signal, 1 kHz	0.8% max.	0.3% for 0 dB
Residual output noise:		
Direct signal	−95 dBm (A wtd)	−98 dBm
Delayed signal	−76 dBm (A wtd)	−75 dBm
Internal delay time range	0.26 to 6.4 msec	confirmed (approx.)
Comb filter frequency range	156 to 3900 Hz	confirmed (approx.)

CIRCLE 31 ON READER SERVICE CARD

Audioarts Engineering Model 4200 Parametric Equalizer-Preamplifier

General Description: The Audioarts 4200 is a four-section stereo parametric equalizer in which each section is a dual range filter. Overall response runs from 20 Hz to 100 kHz. Each of the four sections on each channel is adjustable by three knob controls in colored groups (red, orange, yellow and green), plus a switch that multiplies the frequency settings by a factor of ten. The knobs, in each section are labeled "fre-

quency," "octaves," and "dB." These are continuously variable controls with indicated markings along their ranges.

Section one covers frequencies marked from 22 Hz to 300 Hz (with the multiplier switch, these become 220 Hz to 3000 Hz). The octave control varies the range width from 0.16-octave to two full octaves. The level control varies the boost and cut action from −16 dB to +16 dB.

The second section is identical to the first section (this permits parametric equalization continuously from 22 Hz to 300 Hz on one section, and from 220 Hz to 3 kHz on the other section).

Section three covers the range from 100 Hz to 1 kHz (or, with the multiplier switch activated, from 1 kHz to 10 kHz). The same octave width choice is provided by the octaves knob, and the same ±16 dB level adjustment is provided.

Section four handles frequencies from 180 Hz to 2100 Hz (or, with its multiplier switch activated, from 1.8 kHz to 21 kHz). Again, the same options for octave width, and for dB of boost or cut are provided.

Each section has its own EQ in/out switch. In addition to these four sections, each channel has an overall gain control, an overload indicator, and a master EQ bypass switch.

As a preamplifier the 4200 will accept low-level signals, such as those from magnetic pickups, contact microphones, and the like so that the device can function as a musical instrument preamp in addition to its EQ functions. Suitable inputs for low-level (preamp, unbalanced) and for line (balanced) are at the rear. The line outputs also are at the rear. These all are standard ¼-inch phone jacks. The power cord is fitted with a three-prong (grounding) plug. The front panel overlaps the sides and is of rack-mount width. The unit's AC power switch is at the lower left of the front panel.

The filter circuits in the model 4200 all use "gyrator" ICs instead of conventional inductors. The power transformer is mounted at the outside of the rear panel as an aid in keeping down hum and noise.

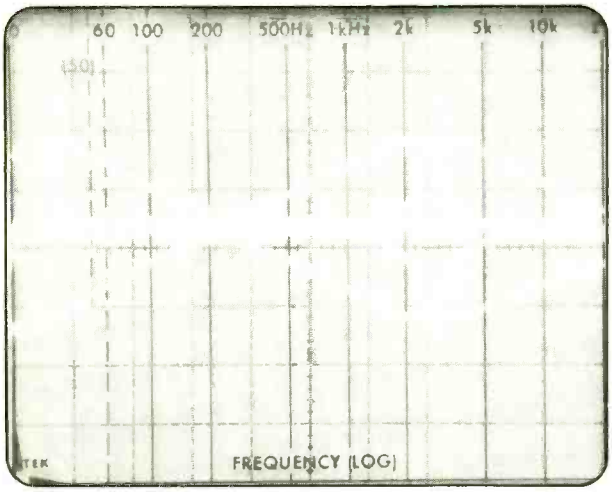


Fig. 1: Audioarts 4200: Total control range of first two bands.

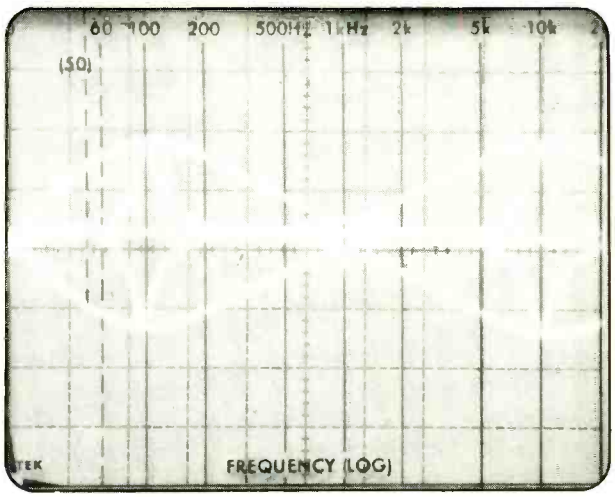


Fig. 2: Audioarts 4200: Total control range of third band.

Test Results: Lab measurements of the Audioarts 4200 produced excellent results that in general confirmed published specs. Distortion and signal-to-noise figures were outstandingly good.

Equally impressive is the control facility available with this device. The emphasis obviously is on the ability to shape the boost or cut required in a given band (rather than the sheer number of bands) so that the operator can compensate exactly for any discrepancies in the overall response regardless of their origin. The model 4200 is capable of providing that kind of precise compensation about as well as any equalizer we have tested. Furthermore, its low noise and ultra-low distortion are such that the device introduces no audible (or, indeed, measurable) aberrations in the sounds produced by the rest of the system.

The range of the first two sections is shown graphically in the composite sweep photos (Fig. 1) made from our test 'scope. These first two bands can be centered at any frequency from 22 Hz to 3 kHz, and

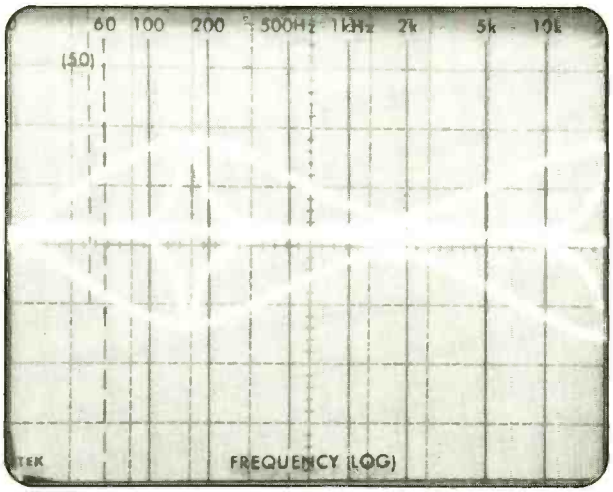


Fig. 3: Audioarts 4200: Total control range of fourth band.

Audioarts 4200: Rear panel.

the octave bandwidth can be varied from a narrow one-sixth- octave to a wide two octaves. It is evident from the 'scope photos that our measured results coincide very precisely with the unit's specs.

The total control range of the third EQ section may be examined by reference to Fig. 2. Here, the specs tell us that center frequencies can be varied from 100 Hz to 10 kHz and again, bandwidth is variable from one-sixth-octave to two octaves. Again, our measured results confirm this.

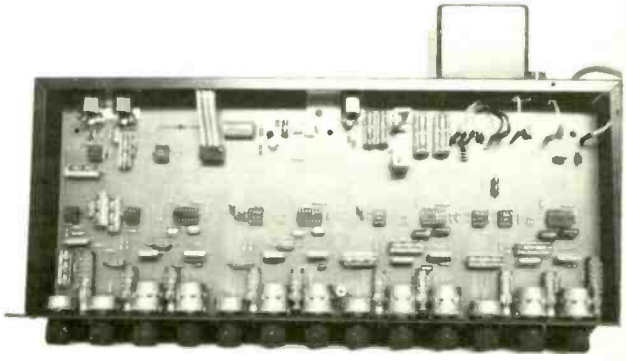
Finally, we checked out the last control band, which is supposed to be capable of being centered at any frequency from 180 Hz to 21 kHz. As may be seen (Fig. 3), the boost and cut peaks fall just beyond our sweep which extends to 20 kHz. Again, the precision engineering of the model 4200 is confirmed.

Boost and cut, regardless of the center frequencies chosen, or the bandwidths selected, remains a symmetrical plus and minus 16 dB (as claimed)—and probably a bit more than you ever would need in any real-life equalization situation, short of having to "suck out" really severe resonance in some totally impossible auditorium or hall.

General Info: Dimensions are 19 inches wide; 3½ inches high; 9⅜ inches deep. Price is $599. (Mono version, model 4100, is $335.)

