

Recording engineer producer

MARCH/APRIL—1974
VOLUME 5 — NUMBER 2
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R-e/p 4

Circle No. 103

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- the magazine produced to relate . . . RECORDING ART to RECORDING SCIENCE . . . to RECORDING EQUIPMENT.



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VOLUME 5 - NUMBER 2

'PLANET WAVES'
recording BYB DYLAN and
THE BAND at THE VILLAGE
RECORDER. Interviews with
studio manager DICK LA PALM
and engineer ROB FRABONI 19 Gary Davis

Control Room Acoustics:
the renovation of Control Room 'B'
at THE VILLAGE - interview
with acoustic consultant
GEORGE AUGSPURGER 31 Gary Davis

RECOGNITION 1973 41

audio superstar
THE EQUALIZER 43 Jerry Milam

Synaesthesia
SEEN ANY GOOD
RECORDS LATELY 47 Paul Laurence

48th 'AES' CONVENTION PROGRAM 54

Letters and Late News 10
The Record Industry in Japan 12
The EI-Cheapo Microphone Cord Tester 57
VSO - Pitch and Frequency Chart 57
New Products 59
Classified 66



THE COVER: Artists' Victor Henderson's and Terry Schoonhoven's epic mural, "THE ISLE OF CALIFORNIA" adorns the entire three story southern wall of THE VILLAGE RECORDER building.

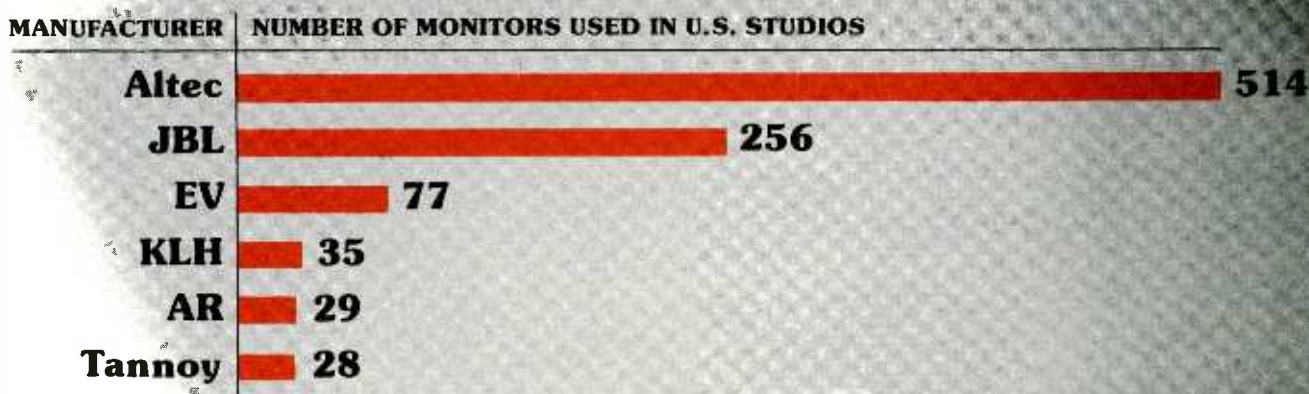
The work depicts the legendary day California falls into the Pacific Ocean . . . west of, as the freeway sign indicates, the California-Arizona border town of Blyth.

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At Altec, we're not taking our leadership position for granted. We're always trying harder – challenging ourselves to develop studio monitor speakers that stay a step ahead of constant improvements in the contemporary recording process.

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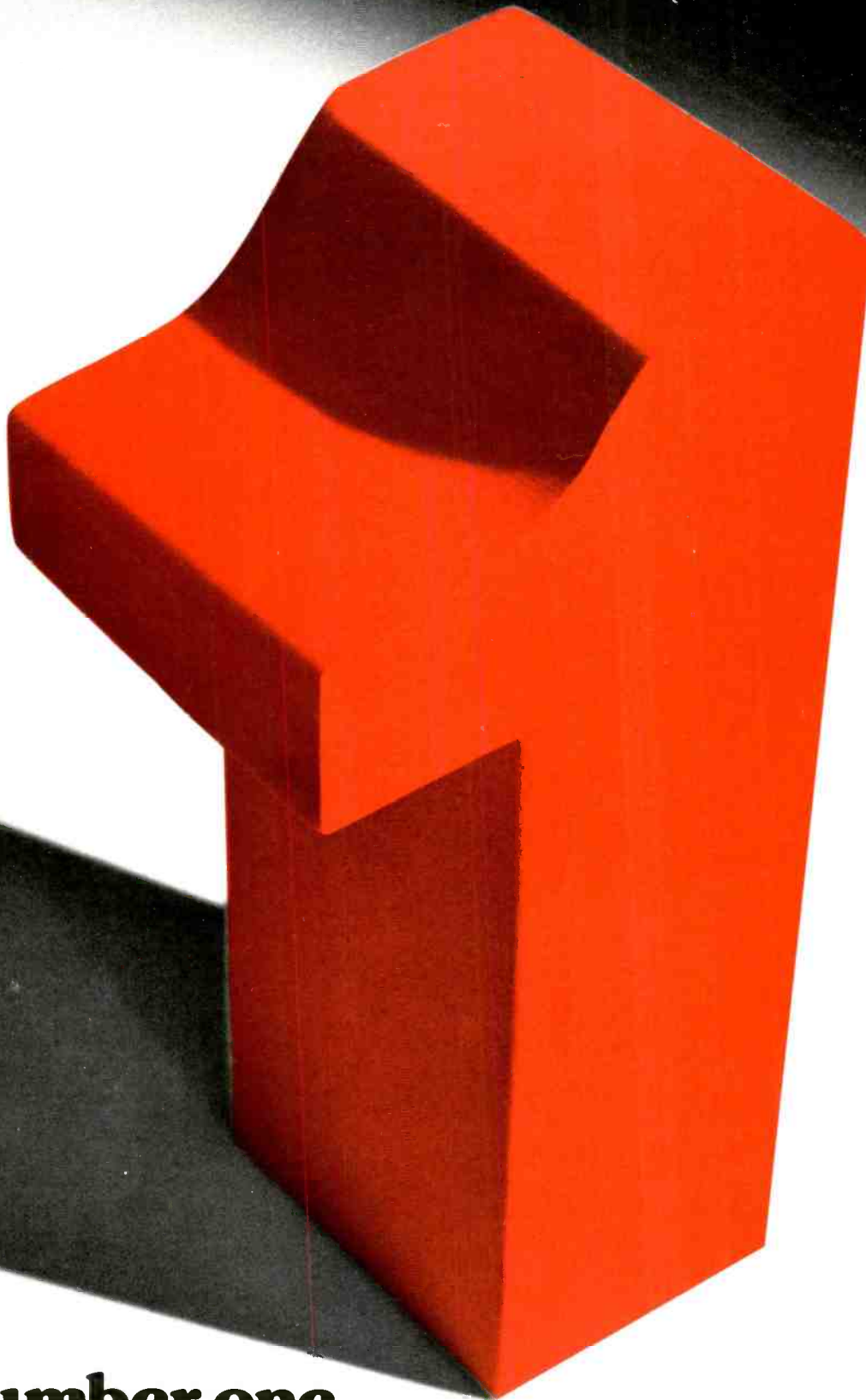


But we're not really satisfied – even with this impressive track record. We're still trying to better ourselves. In fact, Altec has three all-new studio monitors available right now. They're a whole new generation of speakers designed to meet the whole new range of tomorrow's dynamic recording techniques. Your studio may need them. Why not call your local Altec representative to find out?

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And have been for
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R-e/p 9

Letters &

Late News

From: STAN POLINSKY
SOUND DEPARTMENT
THE BURBANK STUDIOS

After reading the article on the technical comments about Film Score Mixing I feel a few clarifications are in order.

1. Stereo photographic sound tracks are not really a new idea at all – as a matter of fact, the first stereo recordings were made (photographically) about 1940 and were discussed in a paper presented by Harvey Fletcher entitled "Stereophonic Reproduction From Film" (*Jour. SMPE*, 34:606-613, June 1940). In 1955 John G. Frayne proposed a (compatible to mono playback) two channel stereo photographic sound track as discussed in a paper presented to SMPTE in June 1955, but was not widely accepted because of the poor signal to noise ratio, due to a 50% reduction of track area causing a 3 dB reduction of SNR.

With the advent of (recording) compression/ (playback) expansion devices capable of near mirror-image control tracking like the Dolby systems, a whole new area was opened paving the way for re-applications of older techniques. Its interesting to point out here that a device basically developed for multi track record recording is being applied to the motion picture recording industry. This is a new twist?

Ronald E. Uhlig of Eastman Kodak's Photographic Technology Division wrote a paper in late 1972 called "Stereophonic Photographic Soundtracks" for SMPTE (*Jour. SMPTE*, 82:292-295) and discussed a practical stereo recording system built by RCA's photophone division utilizing Dolby noise reduction in the recording channel and projector. The results of the measurements indicated an improvement in signal to noise for both new prints and worn prints (worn prints are really a problem because scratches, dirt etc. are also scanned and come out as noise) – above and beyond the original SNR of mono prints. Furthermore, and perhaps even more important, the sound of a Dolbyized photographic sound track sounds good to the ear.

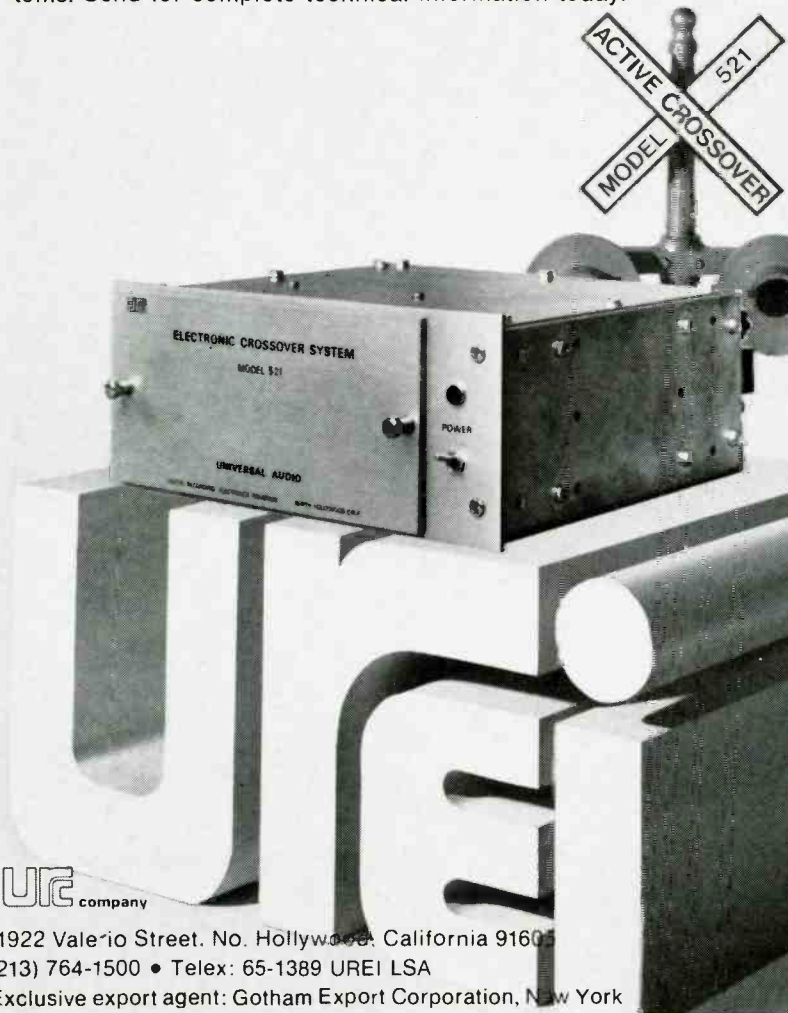
2. The "3 into 5" (monitoring and printing) method of 6 track stereo dubbing is a rather popular method of stereo dubbing in the 6 track release format because almost all major dubbing studios are equipped with 3 bus consoles (and 3 channel pan-divergence pots which are rather expensive) and it has always been less expensive to do the sound recording

Model 521 Series Electronic Crossover

If your tweeters are "tweeting" when your woofers should be "woofing"

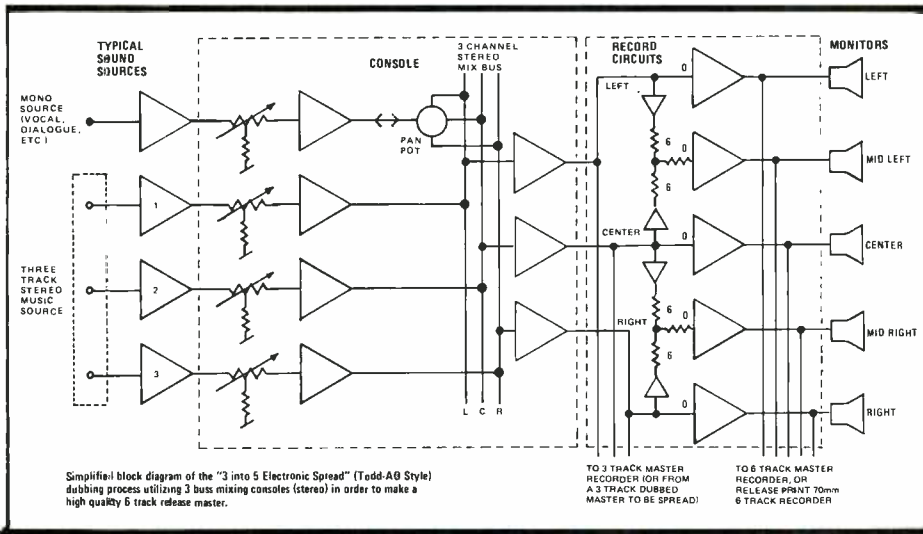
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in house rather than to pre-dub and then send the picture for 6 track (6 bus) dubbing in one of only 3 or 4 six track dubbing facilities in town . . .

Essentially, the 3 into 5 spread is a 3 channel master recording which is sent to the lab which then electronically derives the five front channels by creating two phantom channels (tracks two and four or mid left and mid right) and ends up with five channels (plus the surround channel) with which they print (transfer the sound) each 6 track 70 mil picture.

As with all types of recording – monitoring systems, it is important to monitor the mix with the same speaker configuration (and about the same levels and EQ, if any) and placement as in the environment of playback – be it theatre, living room stereo, car radio or quad listening rooms.

The new feature dubbing stage at TBS (The Burbank Studios) has the monitor mode facilities to switch to any release format during a recording in order to check perspective in the various release formats including the 3 into 5, 6 track, and quad. It is also wired for "Comp-mix" and signal switching and re-routing logic for external computer control. The room we think is the most sophisticated multi channel dubbing facility in the world and includes film reproducers and recorders which can travel in sync at up to six times normal speed.

From: **GEORGE J. KEREJI**
MOTION PICTURE SOUND

On page 52 of the January/February 1974 R-e/p Ampex introduces the new AG-440-C recorder/reproducer. A portion of the copy reads "Users requested motion sensing, to allow them freedom to push any transport command button at any time, without fear of breaking tape . . ." I have always felt that motion sensing was great as long as it was optional. That way I didn't have to pay

for it if I didn't need it. Most of the engineers I have talked to feel that motion sensing only adds to the cost and complexity of a tape machine. For a 1/4 inch transport I would much prefer non-motion sense transport control. At this time the big three (Ampex, Scully, and 3M) do not provide such a model.

I would like to know what the readers of R-e/p have to say about motion sense transports. If I am just one in a crowd then I shall have to live with motion sense transports. If I am not alone then I think the industry manufactures should respond to the legitimate demands of the industry.

Agree with reader Kereji Circle # 169
Disagree with reader Kereji Circle # 170

WESTLAKE EXPANDS SALES AND SERVICE STAFF

Westlake Audio, Los Angeles, has expanded their field engineering staff with the addition of John Wesley Gardner and the expansion of the sales staff with the hiring of David Miller and the transfer of John Sands from service engineering to field sales.

Prior to joining Westlake, Gardner was a principal in his own acoustic consulting firm, Studio Maintenance, Inc., Bearsville, New York. In the six years before this he was the Chief Engineer for Bearsville Sound Studio, Bearsville, and Assistant Chief Engineer at Electric Lady, New York City. At both Bearsville and Electric Lady he designed, developed and built the studios now in use.

Miller joins Westlake from Tascam Corporation where he was Sales Manager, Music Division. Prior to this he worked in a production capacity at SAE, The Aquarius Theatre and the new UCLA Media Center.

Sands has transferred from Field Service to Sales with Westlake and joins Miller and Glenn Phoenix in this depart-



HOW NOT TO CHOOSE A MICROPHONE

As in any industry, there are fads of the moment, effects that are popular, recording techniques that create sounds rather than reproduce them. Yet, through 40 years of recording, there is one constant thread that runs through the fabric of our art, the NEUMANN condenser microphone. NEUMANN's preeminence in the field was established and is maintained not on the basis of its excellent specs but on its performance.

For broadcasters and recording studios throughout the world, both East and West, the NEUMANN microphone has been, and continues to be, the instrument of choice.

A professional musician can't pick out the Stradivarius from a catalogue of violin specs because there is no constellation of specifications that would pinpoint the Stradivarius. However, given no numbers at all but the date, and the name of Stradivarius, he could pretty well imagine its sound.

Similarly, from a catalogue of specifications on microphones, a recording engineer cannot hope to establish a correlation between the numbers given and the transducer's performance. The measurements used today are so gross that they fail to distinguish qualities that are essential in reproducing the sound of an instrument or an orchestra.

The neophyte, having little experience in studio work, relies heavily on specs as the drowning man relies on straws; and there's nothing that will save him from expensive mistakes except the realization that he can't choose microphones from catalogues or ads.

How, then, can he choose a microphone?

Very simply, ask the experts in the field.

Eli Passin, Vice Pres.,
Gotham Audio Corporation

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Hollywood, CA 90046 (213) 874-4444

ment. He formerly has his own studio, John L Sands Productions. Before this, he was First Vice President of the Palm Springs Civic Theatre, Chief Engineer at KCMJ Radio and KPLM-TV in Palm Springs.

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Federal Express has three types of service available for broadcasters and other segments of the entertainment industry.

'Priority One' packages are picked up during one business day and will be delivered not later than noon the following day at rates competitive to REA.

'Economy Air' packages are picked up one business day and will be delivered no later than the second business day after

shipment. Economy Air is priced approximately one-third less than Air Parcel Post and competitive to UPS Blue Label.

'Courier Pak' is a totally new system for delivering recording tapes, scripts, contracts and other materials weighing under two pounds and not exceeding the size of the Courier Pak supplied by Federal Express (12" x 18"). Courier Paks are delivered to the consignee by noon the day after pick-up.

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SOUND 80 LICENSES MCI ON SYNC SYSTEM

SOUND 80, INC., Minneapolis, and MCI, Ft. Lauderdale, have entered into a licensing agreement on Sound 80's design of the ZPE Multi-Track Tape Lock-Up System. MCI will manufacture and market the equipment world wide.

The System puts a sync pulse on one channel of each of two 16-track tape machines. When the machines are rewound, they can be stopped somewhere close to one another, and as soon as the two are put into play, the one machine will find the other and lock precisely in sync.

The Lock-Up has been in use in Sound 80's Minneapolis studios for the past year and a half. With it they have bypassed 24-

track which, according to Sound 80 Vice President and Chief Engineer Tom Jung, "is not practical because distortion, S/N and crosstalk make it imperative to use noise reduction in the original recording. One cannot justify compromising quality for the few times more than 16 tracks are needed."

Production on the ZPE Multi-Track Lock-Up System is scheduled to begin immediately. The agreement was signed by Jung and MCI President G.C. (Jeep) Harned.

CUSTOM FIDELITY APPOINTMENTS FOR INCREASED SERVICE

Custom Fidelity, Inc., Hollywood, CA Pro Audio distributor has restructured its staff as of March 1st and added numerous new equipment lines.

Brian Cornfield, formerly of Westlake Audio, has been named Field Sales Manager and given responsibilities extending throughout the Western States. Virginia Levy, formerly Assistant Sales Manager, has been named head of the Pro Audio Division, with management responsibilities within the Division and the public parent corporation as well.

Custom Fidelity has developed a complete new corporate image campaign built around its new stocking and expanded line capabilities. Remodeling of the firm's headquarters building has been underway since March 1st with a complete revamping of Custom's demonstration room and disc mastering facility on top of the list.

New personnel at Custom also include Annette Saldana, also formerly of Westlake Audio, who will be staffing the Field Service Desk and supporting sales personnel.

... a returned travelers view of: THE RECORD INDUSTRY IN JAPAN by JOHN EARGLE

The Japanese record industry is one of the largest with gross sales of about \$350 million during 1973. It is unique in its assimilation and development of high technology and its involvement with most aspects of home playback. The essential differences between it and the US record industry may be summarized:

1. Many Japanese record companies are closely allied with the manufacture of high fidelity equipment: Victor/JVC; CBS/Sony; Toshiba/EMI; Nippon-Columbia/Denon; and Warner/Pioneer. This implies a degree of coordination of hardware and software interests which probably does not exist in any other country.

2. The Japanese record marketplace seems far more interested in advanced technology than the US market. As a result, substantial changes in hardware and software techniques can be introduced at a rate that will surprise many

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Americans. For example, when matrix quad systems were only being hinted at in this country back in 1969, many systems based on the simple Scheiber sum-and-difference matrix proliferated in Japan over a very short period. One can still browse through record bins and find albums with legends at the top mentioning not only the SQ and QS matrices, but also such things as the Quadralizer system, the Quadriker system, the QX system (quad extra); AFD (acoustical field dimension); QM (quad matrix); DM4 (dynamic matrix 4-channel); SE (separation enhancement); SC (surround composer); SFCS (sound field composer system); and finally MA (matrix ambiphonic)! Only four of these systems were developed with any kind of logic control in playback and, with the exception of the SQ system, the matrix coefficients all were within a few dB of each other. Most of these systems have fallen by the wayside, and there remain only two matrix systems of any significance, SQ and QS. Such a marketplace provided very fertile ground for the introduction of the JVC CD-4 system back in 1970, and at this point CD-4 seems to have taken a commanding lead in the rate that record releases are appearing and that new hardware is developed.

As in the early days of the stereo disk in this country, special attention is often

given to new recording methods and devices. For example, Nippon-Columbia proudly states at the top of some record jackets that the record was done on their new PCM digital recording system. Other companies have touted their acquisition of the new Neumann SX74 cutter heads by likewise giving them billing at the top of the record jacket. This is reminiscent of the Everest and Command releases of the late 50's which capitalized on the benefits of 35-mm magnetic recording.

3. The Japanese record industry, from a creative point of view, remains very tightly in the hands of the record companies themselves. In the US, by comparison, a large part of artistic control rests in the hands of independent producers. More about this later.

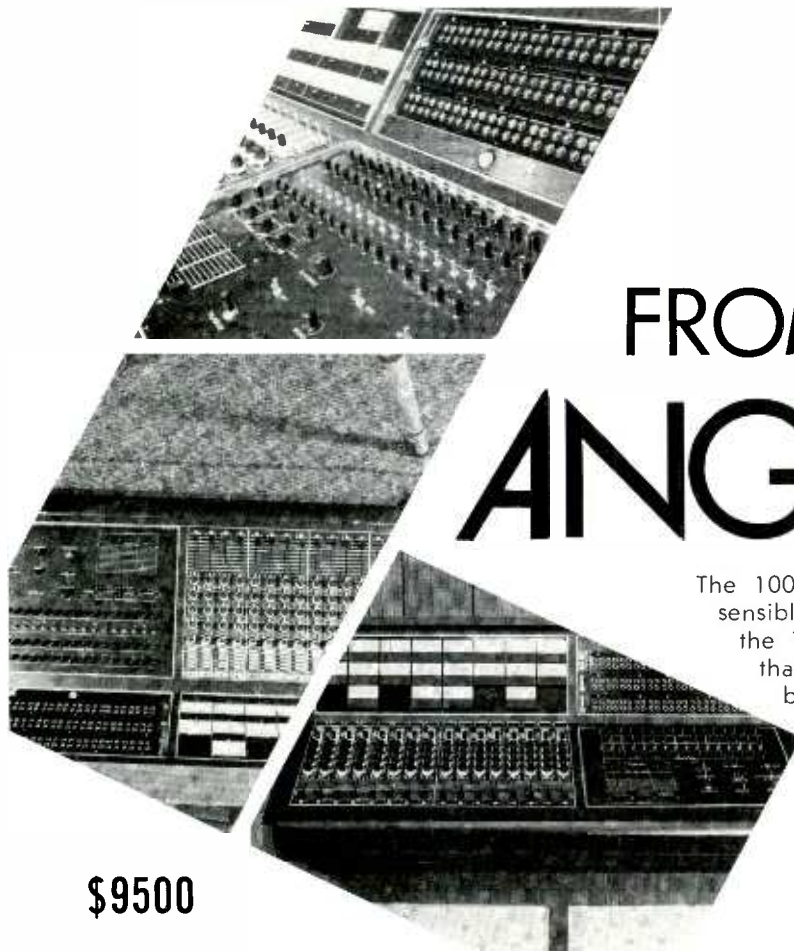
THE HARDWARE MARKETPLACE

Let's examine the hardware marketplace in more detail. A visit to the Akihabara district of Tokyo on a Saturday or Sunday is quite revealing. It is the center where most of the "electrical department stores" are located; large stores that specialize only in appliances, consumer electronics, records, and hifi equipment of every description. The price

of a phonograph record is about the same in terms of actual purchase price in Japan as it is here, and this means because of lower average pay scales, that the cost of a record it is somewhat more dear to the average consumer. It is not unusual to see a prospective purchaser of a classical album examining the disk under a strong light before he buys it. The records are not shrink wrapped; they are sleeved in reusable plastic sheaths so they can be examined for scuffs or scratches. In this country, we couldn't easily do that. You take the record home, and then if it is defective you go to the trouble of taking it back for exchange. Japanese consumers have demanded quality, and it is this reporters observation that their workmanship in making pressings rates with that of Germany and Holland as the very best there is.

