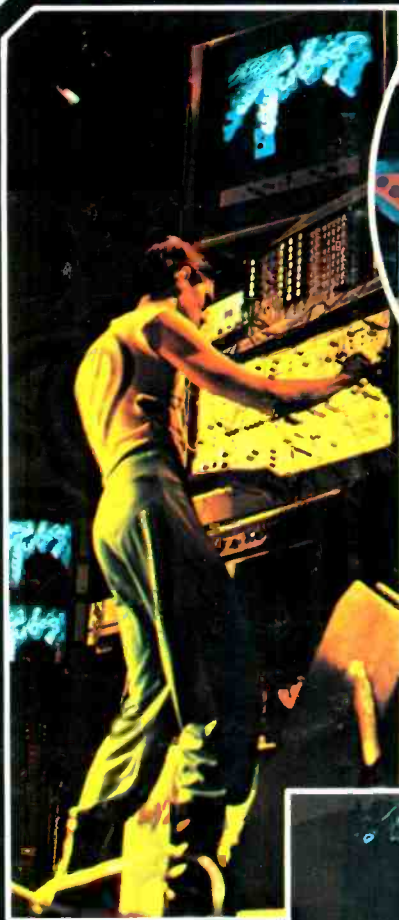


MODERN RECORDING

SERVING TODAY'S MUSIC/RECORDING-CONSCIOUS SOCIETY

Multi-Media Madness
with The Tubes



Starting
a Mobile Studio

History of
Recording, PART 4



Lab Reports
New Products
Record Reviews

A Yamaha sound mixer is shown inside a wooden case, which is placed in the back of a van. The van's interior is dark, and a red light is visible in the background. The mixer has several meters and knobs. The license plate of the van is partially visible, showing "489 G".

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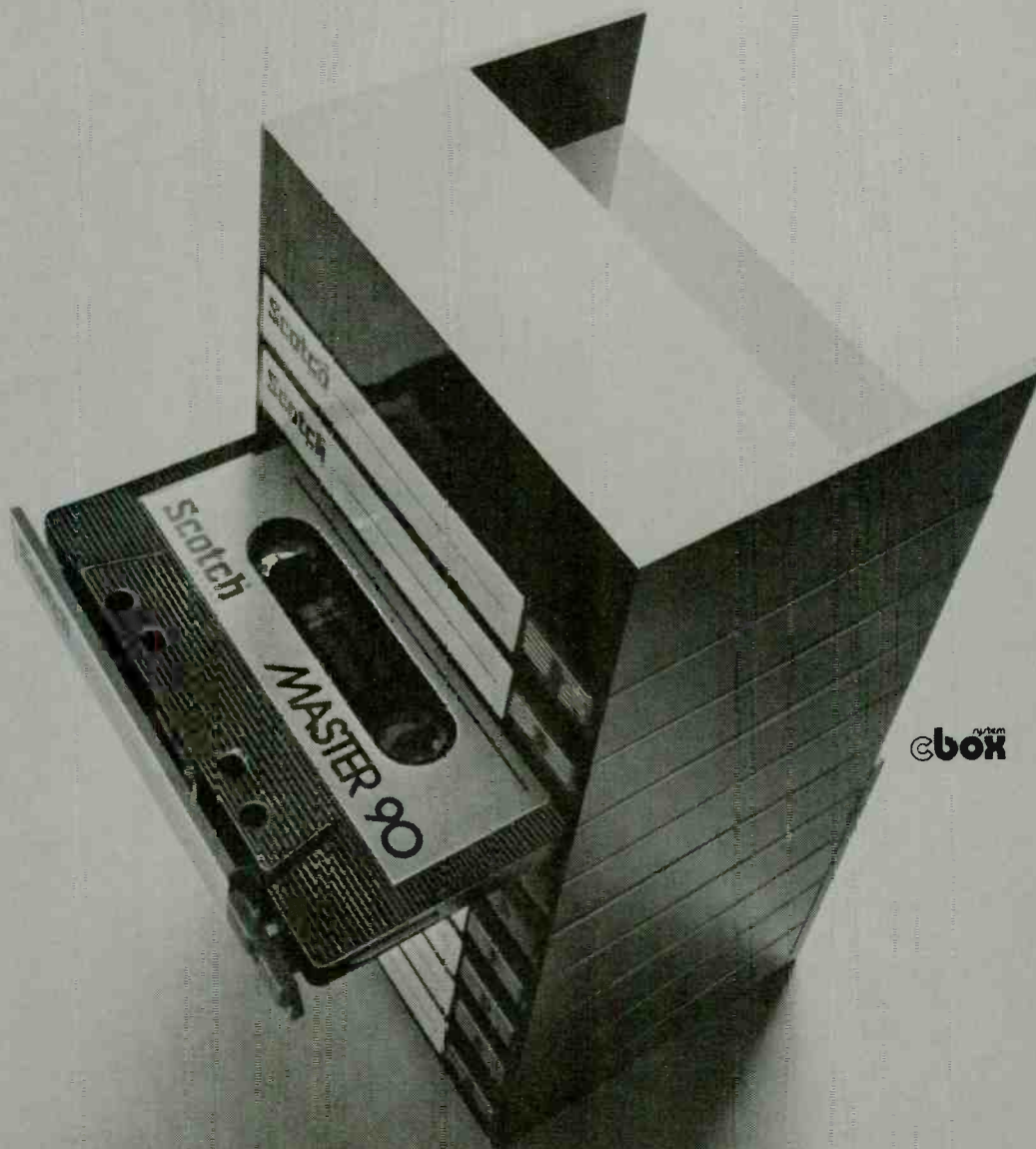
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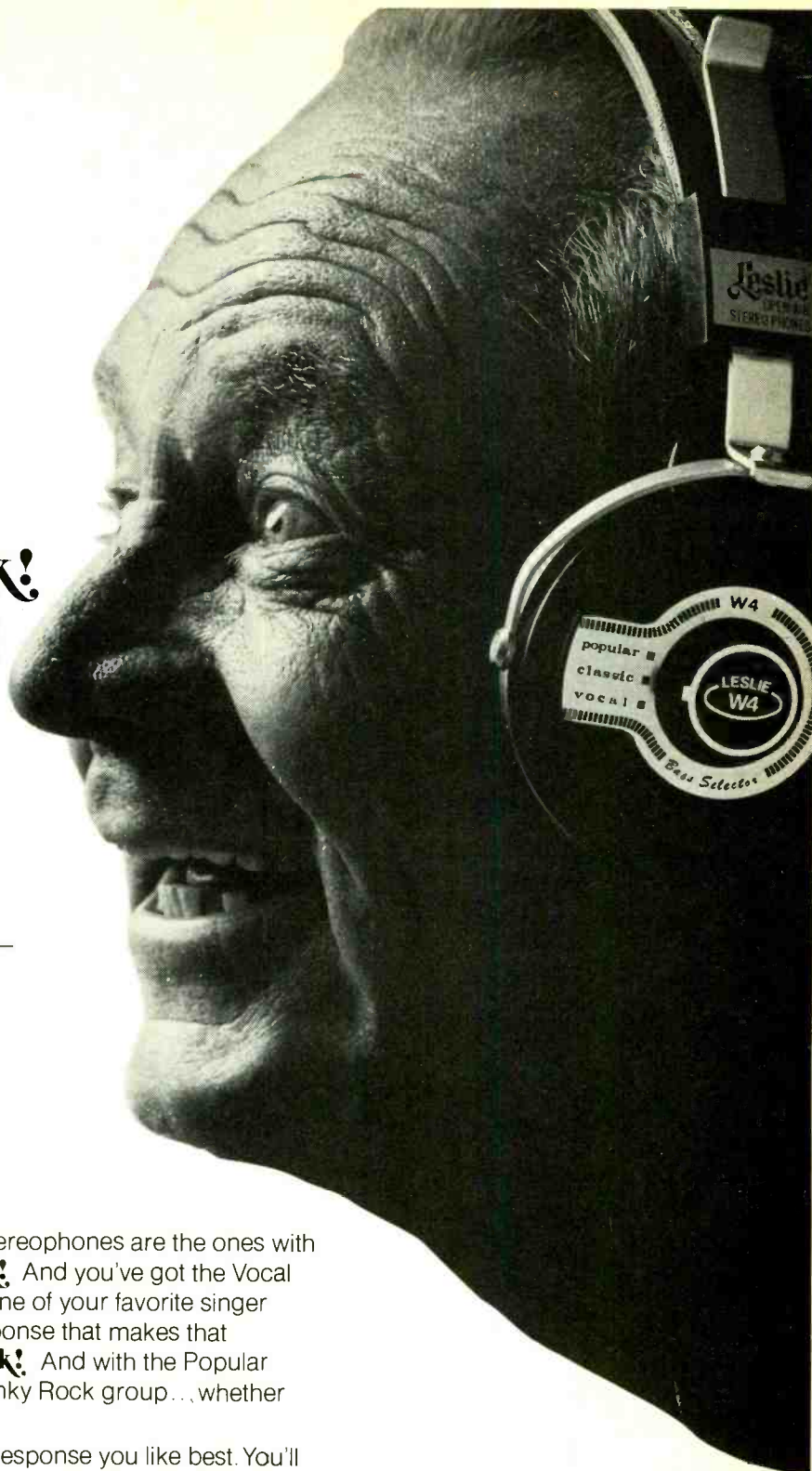
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SERVING TODAY'S MUSIC/RECORDING-CONSCIOUS SOCIETY

APR/MAY 1976

VOL. 1 NO. 4

THE FEATURES

THE HISTORY OF RECORDING, Part 4 **22**

By Robert Angus

A compelling precis of the fascinating development between World Wars I and II of the magnetic recorder. During this crucial period, inventors experimented with wire, iron particles, steel bands, cellulose acetate film, and paper and black oxide tape as a medium on which to record sound.

STARTING A MOBILE STUDIO: A Case History **30**

By Sedgwick Clark

How two young recording engineers first broke into the business and eventually started their own mobile recording company.

MULTI-MEDIA MADNESS WITH THE TUBES **34**

By H. G. LaTorre

A serious look at an up-and-coming group whose audio and technical innovations may well herald the future of rock.

COMING NEXT ISSUE!

A Session with The Beach Boys

A P.A. Primer

History of Recording, Part 5

Profile: Gus Dudgeon

Cover design by Frank Santelia

Cover Photos © 1976 Chas Farrell-Kimbrell

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By Sedgwick Clark

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scripts will be treated with care and must be
accompanied by return postage.

Letters to the Editor

Bridging the Gap

I thought I would drop you a note to let you know how much I enjoyed your publication; I feel that it bridges a gap between strictly technical and somewhat useless "review"-type magazines. I find your articles very informative and professionally useful; and your coverage of new products [is] very comprehensive.

I would like to see some articles on the construction, practices and hints on the portable/home studio.

I wish you continued success on your fine magazine.

—Mark K. Hogue
Road Manager/Sound Man
Maureen McGovern

Semi-Pro Mobile Recording

I would like to see an in-depth article on semi-professional mobile recording. That is, show construction plans, photos and list the equipment used in making a small van or Kary van (boxback) into a remote truck.

There have already been some questions regarding this subject in the "Talkback" section. An article, either by someone who has done it or is about to do it, would be very informative to us *Modern Recording* readers.

—Benjamin J. Homenick
Jericho, N.Y.

See the article beginning on page 30.

Next AES Convention

First of all, I think that *Modern Recording* is the best idea that anyone has come up with for sound engineers that are new to the field.

I would like to know where and when the next Audio Engineering Society convention is to be held. And how can I get tickets? Thank you.

—David A. Fogle
Dayton, Ohio

The next AES convention will be held at the Los Angeles Hilton from May 2-5. For tickets, write to the AES at 60 East 42nd Street, New York, N.Y. 10017.

MR Identifies Two Telegraphones

I have read both copies of *Modern Recording* [No. 1 and 2] and find them of great interest as a lay recording "buff."

The Association has three tape decks which are used to record historical material including early phonograph records. Your magazine can be of help to us.

Of more interest is the article titled "History of Recording" by Robert Angus. There are two telegraphones in the Association's Electronic-Communication Museum. For some time we have been trying to identify these machines without success until your magazine printed this article.

The article appears to be very well written and the author must have done much historical research. A fine job!

—Bruce Kelly, Secretary
Antique Wireless Association, Inc.
Holcomb, N.Y.

Cont. on p. 6

TANDBERG

10XD bridges the gap between consumer and professional tape recorders.

Meet the world's first and only 10½" reel tape recorder that operates at 15 ips and combines Tandberg's unique Cross-Field recording technique with the world-famous Dolby* B system. Result: A *guaranteed minimum* signal-to-noise ratio of 72 dB, measured on a 4-track machine using IEC A-weighting. Simply put, the 10XD completely eliminates audible tape hiss!

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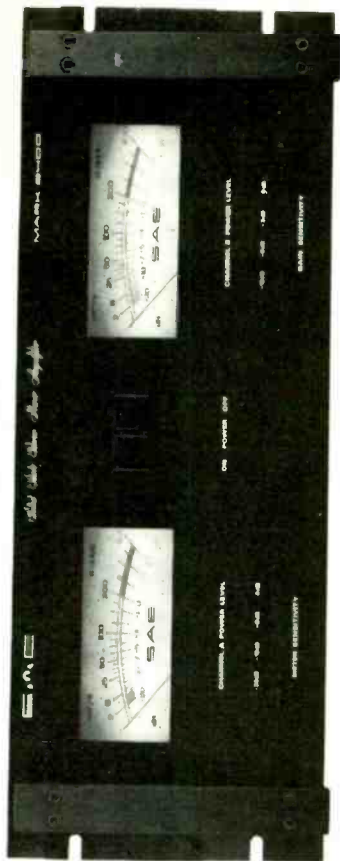


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Engineering Awareness

I've just finished reading your Dec/Jan issue (my first one). I was happy to see your wide range of articles bridging the musician/engineer gap. Other recording publications are available (*dB*, *Recording Engineer/Producer*), but these are aimed at the experienced engineer and would confuse most musicians/producers after one paragraph. This technical approach is much appreciated by us engineers, but does [not] help us with the problem of lost producers/musicians asking us thousands of questions and still finding themselves lost after they've got the answer. This is where your magazine is most applicable. I'm sure in the issues to come you will do a just job of providing informative articles of interest to both the beginner and advanced engineer/audiophile.

I am a professional engineer. I have engineered numerous L.P.'s for Polydor Records, including nine James Brown L.P.'s. I have worked in many studios around the country (Wally Heider's, San Francisco; Criteria, Miami; Sound Ideas, A + R, Record Plant, New York City) and been exposed to many different techniques and recording situations. I've worked with the top studio players (Joe Farrell, Dave Sanborn, Joe Beck, Will Lee, Ron Carter), just to mention a few, and I always find [a] lack of understanding [of the problems which confront] the engineer—the good old if it doesn't sound right "blame it on the engineer." Engineers must be aware of the nature of the musicians and their instruments and the form of music and a thousand other things. But the reverse is in great need of help. I'm glad to see your awareness. Thanks and keep it up.

—Bob Both

Personal engineer to James Brown
Independent engineering
West Milford, N.J.

Dolby Calibration Tape

Can you, or any fellow readers of MR, give me the name and address of a source for a reel-to-reel 7½ ips and/or 15 ips calibration tape for an external Dolby unit?

I bought my unit from Lafayette in August 1975. They were out of stock on the tape at the time. As of this date, they are still out of stock. Meanwhile, the unit, still unused, gathers dust on

my shelf. I tried virtually every electronics supply, audio dealer, and record store in both the Long Island and Albany, N.Y., areas, to no avail.

I would greatly appreciate any help anyone can give me in this matter.

—Martin J. Walker
Troy, N.Y.

You are having difficulty, Dolby Labs tells us, because there is little demand for open-reel calibration tapes (cassette ones are in demand, however). 15 ips calibration tapes are not available, but Teac, Ampex and Marantz manufacture the 7½ ips variety. Write to the companies and they should be able to help you.

Wireless Guitar Transmission

First, let me thank you for an excellent publication that fills a huge void in the music-recording field.

Secondly, I have been told of a wireless transmitter that plugs directly into an electric guitar and enables one to play through any speakers nearby (i.e., the nearest stereo), regardless of [the] speaker's primary usage. In other words, one can wander from room to room playing through whatever system happens to be at hand.

Is such a miracle possible? And if so, could you give me the manufacturer and a general price range? Thanks.

—Russell B. Cunningham
Milmay, N.J.,

It sounds like that "miracle" is The Box, made by The Box Maker Company, 116 Mahan St., West Babylon, N.Y. 11704. It's actually a wireless FM transmitter. You can play through a tuner or any portable radio by either plugging any electronic instrument into The Bos, then tune in the box or the radio to a dead air space. In effect, you become a radio station.

On Record Reviews

I have just received my third issue of *Modern Recording* and am very pleased with its editorial content except for the seven total pages which in my opinion are wasted on record reviews.

I look to *Modern Recording* for technical information, reviews of units I might consider purchasing which are not evaluated by other magazines,

Cont. on p. 72

TALK BACK

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

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

Limiting and Noise Reduction

(1) Explain the use of a limiter—what kind of music, what kind of instruments, where to place; before mixer, after mixer, before recorder, or with mixer send/receive?

Explain function of slope and compression on a limiter.

(2) Do most studios use dbx noise reduction or Dolby? Do most studios use noise reduction? In the "Session with ..." articles, nothing was said about noise reduction in those pro studios.

(3) I was told that many studios use 30 ips, instead of noise reduction. Wouldn't it be more economical (and get a cleaner sound) to spend dollars for a one-shot deal and get noise reduction, rather than run at 30 ips using expensive two-inch tape?

—Linc Chamot
Brook Park, Ohio

(1) A limiter is a device used by audio engineers to increase the apparent signal level by compressing the dynamic range of the program material. It sets a ceiling on loud signals, preventing them from going beyond a pre-determined level.

Because of this, the low-level signal sounds can be brought up in level without fear of the high-level signals going "sky high." The apparent effect here is to bring a voice or instrument into the foreground and give it more presence.

All kinds of instruments and voices can be limited. Caution should be used in selecting how much limiting to use. A small amount on a vocal can permit the audio engineer to concentrate on the quality and sound rather than worry about levels. Instruments with sharp, high peak sounds can cause a limiter to react violently, causing a "pumping" sound every time the limiter tries to hold down a peak. The sound following the peak is caught in the "hold down" action before the limiter can recover and return to its normal state, and is lost to the ear.

Sometimes, limiters are used in heavy limiting on percussion instruments to obtain special sounds without overloading the audio system.

As to where to place a limiter, here again the choice is determined by the overall picture. They can be used on individual instruments or voices to get the desired sound. So here it is used in the individual mic channels, before any combining takes place. Limiters can be used in areas where individual sources do not need limiting, but when combined, after sub-mixing, some level control is desired. When mixing down to the final stereo product, limiters are sometimes used for overall control.

Remember, once it is on the tape, it is there forever. Use limiters with discretion.

(2) Most "pro studios" do use some kind of noise reduction. Both the dbx and Dolby systems are widely used, the choice is a matter of personal preference. With the dbx system, calibration of record to playback levels are not critical, and the system acts upon the entire sound spectrum at one

time. The Dolby system breaks up the sound spectrum into four parts, and acts upon each part separately, with the most action against the higher frequencies. Here, calibration of record to playback levels are critical.

All noise reduction systems alter the signal slightly. The super-critical and many classical artists and producers will not use any system at all. The altering of the natural tones is a definite "no-no."

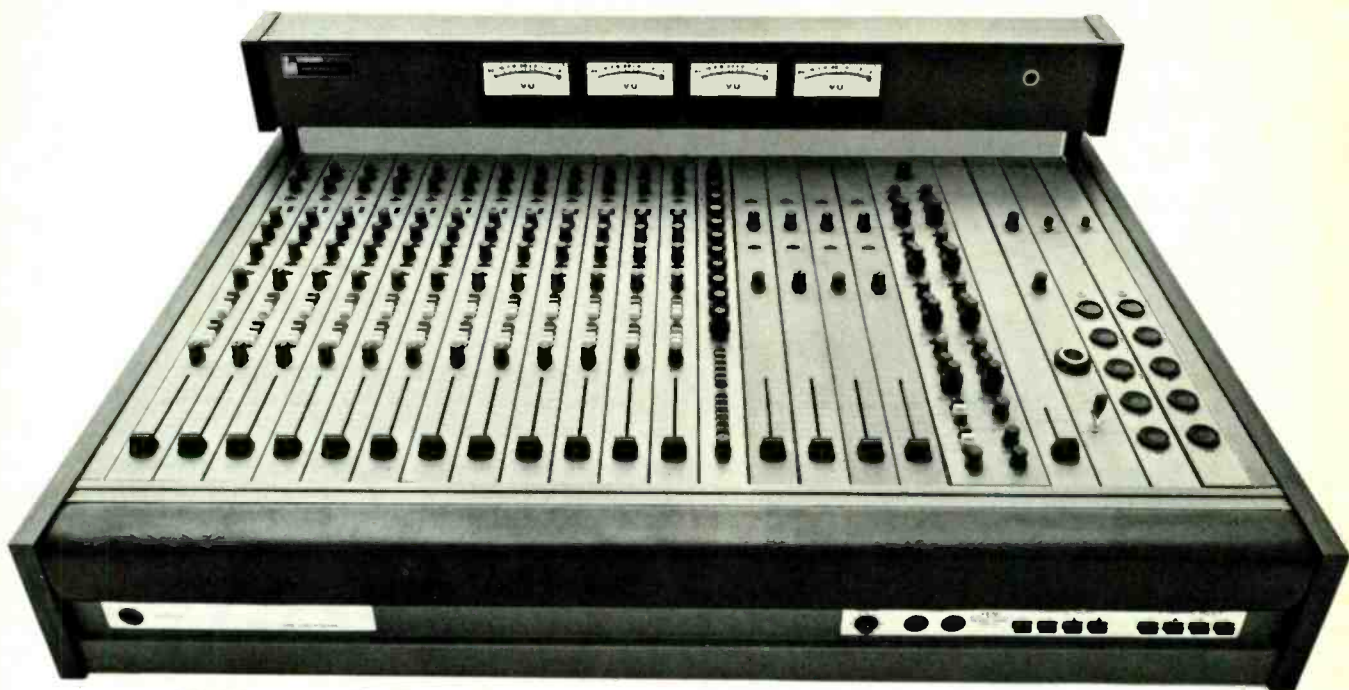
Sometimes, when the music is such that there are many very quiet passages, some type of noise reduction has to be used to overcome tape hiss. If the material is mostly loud, high-level stuff, such as most rock recordings, the action of the noise-quieting systems is minimal, and not useful at all. As tape manufacturers improve the quality of their products, noise reduction will be used less and less.

In this age of gimmicks, some audio engineers have used the Dolby and dbx units as continually variable equalizers with some very interesting results.

"To use, or not to use," that is the question. Record a little of the program material with and without noise reduction. If you hear an improvement, especially in the quiet areas, then use it. If you can't or it is hard to tell, then don't.

—Harold Tarowsky
Asst. Supervisor Design & Const.
Columbia Records
New York, N.Y.

(3) 30 ips doesn't replace noise reduction and vice versa. Depending on the nature of the recording project, either might be required or both together. Higher speed will result in "cleaner" sound (better frequency response, wide dynamic range, reduced tape hiss per channel). Noise reduction will drop the background noise considerably but in itself does not necessarily give as clean



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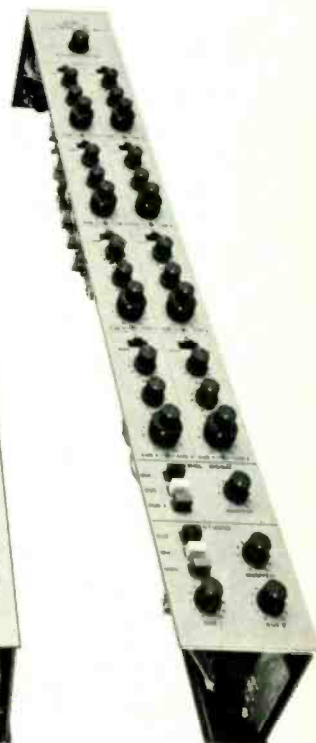
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Model 120



Model 116

Model 10B

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a recording as without it. Recording chamber music would warrant the use of noise reduction and even running at 30 ips if necessary. Recording an electronic jazz group with a wide variety of percussion instruments might well be done at 15 or 30 ips without noise reduction. You might not want to compromise quality by any form of coloration introduced by noise reduction on a master tape. Then, there is the risk of one or more malfunctioning units introducing subtle changes to tracks while doing the studio date. With 16 to 24 units in the circuit, you can't always be certain as to what is happening until you hear individual channels played back. The noise reduction is "locked in" on that tape!

For many studios there is no choice. They must have the 15-30 ips capability on all their machines up to 24-track and have some form of noise reduction (with as many units as is necessary to handle up to 24-track) available. Furthermore, if they are heavily equipped with Dolbys, there is always a tape coming from another studio that is dbx and has to be decoded, or noise-gate equipment such as Kepex or Quad 8 that is required to handle other types of noise problems. You must have the equipment to do the particular job properly—as well as plenty of that "expensive" two-inch tape, if you have to run 30 ips—not to mention good maintenance on the many channels now in use!

—Stan Tonkel
Engineer for Miles Davis
Columbia Records
New York, N.Y.

Powering Condensor Mics

I understand condenser microphones need their own power supplies. Is this true of all condenser mics? And what kind of expense does it run into?

—Anne Chilton
Des Moines, Iowa

All condenser microphones need some form of powering, the most common voltage range being from 44V to 52V DC. Individual power supplies may be purchased or they can be phantom-powered from the console. Phantom-powering applies the DC supply voltage to the artificial center of two 6.8K 1% ¼-watt resistors. In this way, no voltage differential appears be-

tween the modulation leads. Studio outlets wired this way will not cause problems with other types of microphones. However, there are exceptions, so check with the manufacturer before using new microphones.

Older condenser microphones such as the Neuman M49 or U47 (both of which use tube amplifiers) often have their own supplies but may also be powered from the console. Consoles equipped for the powering of tube or condenser microphones may be altered to accommodate the newer FET condensers previously mentioned. This connects the old-style six- or seven-pole connector with a three-pole connector which is capable of phantom-powering FET condenser microphones.

Probably the cheapest solution to the condenser microphone problem is to choose an electret. They require no polarizing voltage for the capsule, as it already has an electrostatic charge which remains in the material. A 1.5V battery is sufficient to power the single FET amplifier. These microphones, due to their small power needs, may last several thousand hours on one mercury battery.

Any price can be obtained from local distributors. My estimates would all be high, as I am presently in Canada.

—Rick Capreol
Manta Sound Company Limited
Toronto, Ont.

Unmatched Speakers

I have a pair of Bose 901 speakers in my living room and a pair of AR 3a's in the bedroom. Both are being powered by the same amp. When played simultaneously, if I adjust the level to the Bose's maximum comfortable volume, the AR's sound underpowered. Conversely, when the AR's sound good, the Bose speakers are deafening. Is this due to different impedances, efficiency or what? Is there anything I can do short of buying a second amp?

—Mike Purrell
Bakersfield, Cal.

You are facing two problems. First, the efficiency of the two speaker types is not the same. The AR 3a is very inefficient and requires tremendous available input power to operate effectively. (The AR 3a has probably the flattest frequency response and therefore the truest reproductive

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capability.) On the other hand, the Bose 901 doesn't require large amounts of input power for relatively the same loudness.

The second problem concerns the active equalizer used with the Bose 901. This equalizer is usually inserted at the tape monitor input of a receiver or between the preamp and power amp of a discrete system. Since the same amplifier is being used for both pairs of speakers, the equalizer is altering (increasing lower frequencies and attenuating higher frequencies) the sound which is being fed to both pairs of speakers. The result is a balanced sound in the Bose 901, as intended by the manufacturer, and a "boomy" sound in the AR's. This effect will add to the "unevenness" in volume.

To remedy the efficiency problem, one could add a series impedance (variable resistor) with the Bose—assuming the A+B speaker systems are in parallel within the amplifier—to lower the power available to the Bose speakers themselves. This method is not desirable since power would be wasted in the added resistors and the power dissipation of each resistor would be quite large. Even if such a resistor was added to each Bose, the equalizer would still discolor the sound of the AR's.

Based on what you have said, I can suggest that you consider one of two routes. Either obtain four matched speakers or trade in your present power system for a quad unit that can be operated in parallel stereo. This would allow you to have separate volume controls for the Bose and AR's, and the insertion of the equalizer would thus only affect the Bose.