Individual Comment by N.E.: Our test measurements speak for themselves. The 4200 is a first-class, professional-grade instrument capable of introducing changes in the sound quality of a system that range from subtle to overt. It should be emphasized that this unit is not a hi-fi plaything, but a technical "sound tool" that probably is best used in conjunction with a real-time analyzer.

Individual Comment by L.F.: I have felt for some time that in the world of pro audio (and particularly when one is dealing with sound reinforcement and the "live" performance situation), a parametric equalizer makes more sense than even a 1/3-octave equalizer with its numerous controls. Not that the model 4200 is shy of controls—just look at that front panel! But the key word here is *control*—of an order that is as accurate and as precise as anything I've yet seen. I cannot fault this unit on any count, least of all on cost which seems to me very reasonable considering the fact that there are some sophisticated equalizers that sell for $1000-plus, and won't do a better job of system equalization.



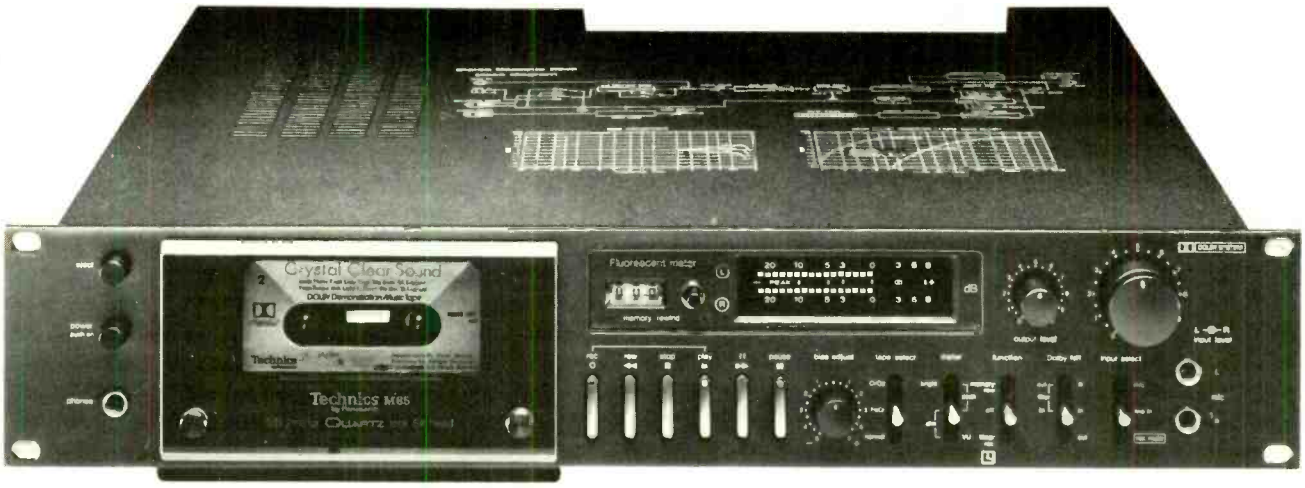
Audioarts 4200: Internal view.

AUDIOARTS ENGINEERING MODEL 4200 PARAMETRIC EQUALIZER-PREAMP: Vital Statistics

PERFORMANCE CHARACTERISTIC	MANUFACTURER'S SPEC	LAB MEASUREMENT
Frequency response	±0.5 dB, 20 Hz to 100 kHz	±0.5 dB, 10 Hz to 100 kHz (with or without EQ "in")
THD, 20 Hz to 20 kHz, @ +18 dBm	0.005%	0.02% @ 20 Hz; 0.005% @ 1 kHz and 20 kHz
IM distortion @ +18 dBm	0.002%	0.0015%
Noise, 20 kHz BW	−92 dBm	−93 dBm
S/N ratio	110 dB	112 dB
Slew rate	12 V/microsecond	14 V/microsecond
Max output level	+21 dBm/600 ohms	+21 dBm/600 ohms
Output impedance	6 ohms	confirmed
Max input level	+20 dBm	+18 dBm
Input impedance	100 K ohms	confirmed
Gain	0 dB line in +27 dB preamp in	0 dB line in +26 dB preamp in
Boost/cut range	±16 dB	±16 dB
Power consumption	18 watts	16 watts

CIRCLE 32 ON READER SERVICE CARD

Technics RS-M85 Stereo Cassette Recorder



General Description: The RS-M85 from Technics is a front-loading cassette recorder of rack-mount width and an unusually low silhouette, being a mere 3⅞ inches in height. It uses a direct-drive capstan motor, a quartz-locked servo control system, IC logic transport controls, a bar-graph fluorescent level ("FL") display, and it has a front-panel bias adjustment in addition to the usual tape selector. A two-head machine, it employs what Technics calls a "laminated SX" head. (This term is not explained in the owner's manual but we guess that it is sendust alloy.)

The front panel is black matte with tan lettering for the controls. At the far left are the eject button, the power off/on button and the stereo headphone output jack. To their right is the cassette compartment, with a transparent cover that slides out and tips downward slightly for insertion or removal of the cassette.

Another transparent cover extends across a fair portion of the top section of the panel. Behind it are the tape-counter with the reset button projecting through the cover, and the signal level meters, one per channel. Calibration runs from −20 to +8, and interpretation of readouts in both the VU and peak reading modes are explained in the owner's manual. The indications are shown by horizontal illumination. To the right of the meters are an output level control (handles both channels simultaneously), and the input level controls (dual concentric for either individual or simultaneous channel adjustment).

Below these items are the transport controls—six "feather touch" switches for record, rewind, stop, play, fast-forward and pause. Fast-buttoning is possible except for going into the record mode directly from play. It is possible, however, to go into record from either of the fast-wind modes by holding down both the record and play buttons at the same time.

To the right of the transport controls is the bias adjustment, marked from −5 to +5 and with a center detent position. A group of toggle switches is next, with the following functions: Tape select (positions include CrO_2, FeCr and normal); Meter (peak values and VU values, with a "bright or dim" option for the peak readings); "Function" (which refers to the memory rewind option and also has a position for use with a remote timer); Dolby NR (two "in" positions, one with a multiplex filter, and an "out" position); and Input Selector (mic, or line, or record mute—this last position prevents any unwanted signal from being recorded while the machine is in record mode). The left- and right-channel mic jacks complete the front panel array.

Printed on the top surface of the unit is a block diagram of its innards, plus a graph showing the effect of the bias adjustment, and another graph showing peak meter response to a 1-kHz tone burst.

On an indented portion of the rear, so that they are accessible from a top position, are the line input and output jacks, a socket for use with an optional accessory remote-control unit (Technics model RP-9690), and an adjustment for dimming the meter brightness.

The Technics RS-M85 may be rack-mounted, or since it has four "feet" on its underside, it also may be simply placed on a shelf or cabinet top.

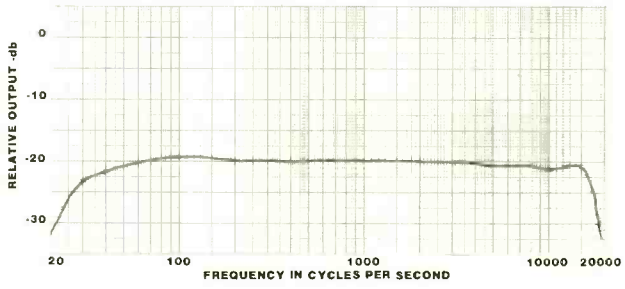


Fig. 1: Technics RS-M85: Record/play response using UDXL-I tape.

Test Results: In *MR*'s tests, the Technics RS-M85 exceeded its specifications for response (with three different kinds of tape). Signal-to-noise measurements were very close to specs and, in any event, could be termed excellent for the cassette format. Wow and flutter was better than spec'd and, at a mere 0.025% WRMS, was truly outstanding.

The front-panel bias control was judged to be a genuinely important feature that can be used to optimize results with just about any tape. We found the center-detent position to be optimum for both the ferric-oxide (Maxell UD-XL1) and for the ferrichrome (Sony DUAD) samples we used for our frequency-response checks. Indeed, r/p response for both of these tapes was very impressive (see Figs. 1 & 2) when analyzed in terms of the other two most important tape parameters—distortion and S/N ratio.