Most of the equipment marketplace is built around receivers of medium to high price. Lately, quad equipment seems to have captured a large share of the market. Since most living quarters are small, bookshelf speakers and small floor models are most popular.

The 'audiophile' or high end component market is very strong in Japan. Many of the higher priced US loudspeakers are in demand, with emphasis on those higher efficiency models bearing the "studio monitor speaker" cachet.



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High-end amplifier/preamp combinations made in the US are also popular, and, with the import duties to be paid, one can readily see that a commitment to a state-of-the-art component system is a costly one indeed. The newer models of tape recorders and direct drive turntables represent Japan's own contribution to the component state of the art. (Japan has both 50 and 60 Hz power available, and this means that all devices with synchronous or induction motors must be made in two models. The direct drive turntables are free of this restriction, and were obviously designed to get around the double inventory problem.)

A typical Japanese component hifi showroom will always have an elaborate console or switching center for comparing systems. Professional tape recorders, often Ampex or Scully, will always be on hand along with a supply of high quality 15-ips quad and stereo source material.

If the average American record buyer seems more concerned with music than with technology, the average Japanese buyer would be concerned with both equally. To many in this country, the front panel of a Japanese receiver may look a little too busy. The Japanese have always liked functional details, and we see this in Japanese cameras, watches and hifi as well. In quad receivers, the number of controls sometimes is stag-

gering, and the flexibility often seems a bit exaggerated, by our tastes. However there are clear signs that tastes in the US are moving in similar directions.

Interestingly enough all nomenclature on audio hardware is in English, whether or not the item is destined for export.

THE SOFTWARE MARKET

What about the breakdown of the record market itself? There are four main categories of music sold in Japan:

1. English/American pop-rock.
2. Japanese pop.
3. Western classical music
4. Native Japanese, classical and ethnic music forms.

The first category is basically product made from imported master tapes, licensed from foreign affiliates. The big rock stars and hits in the US are popular in Japan as well. The second category is all but unknown in our country and consists of pop songs, usually with big band accompaniments, based upon native Japanese melodies. The third category is Western classical music, and much of this is recorded in Japan by their own symphony orchestras. In terms of releases, it represents a substantial part of the catalog, but I have no relative sales figures available. Judging from the record bins in some of the large stores, I would

certainly estimate that it does far better than the meager 4 percent of the market which it accounts for in the US. The fourth category is also one unknown in this country and is the very interesting and exotic world of the koto, shakuhachi, and other native Japanese instruments. It is a highly developed art form like the classical music of India and Indonesia, but one that most Western ears are not attuned to.

The balance of these categories in LP releases during 1973 was:

- | | |
|------------------------------|-----|
| 1. Western Pop/Rock | 39% |
| 2. Japanese Pop | 12% |
| 3. Western Classical | 27% |
| 4. Japanese Classical/Ethnic | 22% |

As an indication of the relative sizes of the major companies, we present their percentages of the total sales during the April-September period of 1973:

- | | |
|--------------------|-------|
| 1. Victor | 18.0% |
| 2. CBS/Sony | 13.6% |
| 3. Toshiba/EMI | 13.4% |
| 4. Nippon-Columbia | 13.0% |
| 5. King | 7.8% |
| 6. Polydor | 6.5% |
| 7. Warner/Pioneer | 5.0% |
| 8. Teichiku | 4.4% |
| 9. Phonogram | 4.0% |
| 10. Others | 14.3% |

THE JAPANESE QUAD MARKET

The relative growth of the various quad disk systems can be seen in Table I, which shows LP release percentages in the major formats over a 3-year period:

TABLE I

	<u>CD-4</u>	<u>SQ</u>	<u>RM¹</u>
1971	33%	15%	52%
1972	25%	26%	49%
1973	51%	24%	25%
3-year average	36%	23%	41%

During 1971, the many RM systems were still in the ascendancy; in 1972 SQ increased while CD-4 decreased. In 1973, CD-4 doubled its releases while SQ stabilized. Also, in 1973 the total of RM releases was about half that of the year before.

STUDIO RECORDING

An important difference between the Japanese studio scene and that of the US or England is the relative balance between independent studios and record company affiliated studios. In the US, the independent studio developed in the early years to satisfy the particular needs of the advertising industry, foreign language film overdubbing, and other specialized needs

¹ *REGULAR MATRIX* — A generic matrix standard established by R.I.A.J., which includes many of the quad system names mentioned earlier.

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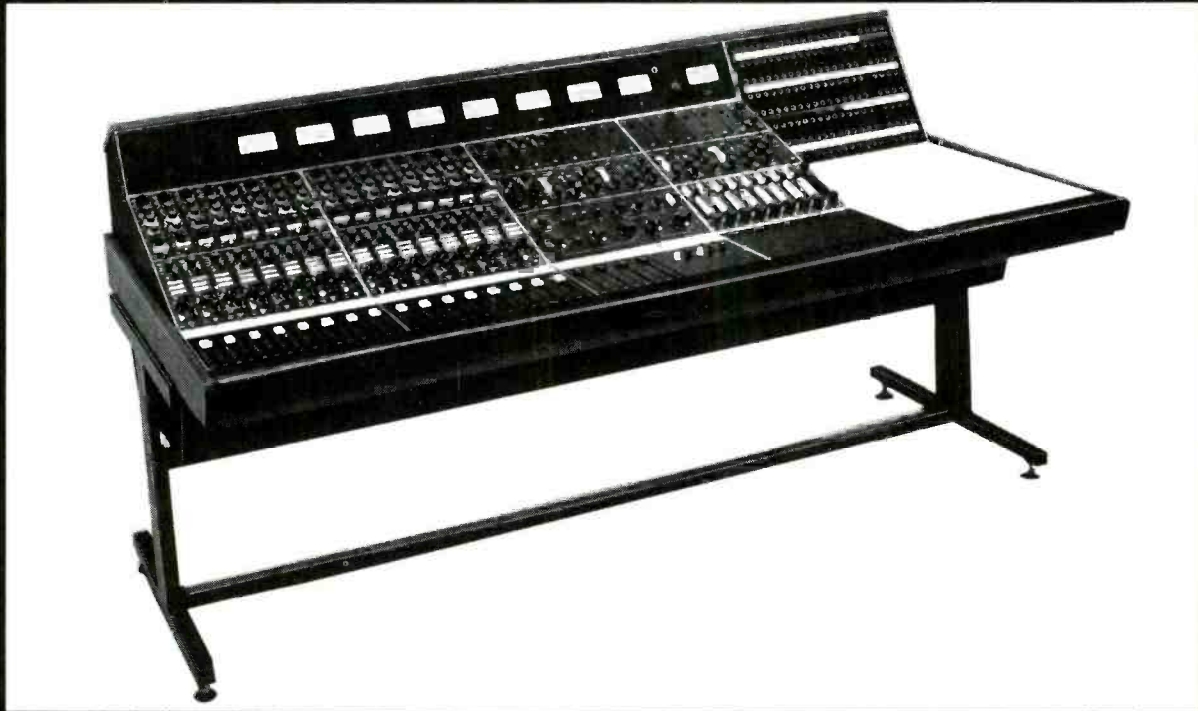
For complete information, contact your Fidelipac Distributor or



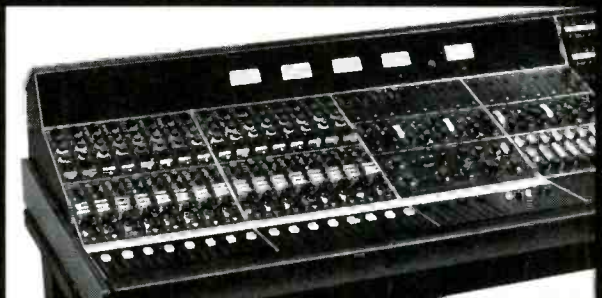
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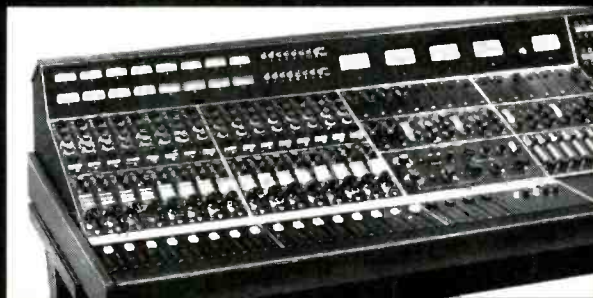
Neve presents the 3-in-1 console.



An unbeatable 8-track console.



A deluxe quadraphonic mixdown console.



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Neve

R-e/p 15

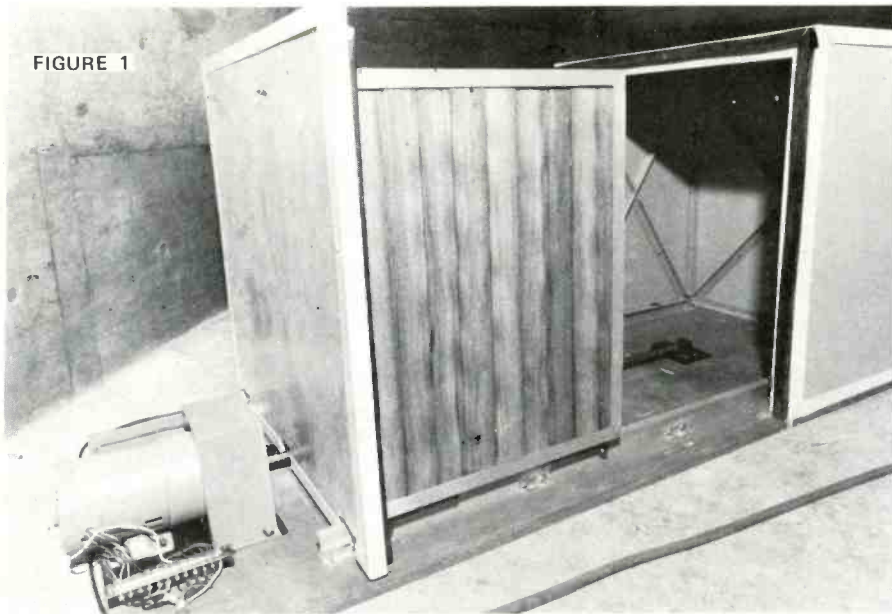


FIGURE 1

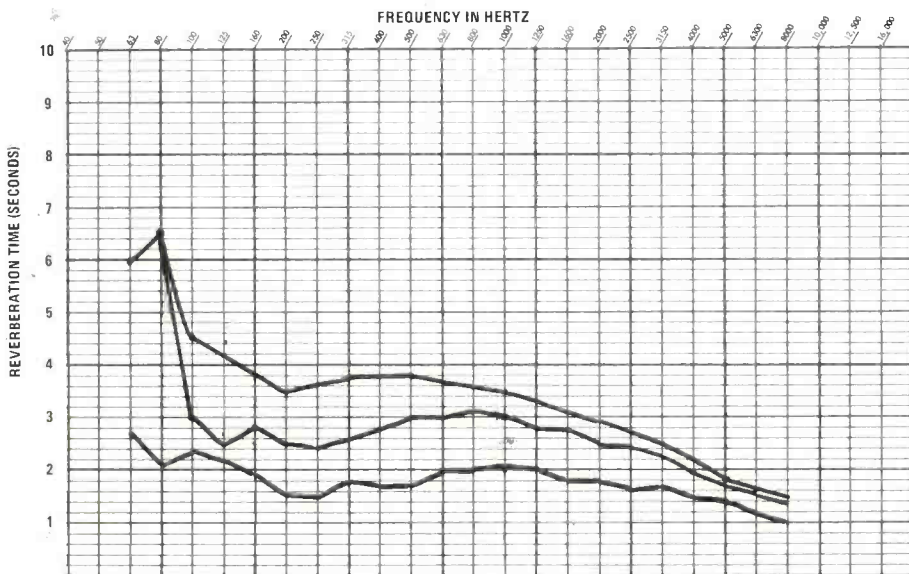


FIGURE 2: EFFECT OF ABSORBERS SET FOR HIGH, MEDIUM and LOW REVERBERATION TIMES.

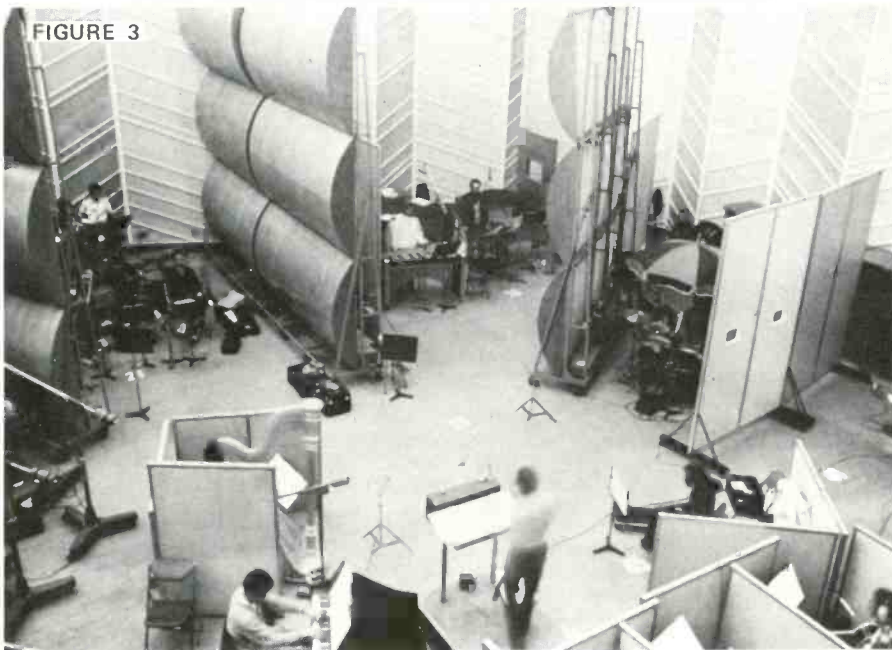


FIGURE 3

that couldn't easily be met by domestic film or record institutions. In recent years, we have seen independent studios proliferate as recording creative centers have become more regionalized.

In Japan, independent studios are a fairly new thing, and the bulk of recording is done in the in-house facilities of record companies. All personnel involved in mixing have had extensive engineering training and have comprehensive operational knowledge of all equipment. It may come as something of a shock for many in this country to realize that mixers in Japan perform their own maintenance on studio equipment, while the "engineering" department is that group within the studio structure engaged in fabrication, systems design, layout, and so forth. I was impressed by the wealth of technology and unstinting design efforts that went into most studios. At the Victor recording facilities for example, in their own building opened in 1969, the studios are thoroughly isolated structurally on all sides. Even the natural reverberation chambers were similarly isolated and were outfitted with remotely operated variable absorption so that reverb times could be easily changed. This is shown in Figure 1. Here, a volume of absorptive fiber glass can be moved in and out of a non-absorptive box by a motor-driven helix. The chambers are roughly 3,000 ft³ in volume and the range of reverberation control is shown in Figure 2. At 500 Hz, a reverberation time of 3.7 seconds indicates a total absorption in the room of 40 sabins. When the absorbers are opened, the total absorption rises to 88 sabins, effectively halving the reverberation time.

In the large Victor studios (53' x 75' x 30') there are a number of movable reflector/absorber panels about 18' high and 12' wide, with sections that can be tilted downward. As absorbers they provide excellent isolation, and as reflectors they provide the early reflections which add not only a feeling of dispersion to large ensemble recording but enable performers to hear each other better as well. These can be seen in Figure 3. At these studios, where VIP guided tours are a specialty, there is a second floor observation booth adequately soundproofed, where visitors can pass through and look down on the action.

By comparison with more recent US installations, Japanese studios have a rather institutional look. While we have gone in a direction of intimacy and warmth in the selection of materials and decor, the Japanese have been content to look only at function in a relatively clinical atmosphere. Another interesting observation is that the end product of the studio, even the independents, is not a master lacquer, but rather a master tape. Lacquer cutting is always done at the

pressing plant and, except under extreme conditions, is a one-to-one transfer operation. The specialized final tailoring that is often a very important part of the lacquer transfer operation in the US is rarely done in Japan. If a tape presents a problem in lacquer cutting, the tape is redone to correct the problem. There may be advantages and disadvantages in doing this. The obvious advantages are that the plant can relate the cutting procedure with its manufacturing operations and always insure that they have what we might call a "compatible" master lacquer for their process. Also, the plant is always guaranteed a reasonably short replacement cycle for getting new lacquers. Essentially the same technique is used in Germany, and in terms of record quality this practice may be quite significant.

What are its disadvantages? Many times we know that the final impact of a disk may result from important contributions made by a lacquer cutting specialist who may know the exact amounts of compression or equalization to add to a good tape to make it into a superlative disk. In the US, with widespread dependence on independent studios, there does not always exist adequate feedback around the entire recording/manufacturing loop to impress on the studio engineers the nature of the disk's limitations and the signal conditioning which should be incorporated into a working master tape. Even in the major companies in the US, this feedback loop is not always established, and corrective measures are expected to be implemented at the point of lacquer cutting. Thus, right now in any case, the creative lacquer transfer engineer is a very important part of our record making process.

Obviously, then, lacquer cutting in Japan is considered a part of the manufacturing operation and is supervised by people knowledgeable both of the mechanics of the disk medium as well as musical values. Each disk transfer system is thoroughly checked out on a daily basis and is maintained at peak operating conditions at all times. Most of the newer cutting systems are Neumann, but there are many Scully/Westrex combinations as well. Every attempt is made to transfer a given master tape on the same cutting channel each time a new lacquer is required. Transfer settings are recorded in detail so that replacement lacquers will always match previous ones. Earlier we mentioned the prominence of CD-4 in the Japanese quad marketplace. At the present time, the Victor Company of Japan is cutting all Japanese CD-4 product in their Yokohama facility, although other CD-4 cutting systems are used in Japan for research and development purposes.

Continued on page 67

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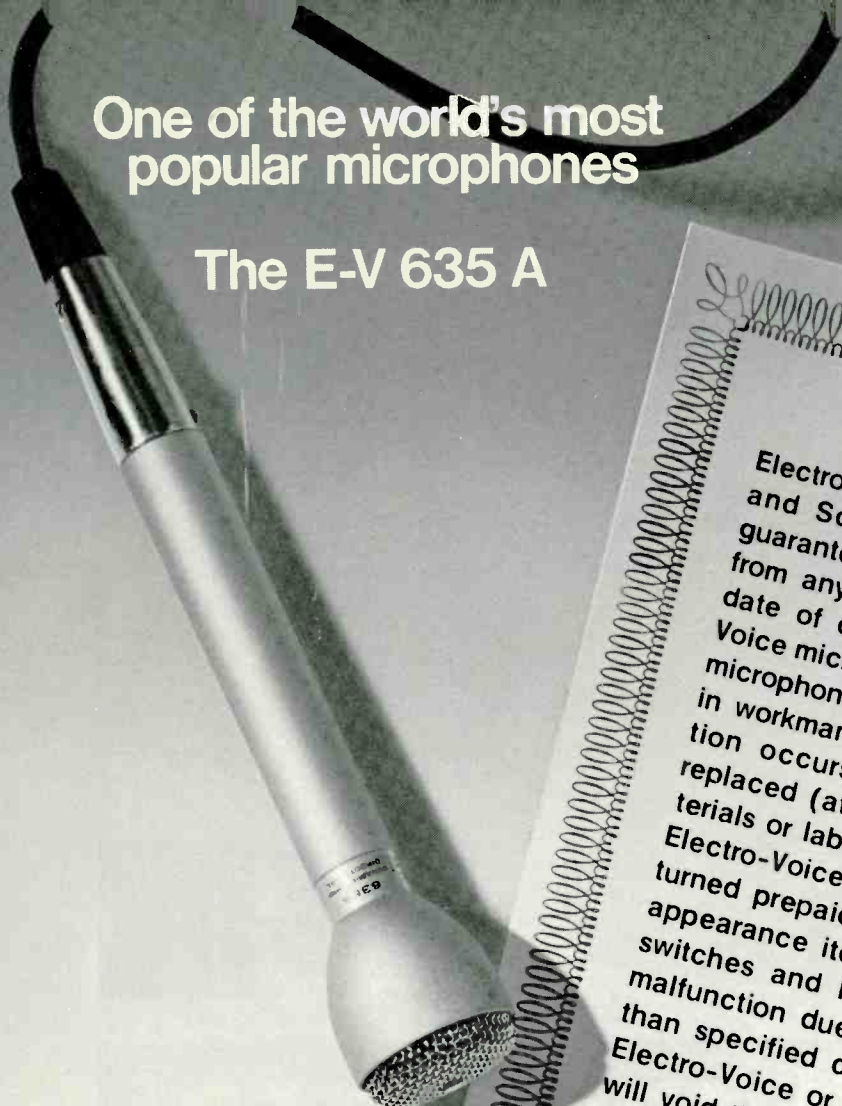
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THE 'PLANET WAVES' SESSIONS
 RECORDING BOB DYLAN
 at
 THE VILLAGE RECORDER
 Interviews
 With
 ROB FRABONI
 &
 DICK LA PALM
 by
 GARY D. DAVIS

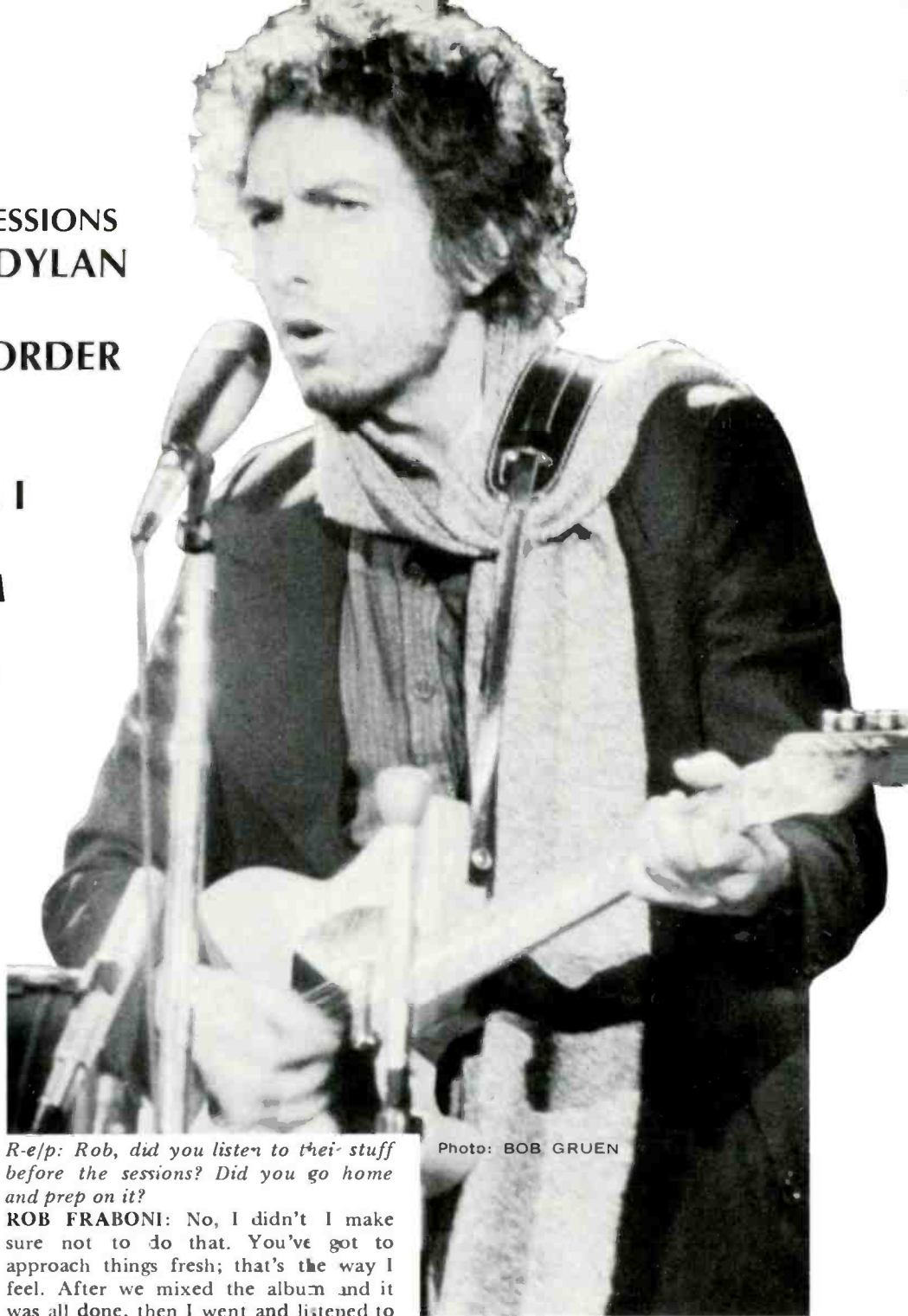


Photo: BOB GRUEN

R-e/p: Dick, how did you choose an engineer for the Dylan album?