—Jack Fassel,

R.I.A. Instructor,
Audio Recorders of Arizona,
Phoenix, Ari.

Recording "Live" Concerts

The following questions all deal with problems I have encountered while recording "live" concerts.

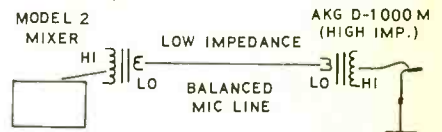
1.) My mics or lines pick up FM radio interference even though I use low impedance mics and balanced lines. In a previous answer to this problem you mentioned an RFI filter. What exactly is an RFI filter and where would it/they be placed?

2.) When recording an organ concert to the recording picked up a click

every time a key was depressed or a stop set/reset on the organ. What is the probable cause and how can the problem be alleviated? Was the tape deck on the same electrical circuit as the organ?

3.) Is it possible to filter out FM interference or the clicks described above on a program which has already been recorded?

4.) Is it possible to use a high impedance mic with a low impedance balanced line (in order to avoid interference) and then feed it into a high impedance microphone input on a mixer or tape deck? How would impedance transformers be placed on this set-up?



—Bill Concevitch
Bethlehem, Pa.

(1) Radio frequency interference (RFI) sounds like a problem due to improper shielding and/or grounding. An RFI filter should not be necessary except in severe cases where there is strong radio frequency energy present. An RFI filter is simply an inductive-capacitive network which presents a high series impedance and/or a low shunt impedance to the RF energy and has a minimal effect on the signal.

Make sure that all microphone cable shields are carried through all connectors, so that the shield is as one continuous run from amplifier input ground to microphone ground. Also check soldered connections for high resistance, as this could cause detection of RF signals.

Check for proper system grounding and if there is any doubt, isolate all equipment from electrical ground with isolator plugs. Run a separate ground wire to a good ground point, such as a cold water pipe or ground rod, and bus between all equipment.

(2) About the organ you speak of, what kind? I will assume that it is a pipe organ and that the noise you are speaking of is not acoustical in nature, resulting from the organ mechanism.

Pipe organs use electro-magnetic devices to open the air valves for the various pipes, and it is possible that these devices are producing "inductive kickback." Inductive kickback can be eliminated by suppression at the offending devices. However, if the

shielding and grounding of your system is proper, the clicks will probably disappear.

(3) It is not feasible to filter out the clicks or RFI, once they are recorded. Suggest that you mark it off as a lesson learned.

(4) It is possible to use a high impedance mic in this configuration, but I question its feasibility. First, this method requires two transformers, and they are relatively expensive. Second, they are cumbersome and require additional connectors and cabling, decreasing reliability.

If the mixer has Hi impedance inputs, it would be more practical to use Lo impedance mics from the start, with step-up transformers at the mixer inputs. Don't waste your money on unnecessary transformers; you would be better off using it to purchase better mics. But, if the only mics you have are Hi impedance, connect as shown below using short cables on all Hi impedance sides.



—Bob Lawrence
VP-Chief Engineer
Knight Recording Studio
New Orleans, La.

Direct Guitar Recording

I have some questions I would like for you to answer in your "Talkback" column or perhaps you could possibly write an article on recording a bass and rhythm guitar straight to the recording console.

(1) How would you build a set-up for recording a bass and rhythm guitar straight to the console?

(2) What are some of the advantages and disadvantages?

(3) Are most of the inputs on the consoles low-impedance or what?

(4) What type of cable and how long can you run it?

—Carlos E. Grier
Monty, Ala.

The process of recording an electric guitar, electric bass and most other electric instruments "straight" into a recording console is a very simple and potentially useful one. The most common way to accomplish this is through the use of a "direct box"

which acts as an isolation and impedance matching device between the instrument and the console.

The heart of a direct box is usually a high-quality audio transformer with a primary impedance of 30-50,000 ohms, high enough to have a minimal effect on the match between the instrument and its amplifier, if one is used. The transformer secondary should have a low impedance—150 to 300 ohms—to match the low impedance microphone level inputs of most professional audio consoles. Two parallel phone jacks are

connected to the primary, the instrument plugged into one, and the instrument amplifier input into the other. This acts in effect as a "Y" connection where the instrument feeds both the transformer primary and the instrument amplifier.

Many direct boxes also include a ground isolation switch to help eliminate certain noises often created by ground differences between the instrument, amplifier and console. Sometimes different sounds are achieved by picking up the signal at

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points other than the instrument output—the instrument amplifier's auxiliary or booster output, external speaker output, or voice-coil leads of the speaker. Sometimes these techniques require the use of a resistive pad between the connection point and the direct box. Also, some new hybrid direct boxes substitute F.E.T.-type amplifiers for transformers.

Some of the advantages of "cutting it direct" are the elimination of the leakage of unwanted sounds (other instruments, room noise, etc.) onto that channel, and the elimination of the need for an instrument amplifier if the musician will monitor through the headphone cue system. Also eliminated is the coloration and distortion that both the amplifier and the speakers add to the natural instrument sound.

The most notable aspect of "direct" recording is the sound character, which can be an advantage or disadvantage depending upon what the "right" sound is. Instruments cut direct often have a very clear, full, very present "fat" sound which tends to dominate in a mix, and could require extensive equalization in order to "blend." If effect-devices ("wah-wah" pedals, for example) are used, a compressor or limiter may also be required in order to counter the severe electrical peaks induced by many of these devices.

There are also potential disadvantages to direct recording—in some cases you may prefer the colored sound of an instrument on an amplifier/microphone recording. "Leakage"—ambient sound—can be used effectively to create dimension or texture, and a direct recording precludes this. (A direct pick-up can be mixed with a miked sound to get a unique blend.) Also, the distorted sound that an amplifier-speaker combination (often played at intense rock 'n' roll volumes) creates is usually eliminated by cutting direct. But, this is often the very sound you are attempting to capture. Another disadvantage is that any changes the musician makes in his instrument's volume or tone settings will be dramatically obvious in the control room. This can be corrected with the diplomatic use of masking tape.

Since electric instruments are usually high impedance, their cable connections to direct boxes, amplifiers or anything else should be with shielded cables that are as short as practical.

Connect the low-impedance direct box output to the console with high-quality shielded microphone cable, which can be as long as any low-impedance microphone cable run, usually a maximum of 150 feet.

If you learn to use the direct box as a supplement or alternative to a microphone, you will have learned a very effective recording technique.

—Steve Litman
Artistic Vision
St. Louis, Missouri

Best Monitors?

(1) What are the best speakers to purchase for studio monitoring?

(2) I know in your last issue of *Modern Recording* you discussed the advantages of direct recording to disc and tape. I would like to know which, disc or open-reel, gives the best quality of sound after running off of the master?

—Gary Gibbons
Osawatomie, Kan.

(1) This is a question which everyone in professional recording has asked and been asked. There is no real answer because of personal preference of engineers and clients. Whereas frequency response in recorders, amplifiers, etc. is easily kept within one dB, the variation in the best speaker system is plus or minus 5 dB. The different acoustical characteristics in rooms will drastically change the sound of the same system installed in different rooms.

In order to overcome some of these problems, I recommend a two-system installation. One set of monitors should have the capacity for extremely loud levels, but still have good sound quality (frequency response, smoothness and dispersion). This satisfies the client who "needs" volume to work. The second set of monitors would have a "truer" sound but not the volume capability. Close placement of speakers to the client and engineer helps reduce the "room effect" on the speaker's sound.

In my opinion, the best high-volume system is Westlake Audio's system. My favorite low-volume system is a pair of AR-3a bookshelf speakers. It's almost essential to "voice" the loud monitors, which means adjusting the frequency response of the signal fed to the speakers to compensate for the

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connected to your good quality reel-to-reel tape recorder, you can make tapes with better dynamic range and lower hiss and background noise than the most expensive professional studio recorders can achieve using conventional noise reduction systems.

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Used with a two channel recorder, it allows you the additional flexibility of recording and playing back the noise reduced signal simultaneously. The 154 is part of a full family of professional format noise reduction systems which allow the recordist to achieve professional studio quality results at surprisingly low cost. For complete product information and prices, with list of dealers serving your area, circle reader service number or write to the factory. dbx, Incorporated, 296 Newton Street, Waltham, Mass. 02154

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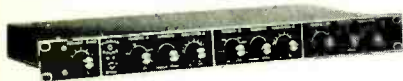
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CIRCLE 87 ON READER SERVICE CARD

"room effect." Westlake's system is voiced when installed and is included in the purchase price.

(2) I think there's no contest here. In the final form, the disc is the best medium for realizing the advantages of direct-disc recording. If you're making a master, the tape medium is going to be very forgiving of sudden volume changes and overload. Recording at a high, constant speed of 15 or 30 ips will provide excellent noise, distortion and frequency response characteristics.

If you're making direct-disc masters, you have a whole different game on your hands. The disc will distort much easier on sudden peaks; if the peaks are unexpected, the grooves will run together, ruining the master. The constant turntable speed of 33 $\frac{1}{3}$ or 45 rpm means that the groove velocity decreases at the inner diameters, increasing the problems with distortion.

But let's assume you've gotten both a good tape and a good disc master. If the disc master were carefully plated and pressed, the distortion and frequency response on the commercial pressing would remain unchanged, for all practical purposes. A little noise would be added over the original disc master, but not enough to require any noise reduction like Dolby or dbx.

A tape master would go through a high-speed duplication process and into a much lower tape-speed medium for the commercial copy. The lower tape speed and high-speed duplication means that a lot of noise, distortion and limited frequency response will be picked up, which will to a large degree negate the advantages of the direct-master recording. That's not to say that there will be no gain from direct recording the tape master—there will be a gain, *but* the difference will be much more dramatic with the disc medium.

—Robert Dennis, Manager
Superdisc Recording Services/
Holland Dozier Holland Sound
Detroit, Mich.

Pick-up Consistency

There are at least three new piano pick-ups available (Frap, Barcus-Berry, Helpinstill) for, presumably, "live" performance. Are these pick-up systems effective for recording or will a good microphone always surpass?

The idea of achieving consistency interests me.

—David Dhuett
Hollywood, Cal.

Many recording engineers have been using piano pick-ups in studios in order to get "presence" when recording "live," and leakage is a problem.

Generally speaking, pick-ups sound much "harder" than microphones. But with a little equalization, a very natural sound can be achieved.

Piano pick-ups can also be used in combination with microphones to produce a "larger than life" piano sound. Using microphones for the natural piano sound and the pick-up for added presence in quiet passages, eliminates unwanted noises such as creaks, rumble, earphone leakage, etc.

As for achieving consistency, a good pair of microphones will cover most situations. But if you're into getting some new or unusual piano sounds, try using a pick-up along with a good equalizer, and if you're into synthesized piano sounds, very unique sounds can be obtained by adding phasing, fuzztone or any other gadget available on the market.

—George Semkow
Freelance engineer/producer
Toronto, Ont.

A Stereo System Test

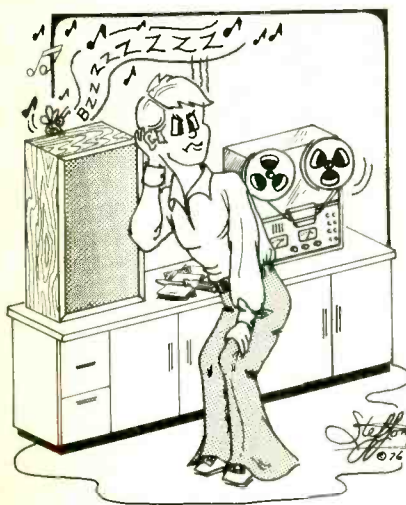
I've got a fairly sophisticated home system and I want to make sure I'm getting the best possible response from my equipment. Is there any way I can test my cassette, turntable, speakers, receiver, reel-to-reel and cartridge recorder at home?

—Jon Gregor,
Las Vegas, Nev.

You can evaluate your cartridge/turntable's performance armed with your ears and a \$7 test record you can buy from any Shure dealer, *TTR 101-Audio Obstacle Course*. This disc allows you to rate your cartridge's tracking ability as well as your turntable's anti-skating (bias) adjustment and rumble performance and your system's channel balance and phasing. You may expect some change to take place in these areas with age and use. These problems are easily remedied at home. Mis-tracking and excess skating (or over-compensation) can usually be fixed by twisting the proper screw (see

your owners manual). You can check the speed accuracy of your turntable with a strobe disc (about \$1) and a neon light (e.g., a bathroom night light). Most high-end turntables are equipped with this feature and an adjustment is provided to correct for error; if yours isn't, it's time for a trip to your local audio dealer.

Your best friend to check your tape recorder (open-reel, cassette or cartridge) is a playback alignment test tape (about \$30). Rule #1 with test tapes: clean, de-magnetize, and dust the tape path. If you own or can borrow a VTVM, hook it up to the line output(s) of the recorder. If you don't, you'll have to rely on your VU meters, which may have a tailored response but should provide relative accuracy. The first tone is usually 1 kHz at oper-



ating level. While it is playing, bring up your output level control(s) to read zero on the VTVM (usually -10dBm for Teac, Sony, etc., +4 dBm for Ampex, Otari, etc.).

Now, without changing the level controls, as the tape plays the tone segments from 15 kHz down to 50 Hz, make a chart of the readings on the VTVM, plus or minus so many dB from the zero. Don't panic, chances are that many of the readings will be off by 2 or 3 dB. This is acceptable as long as the overall chart is smooth; also, as the tones approach the low end (below 200 Hz) there will be a sharp rise which is caused by the "fringing" effect of full-track test tapes. Keep this chart and refer to it as you perform this test every 40 hours of playing time. After a time you'll notice the highs will start to fall, which means that the playback EQ (internal) should be touched up either by yourself or at the shop.

Without lots of good test gear, re-

ceivers (tuners, pre-amps, amps) and speakers are hard to evaluate. These components change little with age. Unless you hear problems, don't go looking for them. If you live in a metropolitan area, watch for clinics sponsored by hi-fi shops. This is a great way to take advantage of a free professional checkout.

—Don Boomer,
Dave Kelsey Sound,
Hollywood, Cal.

Excess Oxicles

A couple of months ago I purchased a Teac 3340S reel-to-reel tape machine. I primarily use this 4-track machine to record groups and songwriters to make demo tapes for them.

I have two problems I need help with. First of all, when I'm recording I repeatedly use the fast rewind so we can overdub the empty tracks. After a while the tape begins to leave great amounts of dust particles on the capstan and shut-off arm.

The tape I use is Maxell UD 35-180 and Maxell LN 35-180. Could it be the tape I use or just rough wear on the machine's part?

—Chris Winn
Rocklin, Cal.

I am going to assume that the "dust particles" that you mention are brown, and that they are oxide particles from the tape.

The wearing of oxide particles from tape is common to all tape recorders but your problem sounds excessive. You may have built up oxides on some of your tape guides from normal use, these will then strip off more particles as you wind the tape past the guides. Be sure to clean your machine often and carefully (including the guides by the heads).

The tendency of tapes to "shed" oxicles differs for each type of tape you use. Maxell does not normally do this. New tapes shed more than old ones. If after cleaning all the guides with alcohol and swabs you still experience severe shedding, take the machine to an authorized service station and have the machine checked.

—Theo Mayer
Teac Corp.
Montebello, Cal.

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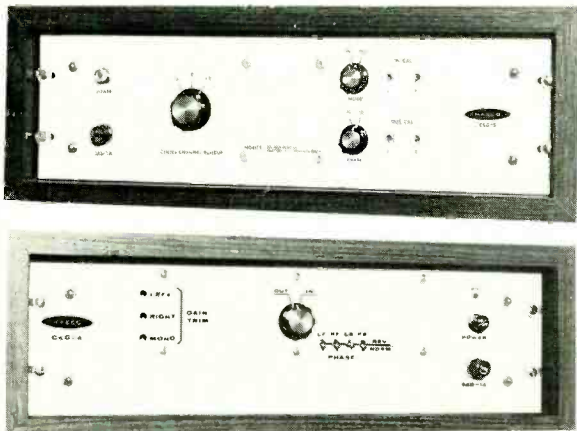
CIRCLE 98 ON READER SERVICE CARD

THE **PRODUCT** SCENE

By Norman Eisenberg

HAECO PRODUCT OFFERINGS

Haeco is the brand name (the letters stand for Holzer Audio Engineering Corp.) of a broad line of audio devices of interest to serious amateur and professional recordists. Offerings include record-lathe systems (prices on request) down to new pressure rollers for an Ampex (\$37.50). One of Haeco's latest goodies is the PL-2, a low-cost (\$100) but reportedly "pro-quality" limiter/compressor which measures only 6 3/4 inches high and 1 1/2 inches wide by 5 1/2 inches deep, weighs 14 ounces, and offers controls for compression threshold, release time, VU readout, meter zero calibration, and gain-reduction bias. Its frequency response is rated within ± 0.5 dB from 15 Hz to 30 kHz with under 0.5% distortion at limiting threshold (less than 0.15% nominal). S/N ratio is given as -85 dBm at any gain setting up to $+30$ dB. Special mixdown devices also are offered by Haeco, including a recently improved model CSG-2 (stereo) and a new model CSG-4 (quadraphonic), which list for \$21.95 and \$29.95, respectively.



CIRCLE 14 ON READER SERVICE CARD

CASSETTE STORAGE DRAWERS

Newest brain-child from the 3M Company is a cassette storage system made up of stackable, interlocking boxes that have push-button drawers for individual cassettes. Index cards and labels are supplied. Each unit in the C-Box series interlocks via grooves on top and bottom. The individual containers can be piled up, rearranged or carried. Another fillip is a wall bracket that converts a group of boxes to a permanent or out-of-the-way storage station.

Scotch Classic ferri-chrome C-60 and C-90 cassettes are now available prepackaged in the new C-Box (as well as in the older-style box). The C-Box adds 30 cents to the regular tape price. Empty boxes also are sold: \$1.99 for a sleeve-pack of three empty C-Box units, and \$.99 for either the wall bracket or a carrying handle.



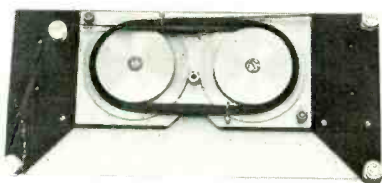
CIRCLE 21 ON READER SERVICE CARD

PRERECORDED TAPE ACTION

Sound buffs who favor prerecorded tape as a super program source ought to know that the Ampex Tape Society, despite recent rumors, is still going. ATS offers a variety to please everyone, with pop, rock and classical releases in all formats—including 7 1/2 ips Dolbyized open-reel. Right now, ATS is offering a six-for-five deal: buy any five tapes and get another of your choice free. For details and a catalogue, write to Ampex, 2201 Lunt Ave., Elk Grove Village, Illinois 60007. If you think this item is a plug, you're right. Ampex deserves it for its pioneering efforts with tape generally, and for its long years of supporting the prerecorded tape format as a top-quality sound source.

CIRCLE 15 ON READER SERVICE CARD

DELAY-ECHO ACCESSORY



For use with its model A77 professional tape deck, Revox offers a delay/echo unit that incorporates an endless-loop cassette. Applications include automatic message repeat, continuous short-term monitoring, time delay of programmable machinery, and tape echo. With a pre-loaded tape included, the new device costs \$187. Installing it on an A77 deck is said to take less than ten minutes. Incidentally, the latest version of the A77 costs \$1,550, features two speeds (7½ and 15 ips), is NAB-equalized, and has balanced line inputs rated at 1.55 volts for peak-level modulation. Balanced line outputs are pre-set for 1.55 volts and take Cannon-type XLR connectors. Outputs for unbalanced line, for speakers, and adjustable headphone drive also are included. Tape tension is adjustable.

CIRCLE 22 ON READER SERVICE CARD

UHER ADDS MIXER 500

Uher has just added a new mixer to their line which they describe as "a console for the amateur studio with professional features." The Mix 500 is said to match any tape recorder and operates either from internal dry batteries or from external power. In the mono mode, up to five sources may be connected; in the stereo mode, two stereo sound sources and one mono may connect up to the Mix 500. The five transistorized amplifier channels are each controlled by a slider-type potentiometer; this control-design, claims Uher, allows accurate cross-fading and, as each control is calibrated, ease of checking the exact settings. The unit offers a choice of nominal output levels of 30 mV and 500 mV (by means of FET amplifier stages). The 30 mV output is suitable for connection to the Radio/Diode input sockets of recorders using DIN standards. The Mix 500 is priced at \$186.

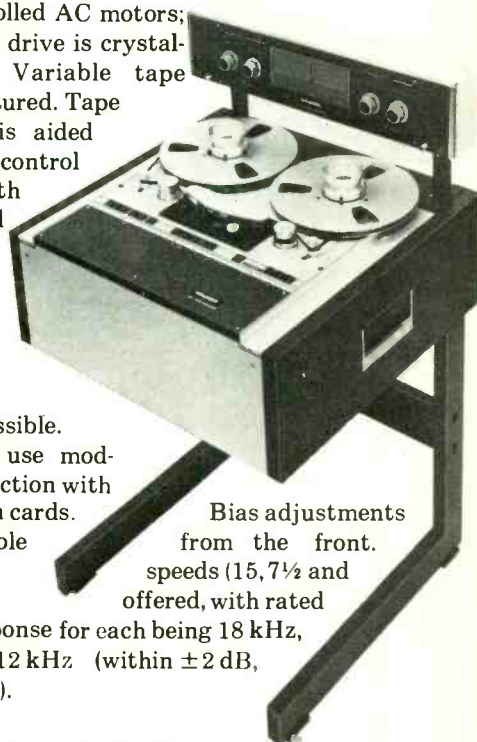


CIRCLE 16 ON READER SERVICE CARD

STUDER'S PROFESSIONAL TAPE RECORDER

From Switzerland comes the Studer A67 professional tape recorder, now available in the U.S. and in Canada via Willi Studer America, Inc. of Nashville, and Studer Revox Canada Ltd., respectively. The A67 is an open-reel deck (transport and electronics) that handles up to the full NAB-size (10½-inch diameter) reels. Various ¼-inch mono and stereo head configurations are now available; a ½-inch four-track sync version is in preparation. All Studer models use three servo-controlled AC motors; the capstan drive is crystal-controlled. Variable tape speed is featured. Tape movement is aided by built-in "control logic" with memory and interlock features. Remote control of all transport modes is possible.

Electronics use modular construction with front plug-in cards. Three tape speeds (15, 7½ and 3¾ ips) are offered, with rated top-end response for each being 18 kHz, 15 kHz and 12 kHz (within ±2 dB, respectively).



Bias adjustments are accessible from the front. Three tape speeds (15, 7½ and 3¾ ips) are offered, with rated top-end response for each being 18 kHz, 15 kHz and 12 kHz (within ±2 dB, respectively).

CIRCLE 27 ON READER SERVICE CARD

SESCOM MODULES AND OTHER ITEMS

A series of ten new audio modules designed for a variety of functions highlights the current product offering from Sescom, Inc. Included are mic preamps, equalizer (for disc and tape) preamps, active equalizer, line amp and power amp. Sescom also produces a wide range of items and accessories such as in-line transformers, various connectors and adapters, microphones, area paging systems, multi-channel mic-splitters, cable tester, and so on. All of this is described in a detailed catalogue titled "Audio Products for the Professional."

CIRCLE 17 ON READER SERVICE CARD

PIONEER TOP-END ITEMS

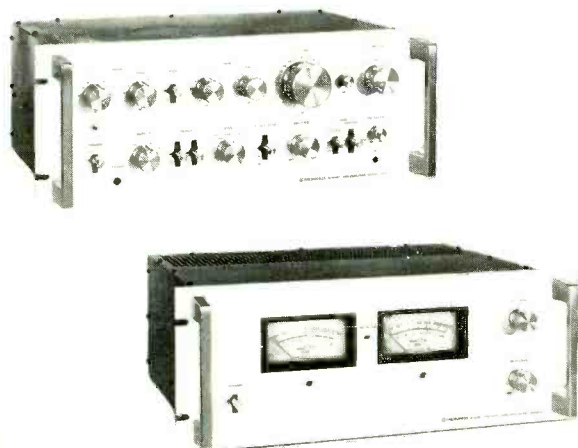
Pioneer's bid for the professional (or advanced amateur) market is seen in two product areas—open-reel tape and amplification. The RT-2022 is a three-motor, three-head, two-track, two-speed (15 and 7½ ips) deck with simultaneous sync monitoring, and variable bias and EQ. The head assembly may be swapped for one that provides quarter-track operation, and add-on electronics permit full four-channel use. Frequency response at 15 ips is stated



as within ± 3 dB from 30 Hz to 22 kHz; at 7½ ips, within ± 3 dB from 40 Hz to 20 kHz. The transport is solenoid-operated. There's a lockable cueing-and-editing switch. VU meters are calibrated from -40 dB to +6 dB. Channels have individual controls

and switches. The RT-2022 lists for \$1250.

Spec-1 and Spec-2 designate a new preamp and power amp, respectively. Both are stereo units and both come with front-panel handles and dimensions suited for rack-mounting. Response and distortion specs are extremely high for either unit; the power amp is rated to deliver continuous power of 250 watts per channel at 8 ohms across the band from 20 Hz to 20 kHz at a maximum distortion of less than 0.1%. The preamp weighs a bit less than 25 pounds; the power amp, 54 pounds. The cost is \$500 and \$900, respectively.



CIRCLE 18 ON READER SERVICE CARD

MEMOREX ADDS ACCESSORIES



Tape manufacturer Memorex has added some useful accessories to its product line covering all program formats—open-reel, cassette and cartridge tape, and disc recordings. Major item in the new group is a head demagnetizer consisting of a handle into which the owner may thread either of two tips supplied to reach the head gap on an open-reel or a cassette deck (for cartridge tape machines no tip is required). The handle also contains an off/on switch, and its other end contains the power cord for plugging into a regular AC outlet. The device comes with instructions and is backed by a 3-month guarantee.

The cassette cleaning kit consists of a regular cassette loaded with a non-abrasive tape and a small vial of a cleaning solution, of which you need apply only one drop to the special tape. The tape then is recommended for one pass through the machine after 30 hours of normal use. A similar kit is offered for cartridge tape machines—this one houses the special tape in a regular cartridge that is inserted into the machine. Both the cassette and cartridge kits clean capstans as well as heads, by the way.

For disc care there are two new kits. The simpler of the two is called the Memorex "Record Cleaner" and consists of a cylindrical brush (in a sturdy plastic container) that may be moistened simply by running your wet finger over it. The brush then is applied around a disc surface. More elaborate is the "Record Care Kit" which contains the same brush plus a vial of cleaning fluid and a stylus cleaning brush, housed in a swing-open plastic container.

These, and other Memorex accessories, come packaged on blister cards, held in place by tight plastic wrap which you have to slit (carefully) to remove the items. Retail prices—like those for most accessories—are somewhat vague at this point: the cartridge and the cassette kits each sell for "less than \$3" while the head demagnetizer retails for "less than \$11." The record-cleaner goes for "less than \$3.50" and the care kit for "less than \$6."

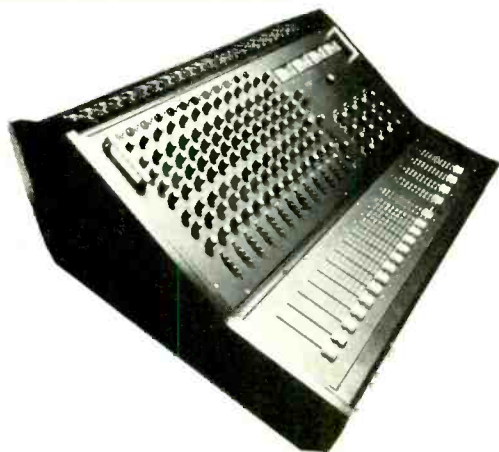
CIRCLE 19 ON READER SERVICE CARD

SYSTECH DEVICES

From Systech (acronym for Systems & Technology in Music, Inc.) comes news of several audio devices at moderate cost. Basically aimed at the amplified-music performer, they use a good deal of technology borrowed from recording studio electronics. One item is a Harmonic Energizer (\$80 list) which Systech says is a "further step in a product originally developed . . . for Greg Lake of Emerson, Lake, and Palmer." The "energizer" section of this item reshapes the harmonic structure of notes, while the device's gain permits driving the amplifier with greater energy. Another Systech device is the "Overdrive" (\$50) which can add controlled distortion to a presentation. The "Envelope & Repeater" (\$100) creates harmonic shaping such as "wah" effects, and the like. The Envelope Follower (\$70) is similar but lacks the "repeater" option. There's also a Phase Shifter (\$120) and the Flanger (\$200) for varied tone-color effects.