When we tested with TDK-SA tape (see Fig. 3), using the deck's CrO_2 switch position, we discovered just how useful the bias adjustment control can be. Initially, our r/p response was measured with this control set to its mid-point. We noted, during playback, that response rolled off a bit sooner than we would have expected (particularly after having achieved the excellent results we did with the previous two tapes). A very slight adjustment of the bias control toward the "lower bias" extreme improved things considerably without seriously affecting either the S/N readings or the THD at mid-frequencies. This should come as no surprise to readers who understand the importance of optimizing the record bias for each given tape, but there are relatively few tape recorders on today's market that provide this degree of flexibility.

Mechanically, the deck ran flawlessly, with very positive yet gentle handling of the tape.

General Info: Dimensions are 19 inches wide; 3⅞ inches high; 15⅞ inches deep. Weight is 23 pounds, 1 ounce. Price is $650.

Individual Comment by L.F.: There is much that is new and different about this rack-mountable cassette deck. Of all the features (described above), I feel that the adjustable bias is the single most important feature of all. As explained in our "Test Results" section, it makes a definite difference in the unit's response. What amazed me generally was the performance obtainable from what is after all a two-head machine. With all the talk about the "compromises" required when designing a combination record/play head (the record gap wants to be large, while the playback gap wants to be as narrow as possible), Technics has managed to come up with a new head (they call it "SX" with the usual penchant of Oriental manufacturers for abbreviations which are never explained in the owner's manual, but no matter, it is a darn good head).

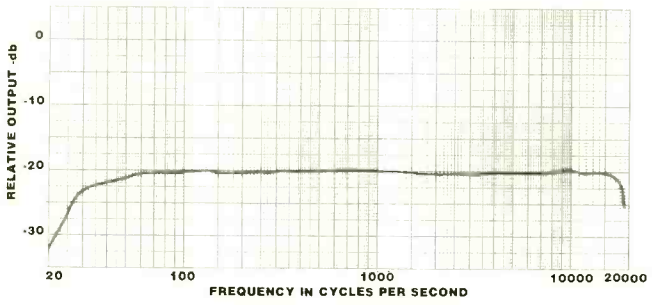


Fig. 2: Technics RS-M85: Record/play response using Sony Duad (FeCr) tape.

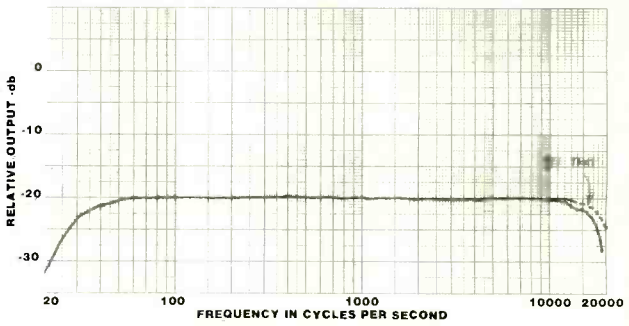
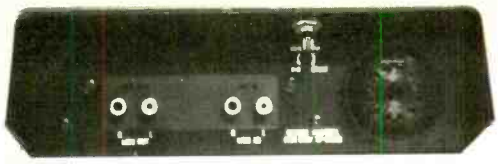


Fig. 3: Technics RS-M85: Record/play response using TDK SA tape.

The fluorescent meters take a bit of getting used to, of course, since most of us are more accustomed to eyeballing moving meter needles. Once you get used to them, however, they are extremely accurate and easy to read. Being all electronic, they have an additional advantage in that they can be set to read as VU meters (with a slower ballistic characteristic), or as peak-level meters (with extremely fast response time). In the peak mode, Technics suggests that levels of up to +5 dB may be used, and our check of maximum record level for 3% THD confirms this, since both the standard tape and the chrome tape were able to accept at least that high a record level (as indicated on the meters) before reaching 3% THD during playback.

If anything negative can be said about this metering system it is only that I would have liked to see somewhat finer increments of display at or near the 0 dB mark. As it is, the fluorescent segments move in approximately 3 dB increments at that critical recording level, but this is a minor matter that really did not affect our results significantly.

As for the transport system, I think the very low wow-and-flutter figure speaks for itself. It is as low a wow-and-flutter figure as we have measured for any tape deck. The light-touch buttons and the logic-control system combine to make this a very elegant machine, one which gives the user a feeling of confidence regarding its tape-handling capability. Technics has added another touch by providing an intensity control for meter illumination so that the readings are visible regardless of room ambient lighting.



Technics RS-M85: Close-up view of input and output terminals, remote socket and panel "meter" brightness control.

So, with a near-perfect transport system, excellent S/N, THD and frequency-response results, what more could one ask for in a stereo cassette deck? Perhaps a bit lower pricing, but don't blame Technics for that—put the blame on the current state of the American dollar vis-a-vis the Japanese yen.

Individual Comment by N.E.: Response of the Technics RS-M85 is obviously among the best and even though its measured S/N did not quite make specs, it still is in the ball park for top cassette performance. At that, I note that the Yamaha (reported on in our September 1978 issue) did make it out to 20 kHz with the same tape used here, and that machine is priced about $50 under the Technics. But of course the Technics does have the adjustable bias feature which, as our tests indicate, did improve the response from the chrome-equivalent tape. How significant this is—in view of the fact that we did nothing with this control in order to get excellent response from the other two tapes—is in my opinion a very debatable question.

There are, in any event, some things about this deck's "personality" that bear comment. For one thing, the lettering on the controls is rather "timid" and faint, and really needs strong front illumination for comfortable viewing. The meter illumination control varies the light on the meter from adequately bright to very bright, but the total range of illumination is rather small. The pot at the rear does the same at maximum rotation as the front panel switch and I wonder just why it is needed at all—particularly since in the VU position of that switch the rear pot has no effect at all on meter brightness. For some unfathomable reason, the VU readings are a shade dimmer than the peak readings with the switch in "bright" position.

I for one do not find this metering system the easiest to read. In place of the VU option I would have preferred a peak-hold feature. I also am not sure about the accuracy of the ballistics in the two meter-readout settings, although the values themselves do appear to be accurate. I agree that a more detailed scale near the 0 dB level would be desirable.

The machine does permit fast-buttoning of a sort but it is the first one I have encountered that has fast-buttoning which does not permit going into the record mode directly from play without having to press the stop button first. You can go into record from fast forward or rewind by holding down the record and play buttons but you cannot go into record from play unless you use the stop button first. 'Tis a puzzlement. So too, for that matter, is the rather low volume available for headphone listening.

TECHNICS RS-M85 STEREO CASSETTE RECORDER: Vital Statistics

PERFORMANCE CHARACTERISTIC	MANUFACTURER'S SPEC	LAB MEASUREMENT
Frequency response		
normal tape	±3 dB, 30 Hz to 14 kHz	±3 dB, 30 Hz to 16.2 kHz
FeCr tape	±3 dB, 30 Hz to 16 kHz	±3 dB, 30 Hz to 18.5 kHz
CrO_2 (or equiv.) tape	±3 dB, 30 Hz to 16 kHz	±3 dB, 30 Hz to 17 kHz
Wow and flutter (WRMS)	0.035%	0.025%
Signal-to-noise, normal tape		
Dolby out	NA	55 dB
Dolby in	NA	65 dB
Signal-to-noise, CrO_2 tape		
Dolby out	59 dB	57 dB
Dolby in	69 dB	67 dB
THD at 0 dB record level		
normal/chrome (SA)	NA	1.2%/1.3%
Record level for 3% THD		
normal/chrome (SA)	NA/NA	+6 dB/+5 dB
Mic input sensitivity	0.25 mV	0.23 mV
Line input sensitivity (for 0 dB)	60 mV	58 mV
Line output level (for 0 dB)	700 mV	600 mV
Headphone output level (for 0 dB)	140 mV/8 ohms	142 mV/8 ohms
Fast-wind time, C-60	80 seconds	80 seconds
Bias frequency	85 kHz	confirmed
Power consumption	40 watts	37 watts

CIRCLE 33 ON READER SERVICE CARD

GROOVE VIEWS

Reviewed By:
ROBERT HENSCHEN
NAT HENTOFF
JOE KLEE
STEVE ROW
RUSSELL SHAW

POPULAR

BILLY JOEL: *52nd Street.* [Phil Ramone, producer; Jim Boyer, engineer; recorded at A&R Recording, New York, N.Y.] Columbia FC 35609.