DICK LA PALM: I left the decision up to Rob. I asked him who should do it. At the time we had 3 guys. Rob came back after a couple of days and said, "I should do it." I said, "Fine."

R-e/p: Rob, why did you decide to do it?

ROB FRABONI: Mainly because I was really familiar with Bob's music, as well as The Band's. I've been listening to them both since their first albums. I talked to the other guys, and it seemed like I was the most familiar.

R-e/p: Dick, do you feel that familiarity with the music is essential for a mixer?

DICK LA PALM: Engineers are much like the medical specialist. I just don't think that every engineer can do every kind of music. I think this guy might be a hell of a lot better to do an R&B date, as opposed to a Country & Western date. And one engineer might be a hell of a lot better to do a Dylan and a Stones. I'm not taking anything away from him; I'm sure he could do a Willie Hutch. I'm sure he could do a Little Milton or a Chuck Berry. But I don't know that he could do it as well as someone else who's really into that kind of music. I think there's a hell of a lot more to it than just knowing that board. I think it has to do with gut feel, and feeling for the music itself.

R-e/p: Rob, did you listen to their stuff before the sessions? Did you go home and prep on it?

ROB FRABONI: No, I didn't. I make sure not to do that. You've got to approach things fresh; that's the way I feel. After we mixed the album and it was all done, then I went and listened to his records. I didn't want to be influenced before the sessions. I just wanted to do it fresh, and that was what they wanted, too, Dylan and The Band.

R-e/p: Was there anything unusual about the way Dylan and The Band work which would affect the choice of an engineer?

DICK LA PALM: We talked about engineers. The one thing they wanted was a guy that not only knew the equipment and respected it, but someone who could work really rapidly. Knowing how a Dylan works — the guy says, "Let's do it now," and he expects the engineer can do it, just like that, without fumbling.

R-e/p: Why did Dylan and The Band record at Village? What did you have that made it just right for them?

ROB FRABONI: One thing, the room was right for them. As far as the size, they really liked that. And as far as the control room is concerned, they just wanted something that sounded good. It could have been done at a number of places, but we had a combination of things: the room, the security and the location. They liked the idea of being out of town (The Village Recorder is situated in West Los Angeles, about ten miles from Hollywood). When we actually got down to the mixing, Robbie was com-

Bob Dylan Comes Home

Rock messiahs, like their scriptural models, need a flair for the auspicious. The Second Coming of Bob Dylan—staged in the city where it all began—should appease the adventists of the cult.

Yes, there have been many other cities and thousands of other A. J. Webersmans to serenade on the traveling minstrel show that pitched its glittery tent at Madison Square Garden last night.

crowds go. They moved meekly when the guards told them to clear the aisles. There was an exuberant audience but far from the hashish of other concerts.

Dylan was into "Lay Lay." In his black su ruffled shirt with piping, he looked like between a rabbinical and a cowboy. And he was very small on

But the vocal delivery was less than the sweet quaver. At times, a note of "Just" he sang back archly.

There is a delivery that rages singing on the or what no is

Mary Travers, who he made the song a '60s classic was in the audience, swayed by the music.

20,000 at Garden Dig That Old Dylan Music

To record Bob Dylan and The Band... Wally Heider, Phil Ramone, Rob Fraboni, and Automated Processes

Bob Dylan's first New York concert in years... the high point of his 21-city tour... was Page 1 news.



Phil Ramone at the Automated Processes console, the Bob Dylan concert in Madison Square Garden.

To record this live concert, Wally Heider Recording, the world's leading remote recording organization, Phil Ramone and Rob Fraboni, the recording engineers for the session, used a console manufactured by Automated Processes.

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Blue Jeans For Bob Dylan

Bob Dylan closed his Madison Square Garden concert the other night with "Blowin' in the Wind" ("how many times must the cannon balls fly/before they're forever banned"), which may well be the nearest thing to the peace movement had. Bob alone on the stage with his guitar and guitar, Dylan and They Are A-Changin' hilariously give the

Dylan Ends Stand Here With 'See Ya Next Year'

Up on Stage: Adrenalin Time

You could sense it even before the concert began. The audience was expectant, even exultant. And when Bob Dylan and the Band trotted on stage last night at Madison Square Garden for the Manhattan concert, they were clearly exultant, too.

Nothing much was different in matters of format or repertoire from the concert Monday night at the National Coliseum, at least in the first half. But the adrenalin was flowing, and everything was different, after all. This was one of the great rock concerts.

Yes, the voices of Bob Dylan and the Band's singers still sounded a little tired from the rigors of the road. But Mr. Dylan was singing with a intensity extraordinary

Staring impassively into the darkness, Bob Dylan grunted the words, "an honor to be here," and sent 20,000 fans into a mature frenzy last night.

At last he was playing "the big one," as he has called his return to New York City, and a joyous, electric crowd welcomed him as he brought it back home.

Only a mile from the tiny coffee houses of Greenwich Village, where he became a national figure in the early nineteen-sixties, Mr. Dylan

cited as it awaited the show, knowing that Mr. Dylan had not given a concert tour in eight years.

When he greeted them with his familiar opening, "I'll go

For Dylan, the Dollars Are a Changin'

The show Bob Dylan and the Band put on at Madison Square Garden is the mid-point climax of what should wind up as one of the most profitable rock 'n' roll tours ever produced.

the seclusion of his life with his wife and five children in California.

"This is it," Gary DeFries said. "He'll never be back, maybe. I've been waiting 10 years to see him. And this is

that is, to reach \$1-million in sales. Some, including his first album, released in 1962, "The Times They Are A Changin'" (1964) and "Another Side of Bob Dylan" (1964) are not certified gold

Dylan Sends Garden Into Mature Frenzy

of love—proving that Mr. Dylan, as lines of age show in his own face, has become a man for most ages.

Last-Minute Check Earlier in the day, Mr. Dylan and his group, the Band, visited the Garden to perform a "sound check" of the equipment in the vawning arena.

\$110,000 for a chartered Boeing 707, according to Journeys Near and Far, the Los Angeles travel agency that booked hotels, limousines and flights.

Bob Dylan comes back from the edge

Wandering through the crowd during intermission last Wednesday night, one got a sense of an agonizing decision for Bob Dylan to

Dylan: 1

After intermission, Dylan returned alone to sing five acoustic numbers. "The Times They Are A Changin'" ran fast, and brilliant embellished harmonica broke new extended applause. "Don't Think Twice It's All Right," and "Gates of Eden." Like "Tommy" the latter was sung with an intensity which bordered on anxiousness. My notes made toward the end of the song read: "that made song great on record" "was calling on something" "him, bringing it out." "In performance he leans on drama." "He gritted, lips contorting 2-3" "s on one vowel, bitten off." "dramatized."

"Just Like a Woman" followed, it was sung slower, more contently. "It's Alright Ma (I'm Bleeding)" was done with hypnotic speed, sung up and proud and sane. It seemed Dylan had hit a stride, that he found his voice, a way to cope standing naked before 20,000

Dylan fan with ticket is gu... the songs the

fortable with what he was hearing, and that was the really important thing.

R-e/p: When you say Robbie, you are talking about...

RF: Robbie Robertson, (guitar, The Band).

R-e/p: Was he the producer?

RF: There was no producer on this record. Everybody was the producer. Robbie is the one who gives a lot of direction, although they all have something to say about the music, and are all really involved.

DL: He seems to be the one that has the most knowledge as far as engineering is concerned. He has tremendous knowledge about what equipment can do — what a board can and can't do.

R-e/p: Let's get back to the room. You told us that studio B was used for the album. What is it about this room that made it attractive?

RF: For one thing, you can work in here for hours and hours and not get fatigued. And you can turn this room up very loud and it won't hurt. Numerous people have commented on that.

R-e/p: What kind of monitors are you using?

RF: The room was conceived by me and designed by George Augspurger, and the monitors are custom built using JBL components and custom crossovers. Each enclosure has two 15" 2220 woofers, which are thin-cone units. They're also efficient, so our amplifiers aren't working so hard on the low end. It gives us a punchier bottom than a 2215, with a different coloration. The 2215 has a more rubbery sound. While the curve of our room might look like another room, it has a certain character. The 2405 tweeters are also part of the picture. I just really like the way they sound in this installation. The overall system has a very low fatigue factor, or whatever you'd call it.

R-e/p: What kind of a curve does the room actually have?

RF: Well, it was originally flat, but we tailored the high end a little differently. I found that having a flat monitor system was a terrible hype. The way we finally decided on the curve was that I went to a lot of studios and to a lot of people's homes and played music on different systems. I took notes and gathered the information.

R-e/p: Since the room is equalized, you could probably have achieved similar frequency response with other speakers. Was there another factor involved in the choice of these particular speakers?

RF: Well, I like 604's with the Mastering

Lab crossover. But they still have a beaming effect. That's one thing you just can't get away from, and that was the reason we decided to switch to units with better dispersion.

R-e/p: Without the beaming, what kind of coverage do you get? Where is the best sound in the control room?

RF: Realistically, the working area is the length of the console. You can sit at the producer's desk and hear well, although there is some difference from behind the console. As far as quad sound, it's surprisingly good for a small room. It sounds very large and open in here.

R-e/p: We've talked a lot about the control room. Let's discuss the studio for a while. For example, how many mikes were used in the sessions?

RF: As it turned out, I used about 28 microphones.



DICK LaPALM

R-e/p: That seems like quite a few mikes for a relatively small studio. Why were so many mikes necessary?

RF: 7 were used on the organ. Garth (Hudson) has got this elaborate Lowrey organ with a Leslie on each of two keyboards. One Leslie is a model 103, of which very few were made. It has stationary speakers with a phasing device in the tube-type amplifier, as well as 2 rotors. There was also a Hammond organ with a Leslie. Sometimes Garth would play both organs at one time, so we were miking three Leslies.

R-e/p: How about the other instruments?

RF: I often use a lot of mikes on the drums; I used about 7 or 8. I wanted to mike everything kind of tight in this case. Bob had an electric and an acoustic guitar, as well as his vocal mike. And it all had to be ready to go because they would just say "OK" and boom, you go.

R-e/p: We'd like to know a little more about the miking, and the diagram you're doing will help. But you just raised an interesting point. That is, what kind of a

recording artist is Bob Dylan? What was it like working with him? Dick mentioned and you are also hinting that Dylan needs an engineer who's on his toes.

RF: Right. Robbie came in that first morning and said to me, "There are going to be no overdubs. We're doing it live. This is it, what's happening here is it." Bob doesn't overdub vocals.

R-e/p: It sounds like Dylan was in the studio to perform, period.

RF: That's really true. The record was really a performance, as far as I'm concerned. It wasn't like we were "making a record." It was more of a performance, and Bob wanted it to sound right — to come across. When he starts playing, there's nothing else happening but that, as far as he's concerned. I don't think I've seen anyone who performs with such conviction.

R-e/p: Maybe we can back up a little and get some information on how the album was first conceived. And how long did Dylan work on it?

RF: I can tell you what I know, although I don't know everything. A few weeks before we started the album, Bob went to New York by himself. He stayed there for two to two and a half weeks and wrote most all the songs. One of the classic songs, "Forever Young," he told me he had carried around in his head for about three years. He gets an idea for a song sometimes, he said, and he's not ready to write it down. So he just keeps it with him and eventually it comes out.

R-e/p: When did he get together with The Band for this album?

RF: I'm not exactly sure but I know they had started rehearsing for the tour before we began recording. They only knew two of the songs on the album before coming in. The balance of the songs on the album they never heard until they were right here in the studio.

R-e/p: It appears The Band are pretty good musicians.

RF: They're really something. And it's got such character — the music sounds like it's all arranged. Bob would just run it down, and they'd play it once. Then they'd come in to the control room and listen. That's another thing that really astounded me. Nobody was saying, "You ought to be doing this," or "You ought to be playing that." They just all came in and listened to hear what they should do, and then they'd go out into the studio. That would usually be the take, or the one following. That was pretty much the way it went.

R-e/p: Were the takes run straight through from the top?



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RF: Yeah. Almost all of them were complete. The other thing was, if that wasn't the take, they'd do a few more. Sometimes, they would change the arrangements from take to take because it was still so fresh. Then they'd choose the one that felt best.

R-e/p: How many days did it take to do all the recording?

RF: They initially came in on Friday, November 2, to get set up and to get a feel for the studio. We did use one song that we recorded that day. They cut three or four things for the album on Monday. Just came in and knocked them off. Then on Tuesday they cut about four more things, and we used about three of them. We took two days off. Then they came in Friday and we cut the balance of the album that day.

R-e/p: So you really cut most of what you used in about three days.

RF: Yeah. Then we were assembling on Saturday, the next day, and Bob, myself, Nat Jeffrey (assistant engineer on "Planet Waves") and Bob's friend were here. We put together the master reels. Then around noon, Bob said, "I've got a song I want to record later," and I said fine. He said, "I'm not ready right now. I'll tell you when." We were doing what we were doing, and all of a sudden he came up and said, "Let's record." So he went out in the studio, and that was "Wedding Song," the cut that ends the album.

R-e/p: You mean he just walked out and it was a one-take?

RF: He just went out and played it. It was astounding. I hadn't heard him do anything that sounded like his early records. Lou Kemp, his old friend from Minnesota, was there. He also came on the tour with us. Anyway, Bob went out to record, and I put up some microphones, and I was going to get a sound. But usually he wouldn't sing unless we were recording. That's the way he was. You couldn't get him to go out and just sing, unless he was running something down with The Band.

Well, I said I was going to get a sound. He asked, "Is the tape rolling? Why don't you just roll it." So I did, and he started singing, and there was no way in the world I could have stopped him to say, "Go back to the top." It was such an intense performance. If you listen to the record, you can hear noises from the buttons on his jacket. But he didn't seem to care. Lou and I were both knocked out by the song. We listened to it a few times and didn't think about it again until we got down to mixing. I mentioned recutting it to eliminate the button sounds, at one point, and Bob said, "Well, maybe." But he never said yes, so we let it go.

R-e/p: Was that the last song they cut?

RF: Actually, the final recording happened during the mixing. We had mixed about two or three songs, and Bob, Robbie, Nat and I were there. Bob went out and played the piano while we were mixing. All of a sudden, he came in and said, "I'd like to try 'Dirge' on the piano." We had recorded a version with only acoustic guitar and vocal a few days earlier.

R-e/p: Were you ready for it?

RF: We weren't ready at all, we were mixing. But we put up a tape and he said to Robbie, "Maybe you could play guitar on this." They did it once, Bob playing piano and singing, and Robbie playing acoustic guitar. The second time was the take. It was another one of those incredible, one time performances.



FRABONI

JEFFREY

R-e/p: Was anyone else involved in the mixing?

RF: Robbie Robertson has a good ear for mixing, knows what he wants to hear. So it was pretty much him and Bob when it got down to mixing. Robbie and I mixed the record together, and Bob was there commenting and making suggestions.

R-e/p: Can you describe Bob's concern with the mixing, or at least the kinds of things he picked up on?

RF: Well, for one thing, he wanted certain types of sounds. He wanted a kind of bar room sound from the piano on "Dirge" rather than a majestic sound. He also wanted a raunchy vocal sound. We actually mixed "Dirge" immediately after we recorded it that night. Robbie and I listened to it once and I said, "Let's mix it right now." So we took a mix and that's what's on the record. It had a unique character. The sound of that particular mix made a lot of difference and was important to him. We did another mix later going for a more "polished" sound, but didn't use it. That's the kind of stuff he was sensitive

to, how the mixes affected the character of the music. That might have been more important to him than the sound quality.

R-e/p: Did it take a long time to mix the album?

RF: We came in and mixed a few songs. We would work a day or two and take a few days off. And we always worked from noon to about eight, really good hours. One of the songs, "Hazel," we used the way we first mixed it. But we remixed the other two because we felt we could do better. Once we got into doing them, we mixed the whole album in about 3 or 4 days. But then we spent more time than it took to record or mix just to sequence the record. Bob wanted to live with a few different sequences, until he found one that was just right.

R-e/p: How far did you go with the project, Rob? Were you involved in the Mastering?

RF: After the mixes were done, they virtually turned the whole thing over to me. They let me decide on the spacing between songs, and everything regarding mastering. I cut sets of refs for them for approval when I was satisfied, and then they gave me the final go-ahead.

R-e/p: We see the record was cut at Kendun. What made you go to that particular mastering facility?

RF: I did some checks, actually. I cut flat parts at a few places, and put 700-cycle tone at the front to get accurate comparisons of the cutting. From there I decided on Kendun. So I went out there, cut it, and that was it.

R-e/p: Kendun's room was done by Westlake, wasn't it?

RF: Yes. It sounded a bit bright in there.

R-e/p: That isn't surprising, considering the different monitor systems involved. Did you have any trouble adjusting to the difference and getting the right EQ?

RF: I suggested that we do nothing to it, and Kent Duncan, who did the cutting, agreed. I just relied on our previous checks of the mixes.

R-e/p: You mean when you got back to the Village with the refs, it sounded right?

RF: Yes, when we cut it flat. But we tried some EQ on the critical refs, a little on this and a little on that, and we couldn't do anything to really improve it.

R-e/p: So you think it's no problem to mix on one system and cut on another?

RF: No, I've done that. An even better

example was the album I did with Richard Green before we did Bob's album. Our studio was booked so heavily that we had to go outside to Sound Labs (Hollywood). It sounded very similar and was easy for us to adjust.

R-e/p: That's a 604 system with the Mastering Lab modification.

RF: Right. The bottom end is different in here, it goes lower -- down to

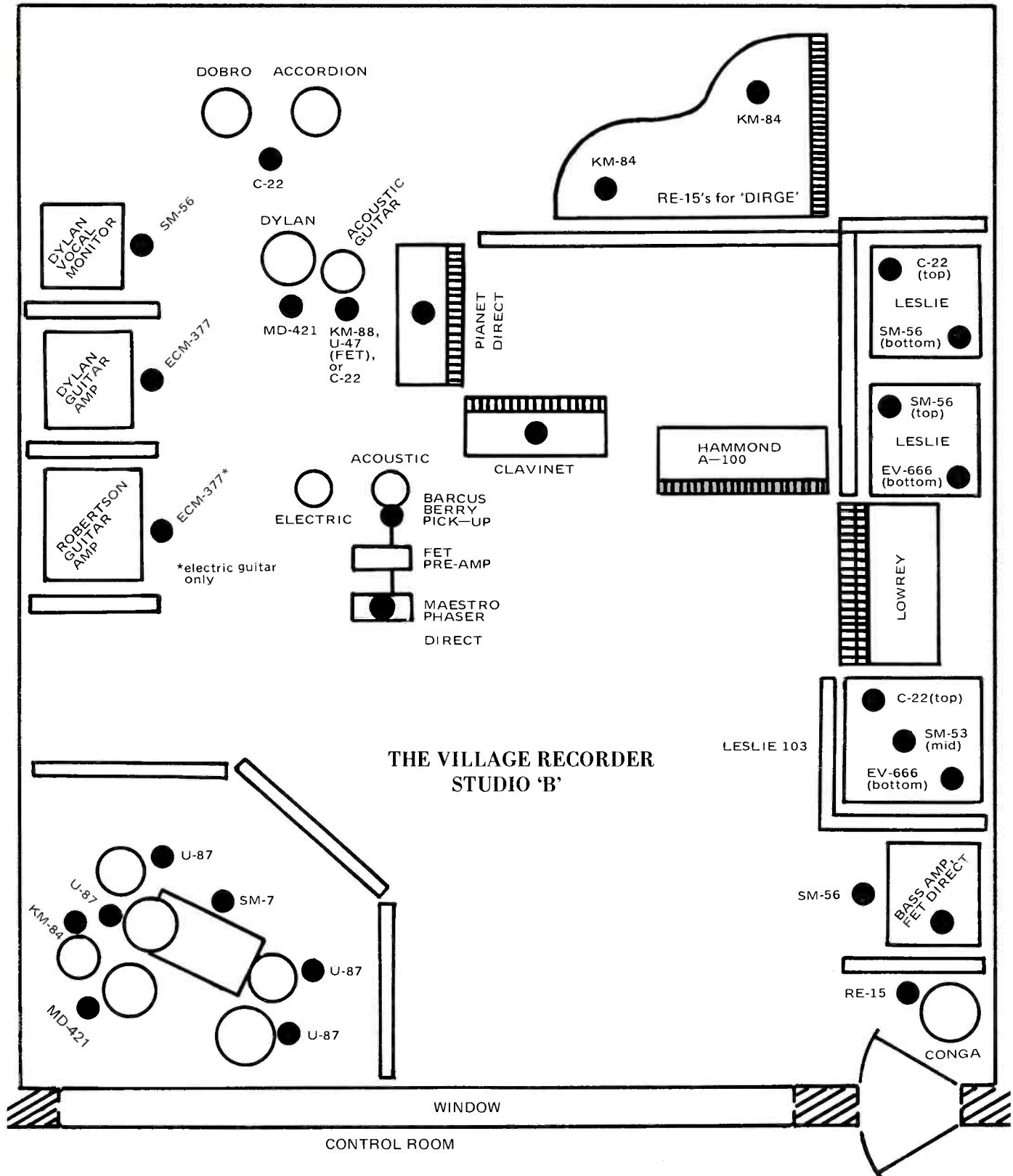
40 cycles almost flat. It just didn't sound like it was doing that at Sound Labs. Our bottom end has a certain feel to it, as well as a sound, which is different over there. But the high end sounded very similar, which surprised me.

R-e/p: What about people who like a different sound?

RF: Of course we're talking about taste. That's pretty much what it comes down

to. Some people like 604's, and you can't argue with it. What we do have in all our rooms is a speaker switching system. We have a rotary selector switch, with other speakers on custom made stands. They have small bases, telescoping height adjustment, and heavy-duty casters. They're sturdy enough to hold a 604E or 4320 and roll around.

R-e/p: You brought up the subject of



taste, and it reminds me that we were going to discuss the mikes used for the album. I wonder if you can describe Dylan's vocal mike, to begin with.

RF: We used a Sennheiser 421. But we went through five or six mikes to find out which would be best.

R-e/p: Did Dylan have a favorite mike?

RF: He preferred a 421 because he had used it before and liked it. Robbie suggested the 421. To tell the truth, it didn't cross my mind because I hadn't used it for vocals before.

R-e/p: Which one would you have used?

RF: As I said, I was experimenting, although there wasn't much time for it. The first day, we tried an SM-53, 57, an 87 and a 47. I figured the condensers weren't going to work because of leakage problems. We also had to consider popping, which was a problem with the 421 — especially because Bob doesn't like to use a wind screen.

R-e/p: What did that do to the sound?

RF: It worked out OK. He's always popped and seems to be used to it.

R-e/p: Did you use any de-essing or correction on the mix?

RF: No de-essing. We had a Pultec filter we would click in for the p's. We usually shelved the vocal at 50 Hz. Nat would sit over there and switch to 80 Hz just for the p's. On one song, "Dirge," I got Bob to use a wind screen. He used it, and it really worked well. So, to answer your earlier question, that was how we chose the vocal mike — experimentation, with an ear to leakage.

R-e/p: What are the leakage characteristics of the 421?

RF: Well, The Band was playing fairly loud and I was limiting Bob slightly, 3 to 5 dB. Live, we were getting -15 dB, tops, on the leakage, and that was incredible. I couldn't believe it. I'd look at the meter, and it was just barely moving. I was immediately sold on the mike. Plus, what leakage there was, sounded good.