Systech also is the exclusive U.S. distributor for the British Soundcraft line of recording input modules and sound-mixing consoles which include units capable of handling up to 16 channels with multiple options for processing signals. The mixer pictured below lists for \$3695.



CIRCLE 20 ON READER SERVICE CARD

A WORD ON \$ AUDIO PRICES

Many sound buffs who are lions behind their control panels in the studio turn out to be lambs when standing before the sales counter in a retail shop. Thanks to the honesty of most audio dealers, the lambs are rarely fleeced, but a little insight into the vagaries of audio equipment pricing could make them wiser and more confident when shopping.

Most audio products have "one-step" distribution—which means from factory, via a sales rep, to the dealer (retailer). The retailer may pay as much as twice what it costs the factory to produce the item. The advertised retail price may then be half or something more over that. The actual selling price (to you, the buyer) should never be more than that and often will be lower, depending on a lot of variables—such as local competition, seasonal or temporary discounts, close-out mark-downs, special discounts for buying a lot of stuff at once, some consideration to the buyer who knows what he wants quickly and does not require a good deal of consultation or "hand-holding" that leads up to little more than the purchase of a blank tape reel or a new stylus, and so on.

As an example, take a tape deck that costs its manufacturer, say, \$225 to produce and get to the loading platform of his plant or that of his U.S. distributor if made abroad. Depending on how many units the dealer orders at the same time, the cost to him averages \$500 to \$525 a unit (out of which the sales rep takes a commission, usually not over 15 percent). The deck is advertised at \$725. So-called fair-trade pricing—an attempt by a manufacturer to prevent a dealer from selling his product below a specified price—is just about dead, and so, unless the "minimum resale price" is strictly policed by the manufacturer, you might get this deck for as low as \$650. In any event you should not pay more than \$725.

Discounting, by the way, is even more likely with other types of equipment such as microphones, phono pickups, speaker systems, many turntables and most accessories. In fact, many dealers are known to include a good phono pickup "for one cent more" when a sizable system is bought at once and there is no way to offer discounts on the other components in that system.

Often you will see a product mentioned with a price stated as "less than" so many dollars. How much less? Well, \$7.98 is less than \$8—but with that kind of price-sticker a dealer may well charge you 15 to a bit better than 20 percent below the "under" figure.



MUSICAL

NEWSIGNALS

NEWS... The fifth annual NAMM (National Association of Music Merchants) Western Market was held at the Disneyland Hotel and Convention Center, Anaheim, Cal., Jan. 23-25. This show gives manufacturers the opportunity to show off their wares, while distributors, music stores and the press have a chance to compare a wide variety of new products at a central location.

While a number of new instruments and models were introduced at NAMM-West, the stars of this year's show were the wide range of innovative new accessories. Perhaps such concentration on exploring and perfecting the capabilities of existing instruments before racing off into other directions indicates a new trend.

GUITARS... Ovation's Deacon 1252-4 (\$475) is their top-of-the-line solid-body guitar. The freeform body, a midrange filter and low-noise, high-performance pick-ups highlight this instrument. For acoustic guitarists who haven't been happy with miking or attachable pick-ups, Ovation's Acoustic Electric Artist 1621 (\$495) has a built-in, bridge-mounted, compression pick-up and an FET preamp to transmit string and top vibrations with minimal hum, feedback and string noise (Ovation Instruments, New Hartford, Conn.)

OTHER INSTRUMENTS AND ACCESSORIES... STM # 1400 Sample and Hold is a combination filter/sample-envelope modifier. This function, previously a synthesizer option only, is thus now available to the guitarist, bass player and keyboard player for \$100 (Systems and Technology in Music, Inc., Kalamazoo, Mich.). Maestro's FSHI (\$129) offers the same functions, so comparisons

might be useful before buying (Maestro Division of Norlin Music, Lincolnwood, Ill.).

Looking for a guitar synthesizer? It's yours for under \$10,000 (just barely) from 360 Systems. This includes polyphonic controller, polyphonic synthesizer, accessories and your choice of a custom guitar, a modified Stratocaster or modification of your own instrument. Other devices from 360 Systems include a Frequency Follower 73B (\$595) which allows single-line instruments to control the pitch of a synthesizer; also, a Frequency Shifter 20/20 (\$495) which raises or lowers the frequency of any sound by .5-5000 cps. Effects include timbre change, phasing tremolo, fake stereo and ring modulation (360 Systems, Los Angeles, Cal.).

Electro-Harmonix has introduced the Y-Triggered Filter (\$79.95). The unit, which utilizes hybrid logic chips, can be used with any amplified instrument, especially guitar and keyboard. It produces a triggered filter sweep effect similar to that of a synthesizer, while maintaining full dynamic range.

Also new from Electro-Harmonix is the Attack Equalizer (\$69.95). This device allows a guitar player to select the fundamentals he wants and blend them with a key range of high "bite" frequencies. This enables the guitarist to simulate various guitar sounds with one guitar. Electro-Harmonix says, for example, that a Les Paul can be made to sound like a Fender, and vice versa (Electro-Harmonix, New York, N.Y.).

Helpenstill, which manufactures the popular Helpenstill Piano Pick-up for grand pianos, has introduced the Helpenstill Piano Sensor Model 75 for upright pianos (\$195). The Sensor uses three electromagnetic pick-ups (14",

16", 18") to sense string vibration only (as opposed to sounding-board vibrations). Helpenstill says that this results in a clean, no-feedback signal with good attack and presence. The kit also includes a passive mixer box, with balance controls for each pick-up, plus overall volume and tone controls (Helpenstill Designs, Houston, Tex.).

The Tama Titan series of cymbal stands is now available from Tama Drums. These stands feature double-legged tripod assembly, with an effective diameter of almost three feet for added stability and strength. The Titan stands also feature a heavy-duty cymbal tilter and are chrome-plated.

The Tama Titan Tower straight-up cymbal stand 6892 (\$40) can be adjusted from under three to almost seven feet. The Tama Titan Multi-Angle cymbal stand 6893 (\$47) can be used as a straight stand or an angled stand with tilting assembly adjustable at 10° increments. The Tama Titan Mobile-Arm cymbal stand 6894 (\$55) was designed for the drummer using large cymbals with a large drum set where accurate placement is difficult (Elger Co., Cornwell Heights, Pa.).

The PEI Junior (\$179.95) is a solid-state unit for electric instruments. This accessory generates the illusion of rotating sound with characteristic reverb, vibrato, tremolo and phase shifts. The Junior is foot- or hand-controlled with on/off and slow/fast switches (Progressive Electronics, Mesa, Az.).

Ampeg's two new solid state amps are rated at 120 watts RMS. The G60 guitar amp (\$1,095) has six 10-inch speakers and the B40 bass amp (\$895) has four 10-inch speakers (Ampeg, Elkhart, Ind.).

The new ARP Model 2600 synthesizer (\$3,095) features two-voice, polyphonic, dual-memory circuitry, which makes it possible to play two completely separate music lines with different sounds for each line.

The new memory capability also permits "interval latching," which permits fast runs of chromatic thirds, octaves and other intervals while playing just one note at a time.

Other new functions include a built-in, low-frequency oscillator (LFO) for a variety of tremolo effects, adjustable vibrato delay and vibrato depth controls, and a transpose switch and calibrated pitch bend control, extending the 2600's range to 10 octaves.

Four-way portamento control, single and multiple trigger modes, keyboard repeat and integrated keyboard connector cable round out the list of new features (ARP Instruments, Inc., Newton, Mass.).

Leslie has introduced two new rotary speakers for professional keyboard artists. The PRO-Line 330 (\$795) is a full-range speaker with a crossover network that sends the high frequencies to a two-speed horn rotor and the lows to a two-speed bass rotor. The unit measures 37" x 28 1/4" x 20 1/2" and weighs 159 lbs.

The PRO-Line 860 (\$899) is a stackable speaker for the touring combo organist. This portable (24 3/8" x 24 3/4" x 18 1/2", 95 lbs.) speaker features single-channel inputs, two rotors and extended-range treble drive.

Both speakers are compatible with the new Leslie Combo Preamp III (\$199). This unit has two inputs with separate foot controls for the rotor speed (slow, fast or off). The two inputs have separate volume controls, adjustable high frequency roll-off, plus silent noise FET input and LED indicators (Electro-Music/CBS Musical Instruments, Pasadena, Cal.).

L.D. Heater, Norlin, Alembic and other manufacturers are getting together in a praiseworthy move to standardize technical specs for modular components. The initial product is the Sound-vendor modular amplification system which will feature phaser, fuzz, ring modulation, oscillator mixer, preamp and more. The Sound-vendor is in the final stages of development and will be marketed soon.

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CIRCLE 34 ON READER SERVICE CARD

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Tapco

For more information write: Wayne Inouye, Tapco, 405 Howell Way, Edmonds, WA. 98020 (206) 775-4411

CIRCLE 93 ON READER SERVICE CARD

THE HISTORY OF RECORDING

By Robert Angus

PART 4: Between the wars —1920-40.

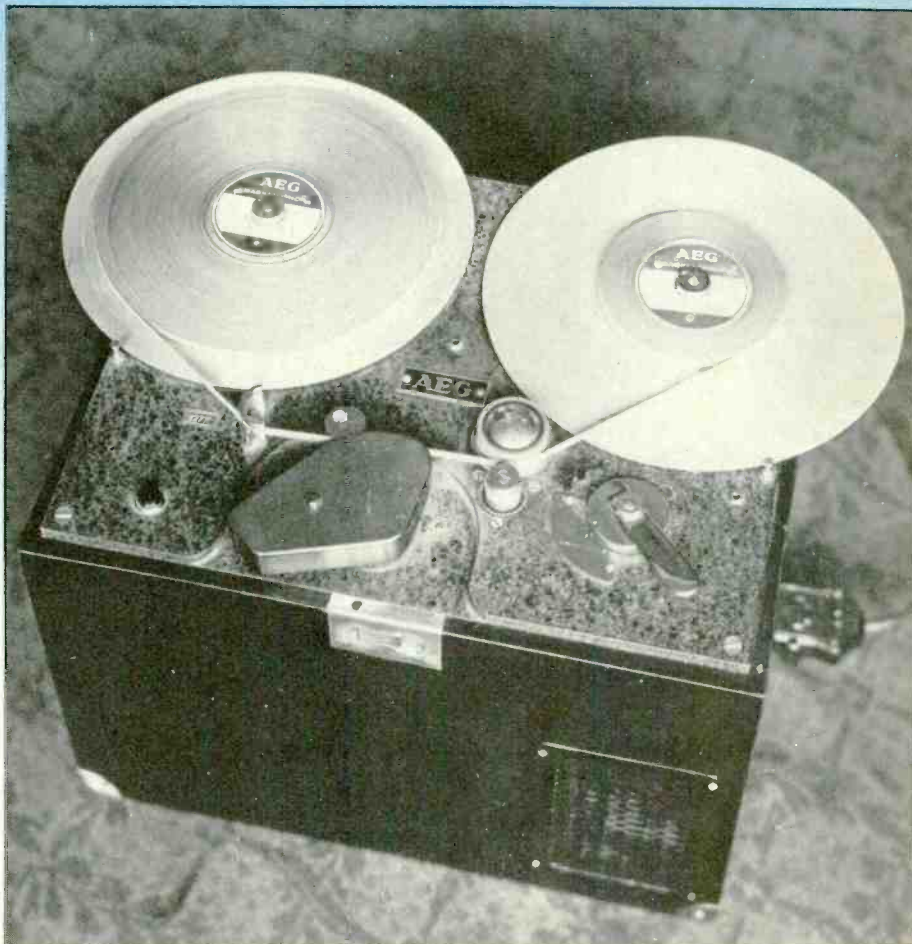
Valdemar Poulsen's patents for a device which could record sound on piano wire expired in 1918, just as World War I was drawing to a close. Poulsen, the Danish telephone engineer who had given birth to magnetic recording some 20 years earlier, had forgotten this particular invention and gone on to others. In Springfield, Mass., the man who was charged with the responsibility of making magnetic recorders, Charles Dexter Rood, was engaged in lawsuits and wrangles with the stockholders of the American Telegraphone Company, which Poulsen had founded and which he headed. At 78, he was employing more lawyers than factory hands.

Bleak as things looked for the future of magnetic recording, the telegraphone was anything but dead. Rood had delivered a number of telegraphones to the Imperial German Navy, which used them to advantage throughout the war to transmit messages at high speed in a code which proved very difficult to crack. Kurt Stille, a businessman, was one German who believed in the potential of the telegraphone as a business machine. He talked financiers into forming a patent-holding company to sell rights to manufacturers who wished to make magnetic recording machines.

One Stille disciple was Max Kohn who, in 1921, produced a telegraphone with a built-in amplifier using electron vacuum tubes. Poulsen had created an electromagnetic recording system, but had provided no way of amplifying the playback of a recording. Accordingly, until the Kohl machine came along, listeners had to plug headphones into the telegraphone to be able to hear anything. This fact alone probably ac-

counted for its failure to replace the phonograph as a home entertainment medium. The Kohl machine substituted 5¼-inch steel discs for Poulsen's piano wire. Kohl recognized the limited fidelity possible on magnetized piano wire as a real handicap. Beginning in 1920, other German scientists began experimenting with strips of magnetic material—tape—instead of wire. In addition to improving the frequency response, the scientists discovered, tape permitted slower speeds, and a consequent lengthening of re-

ording time. Poulsen's telegraphone utilized two magnetic pole-pieces placed on opposite sides of the wire and offset with respect to each other. The magnetic pattern in the wire thus consisted mainly of a variation in the intensity of magnetization, the direction of the magnetization being substantially parallel to the axis of the wire. This method of longitudinal magnetization required very high speeds for minimum fidelity—with the wire frequently travelling at speeds of six to ten feet per second. By using



The AEG Magnetophone used to record the first concert on tape.

tape instead of wire, it would be possible to place the pole-pieces directly opposite each other so that the magnetic pattern consisted of variations in the intensity of magnetization, the direction of magnetization being substantially perpendicular to the surface of the tape. Theoretically, perpendicular magnetization could produce reasonable fidelity at a tape speed of 16 inches per second.

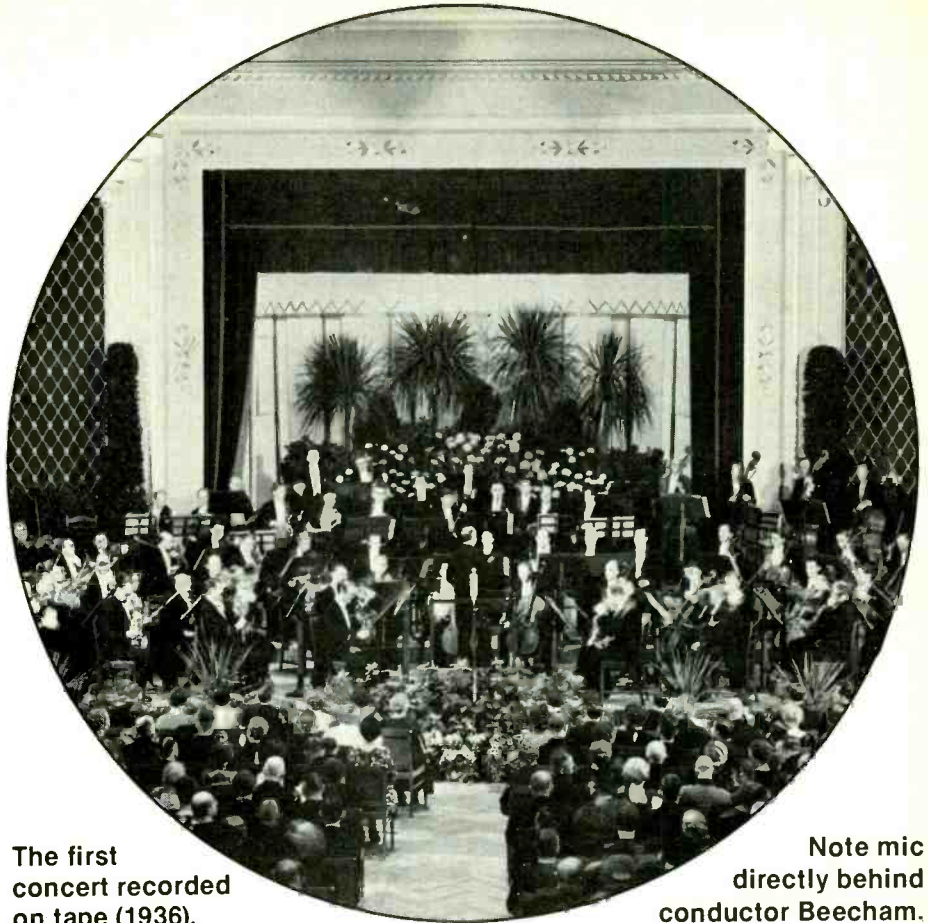
Of course, to record on magnetic tape instead of wire, it was necessary to have tape. A. Nasavischwily, a German scientist, was experimenting with powdered iron oxide as a recording medium. Apparently nothing much came of his efforts, although Karl Bauer marketed a recorder later in the decade which used a form of tape instead of wire. Although Nasavischwily proved the feasibility of recording on iron particles, he couldn't produce a tape of the stuff suitable for use on a recorder.

Probably the most successful of the Poulsen-Stille offspring was the Echophone Company's Dailygraph, a compact wire recorder designed for business use. Unfortunately, fascinating as the little machine might have been technically, the economy of postwar Germany wasn't ready for such labor-saving devices. Thousands of stenographers were out of work, and it was cheaper for most businesses to hire a secretary than to buy a machine.

Then in 1927, Fritz Pfleumer, an electrical engineer in Dresden, borrowing the idea of coated tape from Oberlin Smith (the American scientific writer who started it all in 1888 with an article proposing magnetic recording) and Nasavischwily's idea of using powdered oxide as a recording medium, began gluing oxide onto strips of paper. Pfleumer's first efforts were primitive by any standards. The tape surface was rough and abrasive, and the glue he used to hold the coating in place less than satisfactory. When he put one of his tapes on an experimental recorder, the coating would fly from the machine in a fine spray as the tape sped past the playback head.

Tape Recording Possibilities

Nonetheless, he proved that tape recording was possible, and five years later approached Allgemeine Elektrizitäts Gesellschaft in Berlin with his idea, and signed a contract to work on the development of a tape recorder.



The first concert recorded on tape (1936).

Note mic directly behind conductor Beecham.

AEG determined to make the machines; to make the tape, it approached Badische Anilin und Soda Fabrik, a chemical manufacturer in Ludwigshafen, then a subsidiary of the giant I.G. Farben chemical combine.

But before things got under way in Ludwigshafen, there was one spectacular attempt to make a high fidelity recorder, this time using a steel band instead of wire. This machine was the brainchild of Prof. Ludwig Blattner, who managed to persuade the British Broadcasting Corporation to buy one, and sold others to motion picture studios in Germany and Britain. The Blattnerphone was used to record King George V's Christmas Message to the Empire in 1930. At the time, the sun didn't set on the British Empire, and the BBC needed a device which could rebroadcast the message at times convenient to listeners in Canada, Australia, South Africa and Hong Kong.

The job of coping with the machine fell to Lynton Fletcher, the BBC's former head of sound recordings. Fletcher described it as resembling two ancient Irish spinning wheels joined together. It used a steel band approx-

imately a quarter-inch wide, traveling at a high rate of speed. Engineers could edit recordings by using a pair of metal shears and a soldering iron. "The result of this," Fletcher recalled recently, "was that, on at least one occasion, you'd hear the announcer say, 'This is Mr. H.C. Harbinger of South Africa,' then you'd hear a plop as the soldered joint went through the reproducing head, and you'd probably hear the voice of Stanley Baldwin."

The Blattnerphone arrived in England in the charge of a young technician named Von Heusing. "There was only one engineer, there was only one machine," Fletcher continued. "Both were extremely temperamental. Even in those early days we knew that what mattered in making a recording was that the machine should run at the same speed when it was being played back as it had run when the recording was being made. This the Blattnerphone flatly refused to do." H. Burrell Hadden, a Canadian audio consultant, then a young BBC engineer, recalled that every so often the splices would come unsoldered, and everybody in the studio ducked to avoid being decapitated by bands of flying steel.

In the United States, two U.S. Navy scientists—W.L. Carlson and G.W. Carpenter—happened on the idea of using alternating current bias instead of the direct current bias incorporated in the telegraphone. AC bias had two advantages—it cut down on noise during the recording process, and insured the permanence of recordings. There's no evidence that Carlson and Carpenter ever saw a telegraphone, but the Navy apparently seized two as part of the property of short wave radio stations set up by the German Navy in Tuckerton, N.J. and Sayville, L. I., N.Y. During the 1920's and 1930's, the Navy seemed to be the only organization in the United States seriously interested in magnetic recording.

Even the U.S. Navy's interest in magnetic recording was lukewarm compared to that of Wilhelm Gaus, the inventor of the Gaus cell and BASF's chief physical chemist. Gaus was entranced with the idea presented by Fritz Pfleumer, and arranged to make laboratory facilities and money available to enable Pfleumer to get his magnetic tape into production. The company persuaded Pfleumer to abandon his attempts to coat paper and use cellulose acetate film instead. Acetate was a product BASF was making for the motion picture industry, and the company already had a technique for coating the film. After some 18 months, AEG issued a report confirming that the magnetic recording tapes supplied by Ludwigshafen met all the company's requirements, and that AEG recorders together with BASF tape would be shown at the 1934 Berlin Radio Exhibition.

The Stahltonmaschine

The year before, Ludwig Blattner had merged his interests with Marconi Radio and Stille to create a vastly improved machine. At the same time, the C. Lorenz Company had acquired the rights to the Dailygraph, and marketed an improved version of it under the trade name Textophone. The following year, Lorenz, by now a subsidiary of International Telephone & Telegraph, introduced the Stahltonmaschine, a steel tape recorder similar to the Blattnerphone. Like the Blattnerphone, it was put to work in radio, this time within Germany. The man who worked on the Textophone and headed the development of the Stahltonmaschine was S. Joseph Begun,

Lorenz's youthful chief engineer. Begun learned all there was to know about magnetic recording at the time, then fled Nazi Germany in 1935 for a future in America. The Stahltonmaschine's steel tape was 3mm wide and ran at a speed of 47 inches per second, producing a frequency response up to 5,000 cycles per second.

At AEG and I.G. Farben, enthusiasm was building for the coup both companies expected to score at the Berlin show at the end of August. The recorder's handiness and compactness led company sales executives to speculate on all sorts of possible uses, including the elimination of the gramophone as a medium of home entertainment. Production started on July 1, and by the beginning of August, Farben had supplied AEG with 30,000 feet of tape. Press releases were written and duplicated, one of them proclaiming, "An instrument with the registered trade name Magnetophone will be displayed at the Radio Exhibition. It is the result of years of development by AEG, and its production has now commenced."

Then suddenly, just a week before the Exhibition, the recorder was withdrawn, information intended for the press was recalled and suppressed, and the delivery of tapes to Berlin stopped. The company didn't say so publicly, but the reason was unexpectedly strong interference within the recorder itself once it was assembled. Besides, AEG had hoped to compete with ITT's Stahltonmaschine—but its tape speed was about the same and its frequency response half that of the steel band unit. AEG's engineers returned to the drawing board to see what they could do about boosting the frequency response. At Farben, Pfleumer and a young assistant, Hans Seiberth, began experiments on improving the consistency of one batch of tape, compared to the next.

Two months after the Radio Exhibition, AEG management inspected an improved version of the recorder. On the basis of the improvements, the engineers were told to carry on. After a further eight months, in the summer of 1935, the electronic experts proudly announced that they had constructed a new recorder operating on completely new principles. They said that they had tested each individual part, and that the prototype was nearly ready. They were confident that, allowing for human errors, the new design would

meet every demand placed on it and that it would be ready in time for the 1935 Radio Exhibition.

However, the project abruptly became involved with Farben internal politics. The BASF plant at Ludwigshafen was in the process of producing some 165,000 feet of tape, an incredible amount at the time, and found itself running out of acetate film. Accordingly, Gaus asked for permission to start making film in Ludwigshafen instead of buying it from the Farben plant at Wolfen. Wolfen already was making film for the movies, and had developed Igephon, a transparent film on which sound could be recorded with a phonograph stylus. Reichs Rundfunk Gesellschaft, which had been using the Stahltonmaschine for radio broadcast, was known to be dissatisfied with the steel band because of its weight, cost and the high recording speed it required; the company had been considering both the Magnetophon and Igephon as a replacement. Igephon tape was being manufactured to fit a recorder developed by Philips of the Netherlands, a recorder which would be used experimentally by the Columbia Broadcasting System in New York in 1938.

The Wolfen plant was all ready to start supplying Reichs Rundfunk and other broadcasters with Igephon, and it didn't want any competition from magnetic tape. In Ludwigshafen, Gaus, Pfleumer and Seiberth were convinced that they had the superior recording system, because their tape was easier to edit, higher in fidelity, capable of unlimited re-use, and suitable for use in both stationary and mobile units. Whichever system the broadcasters chose, however, they would have to deal with I.G. Farben.

Gaus and his subordinates won the battle, simply by ignoring directives from Farben headquarters. When the 1935 Radio Exhibition opened, there was the AEG K-1 Magnetophon on display and BASF tape to go with it. The recording cost per minute was 15 cents, while the Stahltonmaschine used about one dollar worth of tape per minute.

Wrote one company observer of the reaction, "Dealers and other interested people literally stormed the demonstration room, so that we were forced to close the door temporarily. Within a few hours, the first eight recorders were sold. If they survive the exhibition, we can say that the re-

corders have adequate mechanical stability, because they have to stand a lot of rough treatment."

First Concert Recordings on Magnetic Tape

Actually, it wasn't until January, 1938, that German Radio switched over to magnetic tape. During the first year, it consumed more than four million feet of recording tape, much of it used to record complete operas, symphonic concerts, dance music and background music for later rebroadcast. It is from these tapes that many early long-playing records released in the United States were derived. One example was a *Hansel und Gretel* recorded in 1938 by Radio Berlin with Erna Berger and released by Urania Records some 14 years later. Another featured Richard Strauss conducting the Vienna Philharmonic in *Der Burger als Edelmann*, also released in 1952 on records by Regent.

However, the first symphony orchestra to record on magnetic tape was not German, but British. In November 1936, Sir Thomas Beecham and the London Philharmonic were touring Germany. On the night of November 19, they were scheduled to perform in Ludwigshafen, as one in a series of concerts sponsored by I.G. Farben for its employees. Farben officials saw in the concert a perfect opportunity to try out a new black oxide tape they'd just developed, and to prove just how wide-range the fidelity of the tape system really was. Accordingly, they set up a microphone and recorder to capture as much of the concert as possible. The result was two 15-minute excerpts, representing the recording capability at the time, which are still extant today.

Seiberth, who retired recently after spending more than 35 years making tape, recalls that one early problem was maintaining quality control. Sophisticated measuring instruments simply didn't exist, and nobody knew exactly what to measure, anyway. "There was a Herr Roebel who was in charge of those things," he remembers. "Somebody would record a sustained piano tone on a sample tape, and Herr Roebel would listen to it. If it sounded good to him, he passed the entire lot. 'Listening by ear is good enough,' he used to say.

"When we were getting started, we had two names for the system—Magnetophon and Ferrotone. AEG

apparently preferred Magnetophon, because that's the one they chose. Otherwise, the tape recorder might be known as the Ferrotone today."

Asked how tape widths and speeds came about, Seiberth said they were equally arbitrary. "We made the first tape 6.5 mm wide, because that's what AEG asked for. Later, they went to 6.25 mm, but decided that was not quite right, so we and they settled on a width of 6.3 mm. That translates

roughly to a quarter-inch. It was as simple as that. When it came to selecting a tape speed, that was determined by the speed of the motor and the diameter of the shaft. We were using 50-cycle current, and shafts with a diameter of 10 millimeters. That meant a tape speed of 77 centimeters per second, or 30 inches per second. Then as technology permitted, we simply cut the speed in half—first to 15, then to 7½, 3¾ and finally to

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CIRCLE 96 ON READER SERVICE CARD

1½ ips—to get more recording time on each reel.” By the same token, Seiberth explained, the reels on the K-1 were 18 centimeters in diameter simply because that was the size that fit. Initially, it was possible to record for 15 minutes, but by varying the diameter of the hub, it was possible to increase playing time to 22 minutes.