Performance: **Irreverent**
Recording: **Vibrant**

Billy Joel can be constructive and cutting as well. To this writer, that is the essence of his art—sophisticated poetic imagery and instrumental embellishments over a pose that is pure street kid.

Joel went into this project with a burden that afflicts all who paint masterpieces. His previous work, *The Stranger*, was a unique compendium of supreme commercial and creative vibrancy. Perhaps *52nd Street* lacks material as immediately communicative as "Just the Way You Are" or as elegantly crafted as "She's Always A Woman," yet hidden in the grooves rest plentiful supplies of allegorical sarcasm and slashing wit.

"Big Shot," unquestionably the new disc's best tune, is another one of those patented Joel put-downs—a rather venomous attack on a name-dropping, drug-taking hedonist whose lifestyle encompasses representative degrees of phoniness and plastic role playing.

Joel can, of course, sing a love song without sounding wimpy. "Rosalinda's Eyes" and "Until The Night" are both tender encyclicals to treasured females. These ballads are aided immeasurably by the production talents of Phil Ramone, an interventionist sort who has a facility for using half of AFM Local 802, yet at the same time, not choking the singer or his message. A session choreographer of unexcelled skill, Ramone's strings on "Honesty," his employment of trumpeter Freddie Hubbard on "Zanziber," and his flawless mixing create the image of artisan at work. In contemporary music, a better producer-artist team than Ramone and Joel simply cannot be found. R.S.

BILLY JOEL: A unique compendium

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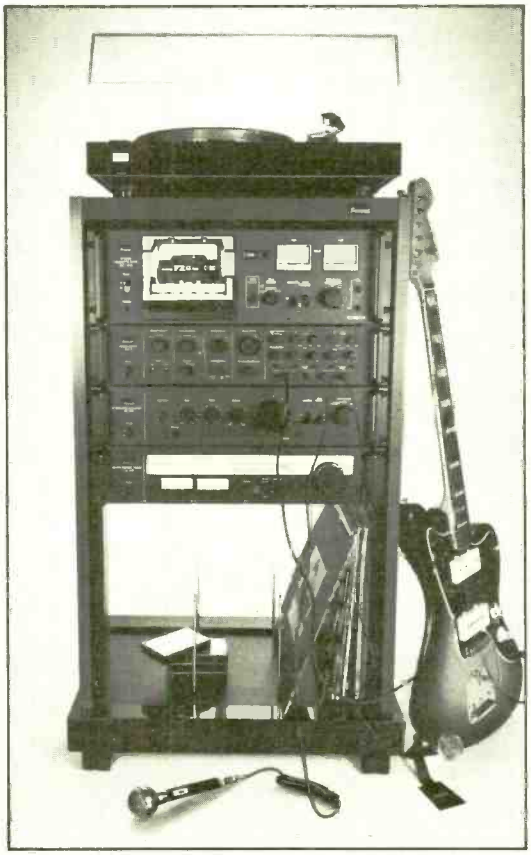
The Sansui AX-7 Mixer with Reverb.



The Sansui AX-7 mixer with reverb is a unique new component that is ideal for every musician, audiophile and serious recordist. With an AX-7 you can create professional quality recordings at home, using your existing high fidelity components. You don't have to spend money to redesign your entire high fidelity system. You can experience a whole new world of recording for about $300 (suggested retail price).

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Each input has its own individual level control and 20dB switchable attenuator to prevent overloading. You may get carried away but your AX-7 won't. For the optimum in tonal quality, the AX-7's special adaptor circuits allow the insertion of equalization, noise reduction, decoders and other audio processing devices. And the Sansui AX-7 mixer with reverb is mountable in any EIA standard-width rack.

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CIRCLE 85 ON READER SERVICE CARD

CHARLY MCCLAIN: Irresistable

CHARLY McCLAIN: ***Let Me Be Your Baby.*** [Larry Rogers, producer; Larry Rogers, Butch Carter, Lou Bradley, Ed Hudson, Bob McGraw, Ron Reynolds, engineers; recorded at Lyn Lou Studios, Memphis, Tn.] Epic KE 35448.

Performance: **Brilliant**
Recording: **Excellent**

In no uncertain terms, Charly McClain is a brilliant artist. Rest assured that I am usually not free with such platitudes; yet in this case, the plug is most convincingly merited.

What earns Charly such raves is a combination of factors different from most merit-earning criteria. She doesn't have an extremely technically gifted, powerful wide-ranging voice; even her vocal tones are not reflective of the soulful emotion that the great country distaff vocalists—Patsy Cline, Barbara Mandrell, and Loretta Lynn—are noted for.

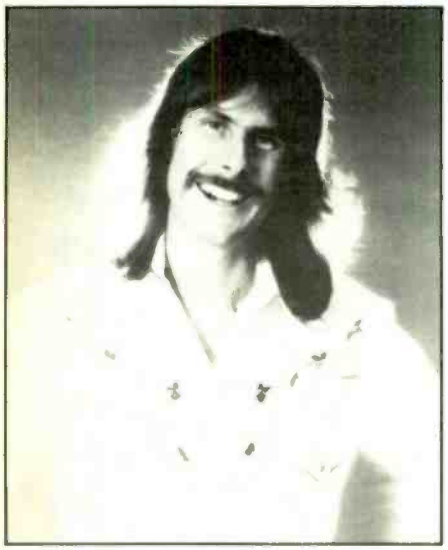
Charly's gift is that of a vocal timbre which speaks of the quintessential woman-child. Her voice is seductive and cooing, but oh, so gentle and innocent. "I'll Love Away Your Troubles For Awhile" is the song of a hungry, yet one-woman man, not promiscuous, just lustful. "Come Take Care Of Me" is another invitation which Charly's clear, high-pitched voice makes difficult for any man to resist.

Lost love, that affliction of the heart since the Stone Age, is also portrayed on such ditties as "You Can't Make Love By Yourself" (although there those who have been known to try it) and the string-laden winsomeness of "Take Me Back."

There are those who decry such ac-

tive production efforts as those taken here as little more that efforts to crash over into the pop, or pap, mainstream. So what! I'd rather hear a distinctive approach like Charly's anytime rather than the programmed, Dolbyed and EQ'ed to death wails of more famous megastars. R.S.

DAN FOGELBERG AND TIM WEISBERG: *Twin Sons of Different Mothers.* [Dan Fogelberg and Tim Weisberg, producers; Marty Lewis, engineer; recorded at Record Plant, Sausalito; Village Recorders, Westwood; Wally Heider Studios, United Studios, A&M Studios, and Sunset Sound, Los Angeles, Ca.] Full Moon/Epic 35339.



TIM WEISBERG: Uncanny sensitivity

Performance: **A real musical treat**
Recording: **Crisp and well-executed**

This is one of those albums that comes along without much prior notice, settles on a handful of appreciative listeners and fades all too quickly into undeserved obscurity. Neither Fogelberg's nor Weisberg's audiences are large enough so that this will become a best-seller, but I can only hope that I am proved wrong. Fogelberg has written some of his most beautiful music, and he and Weisberg have crafted a splendid little album.

The album works best when the two are involved in purely instrumental music. Seven of the ten cuts are instrumental, and they are, needless to say, played quite well. The three vocals are a 1966 Hollies song by Graham Nash, Allan Clarke and Tony Hicks, "Tell Me To My Face;" Judy Collins' "Since You've Asked," and a Fogelberg original, "The Power of Gold."

The Hollies' cover is the best of the three, with a catchy rhythm and Fogelberg's breathless voice that takes some of the edge off. The very quality of his voice that endears him to many female admirers, however, harms the beauty of the Collins song. Fogelberg adds a vulnerable hesitancy to the song that never was apparent (or intended) in the self-assured reading by Collins. He also has been overwhelmed by the orchestral arrangement. "The Power of Gold" is a fast but rather inconsequential and enigmatic song that seems almost out of place here.

The instrumentals are something else, though. Fogelberg and Weisberg play off each other with uncanny sensitivity and skill. They are, for the most part, quietly exploring pure melody here, and only on occasion do they move into higher gear and a quicker tempo. "Intimidation" has a slight disco beat for part of the song, but it remains primarily a Latin-flavored jazz piece for flutes, guitars, piano and percussion.

"Lahaina Luna" is very similar.