R-e/p: Would you mind getting into more detail on the instrument miking?

RF: On the drum kit, I used quite a number of mikes: a Shure SM-7 on the bass, Sennheiser 421 on the snare, KM-84 on the high hat, and 87's for toms and overheads. I experimented with the set a little bit.

R-e/p: Was there anything you particularly like in that combination of drum mikes? Is it a favorite set-up?

RF: It just worked. The Band likes a thick tom sound, and the proximity effect of the 87's worked to our

advantage in this respect. And I like the sound of condenser mikes on drums, so that's why I chose them. On the high hat, I have found the 84 just works well on almost any set. I've got about three or four different mikes I use on snares, based on the kind of sound the drum set has.

R-e/p: So you try to get a sound tailored to the specific situation?

RF: Yeah. I don't have a set up that I use on every drum set.

R-e/p: You really seem to be enthusiastic about the drums.

RF: That's probably because I play drums. I feel they're really an important part of a good sounding record. I have a feeling for musicians, having played myself. I always go out in the room and listen. They'll run through something and I'll stay in the studio. When the musicians come in initially I always ask, "What's the most comfortable way for you to set up?" I tell them we'll start from there, and if there are any problems, we'll rearrange things. It helps a lot — when you give musicians that kind of room, they feel better.

R-e/p: Let's run through the rest of the miking. The diagram you prepared shows a lot. What about the choice of piano mikes?

RF: We used two KM 84's. I tried a couple of things. I miked both facing the hinge. One of them was almost to the end of the harp, and about 12" toward the hammers — about a foot to 18" from the hinge. The body of the mike was parallel to the soundboard, about 2" up. The other mike was in the same basic position, but angled a bit toward the soundboard — about 30 degrees. It was in the high end section of the piano, nearer the holes. It worked really well, with practically no leakage at all.

R-e/p: Did you have the top open?

RF: I had it on the short peg, with it really covered. We were all surprised how low the leakage was. But when I did "Dirge" with Bob, we used a completely different set up, mainly because he wanted it that way. I had it open all the way, no covers, nothing.

R-e/p: Did the piano get into his vocal?

RF: No, he sings so loud. Interestingly enough, the one thing that leaked into the drums was Bob's vocal. That's one reason the leakage was so low. He really sings hard. In fact, he was leaking so badly into the uncovered piano that I had to experiment. I used RE15's. I faced them toward the back of the piano, instead of the hammers, and it worked really well. It took a bit of EQ, but as far as leakage went, it was really

excellent. Plus, as I said, he wanted a more "far away" sound for that number.

R-e/p: Were there any other unusual or special miking techniques?

RF: Let's see. We used a special direct box for the bass. Our maintenance man, Ken Klinger, built it. It's a solid state, discrete, FET type. We used that on the bass, and miked the amp — a twin reverb, I think — with a 56.

R-e/p: It's becoming easier to see where all the mikes were used. According to the diagram, there seem to be quite a few more instruments than there were players. Were they all used in the same session?

RF: Yes, sometimes. There was a pianet and clavinet — both were direct. Rick (Danko), who played bass, also played fiddle a bit. And there was an accordion. There was also a Dobro guitar. I had extra mikes up for these instruments, for whatever might happen. The Band didn't do any singing on the album. And that's it.

R-e/p: With all the close miking and the experienced musicians, did the actual levels in the studio tend to be low? And, if so, did everybody wear phones?

RF: The levels were medium-loud, and they could hear each other in the room. They would occasionally wear phones.

R-e/p: What kind of mixes would you give them? Heavy on their own instruments, just the other guys, or what?

RF: A stereo mix of the whole thing, and they loved it. They had Sennheiser 414 phones, and the stereo worked out very well, especially for Garth. I could put one Leslie in one ear, and the other Leslie in the other ear, and it gave him the perfect effect because that's what he does. He puts the Leslies on either side of the Lowrey so that when he uses the different keyboards, the sound goes back and forth.

R-e/p: As far as your monitoring was concerned, did you listen in mono at all?

RF: Yes, a lot. That's a sure-fire way to acoustically catch phase problems.

R-e/p: But what do you do with something like the Leslie, where the phase is all over the place?

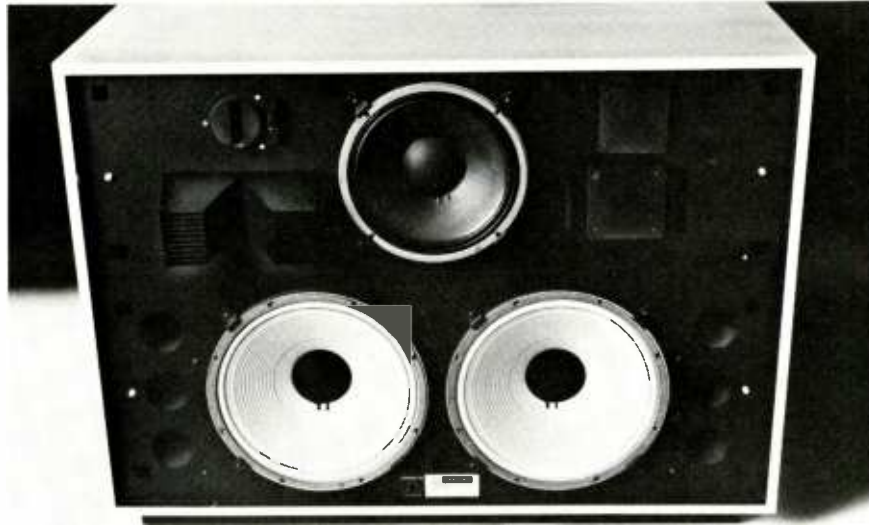
RF: That's a whole different circumstance. You just do your best to make it sound good.

R-e/p: We have led you into long discussion about miking, and you have told a lot about your decisions. But we'd like to play the Devil's advocate for a minute, and to ask you how important the miking really was?

RF: It was very important. I'm doing a

continued on page 29

Nobody ever made a monitor that could match this sound.



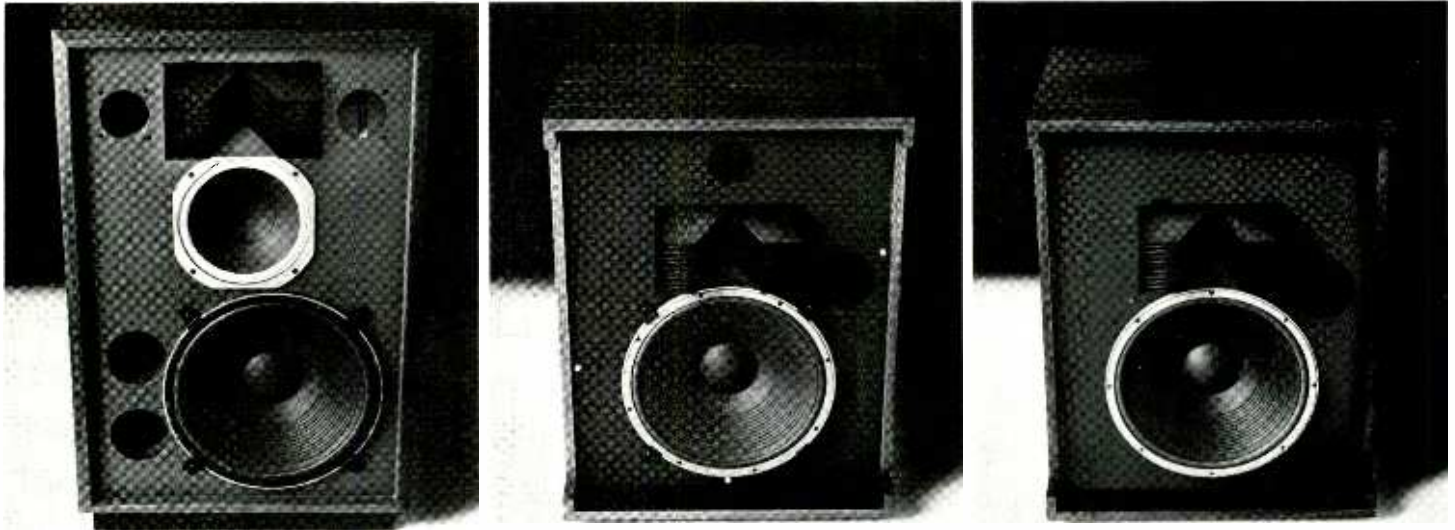
Type of System	4-way
Components	(2) 15" low frequency loudspeakers (1) 12" midrange loudspeaker (1) High frequency compression driver with horn lens (1) Ultra high frequency compression driver
Frequency Response	30 to 20,000 Hz \pm 3dB
Sensitivity (SPL at 30' 1mW)	46.5 dB
Power Output (SPL at 10 ft. in a room volume of 2000 cu. ft. with 1/2 rated power input - 150 watts)	110dB
Crossover Frequency	250, 1100 and 9000 Hz
Size	35" x 48" x 20"
Net Weight	243 lbs (110 kg)
Configuration	Bi-amplification only
Price	Utility finish shown \$1314 Walnut finish \$1464
-	

The 4350. Three years ago JBL's technical staff was asked to produce the best studio monitor that technology and artistry could create. That was their total assignment. Considerations of cost and monitor size and studio application were secondary. The search was for a sound. The name was 4350. Its birthday was April 13, 1973. And, from the day it was born, it was the best sounding studio monitor money could buy:

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Type of System	4-way	3-way	2-way
Components	(1) 15" low frequency loudspeaker (1) 10" midrange loudspeaker (1) High frequency compression driver with horn lens (1) ultra high frequency compression driver	(1) 15" low frequency loudspeaker (1) High frequency compression driver with horn lens (1) Ultra high frequency compression driver	(1) 15" low frequency loudspeaker (1) High frequency compression driver with horn lens
Frequency Response	35 to 20,000 Hz \pm 3dB	35 to 20,000 Hz \pm 3dB	35 to 15,000 Hz \pm 3dB
Sensitivity (SPL at 30' 1mW)	44dB	44dB	44dB
Power Output (SPL at 10 ft in a room volume of 2000 cu ft with 1/2 rated power input—37.5 watts)	101dB	101dB	100.5dB
Crossover Frequency	250, 1250 & 9500 Hz	800 and 8500 Hz	800 Hz
Size	38"x24"x20"	30"x24"x20"	30"x24"x20"
Net Weight	179 lbs (81 kg)	121 lbs (55 kg)	96 lbs (44 kg)
Configuration	for bi-amplification or with high level network	for bi-amplification or with high level network	for bi-amplification or with high level network
Price	to be announced	to be announced	to be announced
Availability	June 1974	June 1974	June 1974

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Circle No. 115

R-e/p 27

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Model 8X4-100-2C portable eight-input four track mixer shown at left includes trackswitching, echo send, equalizing, two compressors, conductive plastic sliders, VU meters, at \$2012.00 FOB Houston. Options include eight different types of interchangeable plug-in modules (see right), internal reverb. The Series 100 also comes in 16 and 24 input mainframes.

Shown below, the **Series 300 Model 24X8 mixer in 24C8 console**, a 24 input eight track mixer with pushbutton trackswitching, multifrequency equalizing, echo send, panpot, cue/solo, 6" conductive plastic sliders, two monitor mixdowns, masters and VU's, talk/slate module, fully wired with input and output connectors at \$10,640.00 FOB Houston. As shown, but 16 input Model 16X8, \$7860.00 FOB Houston.



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SERIES 100 four track mainframes for plug-in interchangeable Series 100 modules include the portable Model 8X4 shown at left, and the Models 16X4 and 24X4, which are in folded pans for console mounting. Eight module options include:

Model 100A with Bauxendall type equalizing, pushbutton trackswitching, **Model 100AP** as above but with panpot instead of pushbuttons,

Model 100AQ as above but with 4-way dual concentric panpots,

Model 100C same as A but with 40 db compressor,

Model 100CP as above but with panpot instead of pushbuttons,

Model 100CQ as above but with 4-way dual concentric panpots,

Model 100B with three equalizers with choice of three frequencies plus panpot,

Model 100R for live rock concerts has panpot to main feeds, four independent monitor feeds, echo send with pre/post switch, equalizers.

Series 100 mixers can be supplied with internal spring reverb on one track.

SERIES 200 two track stereo mixers come in standard 8X2 portable two track panpot mixer with Bauxendall equalizers, echo send, conductive plastic sliders, setup oscillator, master and VU meters; can be slaved to give 16 or more inputs, also nicad battery option, 16 or 24 input versions on special order.

SERIES 300 offers eight track 16 and 24 input fully wired mainframes with power and XLR type input and output connectors, plug-in input modules with nonexclusive pushbutton track selection, panpot, echo send, cue (which doubles as monitor-only solo), three octave-wide peaking boost or cut equalizers with a choice of three frequencies on each, adjustable input gain and input pad, line/mike switch, and a six inch conductive plastic slider. Each module is provided with balanced 200 ohm mike input and bridging single ended line input, as well as module output. Using module outputs, more than eight tracks can be fed. The fully modular system also includes masters and setup oscillator on the output module, and up to three mixdown-monitor modules with automatic transfer of cue to monitor if desired, and mixer-playback switch; the talk-slate module includes slate track select and talk-back/slate microphone.

ALL INTERFACE ELECTRONICS mixers are capable of performance comparable to the finest professional equipment, and insure reliability through the use of plug-in integrated circuits, plug-in modules, conductive plastic sliders, gold plated card and IC connectors, tantalum or computer-grade condensers.

COMMON SPECIFICATIONS
FREQUENCY RESPONSE:

± 1 db 20—20,000 Hz

EQUALIZING:

± 12 db at specified frequencies

DISTORTION:

less than 0.1% THD @ 400 Hz, + 3 VU

NOISE:

less than 0.6 microvolts equiv. input

INPUTS:

MIKE: 200 ohms balanced, XLR type connector max. level 0.5 volts RMS max. level 5 volts with int. pad (100B, R)

LINE: 10K unbalanced phone plug

OUTPUTS:

TRACK: approx. 1 volt RMS at zero VU unbalanced, to not less than 600 ohms, XLR connector

ECHO: same as track, but phone plug

ECHO RETURNS:

1 volt RMS into 5K required, phone plug

quad mix of it now, and I've been away from the 16-track for about 2-1/2 months. And I was astonished when I put those tapes up. Bob was right in the middle of the room, with all these musicians, and without baffles. The leakage is really low, especially for the size of the room and the fact that they were playing pretty loud. There is no leakage to speak of, and I really feel it's in the miking.

R-e/p: Did you use any noise reduction on the 16-track masters?

RF: No, just 30 ips. There's no noise reduction on the whole record.

R-e/p: You said you used a little limiting on some of Bob's vocals. Was any other limiting necessary?

RF: I used a little limiting on the bass, very little. It was just there in case; Rick, all of them, are so great in the studio. They know just what to do. Bob works the mike. He gets on it when he's supposed to be on it. He was great about it. They all know just what to do, so a little bit of limiting on the bass and the vocal was about all we needed.

R-e/p: How about equalization? Did you use much of it, in addition to the piano EQ you mentioned for "Dirge"?

RF: There is relatively little EQ on anything. Vocals were all cut flat. But I do tend to get rid of frequency response that isn't needed on the instruments.

R-e/p: You mean you roll off the high or low end accordingly?

RF: Say, on the drum overheads; I got in tight on the cymbals and I didn't want to get a lot of bottom end on it. So I just rolled off a certain amount of the bottom end. I like to use equalizers for things like that.

R-e/p: That would help with crosstalk, too.

RF: Right. That was one approach. They might have wanted the guitar to sound a certain way, so we might have used some EQ on that. For example, the piano was recorded relatively flat. We arrived at the right combination of his touch, the microphones, and the positioning, so I didn't need the EQ.

R-e/p: How about echo? Did you use much, and was it equalized?

RF: We used echo in the mix. We used a few things: an Eventide digital delay, two EMT's with a little EQ, and acoustic chambers on a few things. We also used 15 and 30 ips slap (tape delay), with a VSO to tune it in very carefully.

R-e/p: In talking with you, Rob, you seem to have a pretty good grasp of the technical realities of the studio, in

addition to your obvious involvement on the creative side. What kind of technical background do you have?

RF: I did the Institute of Audio Research course on systems design, and the one on Studio Technology. I took an electronics course for two years, also. It may seem unrelated, but at one time I was a calibration repair technician and a mechanical inspector for precision machine parts. I even took a course in shock testing and vibration from the Tustin Institute of Technology. But I can do what needs to be done. For example, I layed out wiring and run sheets for the studio upstairs, and worked with George in putting this studio together. Now I realize how valuable it all is. We try to train engineers who work here and want to expand their background.

R-e/p: Do you think that mixers should also have musical training?

RF: I don't think it's a necessity, but I think music education is a definite asset.

I feel, the more you know about music, the better engineer it helps you to be. Because it's a matter of fusing the engineering with the music; to me that's what the whole game is about.

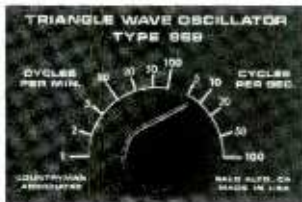
R-e/p: In other words, it helps you direct your gut feelings?

RF: Yeah, that's why I think some of these guys, like Jerry Masters of Muscle Shoals, for one example, are on it. The magic in their work is that they know exactly what the mix should be to make the music sound and feel right. It's really not a technical thing. Yet, it's interesting to note that some people, forceful talent -- Dylan's a good example -- you could record with one mike and it still gets across. It then gets into degrees of greatness, or of feel. You can keep polishing the gem, but it's a gem to begin with. That, to me, is a great thing -- to be fortunate enough to work with people like that.

□ □ □

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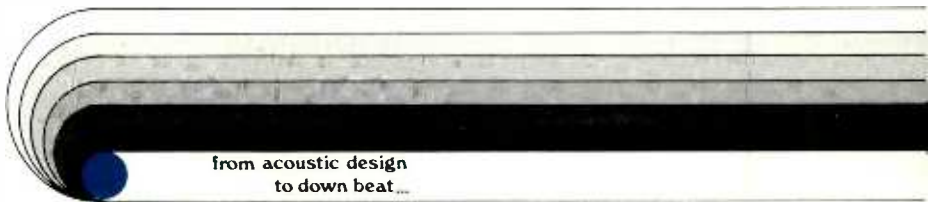
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from acoustic design
to down beat...

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I. Control Room

Acoustical and Geometric Design by Westlake Audio

A. Frequency Response

± 3 dB upon installation, 31Hz-16KHz measured with B & K, 1/3 octave, pink noise source.

B. High Frequency Dispersion

± 2 dB maximum @ 10KHz across a minimum 10 foot horizontal plane at the console (from left of the mixer to the right of the producer or vice versa) **from any one of the four monitors**, measured with pink noise source.

± 2 dB maximum @ 10KHz across a minimum 5 foot horizontal plane front to back of the mixer or producer **from any one of the four monitors**, measured with pink noise source.

C. Power

116 dB SPL minimum, linear scale, with broadband pink noise source from one monitor measured at the mixer's ear. The control room potential with four monitors is a minimum of 128 dB SPL.

What the above really means is that as the mix is being created, the mixer and producer will accurately hear the same music timbre balance.

II. Studio

Acoustical and Geometric Design by Westlake Audio

A. Room Character

The characteristic "room sound" which results from recording in a three dimensional area is eliminated by the utilization of an active ceiling providing a minimum of 50 dB attenuation @ 40Hz. This, in effect, produces an infinite third dimension such as would be present in an amphitheater.

B. Decay Time

Multiple decay times of various frequencies may be incorporated into the studio design. Thus a tight rhythm sound may be achieved in one area while a bright string sound is obtained in another.

Performance Specifications

Westlake Audio *

C. Multi-track Separation

Active traps are built into the studio walls which allow "in-studio" vocals, eliminating the usual need for vocal booths. 40 dB of isolation can be provided between the band and a vocalist only 10 feet away resulting in 40 dB of isolation @ 40Hz or tuned to selected frequencies.

D. Drum Isolation

A drum cage is provided, either built into the structure or on a movable platform. Again an infinite third dimension is achieved through an active ceiling design. The highest sound pressure level (SPL) are generated by the bass drum at 90Hz and the stick on the cymbal at 8KHz. These are attenuated a minimum of 24 dB measured one foot outside the drum cage. If desired, the cage may be built to project mid frequencies into the studio to give the musicians a better "feel." The "character" of the drum cage may also be designed for bright, dim or variable results.

E. Bass Traps

Bass guitar traps are incorporated into the design to provide 24 dB of attenuation at 40Hz with an SPL of 116 dB exciting the trap.

F. Piano Trap

A piano trap is also included for the purpose of rejecting unwanted sound from the studio to the piano microphones. The broadband rejection to the piano trap will be in excess of 20 dB.

III. Live Quad Echo Chamber

Acoustical and Geometric Design and Active Components by Westlake Audio

A. Timbre

Variable control of low frequencies from section to section of the chamber.

B. Decay

Individual variable control of decays from all four chamber areas.

C. Echo Mix

Variable mix of echo content, parent to decay.

D. Depth

A three dimensional effect in echo content thru the use of two MS stereo return (4 channel).

E. Stereo

If stated prior to construction, the quad chamber may be used as two independent stereo echo chambers.

Which other professional studio design company will guarantee in writing these features and specifications, prior to construction?

*On all jobs commencing March 1974 or later.

Kent R. Duncan, President, Kendun Recorders, Burbank, California: "The new room has been in operation for six months now and our success is as much a tribute to Westlake Audio and Tom Hidley as it is to our long hours and attention to detail (and possibly some good engineering). Our Westlake room made us a 2 studio operation but instead of just doubling our gross, we went from \$12,000 a month to \$60,000 a month. The incredibly accurate planning of our Westlake turnkey installation resulted in completion exactly on time, response precisely as promised, all equipment functioning within one day of installation, and all within budget! In the past six months we have mastered such acts as Stevie Wonder, Bob Dylan, America, Buddy Miles, Fleetwood Mac, Rick Nelson, Tower of Power, Livingston Taylor, Isley Bros., Rod McKuen, Nitty Gritty Dirt Band, Emitt Rhodes, Richard Greene, El Chicano, Nana Mouskouri, Cleo Laine, Bola Sete, San Sebastian Strings, Jo Stafford, Maxayn, Pharoah Sanders, Archie Shepp, Ballin' Jack, Vickie Lawrence, Maureen McCormick & Chris Knight, Don McLean, Vikki Carr, Bill Medley and even Rodney Allen Rippy. Over half these acts were recorded on Westlake monitors in various studios around the country, attesting to the fact that truly, you are *the* professional."

Christopher Stone, President, Record Plant Recording Studios, Los Angeles: "As you know, we have used Westlake Audio and yourself since the inception of the company for all of our studio design, construction, electrical interface and implementation. During the past four years you have designed and implemented eight studios for us in New York City, Los Angeles and Sausalito. Obviously we are known as a Westlake-designed operation. We have built our total reputation around your studio design and have always been happy with our decision to utilize you on an exclusive basis for all our acoustical requirements and equipment consultation. The success of your design speaks for itself in the form of our success as an independent studio operation."

John Sandlin, Vice President A & R, Capricorn Records, Macon, Georgia: "All of the work done was of a quality that is almost non-existent today. The people from Westlake *cared*, and saw to it that their work was of the highest standards. The carpentry work is incredible. The complete construction and equipment interfacing went more smoothly than can be expected in such a major undertaking. Westlake's delivery dates were either on time or before the time they were promised. The real test, however, is in the performance of the control room. Our room sounds great and objectively measures great. Also, the room is comfortable and easy to work in. It is really a pleasure to work with people of the integrity and abilities of Tom Hidley and Paul Ford and the rest of the Westlake personnel."

*Complete, unedited photocopies of these and many other testimonial letters are available on request from Westlake Audio.
Phone or write direct to Tom Hidley, President.*

Michael Nemo, Independent Recording Engineer: "My clients and I have found that the closest approach yet to a true standard is the integrated concept of speaker and room acoustic control found in studios built by Westlake Audio. What a pleasure to go from one Westlake installation to another and not have to be concerned about compensating for too much or too little bass, or high frequency response."

John Boylan, John Boylan, Inc., Hollywood, California: "First of all, this is my third project in a row to be mixed on your monitors and once again it looks like we have a winner — a record that sounds as good at home as it did in the control room. From a producer's nontechnical viewpoint, this ability to trust a studio monitor and come out with even results is extremely satisfying. Secondly, the Westlake Monitor never seems to vary in any substantial way from studio to studio, in the control rooms that you've designed. So I have no worries about consistency in today's widely dispersed recording scene."