The K-1, designed for professional use, spawned a number of special-purpose Magnetophons, including low-cost, low-fi portables for use by correspondents, dictating machines, and even a model designed for home use in addition to the hi-fi version designed for German radio. AEG and BASF engineers presented papers on their achievements and explained how their machines worked—papers which were ignored by the scientific community outside Germany.

Developments in the U.S.

Meanwhile, work was going on

(albeit on a very limited basis) on magnetic recording in the United States as if the German developments had not taken place. The work of Carlson and Carpenter was part of an ongoing Navy research project into wire recording which extended through World War II. The Navy’s interest was in transmitting messages at high speed—exactly as telegraph inventor Valdemar Poulsen had intended, and as the Germans had done from their radio stations in Long Island and New Jersey. There were some independent producers as well, including S.J. Begun, who fled Germany in 1935 to go to work for the Brush Development Company of Cleveland. Since Begun had designed the Lorenz Stahltonmaschine, Brush put him to work on a low-cost home wire recorder. One of the first fruits of his new affiliation, instead, was an endless loop steel cartridge. Two years later came the first Brush Soundmirror, which also used steel tape. None-

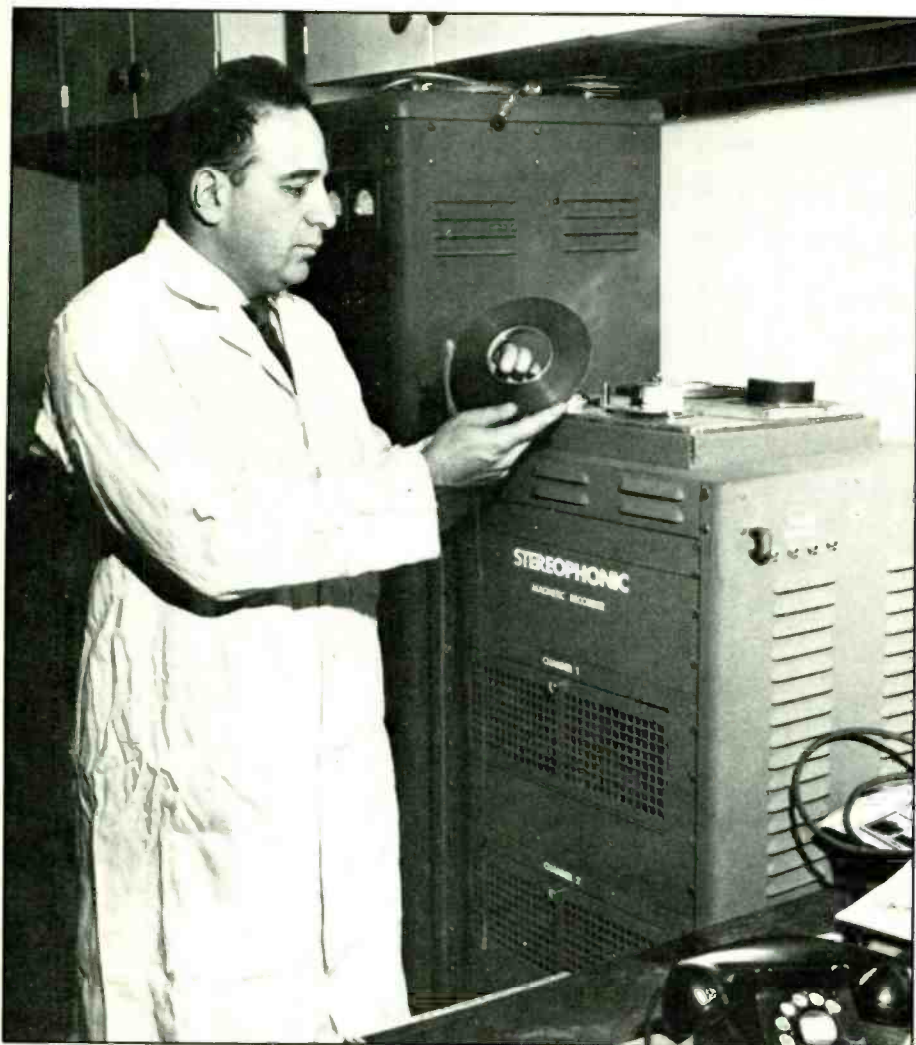
theless, Dr. Begun was dissatisfied with the steel medium. “We had almost nothing going for us with steel tape,” he wrote. “It was difficult to make, expensive and hard to handle. In fact its only advantage was that it could be recorded again and again.”

By 1939, however, Brush had begun to coat strips of paper with oxide, for use in recording. The results were unsatisfactory. “The development of paper tape was just not far enough along and the military requirements were such that we could not go to a non-metal body,” Dr. Begun recalled.

The Bell System was equally hard at work. In 1937, C.N. Hickman of Bell Telephone Laboratories described a magnetic recorder the Labs had developed for recording speech. It used a steel ribbon about 1.5 mils thick and 50 mils wide which could operate at a speed of eight inches per second. However, the recorder also operated at a speed of 16 inches per second, at which it could record frequencies up to 8,000 cps. In 1939, the machine was modified to accommodate two separate coils of steel wound side by side on the same reel. As the tape unwound, it separated so that each tape could pass by a separately-mounted playback head to produce stereo. The stereo machine was demonstrated at the Bell Telephone exhibit at the New York World’s Fair.

Training and Teaching on Tape

The Hickman machine was not Bell’s first try at a workable recorder. Work had begun as early as 1933, with the intention of producing a device which could be used to train telephone operators by allowing them to hear themselves at work. Hickman published a paper that year discussing his early experiments. By 1935, Bell had such a machine, using steel tape. This machine, capable of recording one-minute bits of speech and reproducing them immediately, caused long lines to form at the New York and San Francisco World’s Fairs, where it allowed fairgoers to hear themselves as others heard them for the first time. Jack Mullin, then a young engineer working for Pacific Telephone, recalls, “One night there was a demonstration for the employees of this thing. A man played a violin and you heard him play for one minute, then the playback for a minute. The quality was remarkably good. I was surprised that a magnetic



Marvin Camras, examining magnetic recording equipment.

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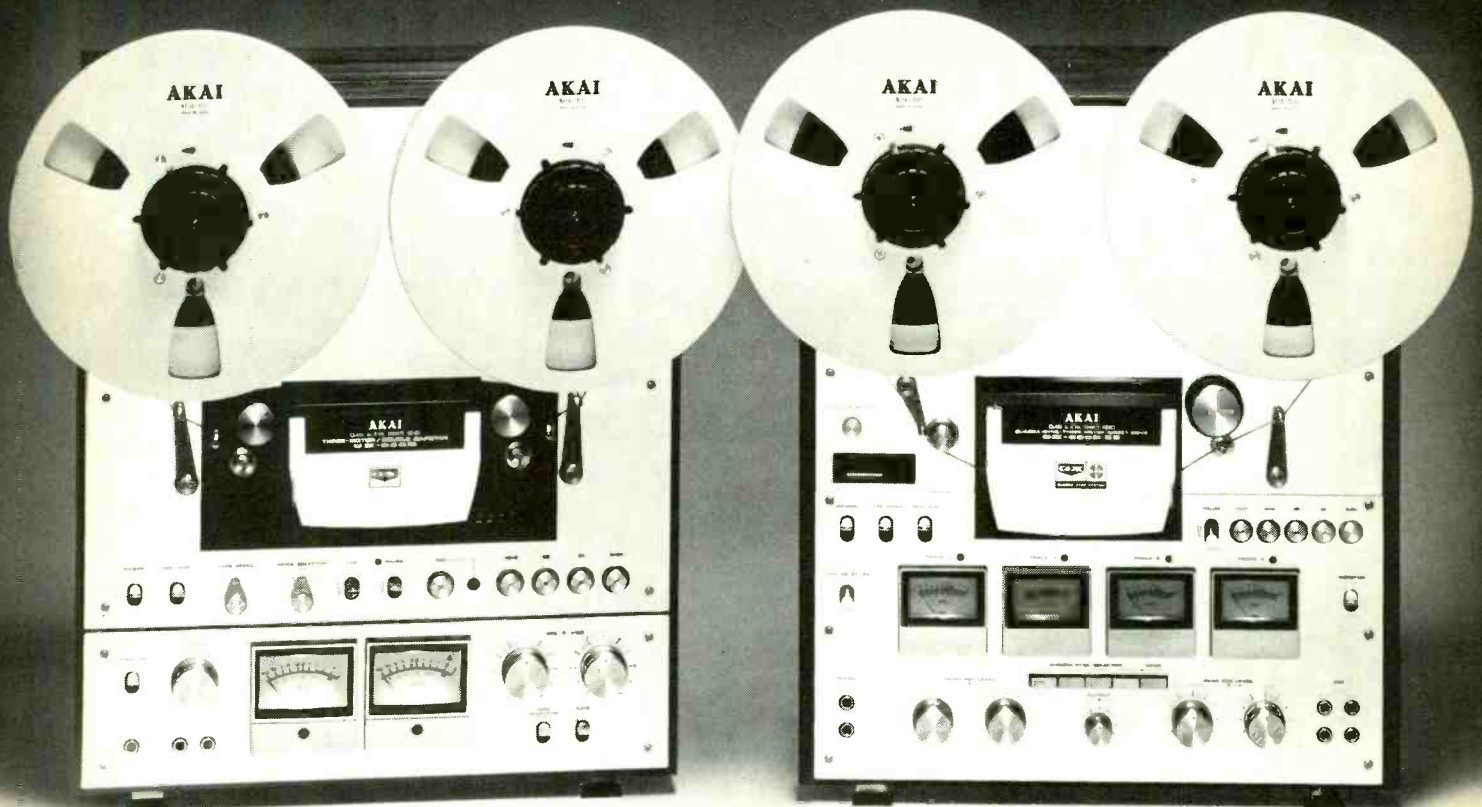
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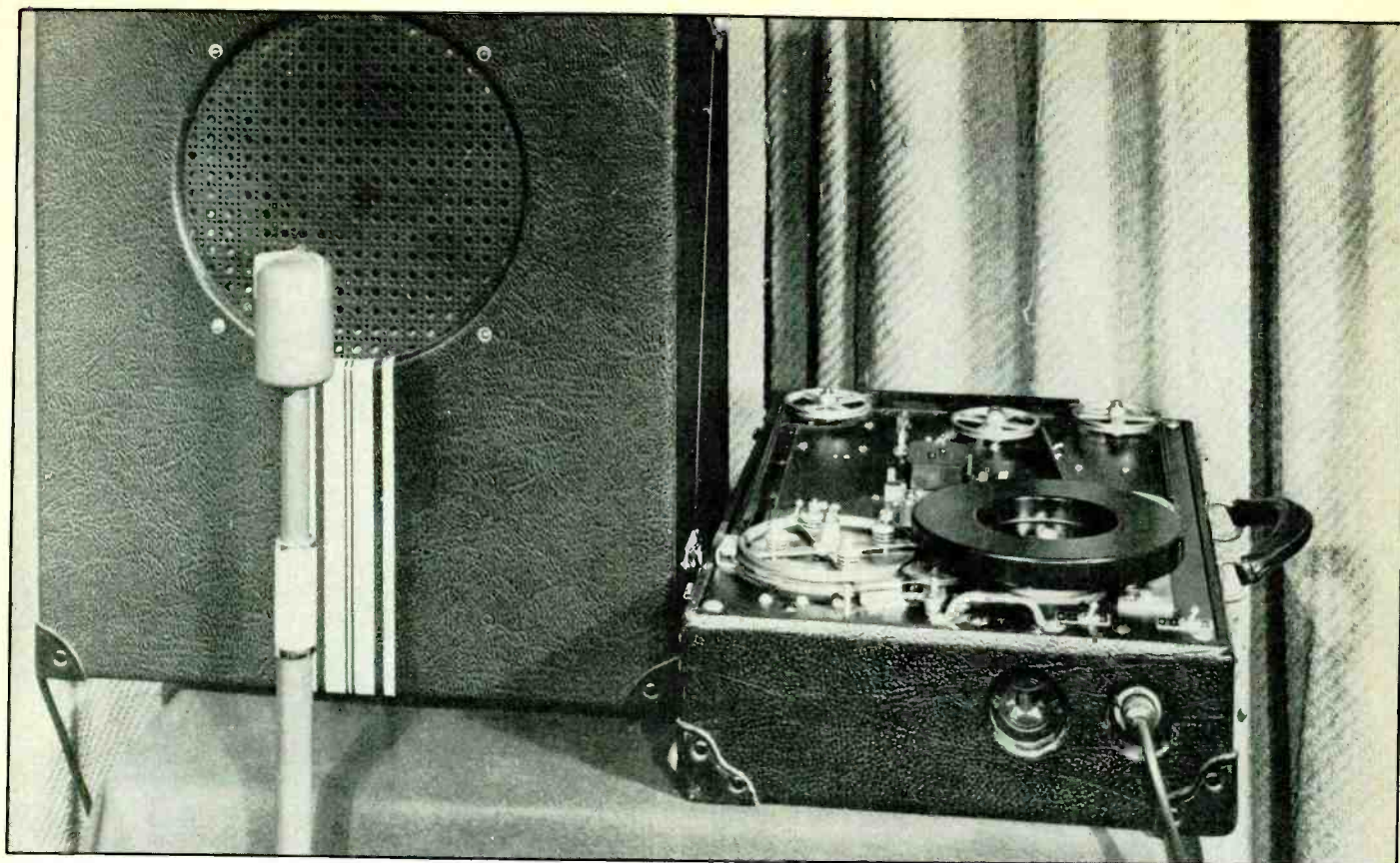
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CIRCLE 48 ON READER SERVICE CARD



Bell Telephone Labs tape recorder (1938)

recorder using an endless loop of steel could sound so good. They used it for teaching operators the proper method of handling customers. In one minute, you can show an operator what she does or doesn't do right."

The steel band machine eventually became Western Electric's Mirrophone, which went into service in 1940 as a continuous weather-announcing device. The Mirrophone stayed in use until the 1950's, when it was replaced with an endless loop tape recorder.

One day in 1939, a junior at Illinois Institute of Technology was faced with a problem: his cousin was studying singing and needed a low-cost device which would enable him to hear himself as he practiced. There were disc recorders, of course, but the cost of blank discs was high and the machines were bulky and difficult to operate. So Marvin Camras began experimenting with a device which could record sounds on piano wire. By the time he graduated the following year, Camras had developed a machine which would record a wide variety of sounds for electronic playback. That wire recorder, which the student brought along to class to show his professors, was the beginning of a career

which was to include a number of patents and professional honors.

Upon graduation, Camras was offered a job with Armour Research Foundation, an organization established by IIT faculty members to provide coordinated research for industry. In 1941, Armour Research applied for a patent on AC bias in magnetic recording. When war broke out late that year, Armour put Camras' wire recorder into production, later licensing General Electric and two other firms to make units to keep up with the demand. Altogether, some 10,000 of the Armour recorders were built. In addition, the military ordered more than 2,000 wire recorders from Brush.

Sketchy Beginnings in Japan

On the other side of the world, in Japan, there had been some research into magnetic recording as early as the 1930's. The first technical articles on the subject appeared in Japanese publications in 1936, with patents being issued in 1937 and 1940. The Tokyo Electro-Chemical Company (TDK) had been established in 1935 by a group of engineers who had developed ferrite, a new iron-oxide compound, and were trying to develop uses for it. Details on Japan's prewar research into magnetic

tape are necessarily sketchy. Nevertheless, patents had been issued. With the appearance in Japan of the first Ampex tape recorders, the holders of the patents felt that their rights were being infringed upon. So in 1952 they persuaded the Japanese communications industry, Tokyo Tsushin Kogyo, to halt all import, use or sale of American tape recorders.

While World War II brought an abrupt halt to many electronics projects, it served as a stimulus to the development of magnetic recording, because the military in both Germany and the United States saw in it a technological communications tool which had practical value.

In the next issue, we'll see exactly what each side was up to during the war years, and what happened to men on both sides of the conflict—Hans Seiberth, the German scientist charged with keeping the tape flowing under the threat of Allied bombers, and Jack Mullin, the Signal Corpsman who brought back the first German recorder and put it to work in American radio.



**NEXT ISSUE:
The War Years**

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THE TAPE THAT'S HEARD AROUND THE WORLD

CIRCLE 45 ON READER SERVICE CARD

www.americanradiohistory.com

By Sedgwick Clark



A CASE HISTORY

"It goes back to when I was six years old. I took accordion lessons for six years, and during that time my father bought me a Pentron tape recorder. By the time I was 12, I had an electric accordion, with an amplifier, a couple of microphones and a tape recorder."—Rick Dior

"I kind of worked out the same way. I was the drummer in a band, and along with my actual drumming I was doing set-ups for the group—vocals and things like that. And since I was 13, I've been fooling around, dabbling with parts, pulling things apart that were lying around, building a ham receiver way back when ..."—Kurt Fleischer

Rick Dior and Kurt Fleischer, both in their twenties, own and operate a mobile recording studio which they call Roadway Recorders. If Talkback questions and Letters to the Editor in *Modern Recording* are any indication, there are countless budding engineers throughout the United States who aspire to the goals that these two young men have already achieved.

Their interest in recording and engineering was a natural outgrowth of their early experience as musicians, which is the case with the great majority of recording engineers. Kurt's interest was kindled at the same time he was pulling pieces of equipment apart. He began doing voluntary work for Vantone Recording in West Orange, N.J. As his experience and knowledge grew, he was finally put on the payroll. Kurt enrolled in a school for broadcasting electronics and received his first-class FCC license. Following graduation, he got a job with Broadway Recording Studios in New York City doing set-ups, maintenance work and running tape machines for sessions. Rick, on the other hand, had no schooling in electronics. His background comes from practical

learning and the devout reading of audio and engineering publications. He built his first console, in fact, from designs printed in magazines.

The idea of getting a truck to act as a mobile studio was suggested to Rick by a fellow engineer. It seemed the answer to a lot of problems that Rick had encountered so far. First, one needed a place in order to build a recording studio. Second, if he were to build his studio and set up his equip-

ment in a stationary location, a lot of business would be lost. "On the other hand," he says proudly, "nobody out in Jersey had a mobile unit. So, I said, 'Be the first.' And we're the only ones from, I would say, our area down almost to Philadelphia."

The impetus for his decision presented itself when Rick was contracted to record a group in a location where there was no room for his equipment. By this time, extra money earned from editing jobs had allowed him to buy a second-hand Revox A77 half-track open-reel deck and a pair of Shure mixers. He hired a U-haul, borrowed a long AC cable from a friend, set up his speakers, tape deck and mixers in the van, made the recording, and the group was so pleased that they spread the word. Rick got several subsequent jobs and poured all his profits into more equipment.

By this time, he was aware that rock groups were not the only customers out there and that competing with the big trucks disregarded an entirely different, virtually untapped market. Conventions, panel discussions, medical seminars and various types of meetings could be adequately recorded



Rick Dior & Son

© 1976 C.F.K.

acoustically balanced with the room. If they're wearing headsets, they'll be totally screwed up. And if they're lucky, in three hours they may record three songs, four songs. Now, they're going to walk out of there with a bill—between mixing and all the recording and a couple of copies—of \$300-400, at a minimum. Maybe more."

The big trucks like The Record Plant and RCA reportedly charge around \$2000 a day, but Roadway is not really competing in that league. "We're trying to get groups who shy away from walking into a studio," explains Kurt. "We try to keep a close rapport with the people that we're working with so they have trust in us and we know where they're coming from and that they know they're getting definitely their money's worth." The charges, therefore, depending upon the various difficulties involved, travel, length of set-up, etc., generally run from a minimum of \$300 to as high as \$800 for six to eight hours.

Serious Business

Life for the two Roadway Recorders sounds like a lot of fun, but Rick cautions that it's a serious business. "They'd better have a lot of knowledge to get into the field. It's not just the recording, it's everything else involved. It's business—we're engineers one day and salesmen the next day. We both formed the company." In the last few years, Rick continues, it has been very difficult to get a job in a studio because no company really wants to train new employees. "Even five, six years ago, a lot of people asked me how I got started. I said, 'Well, I pushed a broom for the first six months.' You know, a lot of kids think you can just pick up a microphone and go. They don't know all the other problems you have with it."

Both Rick and Kurt still freelance for Vantone Sound Studios, but their "regular" job is at Trans/Audio, Inc. in New York City. Rick is a sound mixer for films and Kurt is an expeditor, working with editors and clients, arranging purchasing and running a delivery service for the company, and seeing that jobs get done on time.

"It's a big company," adds Kurt. "There is a lot there. But that's only from 9-5:00. From five to midnight, one, two or whatever, we are working at Roadway. I'm working in my little studio in my basement and Rick is put-

A Top-to-Bottom Inventory of Roadway Recorder's Equipment

RECORDERS:

Scully 280 8-track open-reel recorder
Teac 4310 2-track tape deck
Telex 88 2-track tape deck

TALKBACK:

Clear-Com Communication System for truck-to-stage talkback, with double-muff and microphone.

MONITOR:

(2) Altec 604E duplex loudspeaker

AMPS:

Phase Linear 400
Dynaco Stereo 120
Dynaco Stereo 70

MIXDOWN SPEAKER:

(2) JBL 4310's in custom-made cabinets

MICS:

(2) Sennheiser MD 421
(2) Sony ECM 22
(2) Electro-Voice 635A
(12) Electro-Voice RE 15
(1) Neumann 87
(1) Shure SM 53

MIC STANDS:

(17) Atlas MS-25 w/baby booms
(3) Atlas Desk Stands
(5) Atlas Floor Stands

DIRECT INPUTS (guitar amp to mic input on console):

(4) Shure A95F
(4) United Transformer Co. custom-designed boxes. Design by Rick Dior, with ground-lift switch.

MIC SNAKES (cable from truck to stage):

200 feet of Belden 8773, with 27 lines and Cannon XLR connectors on both ends.

MIC-SPLITTER BOXES:

(4) From one mic to two inputs, such as

P.A. and recording console; custom-made with U.T.C. transformer, with ground-lift switch.

MIC CABLE:

(30) Belden 8412, 25-foot, 2-conductor, with shield, male and female Cannon plugs.

LIMITERS:

(2) UREI LA-3A Leveling Amplifiers

EQUALIZERS:

(2) Pultec PEQ 3

CONSOLE FEATURES:

24 inputs
Mic preamp with 10, 20 and 30 dB pads
9-frequency equalizer with +12 and -12 dB on each input

Conductive plastic attenuators
Echo send one and two, with pre/post switch

Stereo pan pot

Quad mixdown

8- and 16-track outputs, each with sub-mix networks

Direct input to track assignment on each input

All mic preamps are by Martin Audio

All mix nets and line amps are Automated Process, Inc., with less than 0.3% THD at +28 dBm out

All inputs and outputs on back of console are Cannon (XLR) male and female

Multi-pair Cannon plugs on 8- and 16-track monitor

Monitor panel can select console outputs, stereo outputs, quad outputs, and an 8-track or 16-track machine

Complete patch field for special remote flexibility and easy maintenance

For extra inputs,

(2) Shure M68 mic mixers

(2) Shure M67 mic mixers

—and countless sundry cable connectors, spare parts, small accessories, fuses, etc., etc., etc.



tering around in his. We get together and we go places. Everything that has been recorded so far has been done on weekends or at night. Nobody really wants to record during the daytime "live." There is really nothing on. If there is something, then I'll take my vacation time."

The Big Plan

The degree of professional commitment shown by these two young engineers of course involves long-range ideas, and their eyes light up and they chuckle excitedly like two kids sharing a secret when asked about their future. "We've got a big plan," bubbles Rick. What we're going to do is get a building someplace, not too big, like a storefront, with an ideal parking area. There are a lot of buildings in Jersey off the street somewhere, one story, one hundred, two hundred feet long, sixty feet wide. The storefront in the beginning will be a repair shop—musical instruments, amplifiers, PA's. Hopefully maybe I'll get someone who really knows a lot about, you know, Teacs and stuff, and do component service. Our associate, Joe Ferla, who's doing sound reinforcement right now for Roberta Flack, could custom-design PA systems. In the back will be a rehearsal studio which we're going to charge out. Rehearsal studios in the city are like \$3 an hour. Rent the place at a ridiculously low figure by the hour. I know I can get the work in there, because there are a lot of groups in the area that don't have a place to rehearse. Have a stage built, a good P.A. system—you don't have to bother with amplifiers or drums; most groups will bring their own. Just build a stage; it won't cost that much; build it pretty dead. We'll park the truck outside in the back, and whether we record or not there doesn't matter. If they want to do something, then we'll just give them the offer really cheap and they'll have to rehearse and when they're finished rehearsing we'll just plug in." Kurt quickly adds that they intend to outfit the studio with a closed-circuit television.

Their undisguised excitement at such a prospect is immediately engaging. "We've gone through the hassles," says Rick. But then he pauses for a second and exclaims with a laugh, "We're *still* going through the hassles!"

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CIRCLE 8 ON READER SERVICE CARD

The Tubes. Does the name recall visions of promotional pictures in skin magazines—glitter rock non-musicians who tune their instruments by number and stage elaborate presentations to cover up for a lack of talent and technique? If your answer is yes, your luck is hopefully better at the race track.

To begin with, one of the most interesting facts about The Tubes (easily lost amidst the glitter, pyrotechnics and props) is the outstanding individuality shown by the members. Almost everyone has a specialty they have brought to the group which gives The Tubes as a unit a singular quality in today's rock world. Michael Cotton (synthesizer) and Prairie Prince (drummer) operate the well-known graphic arts design service Airamid Designs. T.J. McHose teaches the technical aspects of theater. When asked about his credentials he says, "Yeah, a lot of degrees and things." He also has a background in cable television productions. Mixer Don Wood is a studio engineer, having worked at The Record Plant (L.A.) before going on

the road with the group. Practically all of the remaining members have theater background as actors, choreographers, set and lighting designers or dancers. The music, performance and recording are not "end-alls" as much as common ground for all to express themselves as a single force. Tubes is a collection of multimedia junkies.

In conversation with T.J. McHose (video) and Don Wood (audio), we found that The Tubes's staging techniques cover a sophisticated ground. Until the Nov.-Dec. '75 tour, The Tubes were operating rented video equipment for financial reasons. However, after figuring out that in the video market rental goes for about 5% of list price *per day* it seemed a more prudent move to buy. Within two months they could have paid for the equipment in rental fees and still have had to return it.

In the beginning, T.J. had operated the show using reel-to-reel video tape, but the group changed the order of the show so often that it became unfeasible. There would be major rush

editing jobs, and consequent losses of generation—a serious consideration when working with ½-inch and ¾-inch tape. Feeling, however, that the larger decks were too fragile for road travel ("They're totally unreliable. You move them two or three times and they start crapping out. Also, the tape transports on them are really crude until you get up to the \$6,000 machine."), McHose invested in the new Sony VO 3800 portable video cassette, a deck fast becoming the standard of television stations for on-location news gatherings. It's used for both original recording and playback during The Tube's show. Also used is a Panasonic 3160 ½-inch reel-to-reel editor, which McHose feels is the most sophisticated of its kind today; its features include color, vertical interval and flying erase heads.

T.J. does his recordings on the cassette. Should he be in a town for more than three days, he will film a segment featuring local landmarks and then edit the new section into an existing piece already used in the show. While in New York City, he filmed the group roller-skating in well-known places. He also filmed a segment featuring "Quay-Lewd" (a rather tainted English rock star character played by lead singer Fee Waybill) in which "Quay" promised to pledge all proceeds from his concert to N.Y.C. in order to help bail the city out of its financial crisis.