But on "Lazy Susan," "Guitar Etude #3" and "Paris Nocturne," the sound is like a cushion. The first is a very crisp Latin number that features a wordless chorus by Fogelberg. "Etude" is the kind of samba or bossa nova that Charlie Byrd plays, and it has the same sound that Phil Bodner worked on in the "Living Jazz" series. At times it recalls Laurindo Almeida, Antonio Carlos Jobim, Gary McFarland or Herbie Mann, with its subtle melody played against icy percussion. "Paris Nocturne" is the most beautiful song on the album, with its slow, classically styled piano introduction and soft melody played in the flute over a string setting. The oboe phrase (also by Weisberg) over the pizzicato is gorgeous, and the song develops into a full-blown orchestrated piece that has much the same effect as Judy Collins' "Whales and Nightingales II" did on that album.

DAN FOGELBERG: Vulnerable

Fogelberg plays guitars and keyboards quite well throughout, and his "Hurtwood Alley" shows that he knows the same engineering techniques used so well by Tom Scholz of Boston to achieve a massed guitar sound. Weisberg, as usual, is just fine on flute, and he also plays oboe and some percussion.

The two are joined by some skilled accompanists—Andy Newmark and Jim Keltner on drums, for example, and Bobbye Hall on congas and percussion. Don Henley of the Eagles provides vocal harmony on "The Power of Gold" and "Tell Me to My Face."

Fogelberg says on the back of the album that this "constitutes collaboration, experimental in nature, between Tim and (me) . . . It is a chance to stretch, an opportunity to grow and a hell of a lot of fun." This is one reviewer who would like to see more artists try the same thing, and these two artists in particular work on a sequel. S.R.

THE WHO: *Who Are You.* [Glyn Johns and Jon Astley, producers; Judy Szekeley, engineer; recording date and place not listed.] MCA-3050.

Performance: **Tragically promising**
Recording: **Deceptively lightweight; turn it up**

"New Song" starts this new Who album off on a different foot, and "Music Must Change" stands near its thematic core. Perhaps Pete Townshend has written some of these tunes in answer to New Wave or disco or complacent rock-making, or maybe he's just maneuvering The Who toward renewed acclaim as rock's premier power dynamo—sixties anger refined and harnessed into seventies productive musical energy. Tragically, just as this giant of British groups seemed poised for a kind of rebirth, drummer Keith Moon was found dead in a London apartment. A shadow is cast upon what will almost surely be The Who's last album; a Who future without the manic-comic Moon is, at this point, impossible to picture.

Several cuts on *Who Are You* deal directly with Townshend's creative struggle for a new identity: in "905" he resists the mass production of men,

THE WHO: This, their last evolution with Keith Moon, will take some getting used to

minds and music; in "Sister Disco" he bids farewell to a middle class craze; with "New Song" and "Music Must Change" he insists on flexibility; and through "Guitar And Pen" he provides the hope and the answer. Another street anthem for this album to rally around is "Had Enough," where Roger Daltrey snarls in archetypically direct Who fashion that he's ". . . had enough of being nice."

Parts of *Who Are You* rock with a vengeance, but Townshend is more concerned with exposing the hard edge of literal reality than just turning up the volume. His songs are accomplished with an unprecedented attempt at diversity and craftsmanship, employing full orchestration at slightly odd junctures. Imagine The Who yielding to French horns and strings! Indeed, your first few listenings to the LP may prove disconcerting, but Pete's imaginative arranging eventually wins out over the orchestral tendency to over-stylize. Unfortunately these phrasings and rhythms are quite unusual in most instances.

The Who's last important artistic evolution, way back on *Who's Next*, was easier to handle. *Who Are You* tries something different by risking the group's hard rock identity on delicate chamber piano ("Guitar And Pen") and pretty, string-laden ballads ("Love Is Coming Down"). It's possible that some of these tunes would eventually prove ineffective onstage, or that "Sister Disco" and other cuts will lose a degree of relevancy. But there are plenty of classic Who moves here—often with a twist—and if this album must serve as a final chapter in the story of a great rock and roll band, then we'll just have to get used to it. R.H.

JAZZ

MOSAIC: *Mosaic.* [Producer not listed; Bill Olszewski, engineer; Harry Gilling, assistant engineer; recorded at Golden Voice Studios, South Pekin, Ill.; date not listed.] LMI 1010.

Performance: **Musical self-indulgence**
Recording: **Finely balanced—a truly exceptional recording**

The late Joe Venuti once characterized the sort of self indulgence that goes with free form jazz by comparing it to a football game in which everybody's trying to carry the ball. Everybody's off on their own trip at the same time and nobody's relating to anyone else. That's why I'm so surprised to hear one of these avant-garde contemporary bands sound like each member is aware of what's going on around him. The literature which came with this recording would seem to indicate that Mosaic is something of a communal band which may account for the fact that the individual players seem to relate to each other. Unfortunately I find little of value in what they have to play or sing with one glaring exception, the funky modern clarinet work of Michael Smith (especially on Neal Robinson's "I'm Just A Primitive Bebop Caveman").

MOSAIC: Who's carrying the ball?

Probably the least enjoyable, for me, feature of this band are the vocalists who range from grating (in the case of Catherine J. Hall) to the sort of choir boy purity that started with the Buffalo Springfield and peaked in the era of Crosby, Stills, Nash, Young and Whatever. Otherwise there's some promising work from Johnse Holt on acoustic twelve string guitar and some interesting electric bass work by Glenn Schuetz

EVERYBODY'S GETTING BEHIND BGW

Even Crown and Yamaha

	POWER* @8 OHMS	@4 OHMS	TOTAL # OF OUTPUT TRANSISTORS	HEATSINKS/COOLING SYSTEM	SPEAKER PROTECTION	MAINS (AC) PROTECTION	CONSTRUCTION DESIGN	TURN-ON DELAY	CIRCUITRY	T.I.M.	PRICE:**	YEAR INTRODUCED
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CROWN DC300A	155 Watts/ch.	NO FTC RATING	16	Passive airflow only	None provided	Rear panel fuse only	Hard-wired, non-modular	None	Quasi-complimentary	Not specified*	$ 919 ***	1974
YAMAHA P2200	200 Watts/ch.	NO FTC RATING	12	Passive airflow only	None provided	Rear panel fuse only	Hard-wired, non-modular	None	Full complimentary	Not specified*	$1095	1976

Here they are — The big guns of professional amplification: The respected Crown DC300A, The cosmetically impressive Yamaha P2200, And BGW's new, no-nonsense 750B/C.

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BGW's new 750 Series amplifiers have taken the lead in both areas. Twenty (20) output transistors as opposed to Crown's 16 and Yamaha's 12 provide a Safe Operating Area unmatched by either the DC300A or the P2200. While both Crown and Yamaha rely on passive "convection" cooling, the extensive heat sinks on BGW's pro amps are cooled by forced air for reliable, continuous performance even on the hottest outdoor concert stages. Unique new arc-interrupting circuitry protects speakers — not just the amplifiers themselves — from catastrophic DC offset.

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CLARITY AND PRESENCE

Now that audible Harmonic and Intermodulation Distortion have been all but eliminated from professional power amplifiers, Transient Intermodulation Distortion (TIM) has become important. Neither Crown nor Yamaha specifies TIM levels whereas TIM specs for BGW's 750's Series are published with the greatest of pride. The 750B and C consequently produce clearer, warmer, and more open sound.

Pros will also appreciate another BGW exclusive: A delay circuit that eliminates all transient "thumps" when the 750B and C are activated. Neither Crown nor Yamaha has anything like it.

POWER

This is where BGW really leaves the competition behind. While the Crown DC300A and the Yamaha P2200 are rated at 155 and 200 watts, respectively, BGW's 750B/C delivers a full 225 watts per channel into 8 ohms,** leaving the competition behind entirely at 4 ohms, with a whopping 360 watts. Only BGW has FTC rated 4 ohm power specifications.

Both the DC300A and the P2200 are good power amplifiers by conventional standards. But real recording pros don't deal with convention.

They get behind BGW.

Because the competition already is.