Edward J. Green, Director of Engineering/General Manager, MGM Recording Studios, Los Angeles, California: "The studios and the control rooms have been completely successful for MGM Records from the time they were finished. Our mixers have, for the first time, the kinds of 'acoustical tools' that are needed for contemporary recording. That is, multitrack recording with all but complete isolation of elements whose parts can be later mixed or deleted and replaced. In the control room, the mixer and producer must be able to accurately monitor the recording so as to make technical and artistic judgements. Your booth design and particularly the Westlake monitors have proven themselves thoroughly workable and accurate. It is to your credit that these recording systems have withstood this test of time, particularly during the last three years, and that we wish to make no changes in studio or control room design in the immediate future."

Robert M. MacLeod, Jr., Artisan Sound Recorders, Hollywood, California: "Now that we have been in our new building for a couple of months, I thought you might like to know how it is working out. About all I can say is fantastic! We have had nothing but good reactions to the monitoring systems, and the acoustics of the mastering rooms are superb. Almost everyone who comes in comments on the quality of the workmanship. We have encountered no problems at all, and we find it a joy to cut records without the constant noise of the vacuum system in our ears. Producers seem to agree, and I am sure these beautiful new facilities will put us in a far stronger competitive position in the industry. In today's world of shoddy workmanship, it is really a delight to see the results of such painstaking care."



from acoustic design
to down beat...

**Westlake
Audio**

6311 Wilshire Boulevard
Los Angeles, California 90048
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in the middle of the board.

R-e/p: Is all of the tuning done after monitor installation? Or can some tuning be pre-planned?

GA: One thing we do on these custom monitors is run the enclosure design through analog circuit simulation. Computer analysis, if you want to call it that, to determine the optimum size, and if it's going to be ported, the optimum port frequency. In this case, we decided as an experiment to go back and use one of the older models of JBL woofers. I felt and Rob felt that we might get a little more of that sort of tight bass, that extra sock, with the 2220B rather than what we think of as neutral consumer loudspeaker sound. And, in any case, the enclosures would allow substituting any other kind of woofer, if we later decided to change. But it turned out to be very successful, I think. It's a neutral sound, and yet at the same time, it has a little bit of that up front effect that the mixers like.

R-e/p: What does it? Is it the thin cone?

GA: It's hard to know. Theoretically, yes, it's the fact that the speaker is not as well behaved as another kind of speaker. But how well behaved any monitor is at the levels some mixers run is a moot point in itself.

R-e/p: What role does the floor play, insofar as low end is concerned, at least the area of the floor that the console and mixer are on? Do you do anything special with that, or are there special problems that can develop with it?

GA: Problems can develop. Although it's not really as serious as a lot of guys like to think. There seems to be a lot of mystique about the platform. And engineers will go in and thump on the floor, and if they feel it give, or if they hear it resonate, they figure, "Well, this is bad. We're not going to get any bass." Well, maybe, maybe not. If it absorbs some bass you'll really get more, at the console location. In general, we try to keep the platforms rigid; we try to keep them non-absorptive. In this case there was no change made in the existing platform. It was solid, it was well done, so it was left alone.

R-e/p: What about the decision to use bi-amplification? Is it necessary?

GA: The system is bi-amplified using a specially designed, phase-compensated low-level crossover circuit. It helps give us a smooth transition from woofers to mid-range drivers, and avoids the common sag in power response through the 300 Hz region exhibited by many studio monitors.

R-e/p: George, thank you very much for going into this kind of detail with us. There are a few general questions we have.

Everybody talks about a sound pressure level of 100dB or 110dB. What scale are they using? What scale are you using?

GA: OK. The accepted scale on which all these SPL figures are given is basically simple, and it's a standardized one. It starts from 0, and 0 is about the softest sound that a very young person with very good hearing can possibly hear. For most of us, in real life, the softest sound that we are apt to be able to hear is somewhere around +10, +15dB. In terms of actual power, 0dB is 0.0002 dynes/square cm., which is now called 20 micronewtons/square meter. Everything is based on that, all the sound level meters are calibrated to that. Now, there's one other thing. You can either throw in a weighting factor or not. In community noise measurements, it's almost always used with an "A" weighting characteristic, which tends to emphasize the middle frequencies where your ear is more sensitive. For most studio use, where you're talking about monitors, we use the broad band spectrum, since this is what you're reproducing. In this room for example, any one of those speakers can develop something over 110dB SPL at the console on musical material.

R-e/p: Another subject. Can distortion in the program material adversely affect speakers at high power levels?


GA: It can. I can think of a couple of


situations in which it might. One is the situation in which, let's say, all the low-frequency distortion products get transferred to the higher frequencies and help blow out the tweeter. The other is sort of the inverse, and that's the kind of wild gyrations a given amplifier may go through once it's been driven into clipping and has to recover. If, as some of the famous old hi-fi amplifiers that we remember, the thing goes into a 5 cycle oscillation and starts sending horrendous currents through the whole speaker system while it's settling back down again, it might very well do some funny things to the speaker.

R-e/p: Is there any sort of circuit that doesn't distort your sound or limit levels, where you still have full protection from blowout?


GA: To the best of my knowledge, it's like putting a governor on the car, there is no way that you can protect the speaker without limiting the level that you might otherwise get out of it. So what I much prefer to do is the same thing we did here. You just build in enough overload margin that, unless something literally blows up in the place, they simply are not going to blow out the speakers.

R-e/p: Thank you again George for contributing some very informative background on control room B, and on room design in general. □ □ □


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RECOGNITION 1973

BEST ENGINEERED RECORDING (Non-Classical)

Engineers: ROBERT MARGOULEFF
 MALCOLM CECIL

Producer: STEVIE WONDER

Recorded at: RECORD PLANT, Los Angeles
 MEDIA SOUND, New York

Mastering Studio: THE CUTTING ROOM, New York
 Engineer – GEORGE MARINO
 KENDUN RECORDERS, Hollywood
 Engineer – KENT DUNCAN

Album: INNERVISIONS
 Stevie Wonder, (Tamla/Motown)

BEST ENGINEERED RECORDING (Classical)

Engineer: EDWARD T. GRAHAM

Quad-mix engineer: RAYMOND MOORE

Producer: THOMAS Z. SHEPARD

Recorded at: MANHATTAN CENTER, N.Y.C.

Album: Bartok, CONCERTO FOR ORCHESTRA,
 Pierre Boulez conducting the New
 York Philharmonic Orchestra (Columbia)

BEST ENGINEERED RECORDING NOMINATIONS

Engineer: ALAN PARSONS

Producer: PINK FLOYD

Recorded at: EMI, Abbey Road Studio, London

Album: THE DARK SIDE OF THE MOON,
 Pink Floyd, (Harvest/Capitol)

Engineers: ROBIN GEOFFREY CABLE
 BILL SCHNEE

Producer: RICHARD PERRY

Recorded at: TRIDENT, London
 AIR STUDIOS, London
 PRODUCERS WORKSHOP, Hollywood
 SUNSET SOUND, Hollywood

Mixing studio: SOUND LABS, Hollywood

Mastering studio: MASTERING LAB, Hollywood
 Mastering engineer: DOUG SAX

Album: NO SECRETS,
 Carly Simon, (Elektra)

Engineer: DAVID HENTSCHEL

Assistant engineer: ANDY SCOTT

Producer: GUS DUDGEON

Recorded at: STRAWBERRY STUDIOS, Paris, France

Mixed at: TRIDENT STUDIOS, London, England
 Assistant engineer – PETER KELSEY

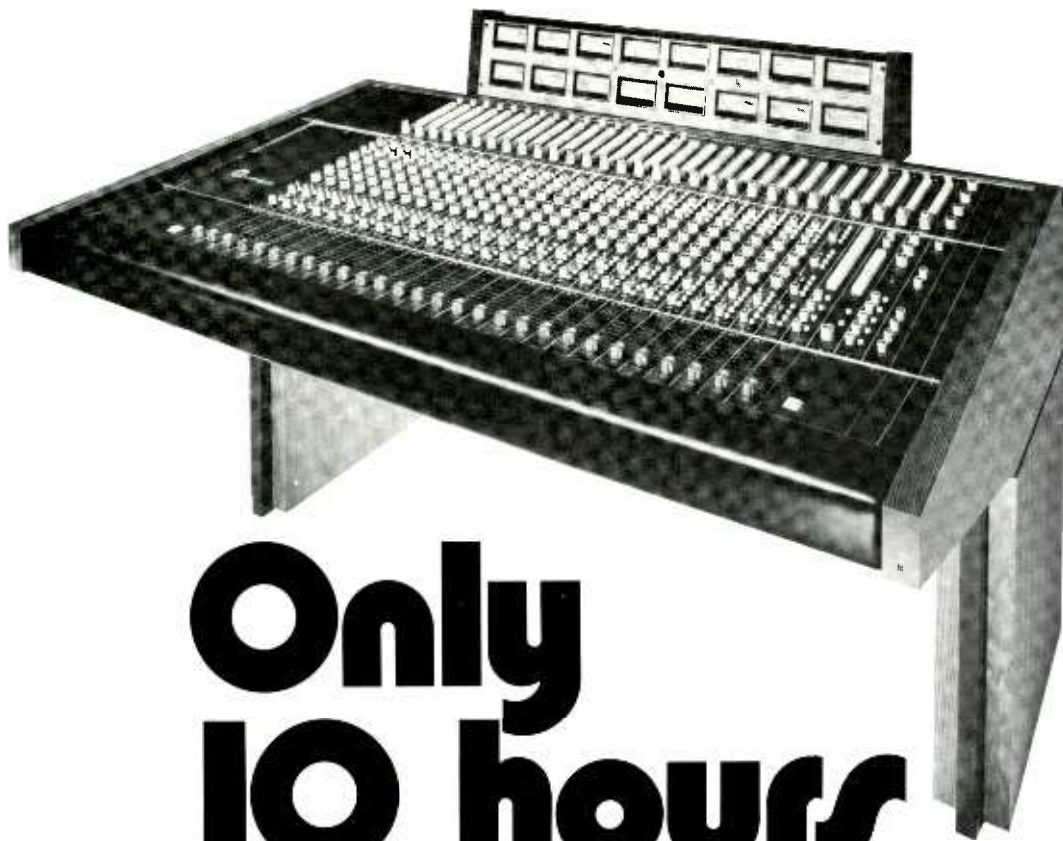
Album: GOODBYE YELLOW BRICK ROAD,
 Elton John, (MCA)

Engineer: DONN LANDEE

Producer: TED TEMPLEMAN

Recorded at: WARNER BROTHERS, (Amigo Studios)
 North Hollywood

Track: LONG TRAIN RUNNIN'
 Album – THE CAPTAIN AND ME,
 The Doobie Brothers (Warner Brothers)



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THE EQUALIZER

by JERRY MILAM
MILAM AUDIO
So. Pekin, Ill.

If one piece of audio equipment was to be singled out as the most widely used and essential tool available to the recording industry, THE EQUALIZER would almost certainly rank top position on the list. Among the many jobs which equalizers are called on to do are noise reduction and removal, compensation of microphone and transducer shortcomings, and above all, enhancement of program material for purely esthetic reasons. Its utility as a creative tool makes it virtually the right arm of many of today's studio mixers, engineers and producers as they strive to create an original and professional product. Indeed, the way certain studios and their personnel employ equalizers may well set these studios apart as having this or that sort of distinctive sound "trademark." Much of this distinctiveness depends on the way in which equalizers are selected for the task and tailored to the sound being modified; the creative judgment employed undoubtedly transcends the simple presence of the many equalizer parameters and prices available today.

We, at Milam Audio Co., have conducted a lengthy series of tests on as many equalization devices as were available to us, and have graphically recorded basic data which seems to offer some explanation of why a product recorded with similar EQ equipment can possess such individual characteristics. Without getting deeply into design theory and engineering, a simple set of test procedures using an audio generator, a scope or dB meter, and a good pair of ears will reveal some distinctive equalizer characteristics, even for people who ordinarily wish to avoid the equipment hassle.

In presenting the following approach to equalizer evaluation, we do recognize a prevailing attitude among some creative studio people which says, "If it sounds right, it is right," or "I don't care what's happening if it sounds good." We believe that the testing methods outlined here will permit many people to relate their subjective experiences with an equalizer to useful data, that may be helpful in the selection and use of a device for a particular job. To those sensitive to the varying harmonic content of different musical instruments, the results may be particularly revealing in identifying why a certain

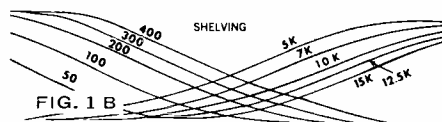
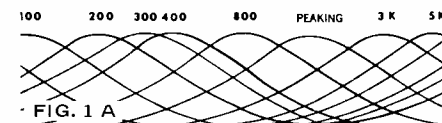
product sounds as it does.

Some major differences that set one equalizer apart from another can be stated in the following ways:

- A. Frequency selections and curve slopes different than those claimed by the manufacturer.
- B. Interaction of one frequency band on another, producing side effects that may not be desirable.
- C. Phase shifts and cancellations between the fundamental and harmonics of material being equalized.

The first test procedure will reveal whether the frequencies at which the device operates are correctly stated by the manufacturer. Different results will be produced, depending on whether the device is a peaking or shelving type of equalizer.

For the sake of anyone not familiar with the terms peaking and shelving, the illustration (Figure 1A) shows the well defined peaks obtainable with a peaking equalizer. Frequencies to either side of the one selected are affected by lessening amounts as program content moves away from the center point of the curve. The shelving equalizer produces a characteristic flat top (or shelf!) at frequencies beyond the selected point. The curves in drawing (Figure 1B) show the very broad effect shelving equalizers have, including substantial boost or cut on frequencies that may be several octaves away from the point selected.



The true frequencies of an equalizer's peaks can be determined by setting it for a few dB of boost and passing a sine wave through it, while observing the output on a VU meter, A.C. voltmeter, or oscilloscope. The signal generator used as a source should be varied above and below the frequency the equalizer is set to operate at; the highest level indication

produced will be the center of the peak, and can be read directly from the generator's frequency adjustment controls. The same result should be produced in inverse form for the dipping, or attenuation function of the equalizer.



Shelving equalizers will most often fail to reveal the greatest boost or cut at the frequency selected. For example, if a device is set for 6 dB of boost at 5,000 Hz, there may be a great deal more at 10,000 Hz. This is not the fault of the equalizer, but rather a characteristic that should be known from test curves, if its markings are to take on any meaning. The nature of shelving curves can also be determined by sweeping a signal generator through the frequencies of interest, and plotting the results observed on a dB meter.



One of the more distinctive characteristics of an equalizer is seldom stated by the manufacturer, seldom adjustable, and very noticeably different from one unit to another. This is the "Q," and in practical terms, devices with higher "Q" exhibit steeper slopes, resulting in more sharply defined frequency bands, given the same amount of boost or cut for the comparison. Parametric equalizers, which have received so much attention in the past year, do have a variable "Q," and can produce slopes that may be very broad or extremely sharp.



High "Q" designs fill certain needs and are commonly used in graphic equalizers with a large number of frequency bands. 1/3 octave equalizers are the obvious example, each frequency band having a bandwidth of 1/3 octave. The problem is that as the "Q" is increased, there is an

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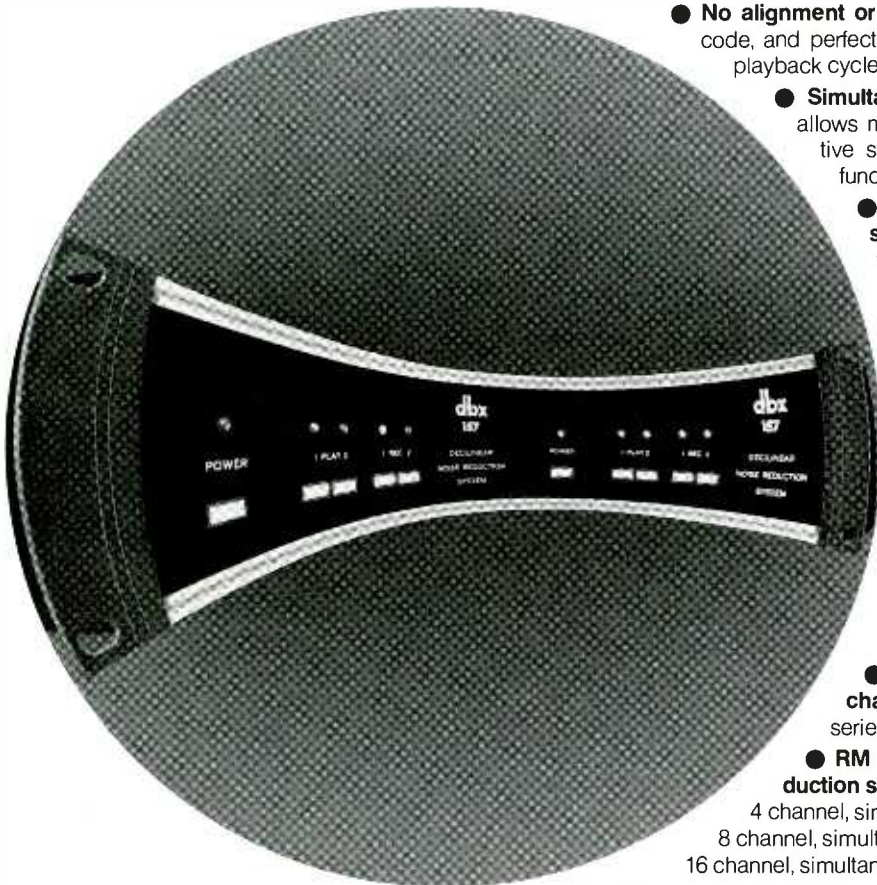
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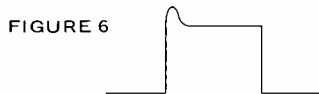
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increased tendency in most designs for the equalizer to “ring” at the tuned frequency, causing undesired results with sharp transients in the program material.

This, and other types of problems can be checked using a square wave from the test signal generator, while monitoring the equalizer’s performance on an oscilloscope. A 1500 Hz square wave permits us to view equalizer performance over a wide range of frequencies, from 150 Hz to about 15 kHz (in harmonic overtones). If the test is properly set up and the equalizer is in the flat response mode, the scope should reveal a wave form similar to the one illustrated below in Figure 5.



The leading edge and left hand portions of the wave front contain the high frequency components of the square wave, while the central portions contain the low and mid frequency components. Setting the equalizer at a peaking frequency of about 5 kHz and 4 to 6 dB of boost should alter the square wave to look something like Figure 6. As the amount of boost is increased we expect the rise of the left portion of the wave to increase proportionately. But under conditions of 8 to 10 dB of boost, most equalizers we have tested begin to show a response similar to Figure 7.



Listening to the square wave on the monitor speakers as this test is carried out is recommended. As the amount of EQ boost is increased there will be points of marked increase in audible distortion. These points will be accompanied by marked changes in the visible wave form. Increasing the boost to maximum will most likely increase the number of peaks and dips. These irregularities are indicative of several types of nonlinearities. Ringing and phase shift will show up in this test, as well as interactions between different frequency bands. Distinguishing between the different types of nonlinearities is beyond the scope of this article, but this square wave test will serve as a qualitative measure of your equalizer characteristics and will establish some guidelines as to the practical limits of performance in your studio.

Since it is not uncommon for production people to use as much as 6 to 12 dB of boost and cut, severe wave form change other than desired or expected

may result. With 10 dB of boost applied to a given equalizer, the results might be as follows:

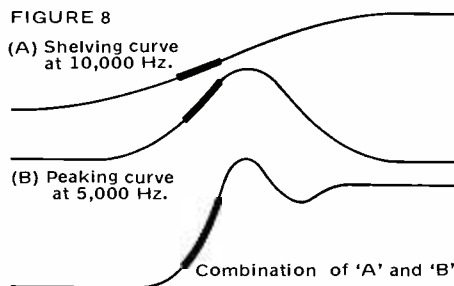
- A. 10 dB of boost at 5kHz
- B. 5 dB of dip near 2.5kHz
- C. 2 dB of boost near 1.2kHz

In most devices which dip at the same time any decent amount of boost is used, the sound produced from them will be lacking in strength and punch. This can be desirable to some people while undesirable to others.

If the device is capable of 6 dB of boost without noticeable interactions, it is advisable to limit the boost to that amount. In multi-track work where more boost than that is desired on a track, 6 dB can be put on during recording and the remainder put on during mixdown. If the entire amount has to be added in one pass, putting two equalizers in series and using each within its limits will work well.

We would like to point out that we are trying to achieve an ideal boost condition and only on a few of the devices we tested was this possible. If the device under test will not produce such an ideal condition, it doesn’t mean that the unit is faulty or producing undesired results. We are only trying to develop a standard of comparison and find the best working limits of each device. On the other hand, some devices will not produce desired results, and following the above procedure will be a step toward working with the device rather than against it.

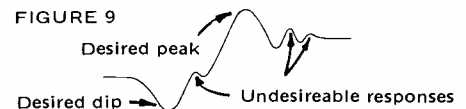
Up to this point we have evaluated a single equalization frequency at a time. The next condition that ought to be investigated is multiple frequency selections being boosted or cut, in different combinations, but at the same time. With the use of more than one frequency selection, we can change the apparent “Q” of the device quite easily; combinations of narrow peaks, broad peaks, and shelf/peak combinations can be produced, that extend the usefulness of the device beyond its basic set of curves. Figure 8 shows a method for increasing the slope of a shelving equalizer, producing a boost condition over a more clearly defined band of frequencies than would be possible with a single shelving selection alone.



Note that a portion of the upward slope is steeper than possible with either a single shelf or peak selection, but that a

dip may appear since the two bands added together do not have complementary curves. Additionally, phase cancellations produced by certain devices used in this way may produce peaks and dips at various locations, and depending on the frequencies used, these “unwanted” dips can be significant enough to reduce the overall usefulness of the equalizer in certain combinations of boost and cut. Looking at a square wave under these conditions can again provide useful information in comparing the performance of different devices.

Given the flexibility present in many of today’s better equalizers, the mixer has the potential to handle conflicting requirements of say, dipping an unwanted resonance or “muddiness” in a room or instrument, while enhancing or “brightening” upper partials of the same sound. To be able to do this successfully with one equalizer and not with another, given similar panel markings on the devices, reveals much about the individuality of different designs. The reasons for this varying behavior are many, but a common explanation lies in the fact that phase shifts produced in different frequency bands can cause additions and cancellations that are in no way related to settings on the EQ device. The situation illustrated in Figure 9 indicates the sort of response that might occur under simultaneous boost and dip conditions.



As might be expected, there is often a relationship between the amount of interaction between multiple equalizer frequencies, and the subjective quality of the sound produced. There will be more interaction and phase cancellation difficulty in some cases, when similar high frequency curves are mixed in dip and boost combinations, than with low and high frequency mixtures. Settings that produce the smoothest response are often preferable for daily work, while the combinations producing “extra” peaks and dips might well be reserved for situations where the tradeoffs are a lot less important than getting the best sound from difficult program material. Equalizers have “personalities”, much like loudspeakers, microphones, and other pieces of recording equipment. The value of a device depends ultimately on whether it is doing the job for you, and making your clients happy with their material. If it is, then stay with it. If it isn’t, we feel the testing methods outlined here will be useful for determining what the equalizer can and can’t do, and, armed with that information, it’s possible to work with it to produce consistent results that come from a better understanding of this vital tool. □ □ □

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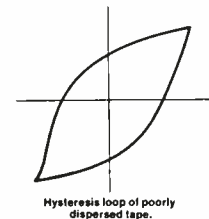
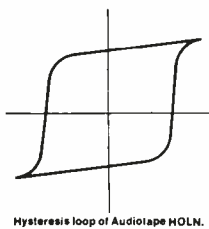
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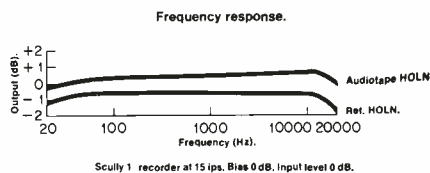
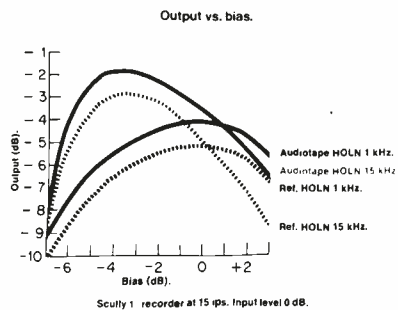


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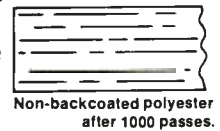
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SYNAESTHESIA

"SEEN ANY GOOD RECORDS LATELY"

by
PAUL LAURENCE

Since the appearance of the first stereophonic "long-player" back in 1958, the technical end of recording has seen generations of evolution. As musical ideas and recording techniques have been refined, the demands upon engineers and producers have grown comparably, to the point where their craft is an art form in and of itself. Today, their expertise with a fearsome array of concepts and hardware can easily make or break a record.