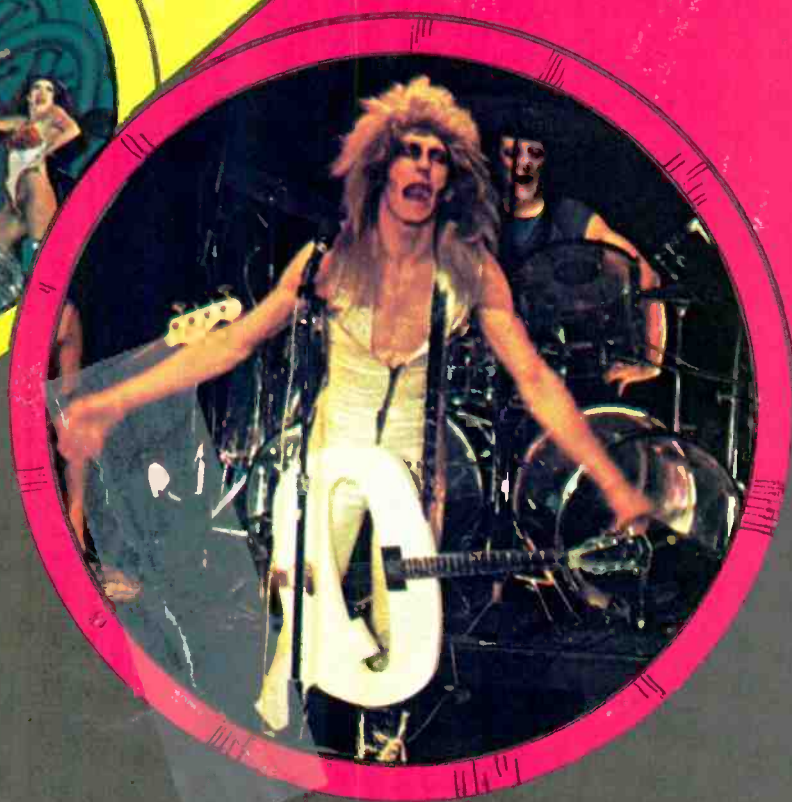
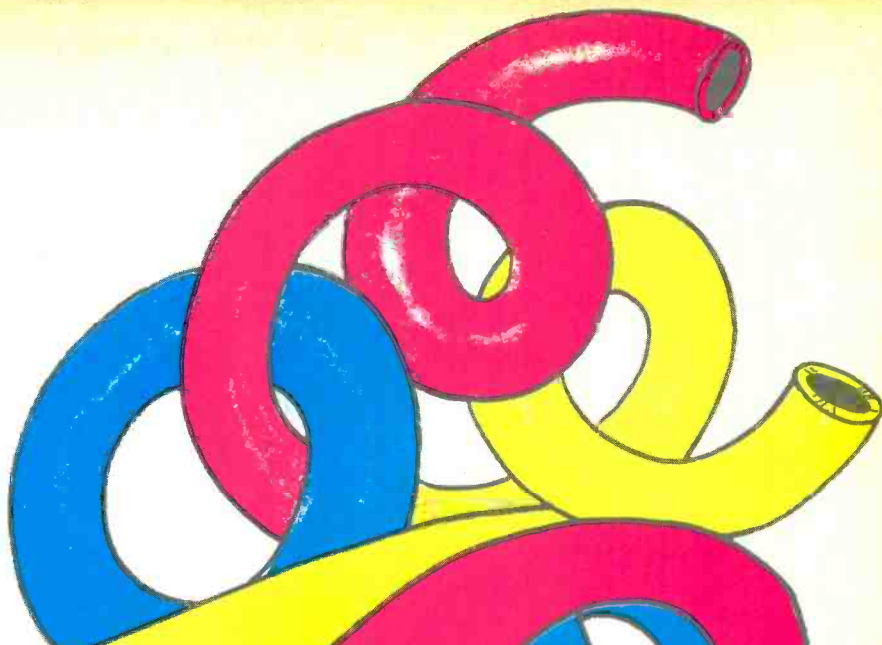
In addition to the basic video



Multi-Media Madness with the

Tubes

recording capability, the VO 3800 allows five different sources of information to be mixed at any point during the show. The unit is run through two mixers which incorporate a playback deck, two cameras off the air and a switcher which allows one to fade and wipe, among other little tricks. The heart of this display system is a matrix switcher, which allows the assigning of any one of five information sources to any one of the display modes. The display modes vary according to the size of the theater or club; sometimes only the 23-inch black and white television monitors are used, and sometimes in larger situations both a large screen and several monitors are placed behind a backdrop so that they are revealed only during certain sections of the show. At other times, one



By H.G. La Torre

or two video projectors, placed on either side of the drummer, cast additional information onto the backdrop.

McHose avoids using video projection alone because he feels that the American television scanning system lacks the quality to be blown up much larger than 23 or 25 inches. "Probably the best picture available," he says, "is on the 5-inch Trinitron because you have all that information crammed into a tiny little space of about 12 or 14 square inches. Our screens run up to about 283 square inches and it's exactly the same information. Definition is lost by some 15 times. If you go up to a 9 by 12-foot [screen], things start to get very fuzzy. As soon as you start getting into some kind of projection system it gets closer to 8 mm film."

T.J. McHose joined The Tubes as a result of a 90-minute cable television program he worked on in San Francisco every Sunday night. At that point he and the others involved in the program were trying to create a multimedia band, but were unable to coordinate much rehearsal time. In fact, the only rehearsal time they could get was during the actual show itself. Nevertheless, they did produce material good enough to be used in some parts of The Tubes's show—basically, dense visual mixtures of four or five sources of abstract imagery, some parts of which complement the music. The group looks forward to a time when it can convey

the show to larger audiences. The one-night amphitheatre performances for which rock 'n' roll is so well known

keeps them from experimenting and attaining an exacting crispness from each show. They would like to do one- or two-week stints in each city to allow the local technical assistants to become familiar with the show and equipment.

The Tubes had always carried a video porta-pak with them, but the tapes were used simply as reference points for the group to see what they were doing on stage. It wasn't until later that the video actually became an integral part of the present stage show. The Tubes are an act which makes you sorry that you didn't bring along a video cassette pack just so nothing slips by unnoticed.

In truth, it is the *act* which has turned off as many potential fans as it's turned on. The show has attracted fans who come to see the smoke bombs, the crazy cast of characters played by lead singer Fee Waybill, and all the assorted stagings and backdrops. These fans miss the intricacies of the interplay between musician and technician. Others come to hear the music and watch the general musician-ship; these purist fans become annoyed by the dancers.

lights and character playing. But no one should argue—there's plenty here for everyone.

This is, for lack of a better or more appropriate term, musical theater. Each musical selection has an accompanying skit and video material. T.J. carefully feeds his cassettes to coincide with each musical piece—190 cues in an 80-minute program. At times the monitors may show various images, Hollywood films, well-known television shows or simply a camera's view of the stage. The activity accelerates in other sections where the musicians on stage ad-lib dialogue with a video piece filmed at an earlier date. All of this occurs at an extremely rapid pace. There are often more sources of input taking place at a given moment than is possible to follow. Some people even come back night after night to watch entirely different sections of the program.

The importance of The Tubes lies in its fusion of audio and video, and its avoidance of the "light-show" pitfalls





of other groups at the onset of the '70's. It has made people aware of the different levels on which video can create a heightened musical experience, the simplest of which may be to satisfy the visual needs of an audience in the rear of a 100,000-seat stadium.

Working the video and audio for The Tubes is a complicated procedure. There is so much information to load in and play back. Also, there is so much on which you are dependent. For instance, the lights must be brighter and the technicians equally more proficient than in the normal situation because the video demands it. The lighting, therefore, becomes theater-oriented. The performers must remember to place mic stands out of the way as they enter the stage and back in place as they leave. Dancers are moving all over, jumping past cables (barely) and amplifiers while the musicians are playing at levels that must be carefully controlled. It could be a sound mixer's nightmare.

Don Wood is the sound mixer for The Tubes, a position he acquired by assisting with the engineering duties on the group's first album—an album which, good as it is, still falls way short of communicating the group's essence. No album could, because of the medium's inability to relate what the stage performance is about. The music and the stage act are inseparable.

Wood was working at the Los Angeles and Sausalito branches of The Record Plant when he decided to tour with The Tubes. "I'm extremely busy during the show. It's a lot different from mixing anybody else I've had experience with. It keeps you on your toes quite a bit more. People change mics at different times. You can't depend on a guy standing there and singing into the same mic every show. He might have to go to another mic in order to get a humorous aspect of the



show across. I have to bear down much more than when I'm doing a stock act like R.E.O. Speedwagon or a few others I've worked with like Dan Fogelberg, Joe Walsh or The Eagles. Those people are much easier to mix than this group."

The listenability of The Tubes "live" depends primarily upon Wood's mixing procedure, which many other sound mixers might do well to emulate. He follows a basic studio mixing technique, bringing instruments in and out from the pack when necessary, but otherwise keeping a good blend. Most mixers will simply keep the overall level from bringing down the walls, while allowing each musician to adjust his own levels

independently—a frequently disastrous situation dictated by the size of the musicians' egos and noise tolerance level of the audience. Wood remarks, "We've gotten to the point where the band has a lot of confidence in me. I've gotten them to turn down their amps 75% from when I started working with them. They used to play their amp's masters on 10 and channel input on 7. They still play the masters on 10 but the channel input is way down to 3. Much lower levels, much easier mix."

Because of the group's present inability to tour with what Wood considers state-of-the-art equipment, he has "labored under heavy difficulties." The equipment changes for every show because the P.A. companies are different in every city. The Tubes' backers have agreed to allow the group to design its own console. Wood, showing his studio background, prefers A.P.I. electronics almost exclusively.

In the interim, he has been using Stephens' "Interface" series and Yamaha electronic consoles. But since no P.A. company carries quite the same equipment, problems have arisen. The major drawback is the lack of a 24-channel input console. Consequently, Wood has had to use a split console technique—a 16-input console and an 8-input console—which prevents him from creating a stereo mix because the eight inputs are going into one input of the 16-channel, thus forcefully creating a mono situation. The resultant mix lacks motion; there is no chance to move things around in the mix.

Movement is important to Don Wood. "The main problem is on the Yamaha 16-channel input console. If you want to go stereo, you have to punch up two submasters—1 and 2, 1 and 3, or 2 and 4—and pan between those subs. So when you bring in your 8-input outboard mixer, all instruments being controlled by that

mixer must be put in only one place in the stereo field. And so [if] you have your drums on your outboard console, obviously you can't have a stereo drum mix because six of your drums must be panned in the same position. You end up in mono."

Microphones are also rented from P.A. companies in each city. The vocal mics are subject to excessive movement and considerable abuse, and for this reason Wood always orders Shure 57's and 58's, which he considers to be overall the best rock 'n' roll mics. For the drums, he prefers Sennheiser and Electro-Voice—specifically, Sennheiser 421's on the mid-range toms, low toms, and bass drum; EV-DS 35's are used on the high toms because of their tight pick-up pattern, which helps to combat leakage from the snare and hi-hat, thus removing the need to ride the high tom mics. Snare drums and overhead cymbals are picked up by Shure 57's. All other electric instruments including the synthesizer are miked with 57's and 58's. For additional control, Wood usually asks for UREI third-octave equalizers and Teletronix LA-3A limiters; also, Crown DC-300A amplification—4,700 watts worth.

Wood is still attempting to convince band members to use fewer effects (phasers, echoplex, wah-wah, etc.) on stage than they have become accustomed to in the studio. When four or five musicians are using effects, the sound usually becomes thick and dense, making it nearly impossible to bring up individual instruments in the mix. The more control Wood has over the balances, the more clearly defined The Tubes's musical qualities will be represented on stage.

Along with the chores of mixing The Tubes's sound, Wood also has six tape cues, most of which demand exact timing to enable the performers to carry out the particular staging. The cues vary from a basic lip-sync scene—the voice is taped and the performers



mouth the speech—to pre-recorded music during a set change. Wood's most impressive cues occur during a marvelous sequence called Halos.

For the Halos section, all seven musicians make an exit, five returning to do a song and dance routine to a pre-recorded tape. As the sequence is winding up, the musicians go back to their instruments and, on cue, led by the drums and synthesizer, sync themselves with the tape and then take off on their own—a very effective routine which Wood describes as follows: "For one thing, it's extremely well-rehearsed. At the point in the tune where they come back 'live,' there's a natural break, and as long as the drums and guitar come in strong, I can sneak out the [pre-recorded] tape. It's always in tune; it's just a question of them all coming up to level at the right time. If somebody's got their instrument turned off and comes out and starts to play on that beat, it'll sound real weak. The drummer and synthesizer pull the beat in. The synthesizer does a sweep effect. It's that sweep that's dominant on the tape, too. Once I get those together it's a psychological trick. A person's ears can't follow that; they can't tell when the band starts and when the tape is gone. First I pull the tape out of the P.A., but it's still coming out of the monitors on stage. Then I fade out the tape deck totally, including the monitors. Takes about three seconds. The trick is to bring the tape level up loud enough so there's no level change when the band starts up. About 105 dB."

Although The Tubes don't feel that they should dictate any musical or artistic behavior for other groups, they nevertheless become a very important influence by the nature of their accomplishment. They epitomize the rock act which must be seen to be appreciated. Some acts have had elaborate stage settings which were merely showy backdrops, lacking any theatrical purpose other than to sweeten musical boredom. The public could always gain a good idea of what the group had to offer by listening to their records. The Tubes, however, present the best argument on the pop scene for additional media input. Television has tried to present music to the public by way of network specials, weekly rock programs and public-funded symphonic concerts. The attempt has been a dismal failure, doomed from inception by T.V.'s abysmal sound reproduction capabilities. Also, it is impossible to pin down the public's taste of the moment. The networks could never hope to please each household at any given moment, as can a recording. Even the commendable idea of simultaneously broadcasting the audio portion from radio stations and the video from T.V. stations has not completely solved the problem, if only because the exorbitant costs limit program frequency.

Present experiments with the video-disc seem to be on the right road. And yet, will the video-discs be capable of reproducing high-quality audio on a mass-produced level?

In the meantime, The Tubes's seemingly chaotic craziness on stage makes them unique. There is no doubt that their technical innovations are creative and sophisticated, beyond what audiences have long been lulled into grudgingly accepting as top-flight entertainment. Whether or not The Tubes will lead us into broader musical and technical experimentation remains to be seen.



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By Sedgwick Clark

The sonic quality of classical orchestra recordings is frequently described as “European” or “American.” The former traditionally favors the more distant, blended perspective of a good balcony seat, while the latter prefers to get close-in to the guts of the orchestra, with spotlighting of solo instruments and extreme directionality. But this distinction has become less relevant as European engineers increasingly utilize more mics in their sessions. As Andrew Kazdin, the subject of MR’s Profile, says, it’s all in the mix and the producer’s and conductor’s choice of final balances. □ The never-ending dispute about what sounds “natural” occupied most of our discussion with Mr. Kazdin, an ardent and articulate spokesman for the so-called “multi-mic” technique. A painstaking perfectionist, his recordings produced for Columbia Records are invariably imaginative in their deployment of the orchestra, sonically exciting and, above all, extraordinarily transparent in texture. Undoubtedly, he views his job as more than musical stenography—simply putting up mics, splicing good “takes” together and sending the tape on to be mastered. Just how *much* preparation goes into a record with the credit line, “Produced by Andrew Kazdin,” became apparent as our discussion progressed.

Modern Recording: How did you become a producer?

Andrew Kazdin: I recall, working the story backwards, that when I thought I was all prepared, I came and knocked on the door of Columbia Records which evidenced a fair degree of enthusiasm. But the conversation eventually boiled down to, “But we have no openings right now,” and although they didn’t use these words, what they were really saying was “Don’t call us, we’ll call you.” And I believed them and waited for a year. Although they didn’t exactly call me, I called them from time to time and then it happened. There was a certain amount of movement in the department and that left an opening. I’m speaking, of course, of back in 1964.

But prior to that, as long as we’re working backwards, I had just gotten a Master’s degree from M.I.T. in Industrial Management and while I was there I took all the acoustics courses that that school gave. Prior to that, I got my Bachelor of Music in composition in the New England Conservatory of Music. Prior to that, before I switched into music, I was an undergraduate at M.I.T. in electrical engineering. I did not finish that degree,

though; I went to music and then back for a Masters.

MR: What made you take the direction of a producer? Were you more interested in the engineering rather than the musical aspect of recording?

AK: No, precisely not that—precisely, that I was equally interested. My interests throughout my childhood were always divided between electrical engineering matters and musical matters. One of the interesting characteristics of a thorough producer is that he has practically dual interests. That is, interests in the engineering aspect of the record are as vital and as thorough as his musical interests. And because those happen to have been my two loves anyway, it sort of became natural that that’s what I was going to be.

While I was at the Conservatory, timpani was my performing instrument, although my degree was in composition. I supported myself by performing freelance around the Boston area for those years and the years that followed back at M.I.T. and even for several years here in New York.

MR: I’d like to get on to your recording philosophy and the kind of sound you look for when you are producing

records. I’m sure you know of the “Living Presence” recordings that Mercury made. In the mono days they used one microphone, and then when stereo came along they used a microphone in the middle and one on each of the sides of the orchestra—and that was it. And they trumpeted that the conductor was the only one in charge, no one else played with dials or anything like that, whereas many other companies were using multi-mic techniques. How do you feel on this?

AK: Well, you know, strangely enough, those Mercury recordings weren’t bad.

MR: You think they should have been bad because of only three microphones?

AK: Well, you’ve asked a lot of questions—some of them loaded—and let me see if I can get to them one at a time. The one that sounds the closest to being loaded was the business about the conductor being the only one in charge.

MR: This was what Mercury claimed.

AK: Okay, I understand. But implied in that is that when you have a lot of mics, someone else can be in charge. I must say, of course, someone

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else could have an influence, but there's always only one person in charge. Of the final musical fabric, only the artist has the final say. Every record that I've done with Mr. Boulez has had his approval, and I can't think of any recording where we did not give the artist the right to listen first and the right to have reasonable changes made—any changes that seemed reasonable in the direction of improving or perfecting the performance.

Having said that—and I believe that—it is also true that in a multi-mic situation (and, even more complicated than that, in a multi-track situation) the producer has the equipment to create a balance which is totally unlike the one that the conductor may have envisioned. Now, if he does that, then the conductor won't approve it, so there's no point in him trying.

What I personally try to do is strike a—I was going to use the word "compromise;" maybe . . . let's see how it comes out, maybe it's a compromise—balance between realizing, making come to fruition, the conductor's image of the piece, realizing it for records and at the same time trying to make the recording interesting from a stereo or quadraphonic or purely sonic standpoint; also, trying to extract from the score (that's my greatest pleasure, as a matter of fact, if I can do that) something which is simply a piece of poor orchestration which is never heard in the hall. I mean, I'm sure we all know that this sort of thing happens all the time, that a composer can have an idea which in practical terms is never heard. But, of course, in recordings it can be made heard and sometimes sheds a very interesting light on a particular passage. In almost every case, if it's something *really* out of left field, I will ask the conductor. I remember distinctly talking to Boulez about a piccolo part in *Petrushka*. I said, "I'm going to try to get this. Do you have any objections?" He smiled and said, "If you think you can get it, great." Nobody ever hears that, but he would be as delighted as I would to hear it.

MR: Did you get it?

AK: Oh, yes. But at that point I should ask him or tell him what I intend to do because it's possible that he would say, "Don't be ridiculous. Nobody ever hears that, and there's good reason for that and don't start now." But, I guess what I'm trying to say in general is that the conductor

and the producer have to work as a team. The closer I feel I can come to understanding his sense of balance, what sort of things he would find appropriate to do in a recording—this is a terribly economical move, because then I can produce it in a way which will satisfy me and the conductor at the same time. And, knock wood, I haven't yet had to make any changes.

MR: Lorin Maazel, Music Director of The Cleveland Orchestra, once commented that he felt that producers tended to take such a personal view of their recordings that they were attempting, in essence, to be the conductor rather than letting the conductor do the job.

AK: I know that quote very well. His exact quote was ". . . engineers who are frustrated musicians and like to twiddle knobs and play God." Well, perhaps if he thought about it he wouldn't phrase it exactly that way. But, first of all, it's the producer he's talking about, not the engineers, although the engineers do twiddle the dials—at least at Columbia, and I think at some other companies like RCA. The producer is, as far as the engineer is concerned, in control of all balances, and no knobs get twiddled unless engineers are instructed to twiddle.

Anyway, [Maazel] was talking about the producer, not the engineer, and I think he said they were frustrated conductors. I know several who are practicing conductors, but then the cute part of the quote, of course, was the "playing God," and this meant that they were playing at the role normally held by the conductor—namely the conductor as God. I think he was being overly modest.

But you see the fact is that, all the jokes aside, it doesn't do anybody good, no matter who can twiddle the knobs, if it doesn't eventually come out to be the conductor's performance. The producer's job *is* to get the conductor's ideas onto the record, and I'm surprised that he feels any other way.

In a way, this summarizes the most general philosophy which I hold as a producer: that *that* is my job and *only* my job. My job is to create an atmosphere which is the best in which a performer can operate and that the performer can then produce the best performance he's capable of. And I hope that I have the competence to capture that performance as well as

can be expected on a record—in other words, to get the best performance out of the artist and to capture it sonically in the best way possible. That seems so obvious to me that that should be the role of the producer, yet for some reason I keep hearing about producers who feel they should be involved in other things, like telling the performer how to play it.

MR: What if, for instance, you think a tempo is much too slow?

AK: I'll never volunteer my opinion. If I'm asked—and many times a performer will ask, you know, "What do you think of this? Is it too fast, too slow? What do you think?"—I'll tell him what I think. If he values my judgment, it may weight on his decision of how to finally do it. But it's not my business to give my opinion to somebody who has spent years of his life studying and performing the piece.

MR: Do you listen to other recordings previous to the session to hear what others have done?

AK: It depends upon what kind of session you're talking about. If it's a simple situation like chamber music, solo instruments—mostly piano—no, I don't. In the case of orchestra, depending on how complex the piece is, and in that ratio, I try to listen to as many recordings as I can. It helps me find out where the pitfalls are, because if I'm watching the score and listening to the first of a series of five recordings that exist, and I see that at letter P you can't hear the third trumpet, although it looks like he is doing something very important, and in the next four recordings you also can't hear the third trumpet, I realize there's got to be a reason for that, and maybe there's some trick in the orchestration that's blotting out the third trumpet, and I'll make a particular effort that you're going to *hear* that third trumpet.

MR: What other preparation do you do before recording?

AK: Well, it varies. Again, orchestral recording is the one that always requires the most preparation, sometimes weeks and weeks of preparation. I study the score, mark it in a way which makes for quick identification of instruments, then I have to re-think it in terms of how the track layout on the original recording should be—the kind of flexibility I'd like to have later, the kind of quad or stereo deployment that I should have later. It's really difficult to go into all the

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details, but I can assure you that it's a complicated process and, if done thoroughly, it takes a long time. *Carmina burana* [a quad "sonic spectacular" produced last year by Mr. Kazdin] was probably one of the most complicated from the recording standpoint (complicated because it's made out of 25 sections, each one of which has practically a different problem and a different orchestration, in a way). The final work of preparing the score probably took six months, because there were all kinds of problems in it. They were all fascinating to solve, but it was full of problems that had to be worked out. And after you thought you had got everything, it was sometimes necessary to go back to the front of the score and go through the score, thinking through an individual percussion line, and then go back and think through another percussion line—this, after you've got a thorough overview—just to see what that person is doing, and can he be here and can he move over to there and things of this sort. I think that, other than a Haydn/Mozart orchestra, I would be petrified if I were thrown into an orchestral recording session without sufficient time to prepare.

MR: Sounds like you almost do more preparation than many conductors.

AK: Well, I know Tom Frost [another Columbia producer] once said that he felt he had to learn the score as well as the conductor did. If I can modify what he said, and I'm sure he would agree with me, "... learn the score as well as the conductor *should*."

MR: You feel that a producer really should know how to read a score?

AK: "Should" is the understatement of the year. Not "really should" or "rather desirable," but ...

MR: "Must!"

AK: Absolutely! Look, if the producer can't be as familiar with the score as the conductor, they have no dialogue. I mean, it's imperative. I can't put it any other way. I wouldn't have the right to work with a man who I couldn't feel confident at least to understand and be able to converse with him musically on a level which doesn't require too much stooping on his part.

MR: You say that you want to obtain the conductor's wishes, in an orchestral recording, as clearly as possible. What are the advantages of multi-miking systems and do you think they outweigh the advantages of

having the kind of blend or sound you would hear with three mics, which probably is as close to hearing stereo out in a hall as you could get?

AK: Ah, well, again, that's about four loaded questions and I hope I can remember everything you've just said. Let me throw out, first, that I believe that the simple three-mic set-up that you talk about is nothing like what it sounds like in the hall—let's just take that as a point of departure. A multi-miking set-up may sound less like it, but even the simple three-mic set-up that we talked about before—the Mercury one—that's not anything like what one hears in a hall. My favorite kind of analogy is to say: If you picked out the concert hall of your choice, the one you thought was the best, and found the seat in that house that you enjoyed the most, and we erected some microphones right at that seat to hear what you would hear when you attended a concert, played that back to you and said, "This should recreate for you and be a totally fulfilling experience; this should be the way you like to hear your favorite orchestra, in your favorite hall, from your favorite seat," you couldn't stand it. You'll have to believe me if you've never tried it.

MR: This would be, I imagine, because of the limitations of the microphone as opposed to the human ear?

AK: No. I don't think the microphone is a very limited thing at all, as a matter of fact. The human ear has only one advantage over the microphone, and that is because the human ear is connected to the human brain in a way which—in this respect, I'm sure I don't fully understand and maybe there are those who do, I'm not sure—allows a selectivity of listening and of concentration which is something which apparently gets lost through the microphone. I mean, the ability to utilize that kind of selectivity.

Are you familiar with the "cocktail party effect?" It's a well-known effect that one learns about in acoustics, actually psycho-acoustics. It's called the "cocktail party effect" because the best way to describe it is to imagine you're in a cocktail party—that is, a room crowded with people standing shoulder to shoulder, pointing in all different directions, trying to hold conversations with people who are supposed to be their partners in conversation, but in truth are no closer to them than several people around the sides and the back of them who are holding

their own conversations. And yet it seems possible for a person to concentrate on his conversation partner in the midst of such a din, while there are other conversations bombarding his ear with equal presence and equal volume which *should* make total mish-mash out of what the one party is saying to his partner. The conversation should be completely obliterated and confused. But it isn't. We have a way of concentrating to a point in space.

If we were to remove that central person and replace him with a microphone or even a stereo pair of microphones and record that or just transmit it to another room and ask that same person to listen in that room and try to weed out the voice of his partner, a lot of information has been lost. He can't do it anymore, or at least he can't do it easily. That is, given that same ratio of interfering voices, the ability to be able to pick it out at an angle in space and say "You're the one I want to listen to," is something we can do in the "live" but can't do if we are being separated from the "live" situation by a transmitting medium.

Anyway, a lot of what is associated with the "cocktail party effect" is responsible for the fact that you can concentrate on different sections in the orchestra, on what you want to hear. And the visual aspects are enormous. You see the strings playing, therefore you hear them. You see the piano soloist raising his arms, his hands, above his shoulders and crashing down at the keyboard with a *fortissimo* attack. And you hear it that loud. Did you ever listen to a concerto with your eyes closed in the hall and see what kind of balance you really hear when you can't see the soloist? It's amazing! Try it some time. If you can't see what he's doing—he or she—and you just have to depend on what kind of balance you naturally hear without using your eyes, that's a tremendous effect right there. You'll see how much you're not getting. Anyway, believe me, you'd be very disappointed with what microphones at your favorite seat would sound like.

But the fact is that we have all, I believe, come to accept a form of reality which isn't real at all. We talk about recordings which are too closely miked, recordings which are "natural-sounding," recordings that sound too dry, that are overly reverberant. You pick the one, each one of us picks the one that he thinks is the most

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“natural-sounding” recording. It’s difficult for me to then do experiments which will allow you to compare that recording to the actual hall experience. We can’t do that. But the fact is that I guarantee you that the recording which you feel is ungimmicked and “natural-sounding” really doesn’t sound at all like what that orchestra sounds like in a hall. It’s already a step away from reality. But it’s a new reality which we believe in the recording industry. We’ve accepted a new standard of reality. Now, when something gets too far away from *that*, then we say, “Well, now, that sounds gimmicked.” But we’ve already taken one giant step away from the real experience. And that’s not bad, by the way. I’m not condemning anybody, least of all myself, because the answer to your question, finally, is that I much prefer the multi-miking situation to the three-mic and I don’t even have to give you any other reason than, “How am I ever going to get that third trumpet entrance I spoke about if I haven’t got a mic in front of the trumpets?”

MR: There is a difference, though. For instance, on a recording of Mahler’s Second that I heard recently a flute is obviously miked very closely as part of a big orchestra and it’s supposed to be playing *pianissimo*; and yet you hear the full tone of the flute that you would never hear if you were, let’s say, fifty feet back in the hall.

AK: The fact that the flute may have sounded that way to you is not a condemnation of multi-miking. It’s only a condemnation of someone’s use of it. Multi-miking, as far as I am concerned, serves only two purposes: one, is to give you the control of being able to go in occasionally to get something like this third trumpet entrance or like that piccolo thing in *Petrushka*. Two, it gives you the advantage of being able to create—especially now in the days of quad—an interesting quadrasonic panorama. And I’m speaking about working in the system which is loosely called “surround sound,” where the orchestra is distributed throughout the four speakers, around the listener. It enables you to take these mics and their appropriate tracks and spread them around.