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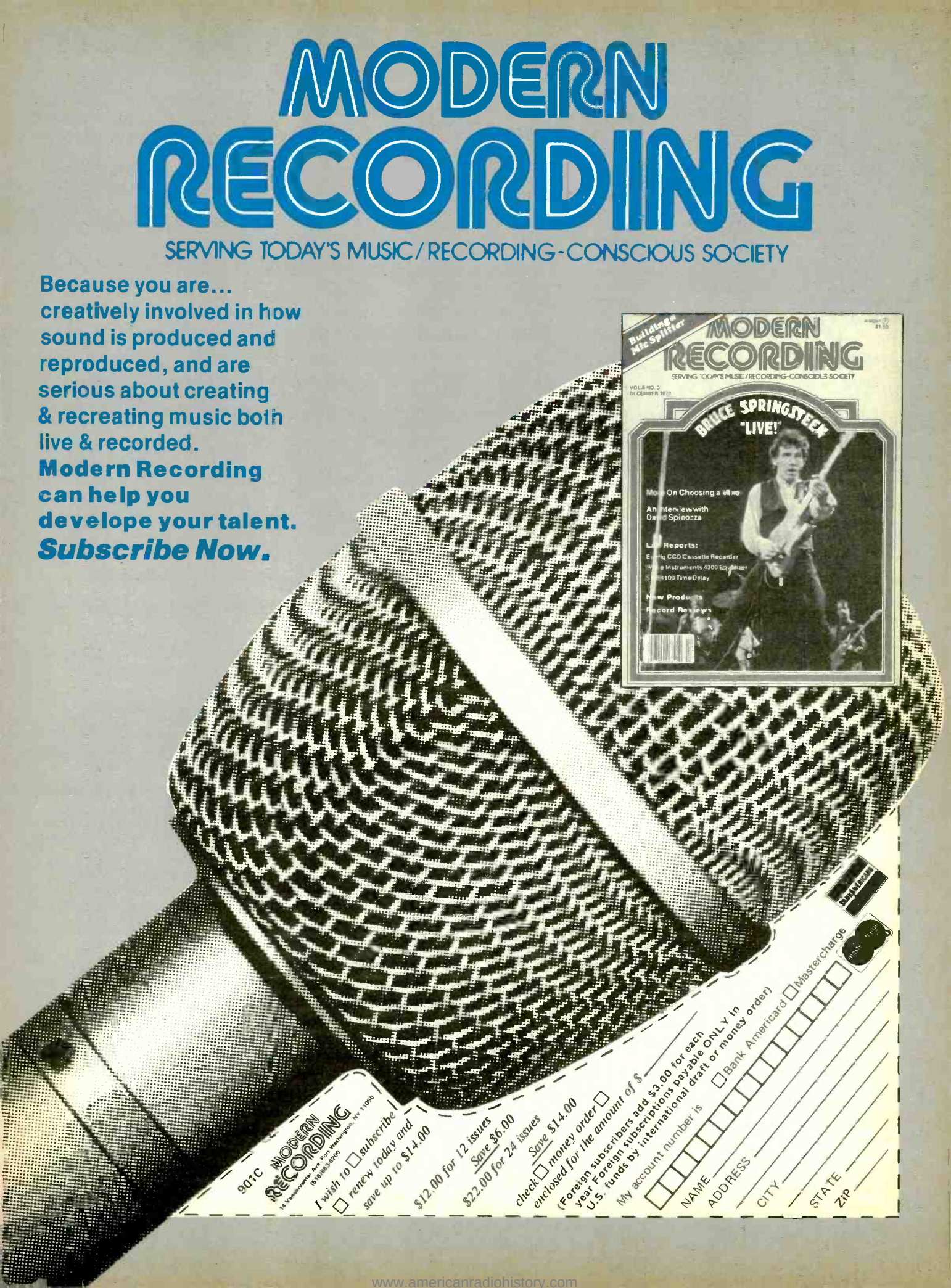

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lost among a lot of routine playing of little distinction.

As far as Fi goes it's really good and well balanced . . . too bad the group doesn't have more to say. J.K.

BILL EVANS: ***New Conversations.*** [Helen Keane, producer; Frank Laico, engineer; recorded at Columbia 30th Street Studios, New York, N.Y., during January and February, 1978.] Warner Brothers BSX 3177.

Performance: **Worth the effort**
Recording: **Faultless**

It would take someone more versed in psychiatry than me to understand what it is about Bill Evans that enables him to split his personality two (or even three) ways and be his own partner in piano chamber music situations. The fact remains that he's done it successfully in the albums *Conversations With Myself* and *Further Conversations* and now this latest effort on Warner Brothers.

The gimmick here is that some of the selections are duets, some are trios, and one, the least interesting to me, is a plain, undubbed piano solo.

The idea of duo-pianists is an old one. They were frequently found in cocktail bars and in the pit of summer theatres in place of full orchestras during the days of my youth. Lately they've fallen by the wayside because it takes two players with the lack of ego that is required to play for each other as well as themselves. By being his own partner Evans solves this problem and has complete control over the situation—there's no inner tension or conflict. Needless to say everything Bill Evans does fits perfectly with everything Bill Evans does. With the addition of a third piano, things can get a little bit busy (as they sometimes do here), but it doesn't seem to get in the way as often as I'd have expected.

Bill Evans includes a lot of his own material and while some of it, particularly "Maxine," is delightful, it doesn't come up to some of the pop tunes he's chosen such as Cy Coleman's "I Love My Wife" which opens—and highlights—side two of the album.

Bill's biggest problem at various stages of his career has been his own seriousness and the intensity of his playing. After a period of playing candlelight-and-wine romanticism, he got into such a classical bag that the only word used to describe Bill Evans in those days was cerebral. There's still a

1979

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lot of that in his playing, more so in his composing, but while his music is not instantly accessible to the casual listener, I think anyone with courage enough to dig deeply into repeated hearings of this music will be amply rewarded by the pleasure received. It's an effort—but it's worth the effort. J.K.

DIAHANN CARROLL WITH THE DUKE ELLINGTON ORCHESTRA UNDER THE DIRECTION OF MERCER ELLINGTON: *A Tribute To Ethel Waters.* [Michael Robert Phillips, producer; Thomas G. Stockham, digital audio specialist; Allen Sides, John Neal, Bruce Rothaar, Robert B. Ingebretsen, John Meyer, Stan Ricker, Phil Cross, George Bennet, Les Cooper, Chris McNary and Michael Carnavale, engineers; recorded at Filmways/Heider Recording, Los Angeles, Ca.] Orinda ORC 400.

Performance: **A heartfelt emotional tribute to a great artist**
Recording: **Flawless**

I'm not going to pretend that I understand the Soundstream Digital recording system designed by Thomas G. Stockham. I can only say that the experiences I've had with recordings made the Soundstream way have been almost beyond belief. This is no exception and it will undoubtedly become a showpiece for those who enjoy showing off their sound systems. But what is even more important is the music on this record.

Let's begin by admitting that Diahann Carroll is not a jazz singer—but neither was Ethel Waters. Ethel Waters was a show biz personality more in a class with Ethel Merman, Sophie Tucker, and the like and that's a mighty fine class to be in. But her innate good taste and ability to communicate plus a most uncommon ability to pick the best songs endeared her to many jazz musicians including the late Duke Ellington whose son Mercer spends a great deal of space in the liner notes writing about Pop and Ethel—so much so that he doesn't bother to list the excellent soloists whose work spices this LP. Especially in the two instrumental tracks, "Sweet Georgia Brown" and "St. Louis Blues," this information is of vital importance. "Sweet Georgia" features the very distinctive boppish piano of Mike Lang and "St. Louis Blues" features the ex-

The Japanese-American Jazz Exchange

By Nat Hentoff

The only disadvantage of the rising success of the Toshiko Akiyoshi-Lew Tabackin big band is that the band's primary composer and arranger—as well as its up-front leader—has had little exposure recently as a pianist. Toshiko sharply rations her solos with the big band, having so much else to do, and she seldom takes gigs with a trio these nights. Yet, Toshiko remains one of the more freshly imaginative pianists in jazz; and so, Concord Jazz has done us a special boon by issuing *Finesse,* the first album in years on which she can be extensively heard as a soloist.

More than twenty years ago, when she first came here from Japan, Toshiko quickly disproved the notion that only American-born players could swing authoritatively. Since then, her beat, while no less sure and flowing, has become even crisper and more resilient. On uptempo numbers, moreover, there is a full-bodied and yet graceful thrust, added to unfailing lucidity of design, that makes her work delightfully easy to absorb though it is by no means simplistic. And Toshiko has evolved into a ballad player of exceptional evocative powers—as in "You Go To My Head" and "American Ballad." Unexpected, and utterly charming, is a modern transformation of Jelly Roll Morton's "Mr. Jelly Lord"—an example of a resurrection route Toshiko ought to travel more often.