It is from this high degree of musical and technical sophistication that expanded possibilities, on both the creating and perceiving ends of a record, arise. This article proposes the somewhat radical notion that sound in general and records in particular have, in addition to their aural aspects, a *visual* aspect, as well. A psychologist would say "Aha, you're a *synaesthete*", or one who perceives a stimulus in a sense not usually associated with that stimulus. Others might not be so kind.

Under any circumstances, this is not a completely new idea. Throughout history, creative people have felt a confluence of the aural and visual realms. Artists have often been moved by a musical piece to the point of

actually "seeing" it and capturing it on canvas. Likewise, many a composer has been sent scuttling to his piano from "hearing" a painting or tranquil mountain panorama.

If indeed records *can* be looked at in addition to being heard, there are clearly implications for all concerned. In exploring this thesis we have selected some of the better known contemporary albums of the last six years as examples, in promulgating a conceptual framework for applying the *visual* aspects of sound to record production.

For maximum clarity and applicability of the subsequent discussion, the optimum listening situation should be described. There are two speakers, whose positionings in three-dimensional space are exactly the same save a moderate separation (3-6 feet) along the lateral axis. The horn faces point in the same direction, or may slant slightly towards each other. The listener should orient himself at a reasonable distance from the speakers, facing their horn faces, approximately equidistant between them (Fig. 1). A set of headphones conforms nicely to this optimum listening situation.

PHONOGRAPHY

"Angie," The Rolling Stones, *Goats Head Soup* (Rolling Stones COC59101), Jimmy Miller, September 1973

T. Rex, *Electric Warrior* (Reprise 6466), Tony Visconti, October 1971

"Go Back Home," Stephen Stills, *Stephen Stills* (Atlantic SD 7202), Stephen Stills and Bill Halverson, November 1970

Led Zeppelin, *Houses of the Holy* (Atlantic SD 7255), Jimmy Page, April 1973

"Hung Upside Down," Buffalo Springfield, *Buffalo Springfield Again* (Atco SD 33-226), Stephen Stills, December 1967

"I Me Mine," The Beatles, *Let It Be* (Apple AR 3400), Phil Spector, May 1970

"Out on the Weekend," Neil Young, *Harvest* (Reprise MS 2032), Neil Young and Elliot Mazer, February 1972

"Prodigal Son," The Rolling Stones, *Beggars Banquet* (London PS 539), Jimmy Miller, November 1968

"Thank You," Led Zeppelin, *Led Zeppelin II* (Atlantic SD 8235), Jimmy Page, October 1969

"2000 Light Years From Home," The Rolling Stones, *Their Satanic Majesties Request* (London NPS 2), The Rolling Stones, December 1967

"What Is And What Should Never Be," Led Zeppelin, *Led Zeppelin II* (Atlantic SD 8236), Jimmy Page, October 1969

"Winter," The Rolling Stones, *Goats Head Soup* (Rolling Stones COC 59101), Jimmy Miller, September 1973

"Song Title," Artist, Album (Label & Code Number), Producer, U.S. Album Release Date



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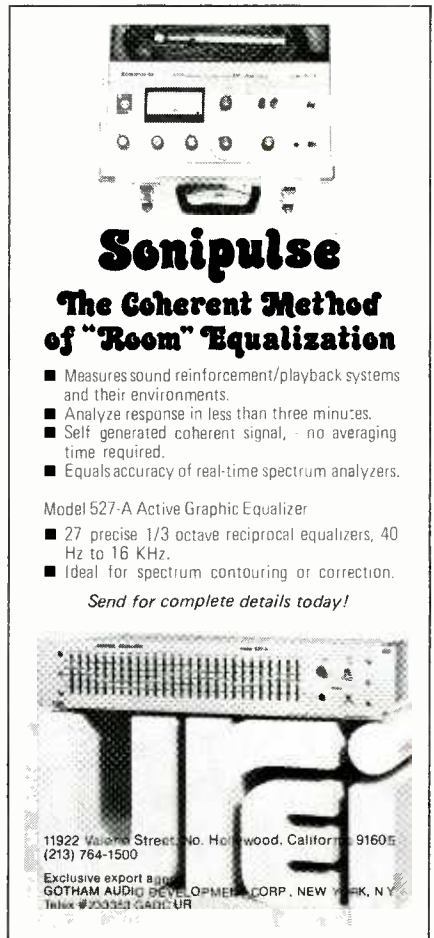
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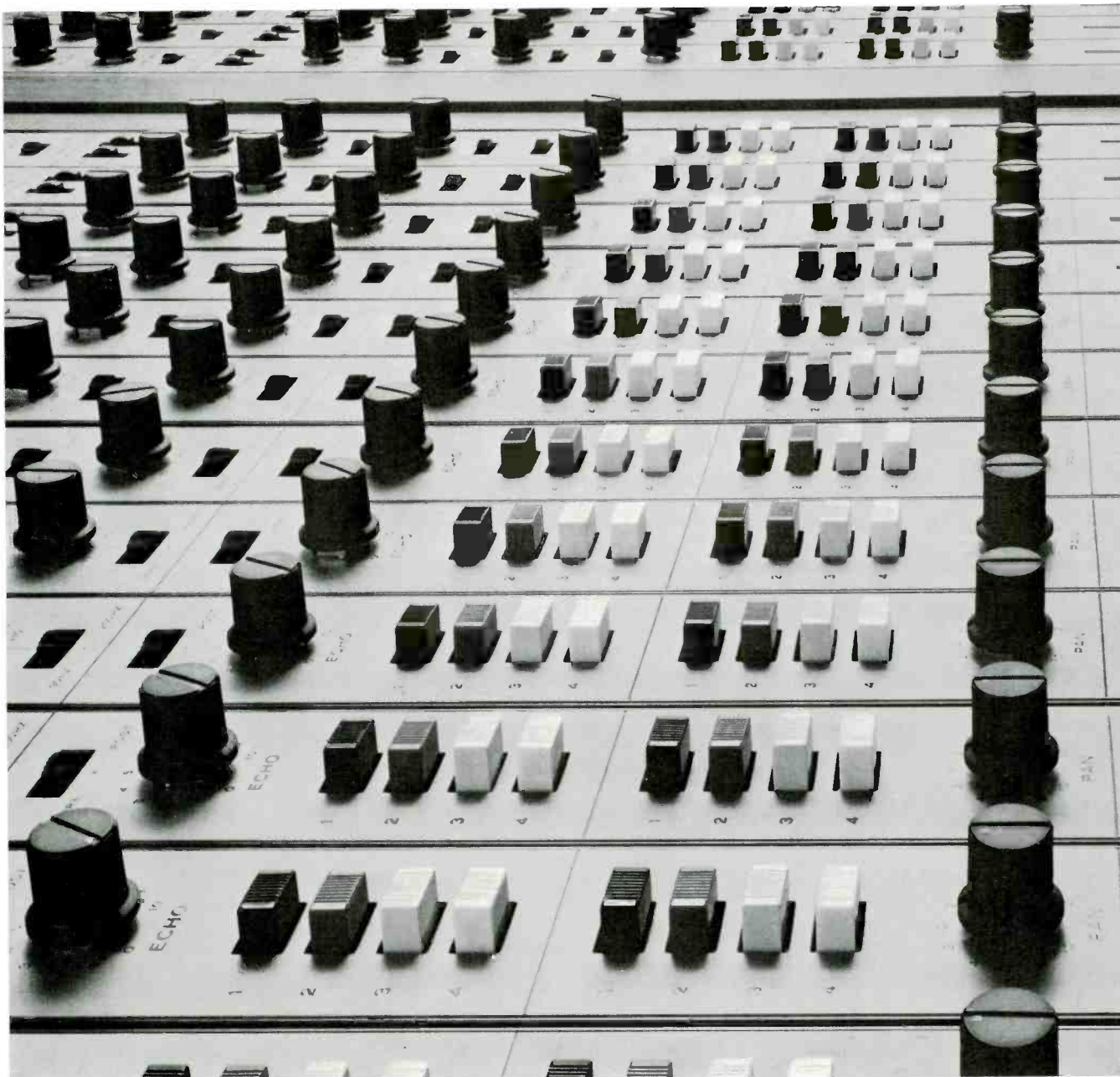
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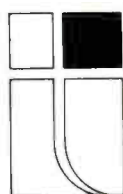
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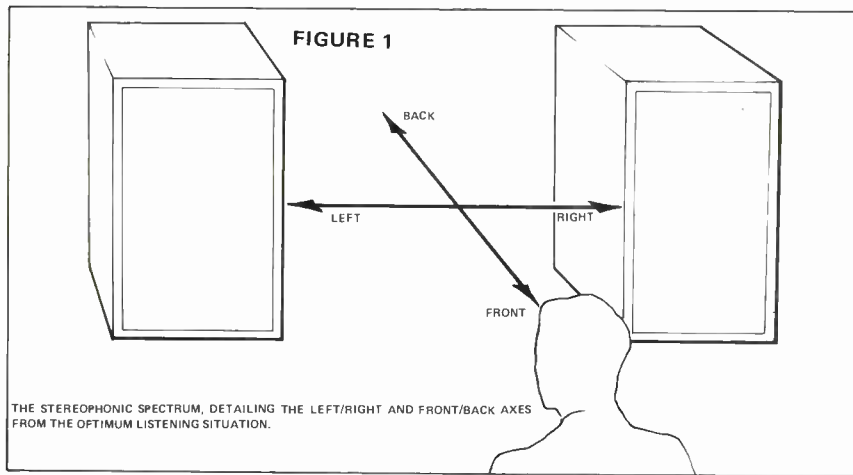
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THE STEREOPHONIC SPECTRUM

The concept most central to an understanding of the interrelationship of sound and visual images (as it appears here) is the stereophonic spectrum. The stereophonic spectrum is the basic unit of aurovisual structure and function, necessarily created when sound is reproduced by a system utilizing two speakers.

It is a two-dimensional model. A dimension, as we define it, is an imaginary line along which a track (in the sense of individual vocal or musical component) can be moved, independent of the other tracks. The stereophonic spectrum has first and foremost the dimension of length, sometimes called the left-right axis. The absolute length of any given spectrum is defined by the furthest extent of the speakers, i.e., the distance between them. The comparative length is of much greater importance, for be the spectrum that of a huge night club p.a. system, or the width of one's head while using headphones, the relative spatial relationships among the tracks remain the same. During mix-down, a track sent equally to the left and right channels should, of course, fall at the midpoint of the left-right axis, whatever its size. The placement of a track along this axis is normally controlled at the board by the panpots.

The second dimension is that of depth, or the front-back axis. The depth of a given stereophonic spectrum is defined collectively by the functions of volume, echo (most often reverb), and midrange equalization. The furthest extents of this axis are, for want of more explicit terminology, "very far back" (little volume, much echo and midrange attenuation) to "very close up" (much volume, no echo, and midrange boost). Using these effects, it is possible to take a track which is clear and up-front, and by simultaneously decreasing the volume, increasing the echo, and attenuating the midrange, make it move back-wards until it disappears infinitely far back into the great stereophonic void.

Additionally, there is an illusion (and a fairly effective one at that) of a height dimension, or up-down axis. This "dimension" is a direct function of the volume at which the source material is being played; as the volume is increased, the spectrum seems to grow along the up-down axis. However, since no one track or combination thereof can be moved independently along this "dimension", it must be regarded as a nonvariable and of no value here.¹

Traditionally, the stereophonic spectrum has been seen by those involved in mixdowns as having three points where a track can be sent — a middle and two sides. This is possibly a holdover from the days when a three-position switch determined a track's placement on the left-right axis. Nowadays, with panpots, a track may be sent to any position along the spectrum's length. This being the case, the lengthwise axis could, where feasible, accommodate five points to which a track could be sent. In addition to the three traditional points, two new ones could be found by bisecting the distances between the center position and each side. Presumably, the new points can be located on the panpots by finding the positions midway between 12 o'clock (the "middle" position) and the furthest "left" and "right"

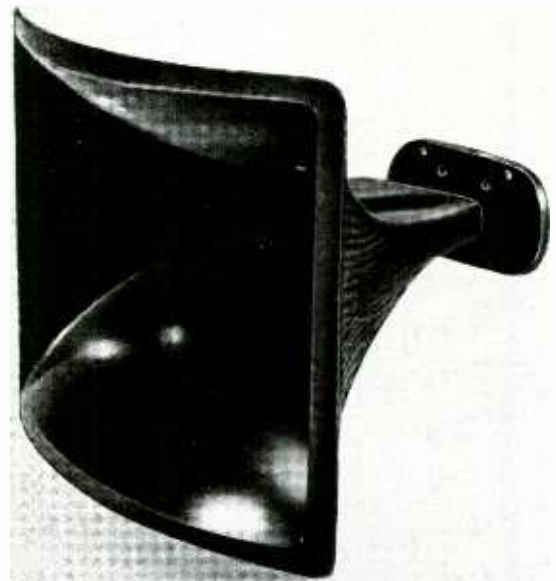
positions. The value of a basic five-point spectrum would be 1) a more close approximation of the visual aspects of a live performance, resulting in greater aural-visual congruence, 2) elimination of those gaping "holes" between the middle position and sides, for a fuller and more aesthetic visual picture, and 3) greater opportunity to eliminate aurovisual occlusion. Still, the five-point spectrum should not be adopted lock, stock, and barrel. Its employment should be contingent upon a high degree of consistency with the principles of track placement. Many songs, because they have a small number of texturally dissimilar tracks, are deemed incompatible even with the three-point structure and are mixed all tracks to the center position ("Prodigal Son").

AUROVISUAL OCCLUSION

Minimizing aurovisual occlusion is a key challenge in creating a visually aesthetic mix. It occurs when two or more tracks *antagonize* each other through being placed at the same

1. *There is a way by which a legitimate height dimension could be implemented, through the use of an otherwise normal quadraphonic system with the speakers arranged in an unorthodox way (Fig. 2). In this manner, through creation of "stereo stereo," a track could be panned during mixdown between any adjacent pair of speakers, resulting in a viable up-down axis. The advantages of this situation would be that the resulting increase of spectral area would 1) allow for greater presence (as there'd be more area for controlled leakage) and 2) multiply by many times the options for track placement, thus lessening aurovisual occlusion.*

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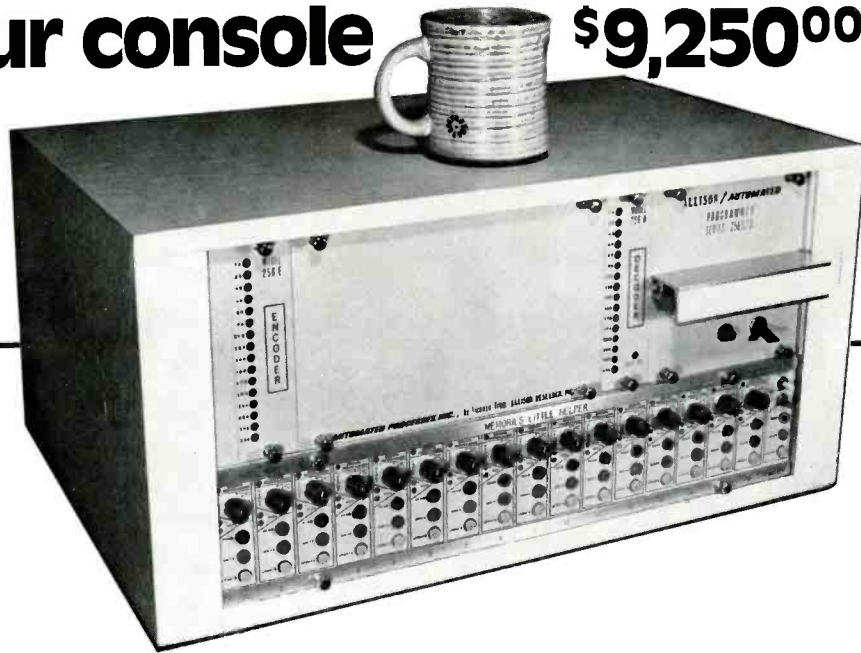
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point on the lengthwise axis. A perfect example of aurovisual occlusion can be found in "Go Back Home", where both visual imbalance and diminished sound clarity result from Clapton's solo being placed directly on top of Stills' wah-wah'ed rhythm track.

With due respect to practicality, it is virtually impossible to find a separate spot on the left-right axis for each and every track. This being the case, it is usually advisable to place on top of each other tracks of different tonal and textural properties to achieve a minimum of aurovisual interference². In certain instances, however, exactly the opposite is true as it can be most auspicious to combine tracks of similar textural properties. For example, the fuzz guitars in Buffalo Springfield's "Hung Upside Down" perfectly illustrate the exception to the rule. Far from antagonizing each other, when combined they create a logical and unified sound. Instead of two guitars playing a standard harmony, their individual identities merge to create a highly innovative keyboard or brass sound.

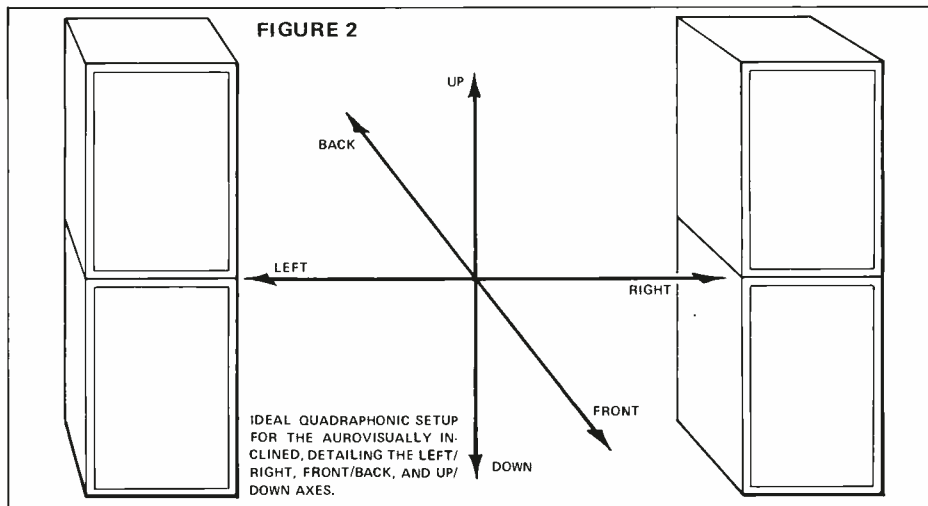
Guitars in particular lend themselves to this *coupling-of-like-sounding-tracks* principle, especially when one or more are "ringing-playing" chords in the open position or in a modal tuning. Listen to Led Zeppelin's "Thank You" — notice the decidedly Oriental sound from the combined guitar tracks?

The similar textures of the bass guitar and the bass drum afford interesting opportunities, at both the arranging and mixing stages of a song. Through limiting and equalization, they can be made similar in tone and size. Neil Young's "Out on the Weekend" illustrates this principle.

SIZE

Another characteristic of a recording or individual component thereof is its size. This is not in reference to the illusory "size", or broadening of the lengthwise axis through an increase in volume. This kind of size is completely independent of volumetric considerations, whose modifiability is a valuable tool in the creation of a visually aesthetic stereophonic

2. For example, most rock records of the last few years have the vocal/s, bass, and drums all in the center. This positioning (especially when the tracks are "shaded" to different spots along the front-back axis through strategic use of echo) is most effective as it frees the sides for melodic and visual interplay.



picture.

Alas, there is no absolute standard with which the size of a track can be measured. Still, comparisons of the relative sizes of tracks within a recording can be made. Likewise, through exposure to and observation of the sizes of tracks in many recordings, generalizations can be made with respect to a generally-understood (if ill-defined) norm — "This is a larger drum sound than usual", etc.

The size of an individual track depends upon the presence or absence of a number of factors. Its size can be made smaller in two ways. The first is signal attenuation. Whether effected through miking or equalization, it can diminish a track's presence (which to an extent is synonymous with "size"). Similarly, size can be diminished through limiting, which shaves

off a track's "ragged edges", resulting in a smaller, cleaner sound.

On the other hand, a track may be made larger in two ways, as well. Most basically, adding echo (especially reverb) will broaden a track along both the length and depth dimensions. The second method is through a stereophonic dubdown of an instrument's components, or different areas of a single instrument (as in keyboards).

STEREO DUBDOWN OF A SINGLE INSTRUMENT

The two instruments most often dealt with in this manner are drums and keyboards. For years, drums have been miked with many microphones, and recorded on often as many as a half-dozen separate tracks. In this way, the components could be combined at a later time to accent any combination of drums and cymbals. When the proper mix was reached, all the components were sent to the same spot on the left-right axis for an essentially monaural mix of a stereophonically recorded instrument. In the last few years, however, the trend has become to send the components to different points across the lengthwise axis, creating "stereo drums", whose size can be as large as that of the axis itself.

At its most pronounced, a stereophonically-dubbed instrument is anathematic to all who hold visual harmony near and dear. This is because of the distortions it creates. There is 1) a distortion in size, of that instrument relative to the others. This is especially true should a comparison be made to the visual aspects of a live performance. There are also numerous distortions in 2) placement, which

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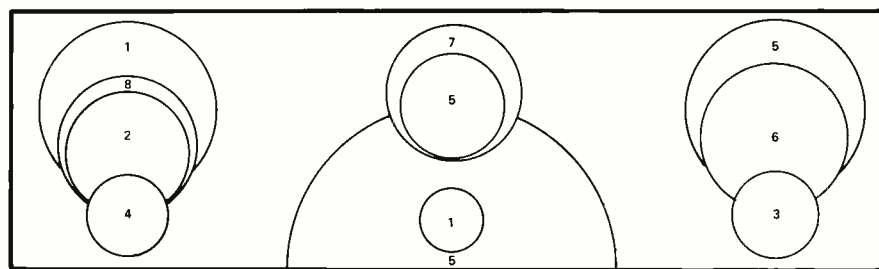
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FIGURE 3



VISUAL SCHEMA OF A WELL-DEVELOPED AND BALANCED SONG, THE BEATLES, "I BE MINE". THE NUMBERS INDICATE THE ENTRANCE ORDER OF THE VARIOUS INSTRUMENTS, THE VARIED SIZES, THEIR TEXTURE.

(The different vertical placings are purely in the name of artistic license, as the stereophonic spectrum has no up-down axis.)

- | | |
|----------------------------------|--|
| 1 (left) ORGAN,
(middle) BASS | 5 (middle top) LEAD VOCAL, (middle
bottom) DRUMS, (right) STRINGS |
| 2 ACOUSTIC GUITAR | 6 ACOUSTIC GUITAR |
| 3 ELECTRIC GUITAR | 7 BACKING VOCALS |
| 4 ELECTRIC GUITAR | 8 BRASS |

can be broken down as follows: a) a stereophonically-mixed instrument often has so much "presence" that its placement, or even that of a component, is difficult to ascertain along the left-right axis, b) as there is movement among the components of the instrument, that movement is reflected in commensurate motion across the lengthwise axis, resulting in the signal jumping around in a discontinuous manner (unlike the more fluid motion of a track during "panpot shenanigans"). This results in d) an almost continual visual imbalance of that instrument relative to the others, and often-times e) fragmentation, where a component (say an individual cymbal) may become visually disassociated from the rest of the components through sparing use and distance on the left-right axis from them. All the abovementioned distortions are more than evident in the stereo drum-filled albums "Electric Warrior" and "Houses of the Holy".

Still, a stereophonically-mixed instrument per se doesn't have to create an irreconcilable imbalance. The Rolling Stones have managed to enlarge the drum kit while avoiding the pitfalls by allowing only a small degree of separation between the components ("Winter") for a more dramatic-looking drum track.

TRACK PLACEMENT

The ultimate goal, with respect to the visual aspects of a recording, is to create a "picture" in which there is order and harmony among the different vocal and musical tracks. Needless to say, there is no set formula for this; one must use one's own judgement in synthesizing the myriad of often-contradictory situations to find optimum track placement. Criteria helpful in making these determinations are: 1) focus of the song, 2) temporal factors, and 3) balance.

First and foremost, one can ask "What is the focal point of this song?" Practically speaking, the focal point is the track or tracks generating the most important melody or concept. This includes almost all vocals and their instrumental equivalents, solos. Barring any number of negating circumstances³, the optimum placement point for these focal tracks is in the middle. Certainly though, they've been everywhere else. Many of the early Beatles records demonstrated some very obtuse concepts in track placement

3. Among which are the desire to preserve the integrity of a live or live-in-the-studio performance, more than one solo at the same time, etc.

in having a near-complete separation of vocals and instruments. Visually speaking, these records were disasters. This is not to say that a vocal should never be anyplace but in the middle. On the contrary, in certain situations it can be an extremely effective vehicle. "2000 Light Years From Home" features probably the most well-chosen use of a laterally-placed lead vocal, in that it creates a striking unity between the song's visual and thematic realms. First of all, the vocal's sound: heavily limited, low frequency attenuation, not much echo or volume. All of these modifications give the vocal a small sound and look. Sending it to one side with no cross-track leakage completes the tie-in with the song's theme: the isolation and insignificance of Man vis-a-vis The Cosmos.