MR: You’ve done recordings both in surround sound and in ambience—the *Petrushka* you referred to was an ambient recording.

AK: 98% ambience.

MR: Okay. What was the 2%?

AK: I thought you’d never ask. The 2% consisted of the offstage snare drum that links the tableaux together, which, being offstage, seemed legitimate to me as I was thinking in those days—I was thinking in ambient quad, so I had to rationalize a legitimacy of moving something into the rear speakers. The offstage snare drum seemed legitimate; indeed, to be off stage if the stage was the front. It would be difficult to erect a sound to the left of the lefthand loudspeaker, so in order to be *really* offstage it has to go to the back. That was maybe 1¾% of the 2%. The other remaining ¼% was the final explosion of *Petrushka*’s trumpet call at the end—the surprise entrance at the very end of the piece where the ghost of *Petrushka* appears. That trumpet is in the back, and maybe you can almost understand why I did that. The word “surprise” might almost be another rationalization. But it was 98% ambience.

MR: What made you change your philosophy of quadrasonic recording from ambience in the early days of four-channel—and this was, obviously, a situation where one starts in a somewhat conservative way, sort of feeling around—to the present surround-sound technique?

AK: Well, I think it’s now pretty much accepted. Not that I think we ought to be afraid of breaking ground. I mean, I think it was at Columbia that probably the first recordings of an orchestra in surround sound were made. I don’t think the company was afraid of doing anything that hadn’t been already, sort of, tried. But, isn’t it obvious from what I’ve said about the way I would record an orchestra even in stereo—the things I try to get, the clarity (and that is one of my personal goals, a clarification of everything that is going on in the orchestra, so that if you open the score and pick an instrument, you should be able to hear it on the record)? Well, if that’s one of my goals, and it certainly is—I mean, when I see that third trumpet in the score and then three or four recordings before me have failed to get it, I know there is going to be a problem. But it’s like out of sort of blind stubbornness I’ll clench my teeth around that problem, I’ll get that trumpet because I just want to see if I can do it. I have all those goals in mind, of clarifying the texture, exposing the music, going for interesting antiphonal effects (which I

always try to do). Even the fact that I separate the harps in an orchestra can really make some *very* interesting sounds.

MR: And you don’t feel this is gimmicky?

AK: I can’t answer that. I think it’s really interesting. I find it fascinating. I love to do it—people seem to love to hear it.

MR: I love it as a listener.

AK: So let’s all shut up and let people enjoy it and let some purist tell us whether it’s gimmicky or not. I’m not talking about going crazy. The point I’m trying to make is that if I have all that as my goal, working in four corners of orchestra (rather than two corners of orchestra and in two corners of hall) has got to be an aid to that quest. Therefore, it was almost inevitable that I would gravitate in that direction because of all the reasons I’ve said: because of the “cocktail party effect,” because of the ability to make interesting question-and-answer things going on in the orchestra. I can do more of it in four channels than I can do in two, *if* I do surround sound.

MR: How about in recording a string quartet? Would you want each instrument to have a separate microphone?

AK: The funny thing is that, talking about a string quartet, I have been in that conversation so many times. For some reason, when I’ve gotten into conversations either formally or informally about quad, sooner or later somebody will bring up that question, “Now what about a string quartet? Surely you wouldn’t put a string quartet, one in each corner of the room!” And my reaction is always [gulp], because what I really want to say was, “Yeah, *I would*. I think that would be fun!”

I’m talking about a regular, old Beethoven or Haydn quartet. There are people who don’t want to know, who want to hear that delicious blend and lump of sound somewhere—no closer than fifty feet away (what an enormous chamber they must have had)—and they don’t want to know whether the first violin starts the tune, and then is taken over by the second violin. They don’t care about that. What if the composer takes a tune and divides it up into four-bar phrases, alternately giving each one of them the tune and the other one the accompaniment figure and then having them swap? Well, that amuses them and it’s fun to play. But if the whole thing is an

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For all that and more the 1140 costs \$1199.95, about 45¢ more than Teac's A3340S. But if you spend that extra half-a-buck with us, you can spend more time with your music.

DOKORDER



5430 Rosecrans Avenue La Jolla, California 90260

	TEAC A3340S	DOKORDER 1140
Wow and Flutter 15 ips	0.04%	0.04%
Frequency Response at 15 ips	±3 dB, 35-22K	±3 dB, 30-23K
Signal-to-Noise Ratio	65 dB WTD	60 dB WTB
Front Panel Bias Controls	No	Yes
Built-in Test Generator	No	Yes
Mic/Line Mixing	Yes	No
Peak Indicator Lamps	No	Yes
Motion Sensor	No	Yes
Manufacturer's suggested retail price	\$1199.50	\$1199.95

Features and specifications as published by respective manufacturers in currently available literature.

CIRCLE 57 ON READER SERVICE CARD

Ovation's Great Guitar Giveaway!

Try the new Ovation Guitar Strings and get a chance to win one of six Ovation Guitars.

You need a good reason to change your brand of guitar strings, right? Well, here's one: a chance to win a FREE Ovation Guitar.

Ovation Strings have a better sound, stay in tune longer, and last longer than what you're now playing. And we're giving away six Ovation Guitars to get you to try a set of Ovation Strings. We think that will convince you. Ovation Strings are exceptional.

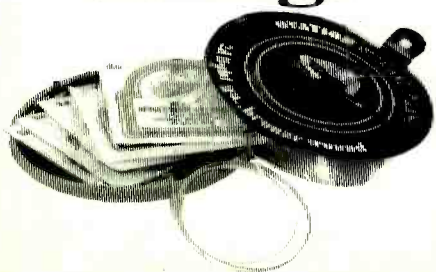
Choose which great guitar you'd like to win.

The Ovation Balladeer: the original Ovation acoustic guitar that pioneered the roundback guitar design.

The Ovation Breadwinner: a super electric guitar with versatility and an extra wide tonal range.

How to enter: Purchase a set of Ovation Strings (acoustic or electric). Take the string package face card (that's the round card inside the plastic cover) and print your name and address on the back. Write down the Ovation Guitar you'd like to win (Balladeer or Breadwinner). Mail the card to Department A 108, Ovation Instruments Inc., New Hartford, CT 06057. Or, if you prefer, simply print the words GREAT GUITAR GIVEAWAY on a 3" x 5" card and send it along with your name and address and guitar you want. No purchase necessary. Enter as many times as you wish. Six guitars will be given away; six chances to win. Entries must be postmarked by July 31, 1976. Void where prohibited by law.

Ovation Strings



CIRCLE 31 ON READER SERVICE CARD

amorphous, echoey blob, the listener is completely unaware of that kind of fun going on, and I must say I'm not that much in sympathy with the listener who doesn't want to know. I'd like to tell him that if he doesn't like it, he doesn't have to listen to my recording.

MR: On another subject, I want to discuss the differences between recording pop and classical albums. We ran session articles on Loggins & Messina and Stevie Wonder in our first two issues of MR, and I personally, being more knowledgeable in classical recording schedules, was appalled by the fact that they have as much time as they want. Stevie Wonder seems to spend at least a third of his life in the recording studio.

AK: Me too.

MR: But he is one artist. You're editing tapes for a number of different artists. Classical makes so much less money, the proportion of sales is heavily weighted by pop; I think a recent figure had pop selling 95%, while classical was only 5% of the market.

AK: Could be.

MR: Given the cost of classical recordings, what does this do to your time schedules?

AK: Look, the figures I'm about to give you, I've quoted them elsewhere and—there's no secret about them; it's just that I'm amused when you frame it in these terms because it becomes a very graphic description of what the costs are. But I was going to say, the figures I'm about to give you, I recognize, are, by twofold, outdated. There have been two increases in recording rates since the time I made the calculations which yield the figure I'll give you now. It's a nice, round figure so I remember it. If I wanted to recalculate it, I bet I might be able to increase it by 25 or 30%.

To record a full symphony orchestra—by that I mean like the Philharmonic, 100-odd people—costs two dollars a second. [Pause.] That's a lot. [Long pause.] You know what that means when you're in a recording session, and Mr. Boulez says, "Alright, we'll start two bars before letter D," and someone in the orchestra says, "I didn't hear that, where was that?" He already paid for lunch when he says that. Two dollars a second. And I think it's probably closer to \$2.25 or \$2.30 now. It would have to be, just the way rates have gone up in the last few years.

MR: So when you start to record,

let's say, the recent Stravinsky *Firebird* which you produced, how many sessions did it take you and how long were they?

AK: There were two sessions. I believe the first one was three hours . . . there were two sessions booked for three hours apiece.

MR: And this for a 45-minute work.

AK: The fact is that the second session ran an hour-and-a-half overtime, so it was a total of seven-and-a-half hours.

MR: And overtime costs much more, I imagine?

AK: Yes. Of course the figures I quoted before were just for straight time. Overtime is about one-and-a-half, not double. Not under those conditions. There are many different recording rates and schedules, but the one that is applicable to symphonic orchestras is not double. By the way, lest anybody try to calculate what that may have cost on the basis of two dollars a second, they have to know one other piece of information: an hour only has forty minutes in it. Maybe I shouldn't have said that, because then the sympathy elicited for our job would have been even greater than it deserves to be!

MR: Do you have any advice for someone who wants to get into the production or engineering end of classical music? I am told that the market is absolutely glutted in the pop field, and I imagine that it is even worse in the classical field.

AK: It's similar, and producers the same way. You're asking a very, very difficult question, and I tried to answer that question for myself before I got my job—in fact, *years* before I got my job when I was still going to school. I've had people only within recent months, people of the age you talk about, who want to know how and what can they do. It's awfully hard.

One thing that I can say for sure, that if it's classical A&R they're looking for, they can't get off the ground unless they can read a score like the *Sunday Times*. If they can't do that, don't even knock on the door because there's no place for them. The simplest job we have here, usually for a new man who has come into the department, is the title of Music Editor. He has the "simple" job of going through, in cases when a producer is not available to edit his own work or hasn't got the time, all the takes that go into a session, following it with a score,

marking all the mistakes, finding all the good places, trying to organize a splicing plan which will, so to speak, walk between the raindrops, and get you from one end of the movement to the other using only good performances. I mean, that's the "simple" job, and I say that with big quotes because do you realize the responsibility that goes with that job, what he's got to be able to hear and recognize? And I'm talking about not *even*, not *even* (although this is definitely required) using the judgment as to what makes a good musical performance; just separating the wheat from the chaff.

So, if a person can't get around a score well enough to do that, forget it. So let's assume we're talking about only people who are really good musicians and can read a score and can make decisions in a reasonably short length of time. Well, the next question is, perhaps they should know something about sound and the technicalities of sound reproduction and recording. Perhaps they should have had some experience in it—maybe not professional, but maybe they worked at their college on the radio station or maybe they recorded the high school band or maybe they did *something*. I mean, have they been fooling around with it, do they have any idea what a microphone is, you know?

Anyway, what I'm saying is that when you get *all* of that, there's nothing we can do. You see? That's the horrible part. That when you get all of that, it's a matter of sitting around and waiting. Do you realize how few jobs there are like this in the whole country or the whole world? That's the frightening part of it.

MR: How many companies are there that make their own classical recordings? A handful. And how many have as many producers as Columbia?

AK: Even, let's say, if every large company had five people involved in actively producing records, how many is that in the whole world? Even if I could say it's a *hundred*—which sounds like a big number—boy, that's like shooting goldfish in a barrel, but from a hundred yards! A hundred people in the whole world.

MR: So you sweep floors for a while.

AK: Yeah. So I played timpani in Boston for a year.

MR: And study your scores.

AK: Stick close to your desk and never go to sea.

here's a two channel preamp and mixer you can wear



The Gimp™ preamp/mixer provides performer control over both voice and instrument channel gain and balance within easy arms' reach. It can be carried in your pocket, or on your belt, or mounted to the mike stand using clamps included. It has maximum gain of 30 dB and will drive up to 500 feet of line without noise pickup or high frequency loss. It gives excellent results with any mike or instrument pickup, even inexpensive ones. It lets you record multiple sound sources without using a mixing panel, and you can drive any amplifier or recorder with it. It is powered by a single transistor radio battery and weighs less than one pound. It is available from music and audio dealers, or you may order direct from manufacturer at \$69.95 plus \$1.25 for shipping. Or write for detailed product information.

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CIRCLE 69 ON READER SERVICE CARD

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CIRCLE 82 ON READER SERVICE CARD

Ambient Sound

BY LEN FELDMAN

The Unprofessional and Semi-Professional Professionals

There is no law in this country that prohibits a manufacturer from affixing a label reading "high fidelity" to any piece of audio equipment. That applies to anything from a \$19.95 children's phonograph or a pocket cassette recorder all the way up to the super equipment that can run into thousands of dollars. Trying to define high fidelity or its contracted noun-form "hi-fi" (as in "I'm going out to buy a hi-fi") is something the industry has unsuccessfully been trying to do since the 1950's with little success.

Happily, in the last few years an awareness has grown amongst the buying public which has helped to separate the low-fi equipment from true high fidelity components, and no knowledgeable music lover is so easily deceived any longer. You just can't buy a true high fidelity system for \$29.95—or even \$99.95, pasted-on "high fidelity" labels notwithstanding.

When it comes to tape products, however, things are not quite as clear-cut. Pick up almost any audio book and thumb through for tape product advertising and you're sure to come across such terms as, "professional," "recording studio features," "just like the machines used by professionals," and more. Evidently, the serious recordist who is into tape decks (and particularly open-reel machines) would like to feel that the deck he purchases or already owns can do all the things that a recording studio machine can do but he is not willing to spend the several thousands of dollars that truly professional machines cost. The differences between a truly professional tape transport and its electronics and a "home" machine that claims "professional" features are, indeed, more subtle than those between "true hi-fi" components and "hi-fi labelled" counterfeits. Few of these differences are apparent from reading a specification sheet, which makes the problem all the worse.

Frequency Response

Amateur recordists are always terribly concerned with frequency response capability of the tape deck

products they buy. Give a home recordist a specification that reads, "Frequency Response: 20 Hz to 20,000 Hz at 7½ ips, within ± 3 dB," and he's not likely to read past that opening performance specification. Indeed, many fine open-reel decks intended for home use achieve this kind of response and even better. In fact, the quest for wide-range response is so intense amongst home audiophiles that many home machines actually do better in this regard than machines used in professional recording studios.

The fact is, however, that given a choice between extended frequency response and better signal-to-noise ratio or lower distortion, most experienced recording engineers would opt for reduced bandwidth. Few master recorded tapes (let alone discs which are derived from them) have much frequency content above 15 kHz, and most listeners cannot detect the difference between recordings with extended response and those which attenuate all frequencies above 15 kHz. But just about anyone can hear (and be annoyed by) background noise that is only 55 or 60 dB below peak program levels, or total harmonic distortion in the 3% range. These three variables—frequency response, total harmonic distortion and signal-to-noise ratio—are interdependent in any tape deck, even if you disregard the particular tape used with a given machine. And the adjustments that vary the interrelationships of these three parameters are bias and equalization.

Bias and Professionalism

There is only one "consumer" tape deck we know of that offers continuously variable bias adjustment on its front panel so that optimum bias can be set for any brand of tape. Admittedly, some machines do have multiple switch positions which may provide two or more bias levels, but a professional recording engineer wouldn't be caught using a new batch of tape (let alone changing brands of tape) without first carefully adjusting the bias of his master tape deck. The criteria he uses in making this adjustment may vary from engineer to engineer. He may want to favor high frequency response, in which case he will under-bias the

deck slightly. Or, he may wish to sacrifice high end in favor of lower distortion at mid- and high-frequencies, in which case he may over-bias the machine. But he has control of bias at all times.

Half-Track Is Not Synonymous with "Professionalism"

Recently, several consumer machines have appeared on the market which offer half-track (as opposed to quarter-track) recording and playback. This feature, claim the makers, makes the deck "professional" since, it is argued, professional or "studio" machines never are equipped with forward and reverse recording facilities (though, of course, they are equipped with multi-track capabilities far beyond the quarter-track machines familiar to home users). What half-track operation *does* provide for the home user is better signal-to-noise ratio, simply because greater tape width and longer tape-head gaps permit higher magnetization and hence greater headroom before tape saturation occurs. It should be remembered, however, that multi-track professional machines utilize half-inch, one-inch, or even two-inch wide tape so that on a per-track basis they have as much or more tape width than the new, home half-track machines in many cases.

Functional Professionalism

It is in the arrangement of transport operation, however, that the truly professional machines differ most from the home varieties. Most home machines have some form of safety feature which prevents the user from accidentally getting into the record mode while playing tapes. But it is exactly this sort of facility that is needed on a professional tape deck for "punching in" corrections to a recording and synchronizing them with the section to be removed from the earlier recording. Professional machines are therefore equipped with a safety switch or button which, when defeated, enables the engineer to instantaneously switch from play to record without missing a beat. That feature, coupled with "sel-sync" (conversion of a record head to a monitoring playback head—a feature which *is* available on many home machines) permits a degree of editing not possible with home, "professional"-type machines.

Watch any recording engineer doing an editing job on tape and you will find him "rocking" the tape back and forth by hand and marking the tape for precise excising and splicing points. As the reels are moved back and forth by hand, contact is maintained between the tape and the playback head, so that recorded sounds can be heard and precision cueing accomplished. I know of no home machine other than the Otari MX 5050 reviewed in this issue that provides

this feature, though some do have a "cueing" feature which permits you to hear (at somewhat diminished amplitude) recorded sound while fast-forward or fast-rewind transport modes are in operation. This does help locate desired passages of music on a long tape but does not afford the precision editing facility commonly available on true professional decks.

Long-Term Ruggedness

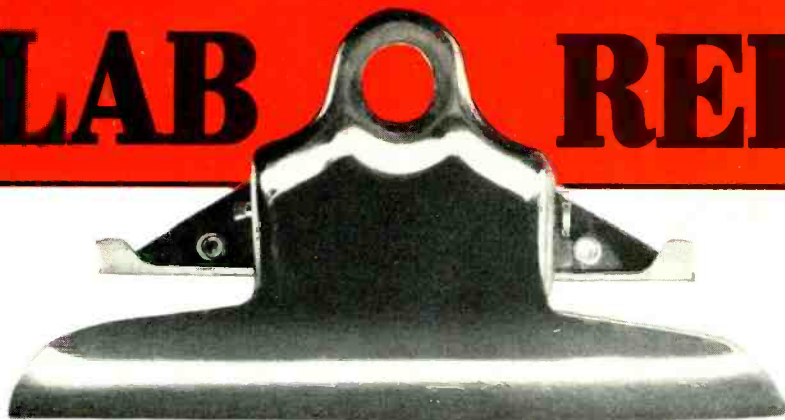
How many hours a day do you use your tape deck? Probably no more than a couple, if you're like most serious tape recordists who set up their "home studios" using the best of the consumer machines. In professional studios, tape decks have been known to operate for as much as eighteen hours a day, almost continuously. Do you think your home machine could withstand that kind of use? Probably not. And therein lies one of the major differences between the professional and the pseudo-professional home machines. The latter variety are just not intended to take that kind of punishment and while, under ordinary home-use conditions, they are as long-lived and service-free as any other home high fidelity component, they are just not designed to withstand that kind of continuous use demanded in recording studios. That's not to say that their initial wow-and-flutter capabilities are not as good as those of their professional counterparts—in many cases they are even better. It's largely a matter of motors used, ruggedness of bearings and other moving parts and the like.

Why Two Grades of Decks?

In case you're wondering why manufacturers of both home and professional machines don't provide the same ruggedness of construction on audiophile products that they incorporate in studio machines, a quick look at some of the prices of studio machines will provide the answer. They can be several times as expensive as even the best of the multi-track, feature-laden machines that are sold to home consumers.

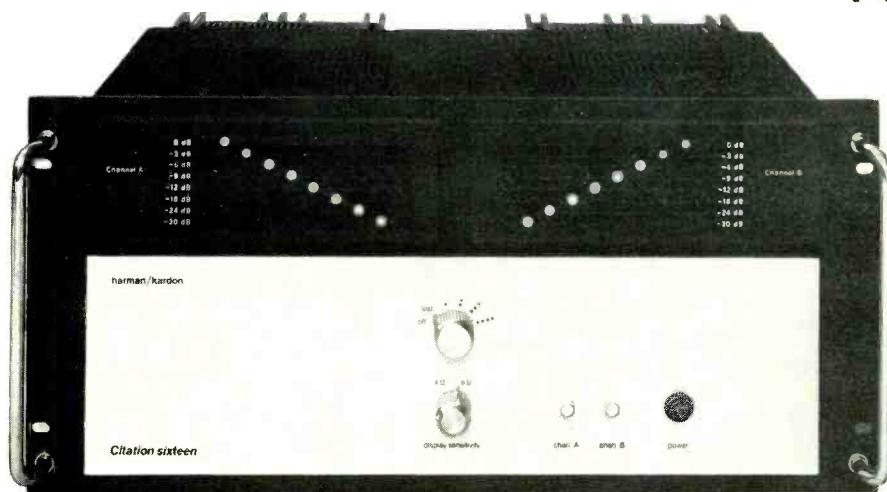
Tape deck manufacturers deserve a great deal of credit for coming up with home machines that, in their recorded results, do as well as their "professional" counterparts, but that's no reason for advertising agencies to go off the deep end and imply "professional" qualities to tape decks that were and are intended for serious audiophile use at home. Surely the industry is not looking for more government control of audio products and their specifications similar to the sad experience encountered by audio power amplifier makers, who must now live with the Federal Trade Commission method of specifying amplifier power. If tape deck manufacturers continue to misapply adjectives such as "professional," that's very likely what they'll have to face.





NORMAN EISENBERG AND LEN FELDMAN

Harman-Kardon Citation 16 Power Amplifier



General Description: The Citation 16 from Harman-Kardon is a stereo basic or power amplifier designed for use with a separate preamp or other device delivering a "line level" or "high level" signal (on the order of 1 volt; the actual rated sensitivity for rated output is 1.25 volts) and preferably with its own level or volume control since the 16 has none of its own. The unit is housed in a sturdy metal case and its front panel is fitted with two handles for sliding it in or out of a rack mounting or shelf.

The front panel features an elaborate L.E.D. display for monitoring power output, with eight separate indicators for each channel. These are marked from -30 to 0 dB, and the wattage calibration is set by adjusting a knob below the scales. The knob has four calibration positions that permit the scale to indicate up to 160 watts output.

As a convenience, H-K includes a printed card that shows all power levels for all switch settings at all dB values in increments of 3 dB from -30 to 0. Note that the switch positions do not change the power delivered by the amplifier, but only the amounts shown by the

L.E.D. display. The amplifier circuit itself is "wide open" all the time and no harm will be done if the actual power delivered exceeds the indicator rating you have selected.

This knob also has two other positions. One is "test" which, if all is well, lights up all the L.E.D. lamps. The other is "off" which cuts out the power-monitor feature; the lamps stay off entirely.

Below this knob is another that you adjust to suit the speaker load—4 or 8 ohms. Again, this knob does *not* change the power delivered by the amplifier; it recalibrates the L.E.D. display to show how much power is being fed to either of the two loads. There is no 16-ohm indication because, according to H-K, the cost of including it was not, in their view, justified by the relatively small number of 16-ohm speakers in actual use today. However, for those who may use this amplifier with 16-ohm speakers, the values indicated in the 8-ohm position may be reduced approximately by 3 dB each to get indications for 16-ohm loads.

As for actual power output, the 16 is rated for 150 watts (minimum RMS per channel) into 8-ohm loads in

accordance with FTC rules and usual industry practice. According to H-K, it will deliver about 240 watts into 4-ohm speakers, and about 120 watts into 16-ohm speakers.

The front panel also contains two pilot lamps (one per channel), and a power off/on switch.

The rear of the 16 contains phono jacks for signals in, and binding posts for speaker leads. The leads may be attached directly or via banana plugs (supplied). Below each speaker connector is a fuse holder. The line cord is fitted with a three-prong (grounding-type) plug. This means that if other chassis in the installation are themselves grounded, they must be electrically isolated from the 16. And, in any event, the 16's line cord should not be plugged into the convenience power receptacle of a preamp unless the preamp's switch itself has a 1,000-watt rating.

The Citation 16 has an internal adjustment that permits it to be used on any of four line voltages most commonly found here or abroad: 100, 120, 220, and 240 volts AC (50 - 60 Hz). As supplied, the adjustment is made at the factory for the area in which it is to be used. The 16 also has provision for a "bridge mode" (mono) operation whereby a single 8-ohm speaker may be connected to the two "hot" (red-colored) speaker binding posts. In this mode, a simple internal wiring change also must be made. When adjusted for this operation, the 16 can deliver about 500 watts of output power into a single speaker.

Test Results: In every one of MR's tests, the Citation 16 exceeded its published specifications and generally impressed us as among the very best power amps to be had today. MR even ran the stringent "preconditioning" test (at a 50-watt per channel output, or one-third of 150 watts) for the required one hour. It passed this test easily, with both 8-ohm and 4-ohm loads connected. For the claimed 150 watts, MR measured nearly 190 watts, into an 8-ohm load on each channel. Continuous power per channel across the band from 20 Hz to 20 kHz was measured at 165 watts, better than the 150-watt level spec'd. Power bandwidth ran from below 10 Hz to 40 kHz. For frequency response (at the 1-watt level), MR measured ± 3 dB from 2.5 Hz to 140 kHz. For a ± 1 dB mark, the response ran from 5 Hz to 70 kHz. Both harmonic and IM distortion were lower than claimed, as was hum and noise. Square-wave response, taken at the very high frequency of 20 kHz, was very good. At the low frequency of 20 Hz it was outstanding. The L.E.D. display was found to be accurate in all calibration options within 0.5 dB.

Under various types of "torture tests" the 16 proved to be rock-stable and impervious to ill effects due to unusual loads or shorts across the output. Early reports from the field, including dealers and owners,

indicate that the reliability record of this amplifier has been excellent to date.

General Info: Amplifier is 19 $\frac{1}{8}$ inches wide; 9 $\frac{1}{2}$ inches high; 13 $\frac{1}{8}$ inches deep. Weight is 55 pounds. May be rack-mounted or placed on shelf. Owner's manual is okay, but could use more detailed hints (for the newcomer to 3-prong plugs) on connecting the power cord. Also could include a bit more info on power outputs into 4-ohm and 16-ohm loads. List Price: \$795.

Individual comment by L.F.: I believe that the superb performance of this amplifier can be attributed to characteristics other than its wideband response, which extends to beyond 100 kHz. I am convinced that the completely dual power supply has something to do with the excellent bass reproduction and superb transient attack capability of this amplifier. It is one reason why my "standard" comparison set-up uses two mono power amplifiers, which is essentially exactly what the 16 is, sharing only a chassis and a line cord between the two totally separate amps.

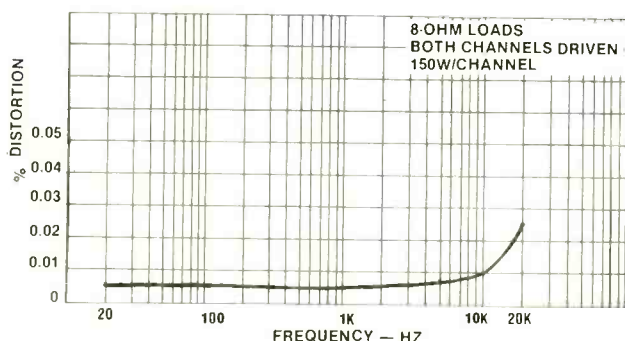
The L.E.D. power level display is an attractive idea, but the 4-ohm switch setting for this display raises an interesting question. If, indeed, the amplifier has an "official" power rating for 4 ohms, and since it may be used with any of several 4-ohm speakers available, why is this rating not published? In my lab tests of the amplifier, it delivered 236 watts per channel into the lower impedance loads at 1 kHz, for rated THD of 0.05%, both channels driven.

While I recognize that the inclusion of an input level control might have introduced some small amount of phase shift at the frequency extremes, I feel that most users would have been willing to accept that in return for the convenience of being able to set input sensitivity to match the requirements of preamps whose master volume controls deliver outputs other than 1.3 volts when they are set to their most convenient physical rotation points. A small point, to be sure, and one which will not bother most users, especially if their preamplifiers are equipped with secondary input level controls for equalizing levels from all program sources, but worth mentioning since many other high-powered basic amps in this price category do provide such adjustment capability.