Bassist Monty Budwig and drummer Jake Hanna are paradigms of subtlety and taste. The recording is spacious, with just about perfect balance.

Back in Toshiko's once and former home, jazz continues to attract huge audiences, including record buyers. And such labels as Nippon Columbia have been producing sets here of unusual quality for home consumption. One, *Soran-Bushi, B.H.,* focuses on the undersung tenor saxophonist Billy Harper who has been with, among others, Art Blakey, Gil Evans, Thad Jones-Mel Lewis, and the perennially challenging Max Roach.

Harper has a huge tone, a lashing beat, and an almost overwhelming authoritativeness of conception. As fiercely magnetic as he can be on swift swingers, Harper is also—as on the unaccompanied "Loverhood"—a probingly thoughtful, tender spinner of romantic melodies. And one full, sometimes volcanic, side is devoted to a venerable Japanese fisherman's work song, "Soran-Bushi B.H." The accompaniment, as strong and resourceful as Harper, is provided by trumpeter Everett Hollins, pianist Harold Mabern, bassist Greg Maker, and drummers Horace Arnold and Billy Hart.

This, and other Nippon Columbia sessions, are now available here on the Denon label, both in audio stores and through Discwasher, Inc., 1407 North Providence Road, Columbia, Missouri 65201. The recording technique is digital—PCM (Pulse Code Modulation)—which does indeed result in a startlingly clear and clean sound, almost entirely free of background noise and variations in signal strength. It's all the more impressive when applied to such searing, explosive sounds as Billy Harper's.

TOSHIKO AKIYOSHI: ***Finesse.*** [Carl E. Jefferson, producer; Phil Edwards, engineer.] Concord Jazz CJ-69.

BILLY HARPER: ***Soran-Bushi, B.H.*** [Yoshio Ozawa, producer; Jim McCurdy, engineer.] Denon YX-7522-ND.

cellent work of reknowned California-based musician Victor Feldmen, who doubles on piano and vibes. Both these facts are happily supplied by the people at Orinda Records when requested.

As for Diahann Carroll, she's carrying on the Ethel Waters tradition admirably. She may not be as bold and brazen in her sound as Waters was in the 1920s but these are different times and different audiences with different images in mind. I would criticize the inclusion of one song which, to the best of my knowledge was not associated with Ethel Waters. "My Man" may well have been in Ethel's repertoire but the song was made popular by and primarily associated with Fannie Brice. There are songs, such as "Taking A Chance On Love," which were hits for Ethel Waters but are not included in this album. That's my only real criticism of either the music or recording. Diahann Carroll shows her love for Ms. Waters, especially in her moving rendition of the two songs most frequently associated with Ethel Waters, "Am I Blue" and "Suppertime." How nice it is to hear a singer remember that the verse *is* as important a part of the song as the chorus. J.K.

JOE VENUTI: ***Jazz Violin.*** [No producer listed; no engineer listed; recorded in unspecified studio in Milan, Italy, in 1974.] Vanguard VSD 79405.

Performance: **Virtuosity defined**
Recording: **Appropriate**

Joe Venuti's gone now. He leaves a legacy as the first to legitimize the jazz violin. As with any new movement, his transformations of an until then "traditional" instrument (i.e. classical music only) in the twenties were greeted with scorn from those that thought that the axe should be left to Mozart and Bach renderings, not to a form of music then associated with bordellos and similarly evil venues.

Venuti, however, was an ideal torchbearer; his considerable classical training provided him with sufficient chops to be conversant in almost any medium. He gave us five decades of his brilliance; not shifting and changing too much; but standing steady as a rock while lesser violinists rose and faded in a comparative wink of an eye.

Jazz Violin is by no means definitive Venuti. As fodder for eulogies, it barely suffices. There are, however, no slip-

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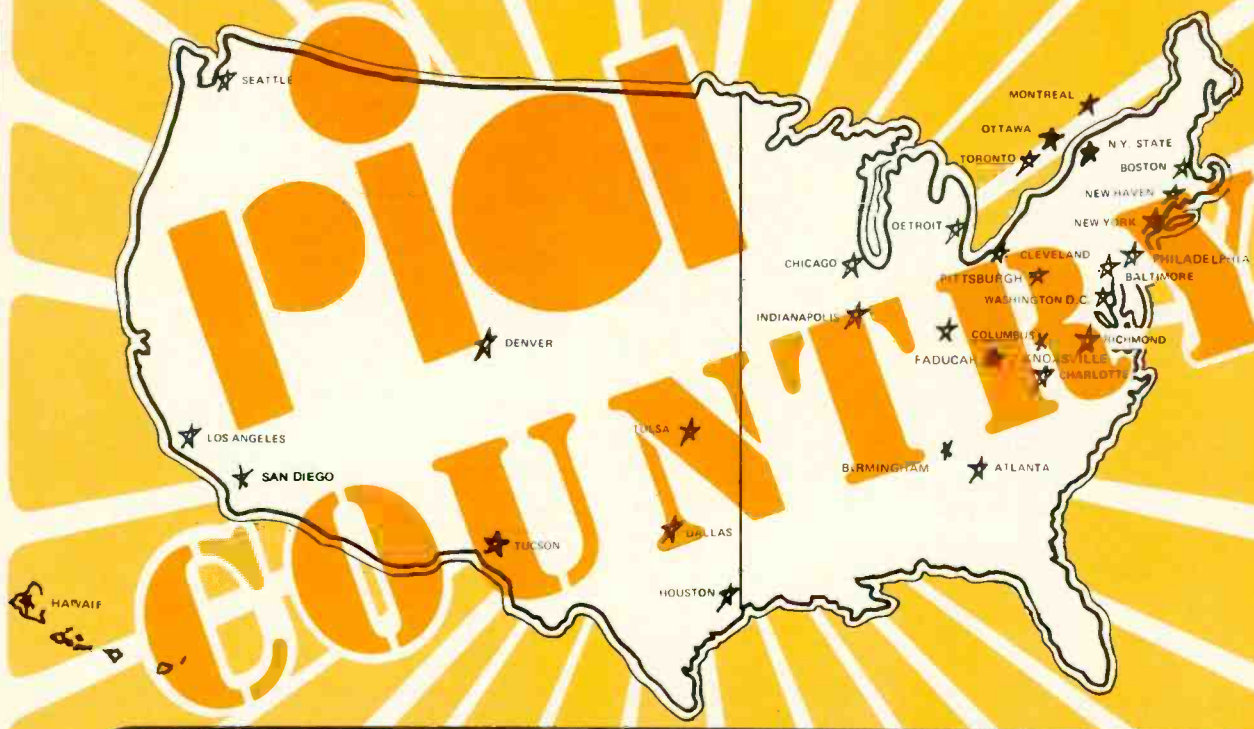

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pages here; standards are maintained; structurings range through some of the best Hoagy Carmichael and George Gershwin, with the later composer aptly represented via a lengthy medley of such hits as "American In Paris," S' Wonderful," and "I Got Rhythm." Opportunities are presented for Venuti to sport varied parlances, ranging from gleeful to somber.

The main problem of the platter is also its main gift. There really isn't enough violin; we are given many clockwork solos on the part of cohorts. However, these accomplices play adroitly and should be noted. Sante Palumbo's meditative, bluesy piano on "Georgia On My Mind," Paolo Tamerelli's slow, stalking tenor sax attack, and Joe Cusamanno's bop guitar vamps throughout provide the auditor with a delicious feeling of discovery. R.S.

SHOWS and SOUNDTRACKS

ORIGINAL CAST: *Ain't Misbehavin'.* [Thomas Z. Shepard, producer; Jay David Saks, associate producer; Paul Goodman, engineer; recorded at RCA Studio "C," New York, N.Y., June 8, 12 and 15, 1978.] RCA CBL2 2965.

Performance: **Just like they do it on Broadway every night, with matinees on Wednesday and Saturday**
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Before he passed away December 15th, 1943, Thomas "Fats" Waller wrote enough good tunes that an entire Broadway show has been built around his music and the surface has hardly been scratched. There were the show tunes that Fats wrote for the Broadway stage, the pop tunes that Fats wrote for the record and radio audiences, the jazz tunes that Fats wrote for Fats, and the funny tunes that Fats wrote for a war-torn world that needed something to laugh about.