Secondly, one can ask "Where (in time) do the tracks come in, relative to each other?". Ideally, a song should "fill out" in a visually pleasing way (Fig. 3). As our culture is attuned to perceiving left-to-right (especially true with visual stimuli), a recording that unfolds in this way is often most desirable. A recording can be made more dynamic through an interesting temporal interplay. For example, the end bit of "What Is And What Should Never Be".

Thirdly, there is the criterion of balance. A key concept here is that of texture — in this case an expedient translation of an instrument's aural qualities (range, volume, timbre, etc.) to a visual sum. What is ultimately done to effect balance is a direct outgrowth of the engineer's and/or producer's textural perceptions. An instrument's texture at a given time may be loosely described as light, medium, or heavy. Flutes and acoustic guitars are usually light, saxophones medium, and basses heavy. Still, instruments like electric guitars, pianos, and drums may be played in such a way as to fall in any category. Hence, one might do well to consider not only the instrument, but also the part it is playing. Having made textural assignments, the fundamental principle to use in achieving a visually pleasing mix is that like-textured tracks should be balanced, i.e., placed on opposite sides of and at an equal distance from the midpoint of the lengthwise axis. For example, a lazy tremolo'd country guitar could be balanced with a sketchy upper register piano part, but not with a piano playing block chords in the lower register. Conversely, tracks which have no textural equivalents in the song are often best placed in the middle position. Vocals, drums, and bass commonly fall in this category. More often than not, the result will be a "middle-heavy" recording. Still, by virtue

of its centrality, the middle position can accommodate a disproportionate number of tracks where any other position could not.

Now, one can ask the question "How aesthetic is the visual picture — at each stage of the song's development?" This is a very tricky issue, as a balance at one point can be completely upset by the entrance of new tracks. When this does happen, there are two alternatives. First, one can "wait out" any transitory imbalances by pre-setting the tracks at the points on the left-right axis where they're ultimately desired. This entails a decision to favor a visual balance for either the longest segment of the song or the segment deemed most important.

The second alternative to an unwanted imbalance is track shifting. A case in point — The Rolling Stones' "Angie." How can one reconcile 1) the piano ultimately needing to occupy the middle position to free the sides for an acoustic guitar each, with 2) its not being appropriate there during the first verse because it would needlessly antagonize the vocal and leave one whole side of the stereophonic spectrum empty? Here is apparently what was done: the acoustic guitar and piano were initially panned to opposite sides, creating good aurovisual interplay with each other and the centrally-placed vocal. When the other instruments came in, the piano was moved over to the middle and back a bit, making room for the 12-string to counterbalance the original guitar.

As a record viewer from way back, I can offer a few suggestions should any desire to initiate aurovisual congress with your record collection. Even though the most primitive 78 will yield an aurovisual spectrum, it was generally not until 1968 that records reached the current state of technical sophistication. This "emergence" was due to increased instrumentation (especially keyboards, brass, and strings), made possible through the popularization of 16-track recording. (This is an example of the reciprocal feedback relationship that exists in all creative/technical collaborations, where the demand for more tracks gave rise to improved technology, which in turn allowed for greater musical experimentation). The fact that more instruments had to be recorded necessitated panning some of them to the middle position, thus overcoming the "side-heaviness" characteristic of many records of the previous two years. The employment of 16-track machines greatly reduced the need to ping-pong, thus minimizing tape hiss and allowing more freedom in track placement. Prior to 1966, many recordings (especially British) were done monophonically.

Look for a record which is stylistically and musically diverse, produced in the best sense of the word, and primarily a studio product (as "organic" albums are not notoriously visual). One of the best examples, stereo drums notwithstanding, is T. Rex's "Electric Warrior." Such a curious amalgam of Elizabethian propriety, 50's hooliganism, and monolithic 2001 imagery — this music is as convincingly surreal as any you're likely to run across. In addition to the standard guitar-bass-drums complement, there is brass, keyboards, a full string section, and all kinds of guitar effects. The continual juxtaposition of melodic elements atop robotical rhythms creates some fascinating aurovisual scenes.

I hope you'll have found this an interesting premise, even one of practical value to your own endeavors. Under any circumstances, happy viewing. □ □ □

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EXHIBIT AREA

AGFA-GEVAERT, INC.	31
AKG MICROPHONES, NORTH AMERICAN PHILIPS CORPORATION	81,82
ALLISON RESEARCH, INC.	56,57
ALTEC MISSION ROOM	
AMPEX CORPORATION	14,14A-D
AUDIO DEVICES, INC.	93
AUDIO INDUSTRIES CORPORATION	62
AUDITRONICS, INC.	64,65
AUTOMATED PROCESSES INC.	36,37
BGW SYSTEMS	63
B & K INSTRUMENTS, INC.	73
BOSE CORPORATION	66
BOZAK, INC. CLEVELAND ROOM	
CALIFORNIA SWITCH & SIGNAL	74
CERWIN-VEGA BOSTON ROOM	
CETEC INC.	46,47,48
CLEAR-COM, DIVISION OF LUMIERE PRODUCTIONS, INC.	68
COMMUNITY LIGHT & SOUND	69,70
CROWN INTERNATIONAL	75,76
CUSTOM FIDELITY COMPANY, INC.	4
DAVID CLARK INC.	96
DBX, INC.	15,16
DIACOUSTIC LABORATORY	92
DOLBY LABORATORIES INC.	51,52
DUKANE CORPORATION DALLAS ROOM	
DUNCAN ELECTRONICS, INC.	108
ELECTRO SOUND, INC.	6,7,8
ELECTRO-VOICE, INC. NEW YORK ROOM	
ELPA MARKETING INDUSTRIES, INC.	27
EVENTIDE CLOCKWORKS, INC.	30
GARNER ELECTRONICS	88
GATELY ELECTRONICS, INC.	71
GOTHAM AUDIO CORPORATION	
20,21,22,23 & STUDIO A	
HARVEY RADIO COMPANY, INC.	61
HOLZER AUDIO ENGINEERING CORPORATION	109
INFONICS, INC.	17
INTERFACE ELECTRONICS	95
JAMES B. LANSING SOUND, INC. ST. LOUIS & FOY ROOMS	
JVC AMERICA, INC. WASHINGTON ROOM	
DAVE KELSEY SOUND SYSTEMS	91
LA SALLE AUDIO	98,99
MARK LEVINSON AUDIO SYSTEMS DETROIT ROOM	
LEXICON, INC.	105
LIBERTY/UA TAPE DUPLICATING, INC.	97
MCI, INC.	83,84
MAGNETIC REFERENCE LABORATORY, INC.	103
MAZE CORPORATION	87
MICMIX AUDIO PRODUCTS	106
MODULAR DEVICES, INC.	
MULTI-TRACK	19
RUPERT NEVE INC.	59,60
NIPPON COLUMBIA CO., LTD. HARTFORD ROOM	
OBERHEIM ELECTRONICS, INC.	72
OTARI CORPORATION	100,101
PANDORA SYSTEMS, INC.	85
PARASOUND, INC.	86
PENTAGON INDUSTRIES, INC.	29
PRATT-SPECTOR CORPORATION	67
QUAD/EIGHT ELECTRONICS	26
RECORTEC, INC.	49,50
REVOX CORPORATION	53
SANSUI ELECTRIC CO., LTD. BUFFALO ROOM	
SCULLY/METROTECH, DIVISION OF DICTAPHONE CORPORATION	2,3
SENNHEISER ELECTRONIC CORPORATION	18
SHURE BROTHERS INC. PATIO ROOM	
SPECTRA SONICS	55
STANTON MAGNETICS, INC.	32
STEPHENS ELECTRONICS, INC.	79,80
WILLI STUDER AMERICA INC.	77,78

AUDIO ENGINEERING SOCIETY

48th CONVENTION

SCHEDULE OF EVENTS

Mezzanine, Los Angeles Hilton

REGISTRATION

Monday	May 6	— 1:00 to 5:00 PM (Set-up & Exhibitors)
Tuesday	May 7	— 8:00 AM to 8:00 PM
Wednesday	May 8	— 8:30 AM to 8:30 PM
Thursday	May 9	— 9:00 AM to 5:00 PM
Friday	May 10	— 9:00 AM to 5:00 PM

EXHIBIT HOURS

Tuesday and Wednesday, May 7 and 8	— 1:00 PM to 9:00 PM
Thursday and Friday, May 9 and 10	— 11:00 AM to 5:00 PM

DEMONSTRATION ROOMS

Foy, St. Louis, Dallas, Hartford, New York, Buffalo, Boston, Detroit, Washington, Cleveland, Mission, Studio A, Panel Room
(All on Mezzanine Level)

TECHNICAL SESSIONS

Golden State Room, Sessions A, C, E, G, J, L, O
Los Angeles Room, Sessions B, D, F, H, K, M, N



**SESSION A
DIGITAL TECHNIQUES IN AUDIO**

TUESDAY, MAY 7, 9:30 AM
GOLDEN STATE ROOM

Chairman: PAUL C. BUFF

SUNN MUSICAL EQUIPMENT COMPANY	
94 & STUDIO B	
SUPERSCOPE TAPE DUPLICATING DIVISION	102
SYNERGETIC AUDIO CONCEPTS	58
TABER MANUFACTURING & ENGINEERING COMPANY	28
TASCAM CORPORATION	24,25
3M COMPANY	9,10,11,12,13
UNITED RECORDING ELECTRONICS INDUSTRIES	33,34½
VIDEO & AUDIO ARTISTRY CORPORATION	89
WATTNOTT ELECTRONICS	104
WESTLAKE AUDIO, INC.	34½,35,38-42
XEDIT CORPORATION	54

**SESSION B
AUDIO IN
AM/FM/TV BROADCASTING**

TUESDAY, MAY 7, 9:30 AM
LOS ANGELES ROOM

Chairman: JAMES GABBERT

**SESSION C
DISC RECORDING AND
REPRODUCTION**

TUESDAY, MAY 7, 2:00 PM
GOLDEN STATE ROOM

Chairman: STEVEN A. GUY

**SESSION D
TRANSDUCERS**

TUESDAY, MAY 7, 2:00 PM
LOS ANGELES ROOM

Chairman: WALTER F. DICK

**SESSION E
ELECTRONIC MUSIC**

TUESDAY, MAY 7, 7:30 PM
GOLDEN STATE ROOM

Chairman: PAUL BEAVER

**SESSION F
EDUCATION IN AUDIO**

TUESDAY, MAY 7, 7:30 PM
LOS ANGELES ROOM

Chairman: ALBERT B. GRUNDY

**SESSION G
QUADRAPHONICS**

WEDNESDAY, MAY 8, 9:30 AM
GOLDEN STATE ROOM

Chairman: LEE HERSCHBERG

**SESSION H
MOTION PICTURE SOUND**

WEDNESDAY, MAY 8, 9:30 AM
LOS ANGELES ROOM

Chairman: RICHARD J. STUMPF

**SESSION J
SOUND REINFORCEMENT &
ARCHITECTURAL ACOUSTICS**

WEDNESDAY, MAY 8, 2:00 PM
GOLDEN STATE ROOM

Chairman: JAMES RYAN

**SESSION K
MAGNETIC RECORDING
AND REPRODUCTION**

WEDNESDAY, MAY 8, 2:00 PM
LOS ANGELES ROOM

Chairman: GLENN MAXWELL

**SESSION L
SIGNAL PROCESSING**

THURSDAY, MAY 9, 9:30 AM
GOLDEN STATE ROOM

Chairman: WELTON H. JETTON

**SESSION M
ACOUSTICAL NOISE CONTROL
AND STUDIO DESIGN**

THURSDAY, MAY 9, 2:00 PM
LOS ANGELES ROOM

Chairman: RICHARD D. M. NEGLS

**SESSION N
AUDIO INSTRUMENTATION
AND MEASUREMENT**

FRIDAY, MAY 10, 9:30 AM
LOS ANGELES ROOM

Chairmen: JOE D. WEATHERSTONE
BERNARD KATZ

**SESSION O
RECORDING STUDIO WORKSHOP
EDUCATION IN RECORDING
STUDIO OPERATIONS**

FRIDAY, MAY 10, 7:30 PM
GOLDEN STATE ROOM

Chairman: ALBERT B. GRUNDY



**Because people
and their professions
are many and varied...
so are Telex headphones.**

Telex makes many headphones for many kinds of people. From sportscasters and pilots to ham radio operators and those who simply enjoy listening.

Telex headphones range from featherweight units ideally suited for dictation, transcription, private radio and TV listening, to professional communications models featuring boom mics, and audiometric-type transducers impervious to temperature and humidity changes.

We make two series of professional models to meet your needs... Series 1325 for stereo monitoring and Series 1320 for communications, with optional noise-cancelling boom microphones.

General purpose headphones include the Telex Announcers Earset®—inconspicuous for 'on camera' work and prac-

tically the standard of the industry—and the Teleset®, Twinset® and Earset® headphones for lightweight, comfortable and inexpensive private monitoring.

In all, there's a Telex headphone to match both your communications requirement, and your budget. For proof, write Telex Communications, Inc., 9600 Aldrich Avenue South, Minneapolis, Minnesota 55420.

PRODUCTS OF SOUND RESEARCH
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COMMUNICATIONS, INC.

CANADA: Telex Electronics Ltd.
Scarborough, Ontario

INTERNATIONAL: Telex Export Dept., 9600 Aldrich Avenue South,
Minneapolis, Minn. 55420 U.S.A.

7312

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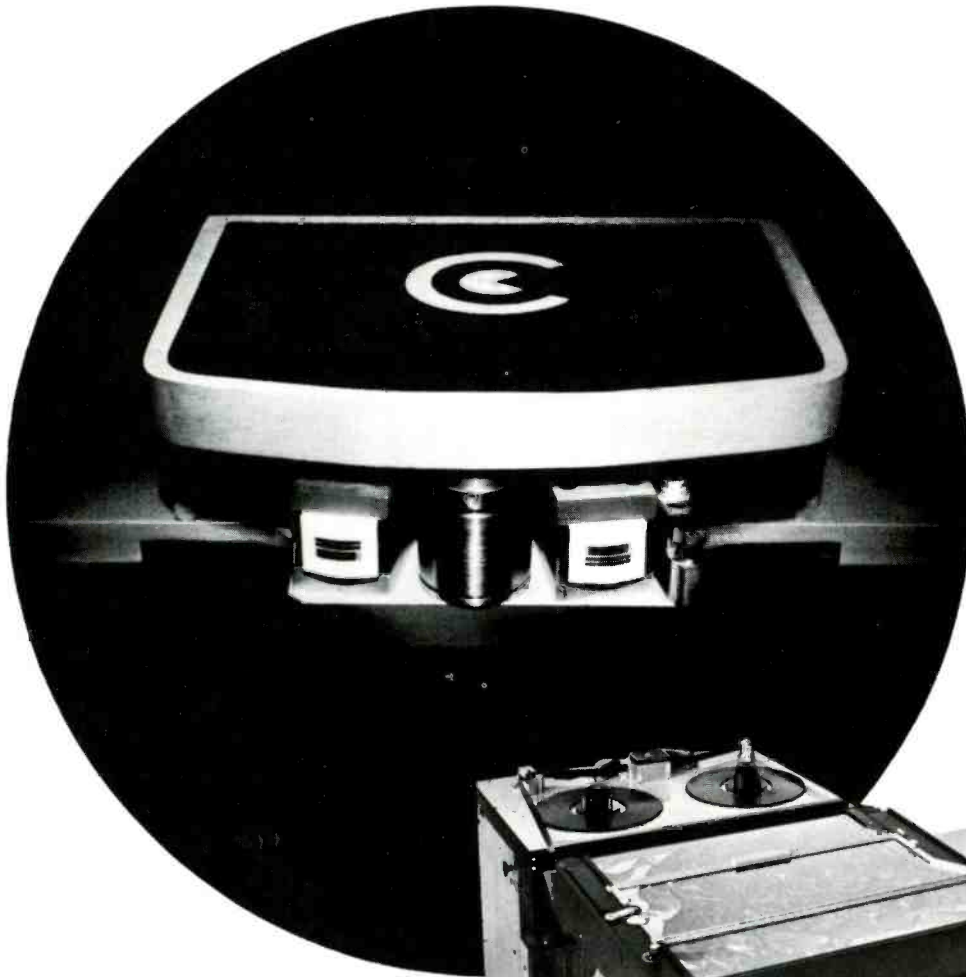
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Now, with the introduction of the exclusive, patented "Focused Gap" Ferrite head, Gauss has raised the standard even higher. Retaining the high penetration, low noise and low drop out characteristics of the "Focused Gap" design, the new heads provide wider frequency response and significantly extended head life. Add to this Gauss' exclusive pneumatically driven horizontal loop bin, 20 slave system capacity with stagger loading capability, new easy 4 track/8 track conversion, 32:1 duplicating speed, traditional precise tape handling and you have the ultimate in quality at the world's highest production rate.

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A basic Series 1200 system (Master Reproducer, Loop Bin, and Slave Recorder).

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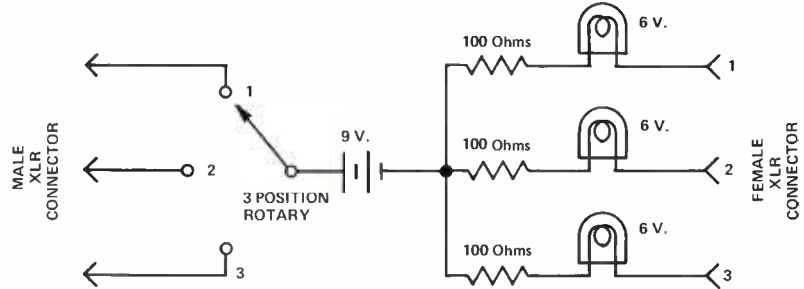
EUROPEAN OFFICE

Cetec U.K., High Wycombe, Bucks, England, High Wycombe 37326 Telex 837329

THE "EL CHEAPO" MIKE CORD TESTER . . . BY JOHN CALDER . . . COOK HOUSE RECORDING, MINNEAPOLIS

If you've ever wondered about the condition of your mike cords, or if you have to check a large number of cords, this simple (and inexpensive) circuit will tell you whether your cord is good, out of phase, shorted, or open. With some twisting and tugging, it will also show intermittent faults.

The tester is basically an ohmmeter, with lamps as indicators instead of a meter. It can be built in a 3 1/2" x 2" x 2" minibox, and the cost is about \$7.00 (using electronics surplus parts), most of which is the two XLR connectors. The lamps are 6 volt incandescent, with red (hot), amber (neutral), and green (ground), lenses. The XLR connectors are mounted on either end of the box, and the 9 volt transistor radio battery is mounted inside. Because the lamps used draw only 50 MA each, the battery should last quite a



while. With the cord removed, the battery is disconnected.

To use, plug each end of a mike cord into its respective connector on the box. With the switch in position number 1, lamp number 1 will light (if the cord is good). In position number 2, lamp number 2 lights, in position

number 3, lamp number 3 lights. If the conductor is open, the lamp won't light. If it's shorted, more than one lamp will light. If the phase is reversed, the wrong lamp will come on.

Simple enough, and much easier than juggling the old VOM around.

VSO BUFFS! BY ROBERT EASTON 360 SYSTEMS, LOS ANGELES

Ever want to raise or lower the pitch of a track exactly, without resorting to your harmonica, or that guitar that is probably in tune? With the

aid of an inexpensive frequency meter the following chart will help when pasted upside your tape machine. The 2nd column is the

exact frequency going up in semitones, and the 4th column for going down. Columns 1 and 3 are the numerical ratios of the musical intervals -- for you math majors.

INTERVAL & NAME	RATIO (Col. 1)	FREQUENCY (Col. 2)	RATIO (Col. 3)	FREQUENCY (Col. 4)
0 unison	1.00000	60.000	1.0000	60.000
1 m-second/semitone	1.05946	63.567	.94387	56.632
2 M-second/whole tone	1.12246	67.348	.89090	53.454
3 m-third	1.18920	71.352	.84090	50.454
4 M-third	1.25992	75.352	.79370	47.622
5 fourth	1.33484	80.090	.74915	44.942
6 dim. fifth/tritone	1.41421	84.853	.70711	42.426
7 fifth	1.49830	89.898	.66742	40.045
8 m sixth	1.58740	95.244	.62996	37.798
9 M sixth	1.68179	100.908	.59460	35.672
10 m seventh	1.78179	106.908	.56123	33.674
11 M seventh	1.88775	113.265	.52973	31.784
12 octave	2.00000	120.000	.50000	30.000

DON'T DELAY... TIME LINE IS NOW!

The time has come when digital delay for both the recording studio and sound contractor is no longer a luxury but a necessity. Pandora Systems has developed a unit which fulfills the needs of both, and has flexibility and technical excellence that surpasses any comparable device available on the market today.

High resolution 12 bit digital encoding produces a full 72db dynamic range naturally, making the use of signal altering noise reduction unnecessary. Coupled with less than .1% distortion (measured at full output 400 HZ) the Time Line literally is a black box that

generates time delays without any alteration to the signal.

By using modular construction the unit can be expanded at any time. The main frame holds 449 ms. of delay and 5 outputs. Inter-connecting frames are available for longer delays.

Delay times are variable in 1 ms steps by simple front panel patching or internal strapping for permanent installations.

Tie this all together with the lowest basic price in the industry, the Time Line becomes the ultimate time machine. Pricing starts at \$2,500. Dealer and contractor inquiries invited.

(615) 320-0623 P. O. BOX 964, **PANDORA** NASHVILLE, TENN. 37202

Swiss Performance

Our new Electro Sound ES-505 Professional Recorder/Reproducer has what it took the Swiss centuries to develop. A heritage of classic design and precision performance. The ES-505's essential mechanical and electronic specifications compare favorably to Studer's A-80. And at 1/2 the price! □ European or American—no other professional machine has more significant "Operator Engineered" features. A disappearing headgate for easy editing or cleaning. A built-in reference audio oscillator that supplies test frequencies 50 through 15K for instant alignment. An optical motion sensing system prevents tape damage during control sequencing. And differential disc brakes for ultra smooth tape stops. □ Operator simplification. Our ES-505's "Record" indicator light also continuously monitors bias. There are two calibrate positions: one for record and one for re-produce. Our optional third reel is the ultimate in convenience for those heavier editing jobs. Operating modes are instantly recognized with fully illuminated transport controls or optional remote controls. □ Operator satisfied idler fly wheel lowers flutter up to 25%. The ES-505's non-slip capstan improves playback timing accuracy to ±1.8 seconds in 30 minutes recording. □ The ES-505 is available in 1/4" or 1/2" versions, with 1, 2 or 4 channels of electronics. □ The Electro Sound ES-505 comes with the world's only 1 1/2 year extended parts warranty. The American machine to match Swiss excellence.



Performance	Electro Sound ES-505	Studer A-80
Mechanical		
Timing Accuracy	± 0.1%	± 0.1%
Wow and Flutter 7 1/2 ips	-0.08 rms	-0.07 rms
Electronic		
Frequency Response 15 ips	30-18K Hz ± 2dB	30-18K Hz ± 2dB
Signal-to-Noise 15 ips— Two Track	63 dB	62 dB
	Unweighted	
Distortion	0.4% 2 HD @ 500 Hz. Peak Record	-1.0% @ 1K Hz. Operating Level
Price	\$3,395	\$6,670

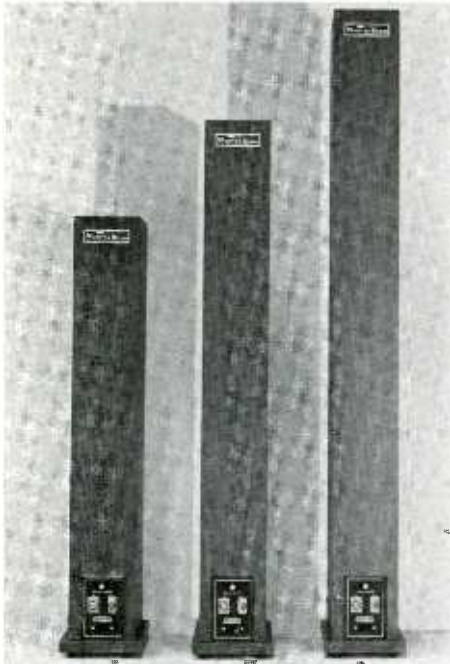
Electro Sound, Inc.
725 Kifer Road, Sunnyvale, CA 94086
(408) 245-6600 Telex: 34-6324 LECTROSND SUVL

American Prices

NEW PRODUCTS

NEW ADDITIONS TO MICMIX REVERB LINE

Micmix Audio Products has announced two additions to its Master-Room line of reverberators. The original MR-II unit, with reverberation characteristics of a medium-size room, has been joined by the models MR-III and MR-IV which synthesize the reverberant fields of concert halls or auditoriums having volumes of 200,000 and 750,000 cubic feet, respectively.