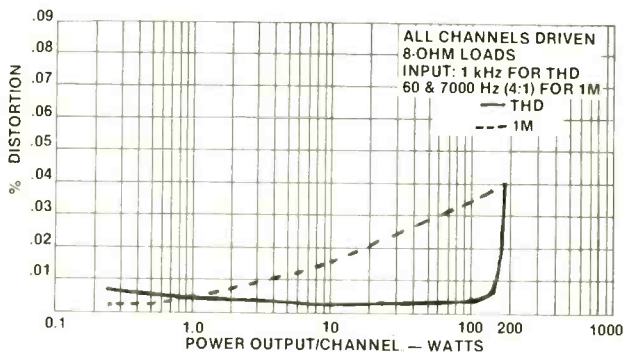
Individual Comment by N.E.: After overcoming such practical problems as the weight of this amplifier (I dare not lift it myself), its power cord (which could not be plugged into my preamp but had to go to its own wall outlet, which means I have to switch the unit on and off separately when I use my system), and those speaker banana plugs (the lead-holding screws were inordinately tight at first), I had this beast tamed

and domesticated for some trial runs in the company of some other fine audio components. It did not take long, listening to it in a system reproducing music, to forget all the inconveniences attendant on installing it. This has to be one of the really great amplifiers available today. Assuming you own speakers that can take the kind of power this monster delivers, you may hear, as I did, a new sense of clarity and "openness" in the sound, an exciting sense of realism throughout the audible range from the tiptop transients to the almost visceral nudges of the deepest bass.

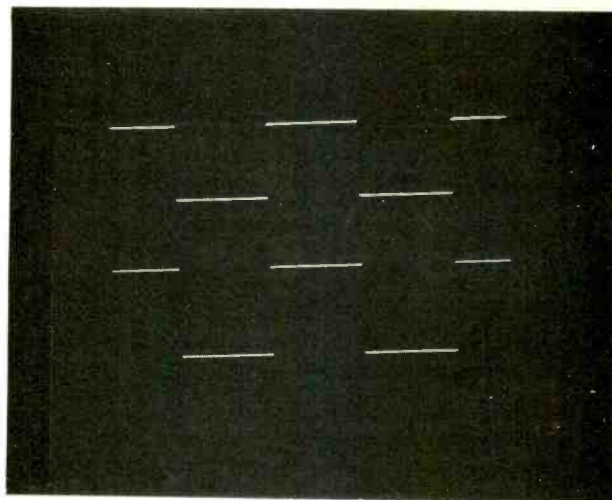
I happen to believe that wideband response does improve the listening quality of audio gear—when that wideband response is linear and is coupled with high clean power and very low distortion, as it is in the Citation 16. Holding the response linearly to perhaps an octave or more above the 20 kHz mark minimizes the danger of amplitude distortion up to 20 kHz. It also seems to be closely related to good phase characteristics which help in transient response. Of course, this kind of amplifier performance demands associated equipment of comparably high caliber, and it is merciless in revealing flaws in program material, from overt defects to subtle imbalances in the tonal spectrum. In this sense, the 16 certainly merits the description of "professional" or "monitor."



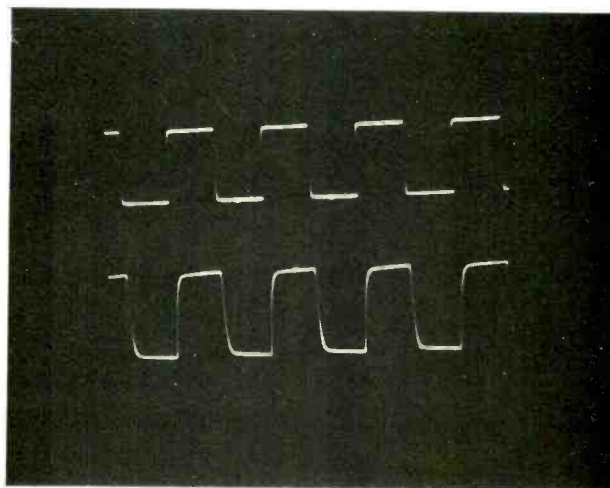
Harman-Kardon Citation 16: Distortion vs. frequency.



Harman-Kardon Citation 16: Harmonic and intermodulation distortion characteristics.



Harman-Kardon Citation 16: Square wave response, 20 Hz (upper waveform = input; lower waveform = output).



Harman-Kardon Citation 16: Square wave response, 20 kHz (lower waveform = output).

HARMAN-KARDON CITATION 16 POWER AMPLIFIER: Vital Statistics

PERFORMANCE CHARACTERISTICS	LAB MEASUREMENT
Power output per channel, 8 ohms, 1 kHz	189.8 watts
Continuous power per channel (20 Hz - 20 kHz)	165 watts
Power bandwidth	10 Hz to 40 kHz
Frequency response	±3 dB, 2.5 Hz to 140 kHz ±1 dB, 5 Hz to 70 kHz
Damping factor	320
THD, rated output	0.0048%
1M, rated output	0.045
Hum & noise below rated output	-110 dB
Input sensitivity	1.30 volts

CIRCLE 23 ON READER SERVICE CARD

Russound "Gimp"

Battery-Powered Portable Two-Channel Microphone or Instrument Preamplifier/Mixer



General Description: The full name of this new device takes up almost as much space as the device itself. The "Gimp" is a small, lightweight "in-and-out" box that is essentially a solid-state, battery-powered signal mixer and voltage gainer for two microphones. Although it is primarily designed for sound reinforcement at a "live" performance, it also has other applications—it can drive a normal home hi-fi system and it can feed tape recorders.

One end of the Gimp, marked "input," contains two standard microphone jacks and their respective level control knobs. At the opposite end are two outputs (both of course presenting the same signal). One output accepts ¼-inch phone plugs; the other, ordinary hi-fi cable plugs. The power switch also is at this end. Access to the inside for battery insertion or replacement is gained by removing two knurled screws and lifting up the top. The device runs on a single 9-volt "transistor radio type" battery. Its metal housing is finished in tan and brown tones with orange lettering.

Test Results: To begin with, MR could measure no undesirable interaction between the two inputs. That is to say, either of the two controls could be varied from zero to full up without affecting the output level of the *other* program input, which is excellent. In terms of normal audio measurements, MR found that while some of the published specs may have been "pushed" a little, the unit still does a creditable job. Frequency response was checked as within the 0.2 dB spec across the audio band except for its being down by 2 dB at 20 Hz. This should pose no great problem in terms of practical applications with the kind of mics with which this unit would normally be used. As for the clipping point listed at 0.8 volts output, that all depends on how you define "clipping." Unlike power amps, a single-ended device such as this does not "clip" uniformly at top and bottom of the waveform. Rather, distortion rises fairly linearly as maximum

output capability is approached. Thus, at 100 millivolts output (corresponding to an input of about 2.25 millivolts), THD at mid-frequency was a mere 0.6%. However at 300 millivolts out, THD rose to 1.8%, while at the listed "clipping level," of 800 millivolts, THD was up to 5%.

Again, however, since input levels (at least with using ordinary microphones) are not likely to exceed 5 or 10 millivolts—even on peaks (corresponding to 223 to 446 millivolts output)—the distortion levels are certainly acceptable, though not outstanding.

Hum and noise figures *were* outstanding, particularly when you consider the input levels handled by the device, plus the fact that its output impedance is low enough (70 ohms) to permit running long cables over to the high-level inputs of a master mixer, or to the inputs of a tape deck.

General Info: Unit measures 2 by 2 by 6 inches, plus about ½ inch added to the length for the knobs. Weight is 15 ounces. Case has three rubber feet or may be attached by means of plastic clamps and screws (supplied) to mic stand. Instructions are simple but adequate. List price is \$69.95.

Individual Comment by L.F.: This is the kind of product that makes one ask how come no one thought of producing it before. The Gimp is a dandy item that will appeal to the serious home recordist, if not to the professional who has access to more sophisticated mixers. An immediate application suggests itself. The performer who both plays an instrument and sings can now do "on the spot" mixing of his or her own two microphones with only one high-level line going to the tape recorder.

Individual Comment by N.E.: One cannot but be impressed with a unit as compact as this that does as workmanlike a job—some departures from published specs notwithstanding. The Gimp could serve not only in "live" performing situations but also as an introduction to the mysteries and fun of mixing for the beginning or budding performer and/or tape enthusiast. It also could permit the hi-fi system owner to add a new kind of fooling-around activity to his rig—singing along with a recording of an orchestra, for one thing.

GIMP MIXER/PREAMP: Vital Statistics

PERFORMANCE CHARACTERISTICS	LAB MEASUREMENT
Input impedance, each channel	100 k ohms
Output impedance, either jack	70 ohms (maximum)
Maximum output below "clipping"	0.8 volts at 5% THD
Interaction between channels	none
Frequency response	±2 dB, 20 Hz to 80 kHz
Gain, maximum volume setting	33 dB
Noise & hum, full gain (0.8 volts out)	-87 dB
minimum gain	-95 dB
THD at 1 kHz	for 0.5 volts out, 3% for 0.3 volts out, 1.8% for 0.1 volts out, 0.6%

CIRCLE 24 ON READER SERVICE CARD

Otari MX-5050-QXH Four-Channel Open-Reel Tape Recorder



General Description: The Otari MX-5050-QXH is a two-speed (15 and 7½ ips) deck that handles reel sizes up to the professional (NAB) 10½-inch diameter. A quarter-track model, it can record and play in four-channel (quadraphonic) and in stereo and mono. Other versions in the Otari MX-5050 series also are available with an alternate two-speed combination (7½ and 3¾ ips) and with alternate head configurations.

Multi-channel and overdub recording in full synchronization is facilitated by what Otari calls its "selective reproduction" feature (similar to the "multi-sync" and "sel-sync" used by competing brands). Fast-buttoning is feasible from any wind mode to any other except when the deck is in edit mode. Fully adjustable bias and equalization are featured on the front panel together with an adjustment for standard reference level. The equalization adjustment itself is divided between high and low frequency ranges. Also found on the front panel is a control to activate a built-in test oscillator which furnishes a 1-kHz signal for testing or cueing.

The edit control permits "spilling" tape as well as rocking the reels to locate a desired point on the tape. An adjustable cue control "defeats" the tape lifters during fast wind to permit hearing a recorded signal at reduced amplitude. Mic and line input controls are arranged coaxially per channel to facilitate direct input mixing. Note: two-channel versions of the MX-5050 come fitted with a second playback head which may be used for either quarter-track or half-track work; a special switch on the head cover selects one or the other mode.

The tape passes through the head assembly in a perfectly straight line, common to traditional professional models, and the non-oxide surface of the tape, rather than the coated side, is contacted by the pinch-roller. Heads themselves are made of hard Permalloy, credited with offering an ideal compromise between extended head life (vis-a-vis standard mu-metal heads) and signal output (compared with ferrite heads). Also

offered on the Otari is a splicing block mounted on the head cover. The vertical cut on the block is aligned exactly with the gap on the playback head.

A "motion sensing" feature permits going from any running mode to any other with neither time delay nor snarling or breaking of the tape.

The transport section and the electronics of the Otari are separately mounted and so they may be stacked or positioned side by side, as you choose. The electronic modules for either pair of channels (nominally channels 1 and 3; and channels 2 and 4) are of course identical. "Secondary" (internal circuit) electronic adjustments probably will seldom need attention; if they should, however, they are readily accessible by removing the bottom panel of the housing. Normal connections (signals in and out) are made at the rear. Line connectors are XLR types; mic connectors are standard ¼-inch types. For the line outputs, a switch selects between "high" (normal +4 dBm, 600-ohm output) and "low" (output is reduced by 10 dBm for driving a hi-fi system amplifier and similar devices). A headphone output jack is on the front of each electronic module.

As supplied, inputs and outputs are unbalanced. Optional plug-in transformers are available to convert to balanced if desired.

The machine runs on three motors, and the capstan drive motor is available as either a hysteresis-synchronous type or a DC servo-controlled model. The latter, which raises the price of the unit by \$150, was the one used in the model MR tested, although substantially the same performance results may be expected with the lower-priced motor. The VU meters (two per electronic module) light up when the deck is turned on, and will indicate play or record levels as chosen by the operator. They also function as indicators for the bias, equalization, and calibration adjustments.

The Otari is supplied with an empty NAB-size reel, hold-down knob, extra fuse, and NAB reel shims. It

may be ordered in a wood case or a portable case. The transport may be installed vertically or horizontally and will fit standard rack consoles. The manual for the recorder is unusually informative, thorough, and detailed; it covers installation, operation, normal adjustments, and preventive maintenance.

Test Results: In terms of features and performance, the Otari MX-5050 seems to be the closest thing to a "\$4,000 pro machine" that MR has yet tested, although it is priced well below \$2,500. The unit exceeded all of its specifications and could not be described as less than excellent in all respects. Using Maxell-UD tape, and following the instructions furnished with the machine, MR measured response that was better than claimed at either speed, and with less distortion than claimed. Signal-to-noise ratio topped the 60 dB mark in any mode; speed accuracy was held to within 0.1 per cent; recording level hit +9 dB at either speed before reaching the 3 percent harmonic distortion level. Wow and flutter were negligible at either speed.

The actual response measured by MR at 7½ ips ran within ±2 dB from 30 Hz to 18 kHz. At 15 ips, response was checked within ±2 dB from 32 Hz to 25 kHz. The fast speed, which was run at a zero VU level, produced a mere 0.6% distortion, well within Otari's claim of less than 1% and certainly among the best yet encountered for this class of machine.

All transport motion functions were found to work smoothly and flawlessly, with controls responding to mere "feather-touch" handling by the operator.

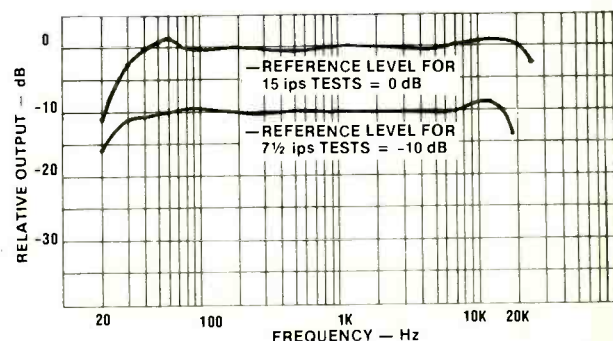
The built-in adjustments, including the 1-kHz oscillator were judged to be genuine conveniences of utility to the serious recordist, and not mere "cosmetics" for the sake of embellishment. All told, the Otari impressed MR as a soberly designed and splendidly crafted tape recorder which, if it be characterized as in the "semi-pro" class can be said to lean more to the "pro" than to the "semi" concept of that designation.

General Info: In standard wood case, complete recorder is 25½ inches high; 21 ¾ inches wide including clearance for large reels; 7¼ inches deep at top and 9½ inches deep at bottom. Weight is 60 pounds. (Dimensions and weight vary as per housing chosen; details available from manufacturer). List price for model with hysteresis-synchronous motor, \$2,195; with DC servo-controlled motor, \$2,345.

Individual Comment by N.E.: This machine seems to combine the best of two worlds (strictly pro and home amateur) in a working format that may take some study to master fully, but which can deliver the kind of superior performance sought after by the serious recordist. From the fully adjustable bias and equalization facility to the built-in splicing block, the Otari boasts an abundance of features that are of appeal because of their sensible usefulness. Add to this

the unit's impeccable performance, both mechanically and electronically, and you have a product that should be of top interest to those who can afford its price.

Individual Comment by L.F.: I quite agree. A tape recorder that combines front-panel trimming (of bias and EQ) for your favorite tapes, plus multi-track sync, plus a host of other features, plus top-grade performance, cannot but garner our admiration. Non-professionals may find the use of 3-conductor XLR connectors a bit disconcerting and possibly would like to find line inputs and outputs using phono or phone connectors paralleled across the XLR sockets. Be that as it may, the Otari is a truly top-grade recorder. A nice question is whether it should be regarded as a "home" machine with just about every professional feature one could think of, or as a professional machine that somehow manages to do what other pro units do at higher cost and with taking up more space. We could not of course evaluate its long-term reliability but our examination indicated very rugged construction, and we did subject the unit to long periods of strenuous use with no apparent problems coming up.



Otari MX-5050-QXH record/play frequency response.

OTARI MX-5050-QXH TAPE RECORDER: Vital Statistics

PERFORMANCE CHARACTERISTICS (using Maxell-UD tape; deck adjusted as per instructions)	LAB MEASUREMENT
Record/playback frequency response	
15 ips, 0 dB	±2 dB, 32 Hz to 25 kHz
7½ ips, -10 dB	±2 dB, 30 Hz to 18 kHz
Harmonic distortion	
15 ips, +9 VU	3.0%
+3 VU	0.8%
0 VU	0.6%
7½ ips, +9 VU	3.0%
+3 VU	0.85%
0 VU	0.7%
Best S/N ratio (15 ips)	68 dB
Input sensitivity, mic	-70 dBm
line	-15 dBm
Output level, line	+4 or -10 dBm (switchable)
headphone	-20 dB, 8 ohms
Speed accuracy (15 ips)	0.1%
Wow & Flutter (weighted), 15 ips	0.035%
7½ ips	0.05%

CIRCLE 25 ON READER SERVICE CARD

Infinity Monitor Jr. Speaker System



General Description: The Infinity Monitor Jr. is a three-way speaker system housed in a walnut enclosure. Drivers used are a 12-inch woofer, a 1½-inch soft-dome midrange, and a 1-inch dome tweeter. The internal network provides frequency divisions from woofer to midrange at 600 Hz; from midrange to tweeter at 5 kHz. Midrange and tweeter may be adjusted for output level by individual knobs (variable pots) at the rear. Although nominally of “bookshelf” dimensions, the Infinity Monitor Jr. is more of a vertical, floor-standing system, and it may be placed on a separate pedestal available as an option.

The rear of the woofer is loaded by the “transmission line” type of configuration espoused by Infinity (and some other manufacturers). This type of loading is characteristically inefficient, and the manufacturer recommends driving this system with amplifiers capable of delivering at least 25 watts (RMS). The speaker is rated to handle up to 200 watts of program material. All three drivers face forward on the front baffle behind the black grille, which is removable. The cabinet itself is finished in oiled walnut and presents a simple, neat appearance. When placed on the optional pedestal, the system gains six inches in height, and the walnut-and-black tones of the pedestal match the walnut-and-black appearance of the enclosure itself.

Nominal impedance is 8 ohms. Hookup is made to binding posts, color-coded for polarity, located on a recessed panel at the rear, where the two controls are found plus a fuse holder. Fuse rating for the Infinity is

2.5 amps. According to Infinity, special pains were taken in the design of this speaker system to assure correct phase relationships among the drivers and in the dividing network to preserve accurate transient response and a related sense of internal clarity on complex musical passages, as well as accurate stereo imaging in terms of both breadth and depth. The manufacturer claims the system’s response to be within ± 3.5 dB from 32 Hz to 22 kHz, but no output level is referenced for this range.

Test Results: MR’s tests, in the lab and in various listening rooms, of the Infinity Monitor Jr. add up to a high-quality reproducer that seems very much in the front ranks in its price class, and certainly one that should be considered by any serious sound buff looking for a lot of clean, smooth sound from a comparatively compact housing.

Obviously, to achieve this kind of performance with this type of system, the manufacturer had to give up something in the way of efficiency. MR, feeding its normal 1-watt of wideband noise test signal into the system, measured an output sound-pressure level (at a distance of 1 meter, on axis) of only about 87 dB. This would suggest that for 100 dB levels, a 20-watt input would be in order—and so allowing for amplifier characteristics themselves, the 25-watt minimum power recommendation seems very much to the point, with the emphasis perhaps on “minimum.” The kind of clean, open, full-range sound of which the Monitor Jr.

is capable did not become too apparent until it was connected to a 100-watt output amplifier.

The response of the Infinity was measured in MR's lab as extending within ± 3.5 dB from 30 Hz to beyond 15 kHz. The response curve was, in fact, very smooth and linear for a speaker. The low end began rolling off at about 40 Hz, but generator tests indicated fundamental bass down to 20 Hz, although with some doubling which itself begins to creep into the response at about 50 Hz. At that, it is proportionately less than in many other systems, and it does not increase appreciably as frequency is lowered or volume is raised. Middles and highs are exemplary, with no apparent beaming even well beyond the 5 to 8 kHz region where beaming typically may be expected from direct-radiating drivers. Tones higher than 12 kHz remain clearly audible well off axis. White-noise response was smooth and widely dispersed at any settings of the midrange and tweeter controls. These controls, by the way, have a relatively subtle effect on program material; their actual measured range was 2 to 3 dB above 1 kHz.

The rated impedance of the Infinity Monitor Jr. was verified as predominantly 8 ohms across the audio band.

General Info: System is 25 inches high (pedestal adds 6 inches to height), 14½ inches wide, 12 inches deep. Weight is 65 pounds (including pedestal). Price: \$225. Pedestal, \$25.

Individual Comment by L.F.: Like other recent speaker systems, the Infinity Monitor Jr. stresses as one of its design aids phase coherency among its drivers. Listening to these smooth-sounding speakers confirms this point for me. Transient response of the systems was excellent, as was stereo imaging—the two major benefits ascribed to careful attention to phase accuracy.

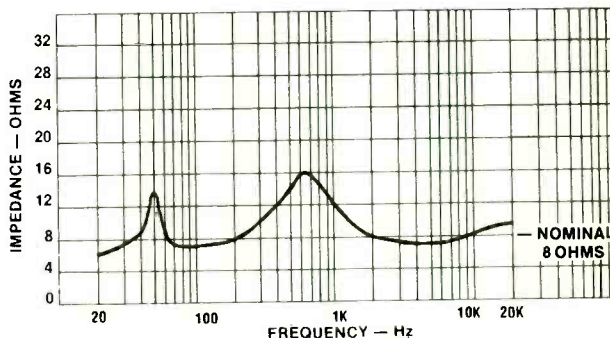
I must confess that on first hearing the units, I felt that they fell short of meeting their claims at the bass end. That just goes to show you how conditioned we become to false bass, or "doubling," which takes place in so many lesser designs and parades as the real thing. It was only after I chose listening material more carefully that I began to appreciate the fact that I was listening to fundamentals down to 30 Hz and even below, and that those fundamentals came through with gut-shaking authenticity which one normally associates with much larger and costlier enclosures.

I prefer the floor-mount arrangement with the optional pedestals. I also feel that the best sound can only be obtained with a really high-powered amplifier (of no less than 100 watts per channel.)

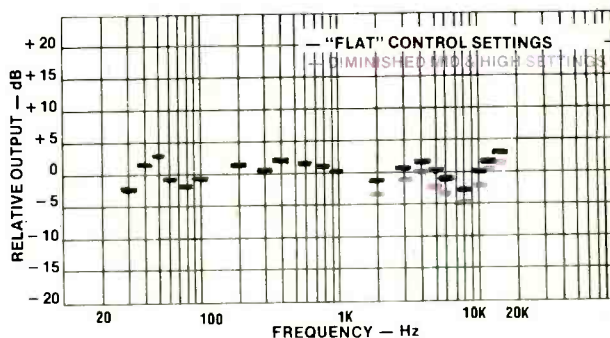
I noted that the two rear controls had very little effect on the sound. My own preference, after careful listening, was to leave both controls set to their indicated "flat" positions.

Individual Comment by N.E.: Low efficiency is hardly in itself a drawback what with all the high-powered amplifiers available today. But I find that even with the "minimum" power (25 watts) recommended, the Infinity Monitor Jr. is a fine-sounding speaker system. I suppose much depends on the acoustical character and size of your listening room, not to mention what your private concept of "good sound" happens to be. I find that the smoothness and natural tonal balance of the Monitor Jr.'s are among the best, and they do pump out enough sheer volume to cover a normal-size room of average acoustical properties. To be sure, for use in a large room or a studio you probably would go to a husky amplifier—to which these speakers will respond cleanly and honestly.

But it also should be noted that whatever the power level, the Monitor Jr.'s are capable of presenting a very pleasing and convincing stereo panorama. They have plenty of depth and breadth, and you never get a vague sense of an acoustic "traffic jam" during complex instrumental passages. This may be due to the "phase linearity" shtick, but I suspect the very smooth, almost bump-free and dip-free response is also responsible, not to mention the system's very good dispersion characteristics.



Infinity Monitor Jr.: Impedance vs. frequency.



Infinity Monitor Jr.: Third-octave frequency response.

CIRCLE 26 ON READER SERVICE CARD



GROOVE VIEWS

Reviewed by:
KEITH BADGER
SEDGWICK CLARK
H. G. LA TORRE
STEVEN R. MASTERS
IRA MAYER
HOWARD ROLLER
BOB WEIL
PAULETTE WEISS

POPULAR

PABLO CRUISE: *Pablo Cruise*.
[Michael Jackson, producer; Al Schmitt, Norm Kinney, engineers; recorded at Sunset Sound, Hollywood, A & M Studios, Hollywood, and Record Plant, Sausalito.] A&M SP 4528.

Performance: **Tight first album**
Recording: **Recipe rock sound**

Pablo Cruise is a fourth generation San Francisco rock group (or is it fifth generation, already?). The band is made up of members (as opposed to leaders) of two of the Bay Area's most underrated bands. Vocalist-bassist Bud Cockrell hails from It's A Beautiful Day, and David Jenkins (guitar and vocals), Cory Lerios (piano and vocals) and Stephen Price (drums) played together in Stoneground. Pablo Cruise's first album never equals the best of the parent bands, but it is a very listenable album, just the same.

The songs range from acoustic ballads ("In My Own Way") to commercial rock ("Sleeping Dogs" and "Island Woman") and each song is pleasant, if slightly predictable. The vocals sound like Kenny Loggins ("Island Woman") and Boz Scraggs ("Not Tonight") and Van Morrison ("Rock 'n' Roller"). But what does Pablo Cruise sing like?

The group sings like it plays—with a derivative polish that carries over to Michael Jackson's smooth production. Or it could be the other way around.

Three of Jackson's previous productions (Paul Williams, Patti Dahlstrom, and Mimi Farina and Tom Jans) leave the same "good, but could've been delicious" taste in my mouth. Anyway, whether Jackson polished the edge off Pablo's performance, or whether the group just needs time to develop its own identity remains to be seen, while this album remains to be heard in the meantime.

B.W.

DR. JOHN: *Hollywood Be Thy Name*.
[Bob Ezrin, producer; recorded at U.A. Studios, Los Angeles, Cal., and "live" at Willie Purple's] United Artists UA-LA 552-G.

Performance: **Without feathers**
Recording: **Excellent "live"**

Shedding feathers, chicken bones, and the eerie voodoo atmosphere of New Orleans for his first United Artists recording, Dr. John, the gravel-voiced Night Tripper, emerges as a contender in the straight rock ring. Unfortunately, his Rizzum and Blues Revue, recorded both "live" and in the studio, flails about aimlessly, landing some solid blows in "New Island Soiree" and Smokey Robinson's "The Way You Do the Things You Do," but nevertheless lacks that distinctive swampy zotz. Chanting has become ranting, and the sense of directionlessness is spotlighted by the inclusion of a medley I can only describe as weird—all-out boogie versions of Porter's "It's All Right with Me," Berlin's "Blue Skies," and Carter's "Will the Circle Be Unbroken?"

Generally excellent musicianship

here, regardless of the lack of innovative material, with kudos to the back-up vocals of the Creolettes and Dr. John's own funky piano pounding. Bob Ezrin's production captures the ambience of the "live" performance portions; the sonic space of Willie Purple's club is convincingly reproduced in the listening room. The studio sound is fair to good, with some nice fade-outs and interesting vocal balances.

For those unfamiliar with Dr. John at his befeathered bayou best, try a taste of his 1972 Atlantic album, *Gumbo*—it'll knock you out. P.W.

BOB DYLAN: *Desire*. ["This record could have been produced by Don DeVito;" Don Meehan, engineer.] Columbia PC 33893.

Performance: **Emotionally charged**
Recording: **Excellent**

Blood on the Tracks marked the revitalization of Dylan the serious songwriter. *The Rolling Thunder Revue* brought him back to a performance posture that recalled less formal folk and rock days in Greenwich Village. *Desire* combines both of these accomplishments with a new kind of studio ambience and an unusual group of back-up musicians (particularly violinist Scarlett Rivera), and is once again a Dylan triumph.