How well Fats Waller's music worked on all his various audiences is shown by the fact that thirty-five years after his death they still remember and they're flocking to see this show, the brainchild of Richard Maltby, Jr. whose father had us all dancing and marching in the 50s and 60s.

It's too bad that Fats Waller couldn't have lived to see the day that it happened. It would have made him feel happy

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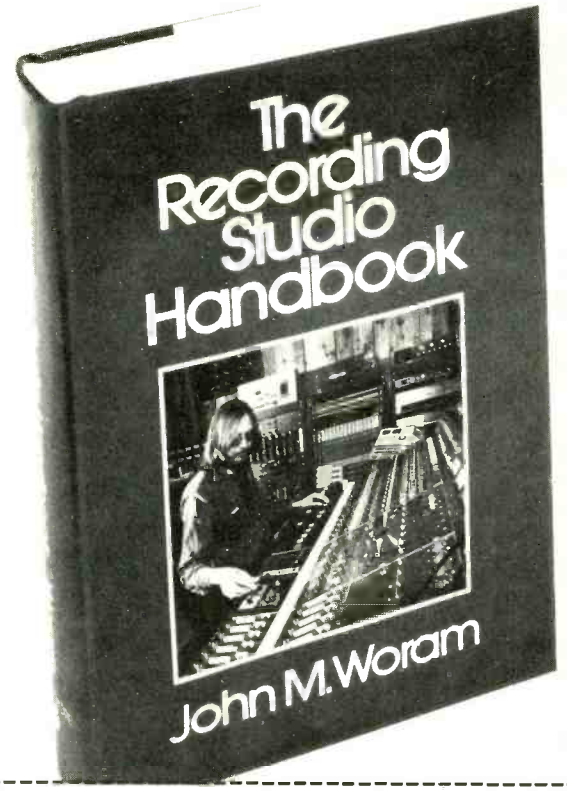

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John Woram is the former Eastern vice president of the Audio Engineering Society, and was a recording engineer at RCA and Chief Engineer at Vanguard Recording Society. He is now president of Woram Audio Associates.

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and proud to see this kind of review built around his music rather than having his music adapted to the situations presented in the script of a Broadway show. It's too bad for us as well because nobody sang, played or clowned Fats Waller's music better than Fats himself. All due respect to the artists involved here (at least one of them, Ken Page, is a real find), but it just ain't Fats Waller. Even in his heydey Fats Waller found a great source of fame and revenue in versions of his songs performed by the pop artists of the day. Gene Austin, the Boswell Sisters, George Burns and Lena Horne all availed themselves of Fats' songwriting genius.

You must remember that Fat's appeal was to a broader spectrum than simply the limited audience attracted to jazz in those days. It's important to realize that fact because *Ain't Misbehavin'* is not basically a jazz show. There is a band onstage and they can, and do occasionally, play hot. But mostly this is a very slick revue with some fine ensemble singers doing as many Fats Waller songs (and songs by other writers which Fats performed frequently) as they could possibly cram into a Broadway show. Of course the classic hits like "Honeysuckle Rose" and "Ain't Misbehavin" are expected to be in a show like this. Less expected are such little known Waller trivia as "The Ladies Who Sing With The Band" and "Find Out What They Like" plus such re-workings as the lyrics written by Richard Maltby, Jr. to such Waller instrumentals as "Handful Of Keys" and "Jitterbug Waltz." The singers, as individuals, are not always the ones I'd like to hear. I miss a female voice who can really cream a ballad the way Lene Horne often did with Fats' material. I missed the period antics of Gene Austin as he went for a really high note on the last chorus of "I've Got A Feeling I'm Falling." But as an ensemble interacting with each other to get the music and the spirit of Fats Waller across to an audience, I can't fault anyone.

RCA's Red Seal team got it all down pat. Names like Thomas Shepard and Paul Goodman are usually seen on recordings by Vladimir Horowitz or Eugene Ormandy and it's about time that somebody at RCA took the care with pop and jazz music that they do with the classics. It's certainly better than the old days when they'd throw Fats in the studio with his band and tell 'em to get hot—and hope the engineer managed to catch everything. J.K.

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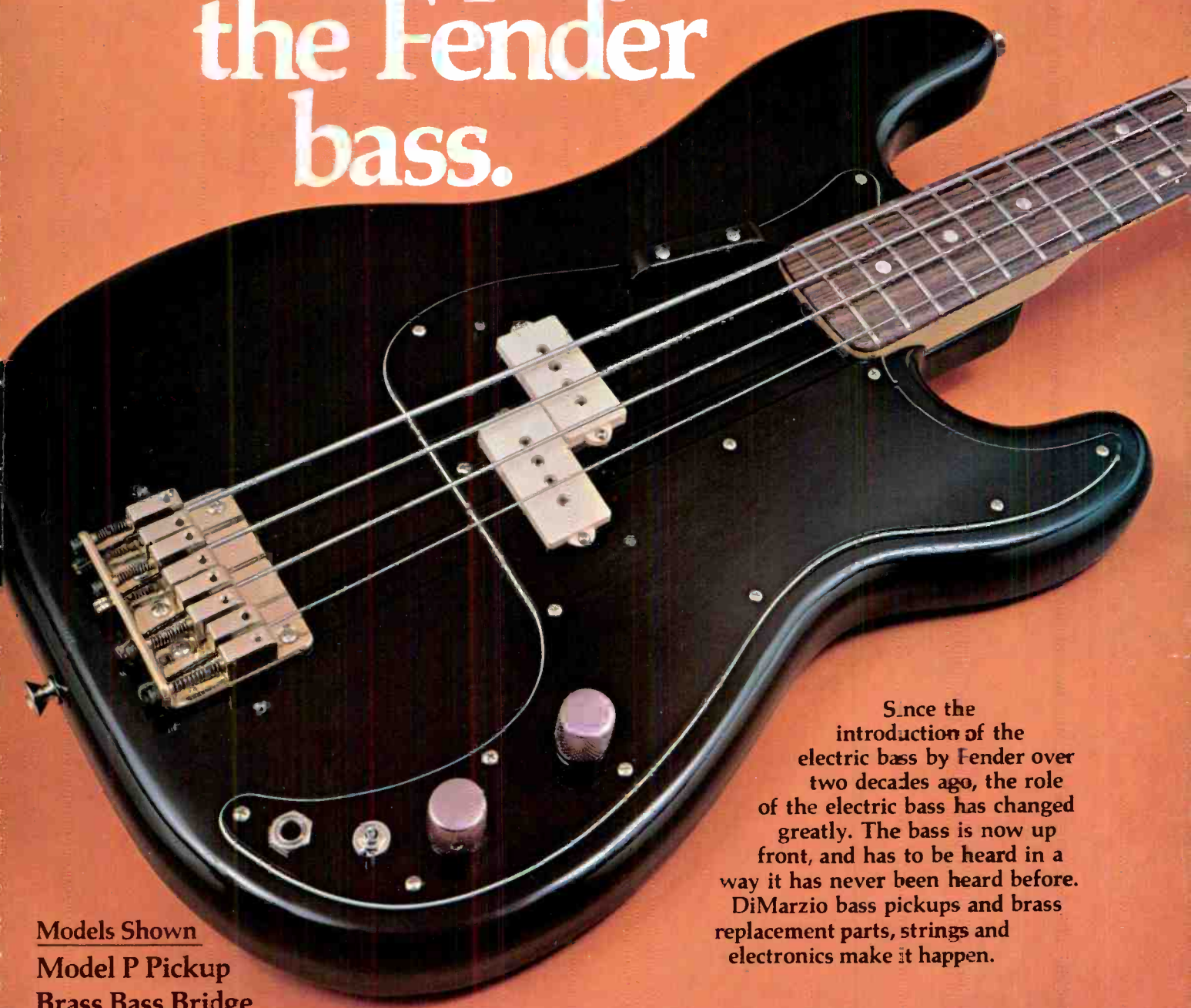

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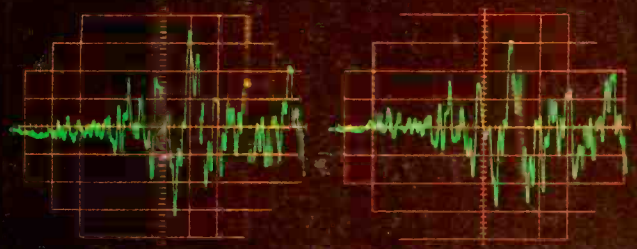

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