Retaining the same smooth response characteristics of the original design, the MR-III and MR-IV Master-Rooms meet the performance standards set by the most expensive type units while remaining economical enough for even the smallest recording studio. With all three units of the series, the latest requirements for differential reverberation on each track can be met inexpensively and without additional set-up.

All Master-Rooms feature monaural drive and stereo-perspective outputs. Nominal decay times are 2, 5 and 7 seconds for the MR-II, MR-III and MR-IV, respectively. Standard input impedance is a bridging 10K ohms and the outputs will drive loads down to 500 ohms. 600 Ohm balanced input/output terminations are available. Input level is normally + 4 dBm (0 VU), but matching levels for optimum performance with particular equipment are furnished when requested. Output level is normally + 4 dBm. Saturation level is + 18 dBm peak and noise is 66 dB down. An acoustic susceptibility level of over 120 dB SPL permits Master-Rooms to be

used in the monitor area without feedback problems. Small in size and lightweight (22 to 29 pounds), the units are readily transportable without special locks or readjustments.

Price: \$985 and up.
MICMIX AUDIO PRODUCTS, INC.,
9990 MONROE, SUITE 222, DALLAS,
TX. 75220.

Circle No. 136

NEW ELECTRET CONDENSER MICROPHONE FROM GROUP 128

Waltham, Massachusetts . . . A new multi-purpose professional electret condenser microphone with 140 dB sound level capability is available from Group 128, Incorporated. Designated SD140-Z the new omnidirectional microphone is built around a rugged miniature electret condenser element of 1/4" x 1/4" x 1/8" dimensions mounted on a 10" long aluminum tube and protected by a foam blast screen. The microphone weighs less than two ounces and virtually eliminates performer fatigue when used in live performance.

The primary advantage claimed for the SD140-Z over other microphones in its class is its wide dynamic range coupled with a high sound level capability of 140 dB without overload or distortion. This permits its use in closer proximity to the sound source than any other microphone.

Operating characteristics include frequency response flat from 50 to 5,000 Hz with less than ± 3 dB deviation over the 40 to 16,000 Hz range; distortion of less than 0.3% at 100 dB SPL; usable dynamic range of 113 dB and negligible susceptibility to vibrations, hum, RFI, temperature or humidity.



The SD140-Z is remotely powered by a 9V transistor radio battery housed in a

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ACCESSORIES

- Soft vinyl dust covers
- Stereo/mono mixdown modules
- Roll-around transport consoles with overhead electronics for #701
- DBX noise reduction

CUSTOM MODIFICATIONS

- Locking screw pots for #701 recorders
- LED overload indicators for input modules
- Built-in low Z mike transformers with XLR connectors and 1/4" jacks

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MIXING CONSOLES USING
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DAVE KELSEY SOUND

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Circle No. 137

R-e/p 59

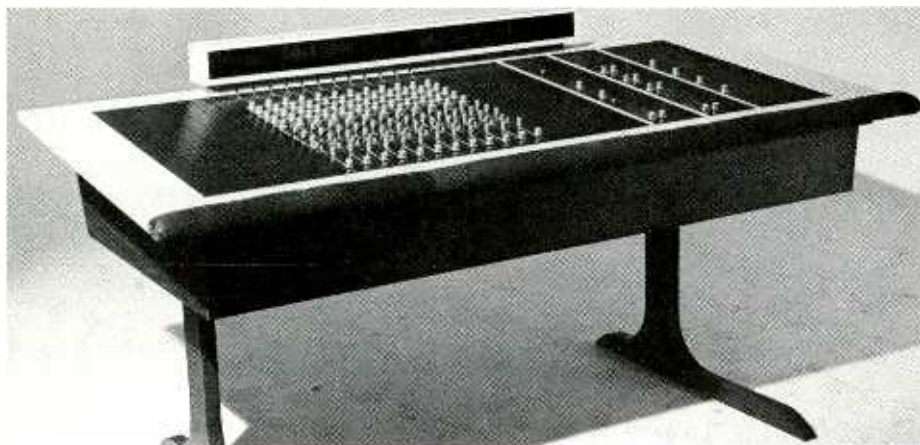
power level control module (supplied) and battery life is 1,000 operating hours. Termination is a standard XLR - 3 connector, and the balanced output works into any impedances from 50 to 600 ohms. Output level at full gain control setting is -49 dBm at 1 kHz.

The American made SD140-Z is available from professional audio dealers or direct from the manufacturer at \$189.00. **GROUP 128, 50 SUN ST., WALTHAM, MA. 02154**

Circle No. 138

NOTE: The following new product announcement is repeated in this issue to correct its appearance with an incorrect photo.

NEW SERIES 'B' RECORDING CONSOLES FROM MULTI-TRACK



The new version of the Series B recording console is a completely redesigned version of both the electronics and the aesthetics. Among the features are:

All switching done with M.O.S. analog switches, no troublesome relays. Advanced equalization section using inductorless circuits for minimum phase shift and ringing. Light Emitting Diode clipping level indicators on all output meters giving the engineer simultaneous indication of average and peak levels.

Module interconnections are accomplished using computer flat cable and connectors for maximum reliability and ease of field expandability. All coupling transformers have been eliminated for

maximum transient response.

100% operational amplifier circuitry includes short circuit proof bus driver stages eliminating unstable push pull transistor outputs. All modules are fully enclosed for maximum shielding providing minimum crosstalk and noise. Newly designed slide fader using sealed rotary cermet potentiometers eliminating noise and short life associated with conductive plastic faders. Custom designed, dual tracking power supply that features: regulation to .1%, ripple below 2MV RMS and SCR crowbar circuitry that protects the console in event of any malfunction. All panels are anodized and etched, not silk screened, the panel markings will not wear off.

These features are in addition to other standard features, such as the built in

echo system. **MULTI-TRACK, P.O. BOX 3187, HOLLYWOOD, CALIFORNIA 90028**

Circle No. 139

NEW ORBAN / PARASOUND MODEL 106C REVERBERATION UNIT

Orban/Parasound announces the availability of the new Model 106C Reverberation unit. The Model 106C boasts increased input sensitivity, increased output level, and a mid-range equalizer with 0 to 11 dB peak boost at four user-selectable frequencies. The 106C also has reduced limiter distortion by a factor of five and improved noise factor by 1 dB over the previous Model 105C.



The 106C comes in a two-piece package. The electronics are mounted behind a standard 1-3/4" x 19" rack panel. The front of this panel contains all of the operating controls. In addition, there is a delay line assembly which is connected to the electronics by means of a 6' plug-in cable. The delay line assembly can be mounted on a convenient wall, under a table, or on the side of a rack. The locking lever, which prevents spring damage in transit, is located

on the delay line assembly. **PARASOUND, INC., 680 BEACH ST., SAN FRANCISCO, CA. 94109**

Circle No. 140

NEW ELECTRONIC MUSIC ACCESSORIES FROM 360 SYSTEMS

The Model 73-B Frequency Follower is a new pitch-to-voltage converter from 360 Systems. It may be used to interface single-line acoustical instruments to ARP, Moog, and other electronic music synthesizers. Acting as a keyboard substitute, the Frequency Follower will control the pitch, timbre, and attack/decay cycle of a synthesizer.



The 73-B has improved immunity to harmonics, and can produce an accurate output within two cycles of when input is applied. The output is an adjustable 1-volt/octave control voltage, with trigger provided for different makes of synthesizers. Freedom from keyboards at last.

Complete specifications are available from the manufacturer. Price: \$595.00. **360 SYSTEMS, 2825 HYANS STREET, LOS ANGELES, CA. 90026**

Circle No. 141

MODULAR DEVICES VARIABLE BANDWIDTH EQUALIZER

A new state-of-the-art equalizer modular devices Model 3000 for individual microphone channel use is available from Modular Devices, Inc., Bohemia, New York.



Known as Model 3000 the new unit is the latest in a series of equalizers and joins Modular Models GME-20, AE-20 and SME-20. Model 3000 features three independent overlapping frequency ranges - 50 Hz to 500 Hz, 300 Hz to 3 kHz, and 1.5 kHz to 15 kHz. Each range has its own continuously variable center frequency and bandwidth controls. The degree of equalization of the bell shaped response

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“For my money it's 3M...”

“The 3M Series 79 recorders are my kind of machine because they give me my kind of sound. We use them in the Westlake studios and recommend them for all the studios we design.

“2-track, 24-track or any unit in-between, they sound better, they're easier to use, and 3M's service organization puts a factory-trained man right on our customers' doorstep any place in the country.

“For a professional sound studio, what else is there?”

Tom Hidley
Westlake Audio

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Mincom Division **3M**
COMPANY

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Dick beats the competition with record master costs like \$30 per side for stereo 12 inch 33 $\frac{1}{3}$ rpm, and \$10 per side for 45's. The day he receives your tape, he'll groove your master with the Neumann SX 68 cutter, the ultimate in cutting machines. Dick'll give it the individual and expert attention of a man who does a lot of producing himself.

For no extra charge, Dick will provide equalization, reverberation, or other special services at your request. And he's used to giving attention to problem tapes.

Interested in album pressing or singles? Dick's got a competitive price list for these services, too. Let us hear you!

Dick McGrew

recording service

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Circle No. 143



substitute your best condenser with a direct box™ on any amp, turn up the monitors, and your mic technique will never be the same.

Courage

ENTERPRISES™

168 S. HUXLEY, CHEEKTOWAGA, NEW YORK 14225

Circle No. 144

is individually selectable in twelve discrete steps from -12dB of dip to +15dB of boost.

Another important feature of this new unit is a voltage controlled equalization "in-out" switch and LED indicator for use with automated programmers. The small size of Model 3000, 1 $\frac{1}{2}$ "w x 5 $\frac{1}{4}$ "h x 6"d, low noise, and transformer coupled output makes it ideal for use in a wide variety of audio applications.

Price: \$325.00 small quantity.

Delivery: Stock to 90 days.

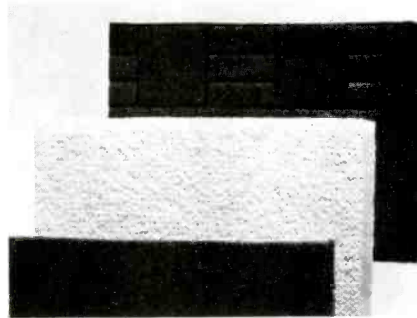
MODULAR DEVICES, INC., 1385 LAKE-LAND AVENUE, AIRPORT INTERNATIONAL PLAZA, BOHEMIA, NEW YORK 11716.

Circle No. 145

FERRO ATTRACTIVE, LIGHTWEIGHT ACOUSTIC FOAM FEATURES HIGH-ABSORPTION COEFFICIENT OVER BROAD FREQUENCY RANGE

Immediate availability of a new attractive, lightweight, flexible acoustic foam that absorbs noise over a broad frequency range is announced by Ferro Corporation, Composites Division.

Marketed under the trade name Coustifoam (R) 3-D, the new sound absorption foam features a random coefficient of absorption equal to 2 lb/cu ft of fibrous glass, the most efficient noise absorber known over a broad frequency spectrum. At 500 Hz, for instance, the absorption coefficient of 1-in.-thick Coustifoam 3-D is 0.7; at 1000 Hz, nearly 1.0.



Coustifoam 3-D is a versatile sound absorption material for middle-and high-frequency applications where an attractive appearance is required, such as hard walls and vehicle headliners. It also makes effective absorbing baffles.

Where decorative appearance is desired, embossed patterns are available. Easily installed with knife or scissors and an adhesive, Coustifoam 3-D can also be die-cut. A pressure-reactive self-adhesive backing is optionally available for even quicker installation.

Safe, nontoxic, and non irritating to handle, Coustifoam 3-D requires little or no mechanical support because of its high tear and shear strengths. It can be glued, taped, heat-sealed, nailed, stapled, or wire-hung. Expected service life is 10 years under normal conditions.

Standard thicknesses are 1/2 and 1 in., available in 200 and 100-ft rolls, respectively, that are 54 in. wide, untrimmed. Nominal foam density is 2 lb/cu ft, and offers thermal insulation.

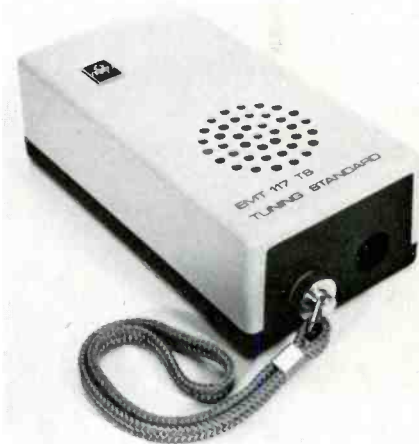
FERRO CORPORATION, COMPOSITES DIVISION, 34 SMITH STREET, NORWALK, CT. 06852

Circle No. 146

EMT-117TS ELECTRONIC TUNING FORK FILLS IMPORTANT GAP

Although the world has an international standard covering the "A" to which all instruments are to be tuned (440 Hz), almost all orchestras have a traditional tuning "A" which may deviate from this by as much as ± 5 Hz.

In the 1950s EMT built the 117 Tuning Generator using bulky and complicated temperature compensated tube oscillators. These found their way into most of the major orchestra, recital and opera halls of the world. The EMT-117TS brings this device into the age of integrated circuits.



It is a self-powered hand held device with a self-contained loudspeaker which emits an oboe-like tone tunable precisely in 1 Hz steps from 435 Hz to 445 Hz. A switch activates a tremulant generator which imparts to this tone the human qualities of an oboe actually being played. The unit has a connector which allows external 9V powering and which feeds the audio signal to larger speaker systems, when required.

Latest phase locked loop oscillator circuitry provides long-term stability.

Available: May 1974.

Price: \$370.00

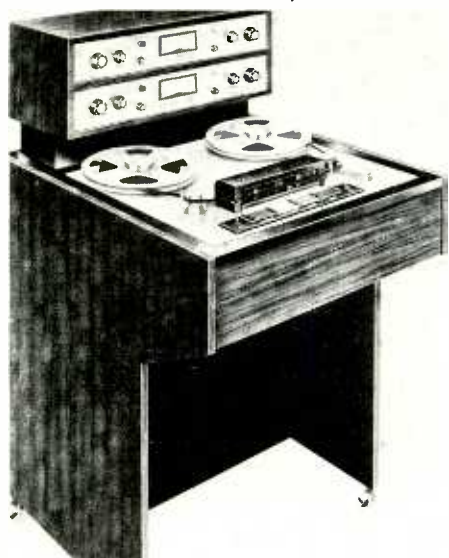
GOTHAM AUDIO CORPORATION, 741 WASHINGTON STREET, NEW YORK, N.Y. 10014.

Circle No. 147

NEW LINE OF STUDIO EQUIPMENT CONSOLES.

A variety of cabinet models for a wide range of recording equipment designed to dress-up studio facilities and provide maximum protection to the mechanical and electronic components is now available

for units manufactured by Scully, Ampex, Studer, Tascam, Rangertone and Presto. The standard finish, heavy duty gunstock walnut formica is easily cleaned and



furnishes extreme durability. Construction throughout is sturdy and prices are considerably below those of original manufacturers. Access to the tape transport is convenient with a hinged lift-up top, and mobility is achieved by Shephard casters mounted on the cabinet. Other sizes and color finishes are also available from Maissana Contracting. Illustrated model is MC 333 and will accommodate Scully and Ampex units.

MAISSANA CONTRACTING 53 BERKELEY AVENUE, BELLEVILLE, NEW JERSEY 07109.

Circle No. 148

SOLID STATE ACTIVE TRANSFORMER LINKS ELECTRICALLY-ISOLATED CIRCUITS, SOLVES GAIN AND IMPEDANCE PROBLEMS, PASSES 360 kHz SIGNALS, GOES DOWN TO DC

Burwen Laboratories announces the Model AT200 Active Transformer for applications in which a conventional magnetically-coupled transformer can no longer provide adequate performance. Historically, a conventional transformer has been used to couple separate stages in complex circuits, provide a high-CMR link between the different racks or chassis of a sophisticated system, or distinguish transducer signals from their common mode background potentials.



The new AT200 solid state transformer performs all these functions, but with numerous advantages that include much lower harmonic and intermodu-

lation distortion, immunity to magnetic pickup or interference, high input impedance, differential or single-ended operation, appreciable output voltage and current, and frequency response an order-of-magnitude beyond that of comparable magnetically-coupled transformers. Last-but-not-least, the solid state transformer handles signals right down to DC, which separates it from any transformer ever built.

Key AT200 characteristics include small signal 3 dB bandwidth at unity gain of DC-to-350 kHz (150 kHz at 30 dB gain); 20 kHz minimum full power response; ± 10 volts output for 10,000 ohms load; ± 9 volts into

600 ohms; gain adjustable from unity to 30 dB using single external resistor; 85 dB minimum common mode rejection from DC through 1 kHz for ± 10 volts common mode input; 0.03% harmonic distortion at 30 dB gain, 0.01% at unity gain; and 3.5 μ V RMS input noise. Offset and drift data include ± 1 millivolt maximum initial offset externally trimmable to zero; 20 μ V/ $^{\circ}$ C voltage drift; ± 7 nA bias current; ± 0.7 nA/ $^{\circ}$ C bias current drift, all valid for the 0° C through 70° C temperature range. The AT200 transformers operate from ± 15 volt DC supplies, measure 1.5" square by 0.62" high, and fit conventional AC1010 mating sockets.

Expand the dynamic range of your recording services by using us as your own album production house.



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7925 Santa Monica Boulevard, Hollywood, California 90046
(213) 654-4522

Circle No. 149

R-e/p 63

The new AT200 active transformer modules perform much like industrial instrumentation amplifiers in linking circuits at different levels of common mode potential. However, the AT200 is optimized for work with high performance audio circuits. Specific applications include DC-to-audio transmission in studios, broadcasting equipment, and in recording/reproducing equipment. The transformers also function as headphone drivers, galvanometer drivers, and as amplifiers for separating transducer signals from background common mode voltage levels.

Priced individually at \$200, less in quantity for OEM console manufacture and related purposes, evaluation AT200 modules are available from stock, and are shipped in quantity within 4-6 weeks. BURWEN LABORATORIES, INC., 209 MIDDLESEX TURNPIKE, BURLINGTON, MA. 01803

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Continued from page 17

STUDIO EQUIPMENT

Japanese studio equipment is basically the same as in this country. Consoles in the more established installations are designed and built on the premises, but more recent installations seem to favor a number of the leading US and English brands.

Altec and JBL share the honors about equally in the monitor speaker area.

In spite of the fact that Japan manufactures some extremely fine recording tape, such domestically produced product is viewed in Japan basically as a consumer item. 3M and Agfa appear to be the most widely used tapes for recording operations. As everywhere else in the world, Transco and Audio Devices, both American brands, account for master lacquer recording blanks.

Preferred tape recorders are very much as we know them here: Ampex, 3M, Scully, Studer, and MCI. (No preferential order intended.)

Only in the area of cutting styli do we see a Japanese source being used. The Namiki Jewelry Company, a large maker of jeweled bearings and playback styli, provides recording styli for the Japanese recording industry.

Microphones are a mixed bag; all kinds are used, but there appears to be a tendency to use more condensers and less dynamics than in the US.

INDEPENDENT STUDIOS IN JAPAN

Independent studios are relatively new


to the Japanese recording scene, and they are developing much along the same lines as in the US. One very important and impressive studio which we visited was the Studio Mouri, housed in their own building away from the commercial area of Tokyo. Most of their work appears to be the result of overflow from the studio activities of the major companies, although they do a substantial amount of work for independent producers and for those record companies which do not have their own studios. Again, their end product is a master tape. Technically, Mr. Mouri has modelled his facilities after the best in the US, and his studios have become the choice of many producers, even those who do most of their work for the major labels.

OUTLOOK FOR THE FUTURE

Japan's attention to technical excellence and progress is likely to be their ticket to even greater successes in the world consumer electronics market. The general economic uncertainty and the energy crunch are hard enough for the US; imagine Japan's position with their rampant inflation and almost total dependence on outside energy sources.

The myth of Japanese cheap labor is all over, and their continued success in the marketplace will be based about equally upon innovation and the skillful application of automation to manufacturing.

In the recording area there will doubtless be more independent studios in the future — including lacquer cutting. The reason is obvious; the world community of engineers is being brought together more often than ever before, and the technical successes of one country will be studied and emulated by others. □ □ □



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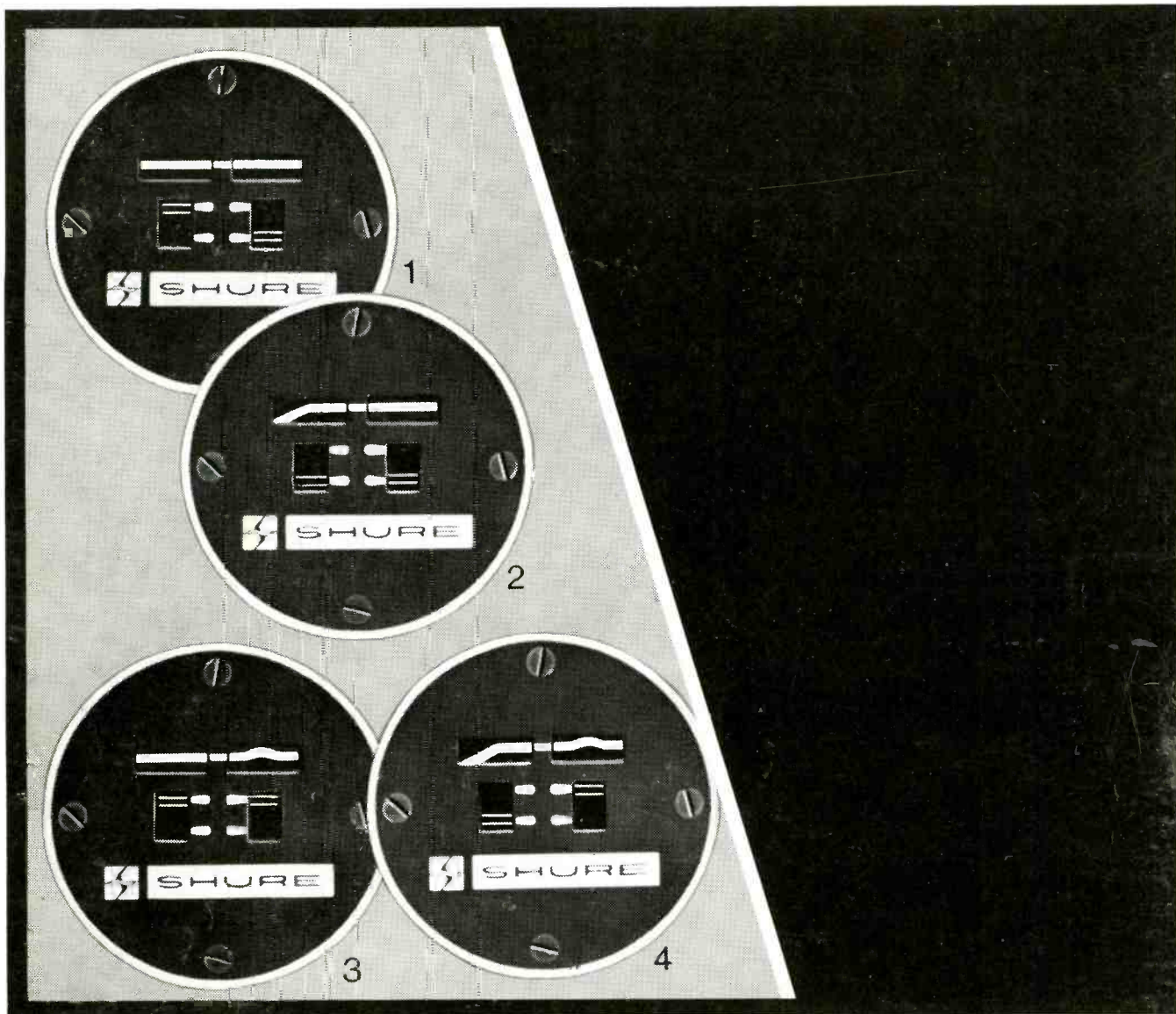
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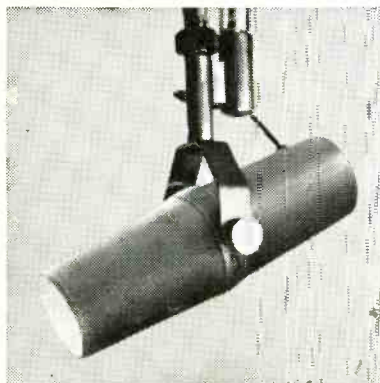
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