Dylan has always gone for a near "live" sound in the studio, preferring to cut songs rather than individual instruments or vocal tracks—though, it should be noted he has in the recent past taken completed tapes and suddenly redone them in other places

with other musicians. Whether the difference on *Desire* is one of miking or of simply playing a little more liberally with the echo controls on the console I don't know. The end effect, however, is often chilling. Listen to "Sara," "Isis" or even the light-hearted "Mozambique" and compare them to anything Dylan's recorded before. There is a haunting rise in intensity.

Some of that intensity is also attributable to Ms. Rivera. Regardless of how far forward her violin is in the mix, she provides a contrapuntal voice to Dylan's singing. And that singing here is more natural than ever before, as though this is his real speaking voice.

There have been enough analyses of the songs and lyrics. Suffice it to say I am among the confused as regards Dylan's tribute to Joey Gallo but continually overwhelmed by the variety and depth of the work as a whole. *Desire* is, as usual, a new road to be explored. No one but Dylan will be able to follow it. I.M.

ELECTRIC LIGHT ORCHESTRA:
Face the Music. [Jeff Lynne, producer; recorded by Mack at Musicland, Munich.] United Artists UA-LA 546-G.

Performance: **Spectacular**
Recording: **Superb**

ELO has once again shown how structured rock can be emancipated by classical influences. *Face The Music* is the fifth and possibly the strongest



ELO—Not resting on their laurels

release from these proficient Limies. After the success of *Eldorado*, it's encouraging to see that the group is not resting on past successes.

ELO has the musical strength of Yes or the Moody Blues, together with the production depth and fullness of 10cc. Jeff Lynne is a four-star performer, excelling on lead guitar, vocals, writing and production. The string section, comprised of Mik Kaminsky (violin), Hugh McDowell and Melvin Gale (cellos), allows ELO to stand out over most four-piece groups.

At first listening, the instrumental "Fire on High" seems like production

gibberish, with voices played backwards and electronic confusion. But it opens up into a fine array of appropriate recording techniques, complete with expertly panned noiseless solo guitar tracks, followed by explosive drum fills. "Evil Woman" and "Night Train" seem to have the best blend of words and music, both with compelling choruses. "Poker" shows good keyboard and string exploration. "Strange Magic" has nice string "swirls," but is the most repetitious offering. "Down Home Town," a spunky C + W spoof, is good for harmonies, while the flowing melodies of

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CIRCLE 1 ON READER SERVICE CARD

"Waterfall" and "One Summer Dream" are enhanced by rich production and orchestration.

It's a pleasure to have an album so complete in all categories (art concept included), and one can only hope that ELO continues to develop and that others face the music. K.B.

FIRESIGN THEATER: *In the Next World, You're on Your Own.* [Phil Austin and David Ossman, producers; Andy MacDonald, Frank Jones and Sergio Reyes, engineers; recorded at Burbank Studios, Cal.] Columbia PC 33475.

Performance: **Zany and brilliant**
Recording: **Sonic pyrotechnics**

Officer Random Coolzip has been on the force so long he looks like a 57-year-old potato in trick suit. His beat—"Police Street," where life goes on ankle-deep in detergent and tears, brought to you by those inveterate zanies, the Firesign Theater. A group of four young men dedicated to the proposition that most things American are assuredly funny and pro-

bably dangerous, Firesign (Phil Proctor, David Ossman, Peter Bergman and Phil Austin) holds nothing sacred, including the Columbia logo on the jacket which has been altered to read "A prize in every pack."

In *In the Next World, You're on Your Own*, as with their previous albums, the fearsome foursome gleefully and brilliantly use the recording medium to create shifting levels of reality. For instance, a character's Raymond Chandleresque train-of-thought narrative in the sonic foreground is gradually overwhelmed by a sports broadcast he has been listening to on the radio. Suddenly, the broadcast is the reality, and the original character disappears.

Writer/producers Austin and Ossman combine old radio sound effects and modern recording techniques with spectacular results. Characters move realistically in space or fade into vast distances as emphasis shifts from left to right channels. Overdubbing and echo chambers create huge crowds from the four available voices. It can get confusing, for within the framework of Officer Coolzip's personal drama, perspectives change with the speed of a twisted TV

dial. *Click!* the listener is present at the interspecies Athletics. *Click!* it's the Academy Awards. *Click!* again! it's *Over the Edge*, a soap opera sponsored by Dead Cat soap. Confusing? Occasionally. Entertaining? Always.

We may be on our own in the next world, but thank heaven for the antics of the Firesign Theater in this. P.W.

DAN FOGELBERG: *Captured Angel.* [Dan Fogelberg, producer; Terry Jamison, Ton Byler, John Stronach, Jeff Guercio, Gary Ladinsky, engineers; recorded at Golden Voice Studios, South Pekin, Ill., Caribou Ranch, Nederland, Colo., Record Plant, Los Angeles, and Record Plant, Sausalito, Cal.] Full Moon/Epic PE 33499.

Performance: **Outstanding**
Recording: **Appropriately tasteful**

Captured Angel, Dan Fogelberg's third album, firmly establishes him as one of the premier solo performers around. This is his most cohesive album musically and conceptually—in fact, the material and performance are of such a uniformly high caliber that

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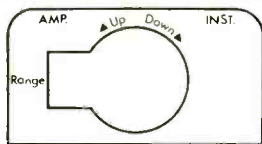
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no individual cut stands out over the album as a whole.

Fogelberg wrote all of the songs, does all of the singing and plays all of the instruments on the album, except for Russ Kunkel's excellent drumming, some brass work by Norbert Putnam (who produced *Home Free*, Fogelberg's first album), and a couple of guest solos by the likes of David Lindley and Al Perkins. Dan also produced the album and managed to incorporate his former producers' sounds into a new sound of his own. Putnam's influence is felt on the folkier acoustic numbers like "Comes and Goes," "Old Tennessee" and "Last Nail," which also bring Crosby, Stills & Nash's first album to mind. These mellower cuts set off the higher energy country-rock numbers ("These Days," "Captured Angel," "Man in the Mirror" and "Below the Surface") which incorporate Joe Walsh's production techniques on *Souvenirs* (Dan's second album).

It is clear that Fogelberg grew as a guitarist while working with Walsh, and his guitar work is tasteful throughout. He fits the rich, clean Walsh-Scymczyk electric guitar sound into his own idiom. He has also grown as a vocalist, and he uses his high country/folk voice (*à la* Richie Furay) as an expressive musical instrument. Many other singers blessed with naturally pretty voices don't find it necessary to reach out and explore and utilize their voices fully. Fogelberg's tuneful songs are ideal vehicles for his distinctive lead vocals and harmonies.

Throughout *Captured Angel*, Fogelberg has recorded a very personal album, at the same time avoiding the self-indulgence of most self-produced solo efforts. B.W.

TODD RUNDGREN'S UTOPIA
Another Live. [Todd Rundgren, producer; Aaron Baron, Larry Dahlstrom, engineers. Recorded "live" by Bearsville Location Recorders.] Bearsville Records BR6961.

Performance: **Vibrant**
 Recording: **Representative**

Todd Rundgren's *Utopia* could prove to be a giant step for composer, singer, guitarist, producer Todd Rundgren. In *Another Live*, his latest Bearsville release, there is more em-

phasis on the other musicians, as opposed to the one-man show Todd is sometimes known for. This is probably because he hasn't had this kind of talent around him before. Ralph Schuckett and Moogy Klingman play a multitude of keyboards, backed by Roger Powell on synthesizer and trumpet. The rhythm section consists of John Siegler on bass and drummer John Wilcox.

Todd is still in control of the production and does an excellent job of capturing the "live" sound and powerful feel of *Utopia*, although the vocals are occasionally masked by other instruments. The album may not be as polished as some of his earlier work with Nazz or his solo efforts, but it is definitely more exciting. This group seems to be the best vehicle yet for the multi-talented Rundgren, and hopefully another life. S.R.M.

JERRY JEFF WALKER: *Ridin' High*. [Michael Brovsky, producer; Gene Eichelberger and Michael Brovsky, engineers; recorded at Quadrophonic Sound, Nashville, and The Barn, Woodstock, N.Y.] MCA 2156.

Performance: **Genuine, flowing**
 Recording: **Well-balanced**

Jerry Jeff's *Ridin' High* with good reason. Along with the Gonzo Band and some Nashville friends, Walker's put together a fine collage of Texas-style "tell-it-straight" music. This is the first real studio album for Jerry Jeff, who previously chose to avoid big-city hassles and state-of-the-art equipment in favor of home or "live" recordings. The result is the cleaner blend (particularly the honky-tonk piano, pedal steel and country fiddle), closeness and presence of a "Nashville Sound."

Analogies between Walker and Dylan are unavoidable. Walker, a New Yorker-turned-traveler-turned-Texan, sings with a nasal inflection similar to Dylan's. Several cuts were done at Woodstock, N.Y., Dylan's domain. "Pissin' in the Wind" is an obvious but well-done take-off ("the answer, my friends, is pissin' in the wind"). Like Dylan, Walker has a lot to express, and songs are his medium.

Most of the material on this album was provided by old friends, and, like an old friend, is handled with respect.

"Mississippi, You're on My Mind," "I Love You" and "Like a Coat from the Cold" are sensitive enough to make even a redneck cry in his beer, while "Public Domain," "Pot, Don't Call the Kettle Black" and "Pick Up the Tempo" give just cause to order another round. There are few weak spots on this album, so grab yourself a six-pack of Lone Star, kick off your boots, and enjoy. K.B.



THE JAMES COTTON BAND: *High Energy*. [Allen Toussaint and Marshall Sehorn, producers; Ken Laxton and Skip Godwin, engineers; recorded at Sea Saint Recording Studios, New Orleans, La.] Buddah BDS 5650.

Performance: **High-calibre**
Recording: **Almost well-balanced.**

One of the major crimes of the 20th century has been the music world's neglect of The James Cotton Band.

Cotton is possibly the finest of all

blues harmonica players. His background extends from working with Muddy Waters and Otis Spann, amongst others, to his own bands. His bands have always given blues devotees the most consistently high-calibre performances in the field.

Toussaint's ordinarily heavy-handed productions are usually more representative of his own conception rather than the artist's. Not so here; everyone involved gets a fair shake. You're treated to Mat "Guitar" Murphy's talented fretboard work and compositions, along with Toussaint's compositions and keyboard playing. Murphy, by the way, is one of the most talented guitarists playing today, at ease with any style of music and awe-inspiring "live."

Technically, the album is well-balanced—Toussaint has yet to blow a mix—except for the harmonica, which has no power and lacks depth on the low end, thereby creating a slightly tinny effect. In fact, Cotton's harmonica has been losing its effectiveness since the days of his classic albums with Verve/Forecast (*The James Cotton Band*, *Pure Cotton* and *Cotton in Your Ears*) and Vanguard (*Cut You Loose*). It's difficult to say

what miking techniques were used on this Buddah release, but it certainly seems a fault of miking rather than of having lost the low end in the mix.

High Energy is excellent, but maybe for the next album a "live" recording should be considered. An even better bet would be to commission Mike Bloomfield and producer John Court to work on the next one. H.G.L.

JIMMY WITHERSPOON: *Spoonful*. [George Butler, producer; Ed Barton, engineer; recorded at Wally Heider Recording Studios, Los Angeles, Cal.] Blue Note BN-LA 534-G.

Performance: **Murdered by material**
Recording: **Representative**

This album is likely the product of Eric Burdon's longstanding desire to be Black and Blue. At first look the project appears to be a noble effort, with the New York City-based rhythm section of Cornell Dupree, Richard Tee, Chuck Rainey and Bernard Purdy supplying the backdrop for Witherspoon and guest trumpeters Blue Mitchell and Thad Jones, among others. However, most of the album is difficult to take seriously because of

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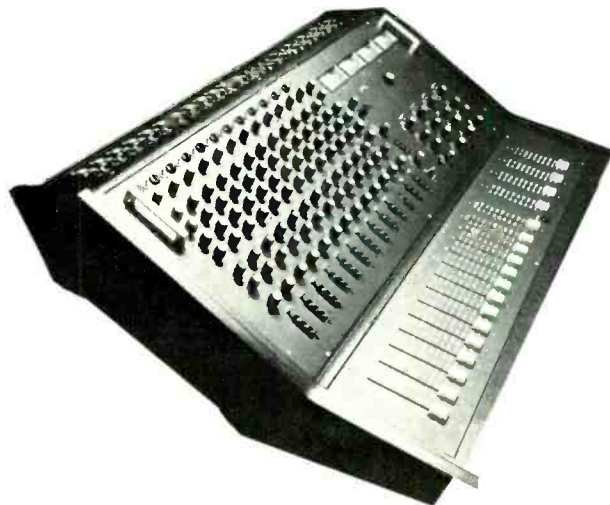
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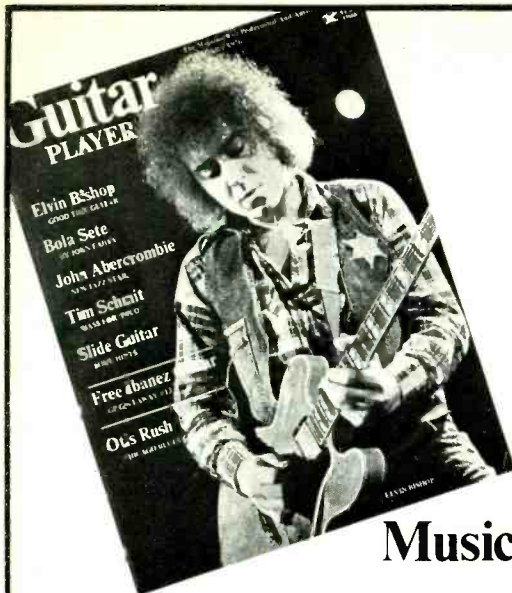
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the extremely weak material. Much of it is reminiscent of the young, white musicians who spent so much time reviving "de Blooze" in the late '60's.

The recording is nothing special, although perhaps one shouldn't be so blasé about good, solid engineering. The highlight of the album is Horace Ott's arrangements. The horns are particularly beautiful and the rearranging of standards such as "Big Boss Man" and "Spoonful" give the album what life it does have. On the other hand, guitarist Robben Ford wastes more notes in 12 bars than was thought humanly possible.

A pleasant shock: the album sleeve is lined with polyethylene—something every record should have but seldom does, especially in a pop album. Now, if the same care is given to the material next time out, Mr. Witherspoon will once again be back on the scene.

H.G.L.

CLASSICAL

MAHLER: *Symphony No. 2* ("Resurrection"). Brigitte Fassbaender, Mezzo; Margaret Price, Soprano; London Symphony Orchestra, Leopold Stokowski cond. [Richard Mohr, producer; Anthony Salvatore, engineer.] RCA ARL2-0852.

Performance: **A gratifying testament**
Recording: **Full and clean**

Leopold Stokowski is at present, by dint of his longevity, our most venerable musical figure. Conductor of major orchestras since 1910, his career has embodied great skill and passion coupled with questionable taste. Stokowski the technician is awesome; the interpreter and arranger is much less so.

Surprisingly, although he is approaching Toscanini's mark for years as an active conductor (67 years), Stokowski has spanned every recording technique from acoustical to quad, and even though he premiered two key Mahler works in America, still it is only now at the age of 94 that he has committed his first Mahler score to disc.

In the past his idiosyncratic approach to the classics has made him

Cont. on p. 70

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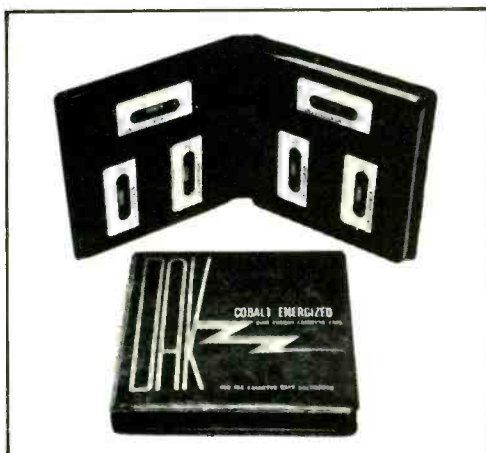
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Hot Fiddles & Horns

By Nat Hentoff

Attempts to combine jazz improvisers and players of classical music have almost invariably been wrong-headed and wrong-eared. Is there, for instance, a "third stream" score anyone voluntarily listens to these years? Yet, there have been mildly eccentric fusions which have worked. A couple of years ago, Angel unexpectedly released *Jalousie, Music of the Thirties* with Yehudi Menuhin, Stephane Grappelli and a jazz trio. Graceful, witty and often abounding in retrospective sentiment (though not quite sentimentality), the session was a reminder that Grappelli is one of the exceedingly few true jazz violinists in tone, phrasing and beat. A quintessential swinger.

I wondered, though, whether Menuhin had been improvising. In some passages, he sounded as if he might have been. "Oh no," Menuhin told me recently. "Everything I played was written. I know better than to compete in the presence of a master of this form." But Menuhin, being a player of unusual openness to his musical environment, buoyantly glided into the jazz groove so that he does indeed complement his French peer with much gusto as well as elegance.

Now there is a second Menuhin/Grappelli set, *Fascinating Rhythm, Music of the Thirties, Album 2*, with a jazz ensemble. It is at least as sunlit as the first session—grandly swinging, jauntily romantic, melodically resourceful and, all in all, providing quite fresh dimensions to such tunes as "I Get a Kick Out of You" and "All the Things You Are."

Grappelli is 66, somewhat of a strip-ling compared to the godfather of the jazz violin, Joe Venuti, who is at least in his mid-70's or, more likely, close to 80. Just listening to the man's emotional force, command of his instrument and unerring time, however, would make it impossible to guess his chronological state, for Venuti is more

inventive and plays with more élan than at any previous time in a career that first became historically weighty through his recorded duets with guitarist Eddie Lang in the 1920's. In his briskly autumnal years, Venuti's occasional colleague on recordings is Zoot Sims, as on the new Chiaroscuro set, *Joe Venuti and Zoot Sims*. It's a brilliant pairing for Zims is, above all, an instant swinger, fully able to match Venuti's intense rhythmic drive. Zoot is also one of jazz's more masterful melodic improvisers, preferring thematic to harmonic ingenuity. And so is Joe Venuti. This is classic, undated jazz, considerably hotter than the Menuhin/Grappelli dialogue, thereby making the two sets themselves quite complementary.

The recording of the Menuhin/Grappelli session, while clear and resonant, seems to take place in a rather large room—like the salon on an ocean liner, appropriate perhaps for the reminiscing ambience. The Sims/Venuti conflagration, however, is miked close and has considerably more bite and immediacy—as does the best Zoot Sims solo set I have yet heard, *Zoot Sims and the Gershwin Brothers* (Pablo), with a rhythm section including Oscar Peterson and Joe Pass. With big, limber sound, exultant swing, and a seemingly bottomless store of enlivening variations on these songs of the 1930's, Sims makes the Gershwin Brothers sound astonishingly contemporaneously imaginative—which is what any first-class jazz player can do for popular composers. For this set in particular, raise the volume high—for this is a celebration.

YEHUDI MENUHIN/STEPHANE GRAPPELLI: *Fascinating Rhythm, Music of the Thirties, Album 2*. [John Mordler, producer; Tony Clark, engineer; recorded at EMI's Abbey Road Studio No. 1, England.] Angel S-37156.

JOE VENUTI AND ZOOT SIMS: *Joe Venuti and Zoot Sims*. [Hank O'Neal, producer; Fred Miller, engineer; recorded at Downtown Sound, New York, N.Y.] Chiaroscuro CR 142.

ZOOT SIMS: *And the Gershwin Brothers*. [Norman Granz, producer; Bob Simpson, engineer; recorded at RCA Recording Studios, New York, N.Y.] Pablo 2310-744.

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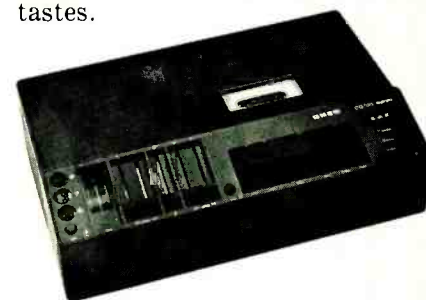
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an enigma among conductors. He has often said that he is more concerned with the life of the music than the notes on the page. By and large, though, the essence of most works seems to elude him. Still, every now and then there is a major surprise. Such a surprise is the recent Mahler Second. An examination of the score will quickly reveal his departure from it. Consistently Stokowski ignores the changes in tempi and dynamics which Mahler so meticulously laid out for this tempestuous, unwieldy score.

This symphony, while composed in 1894, actually can be viewed as a 19th century Romantic work. In this context, Stokowski's reading is a marvelously successful one. This is a performance of great charm, fluidity, and musicality, free of the overt, heart-on-sleeve bathos of a Bernstein. Though purists may protest, I prefer Stokowski to all but one other—Maurice Abravanel's on Vanguard Cardinal. The sound of the new RCA set, while not up to the best of London Records, is full and clean, and quite satisfying all in all. It is most gratifying to have this recording from Stokowski at what must be the twilight of his career. It could almost be viewed as his testament. H.R.

STRAVINSKY: *The Firebird*. New York Philharmonic, Pierre Boulez cond. [Andrew Kazdin, producer; Bud Graham, Milton Cherin, Ray Moore, engineers; recorded at Manhattan Center, New York, N.Y.] Columbia M 33508.

Performance: **Richly romantic**
Recording: **Bass-oriented**

RAVEL: *Daphnis et Chloe*. Camarata Singers, Abraham Kaplan, Director; New York Philharmonic, Pierre Boulez cond. [Technical staff same as above.] Columbia M 33523.

Performance: **Sparkling clean**
Recording: **Sonorous and transparent**

Each of these fine recordings was produced by Andrew Kazdin, the subject of this issue's Profile on page 42. The recording site is the hugely reverberant seventh floor ballroom of Manhattan Center, a ramshackle edifice just a block and a half west of Macy's on 34th Street.

I attended each of the recording ses-

sions for these works and can vouch for the awesome sonority captured on these discs. The attendant problem with such cavernous sound, of course, is a lack of clarity—qualities anathema to both conductor Boulez and producer Kazdin—which makes microphone technique particularly crucial. The orchestra was spread out in a circle for these sessions, with most of the various instrumental choirs grouped together. Exceptions were the percussion and harps, which were spread out for minimum leakage and, in the case of the harps, maximum antiphonal left/right dialogue. These instruments were all very closely miked, especially Roland Kohloff's carefully goboed timpani and Paul Jacobs' celeste, which contributes so much color to both of these exotic scores.

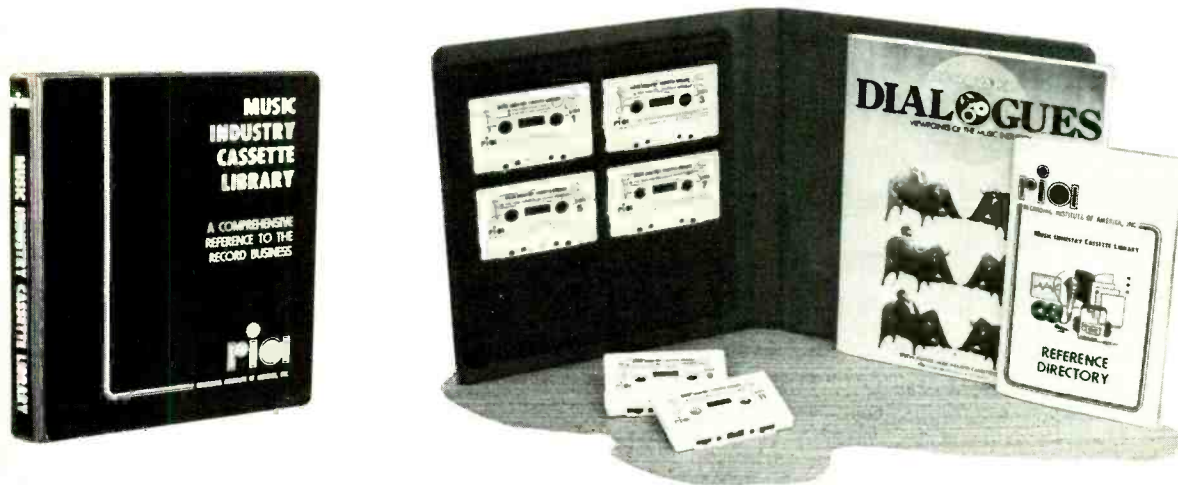
The sound on the two discs, however, is quite different. The spacious *Firebird* textures are much thicker, almost bass-heavy in some sections (although easily remedied by good tone controls) in comparison with the composer's own 1961 recording, which stresses the lighter, upper-frequency scoring. Boulez is probably closer to the Rimsky-Korsakov origins of the work, however, than Stravinsky's own second thoughts of half a century later. Both recordings are well worth the time and outlay.

The Ravel disc is complemented by a pristine ambience. Furthermore, Boulez's X-ray view of Ravel's meticulous orchestration is of near chamber music quality, revealing countless details smudged by less careful maestros. The sonic clarity even reveals some less than immaculate playing by the Philharmonic. On the technical side, I feel that the overly close balancing of the offstage solo trumpet and horn at section 88 during the wordless choral section destroys the atmosphere. (I also felt the left/right trumpet fanfares at the start of side 2 in *The Firebird* to be much too close.) The chorus, on the other hand, is beautifully balanced with the orchestra—one of the finest attributes of this *Daphnis*.

But make no mistake, Boulez is thoroughly competitive with Ansermet, Monteux and Munch (recently re-issued on RCA's new Gold Seal label) in the *Daphnis* sweepstakes. The new Ozawa and Martinon versions are okay, but, unlike Boulez, join the Maazel recording (MR, Oct/Nov 1975) in the "also-ran" category. S.C.

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LETTERS Cont. from p. 6

helpful hints I can use in my own recording activity, whether in the field or in my makeshift "barn studio." To me, "recording" means "tape."

It seems to me that record reviews should be left to the hi-fi magazines who are already doing a competent job in this area. If *Modern Recording* is to treat the disc area at all, how about viewing the subject from the needs of those of us in the producing end, whether amateur or semi-pro?

I would like to see the following areas covered in the space now devoted to disc reviews:

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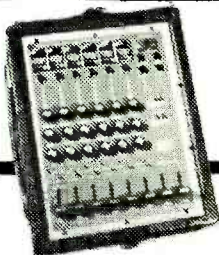
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What should the recordist know to make his final edited master tape most easily transferred to disc? Basic rules, pitfalls to avoid, etc.

Where can I go for disc mastering on a church or school job where the budget is limited and I cannot afford one of the big name state-of-the-art mastering houses?

Where can I go for high-quality pressings in low quantities? Should I get separate suppliers for mastering, metalwork, pressing, jackets and such or go to a one-stop operation offering total capability? What are the trade-offs?

What's going on in disc technology or materials which bears on what the recordist does? How about dynamic range limitations and surface noise? Are materials getting better or worse? What's the current prognosis for the four-channel disc? Should material which will now or later go to disc be automatically produced in both two- and four-channel versions against the possibility of four-channel discs really getting off the ground?

It was not my intention to go on at this length, but I am pleased at your results to date, and seriously interested in seeing your future editorial attitudes directed to the needs of the recordist, as opposed to the buyer of discs.

—Bruce Mallion
Stoneham, Mass.

I was delighted that your fine, new publication has wisely chosen to reserve a section for reviewing new recording releases. With today's market inundated with new products at high prices, any help the consumer receives is always welcome. New releases in the classical record market often duplicate repertoire that is well-represented by previous artists, and the reviewer can provide a real service to the serious consumer of classical music.

Your classical reviewer's thorough analysis of such well-traveled staples as Bartok's *Concerto for Orchestra* and the Maazel *Daphnis* [Oct/Nov. 1975] was a needed refresher course in consumer economics for a record buying public that dashes to new recordings instinctively. His classification of the Marriner set of early Mozart symphonies was especially welcome. Amazingly, Philips, with a price tag of \$7.98 a record, has not been labeling their multiple record sets with complete contents on the outside. Does Philips expect a consumer to buy a sixty-dollar record set to find out its contents? Had it not been for Mr. Clark's breakdown of the set's recordings, which informed me about works apparently not previously available, I never would have bought the set.

—Jeffrey Nelson
Urbana, Illinois



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(Stereo Review, February, 1975)

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*SP-10—Audio, 8/71; Stereo Review, 9/71; Audio, 10/73, 3/74.

SL-1100A—Stereo Review, 7/73; High Fidelity, 9/73.

SL-1200—Radio Electronics, 7/74; Audio, 7/74; Stereo, Fall '74.

SL-1300—FM Guide, 9/74; Stereo Review, 2/75.

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