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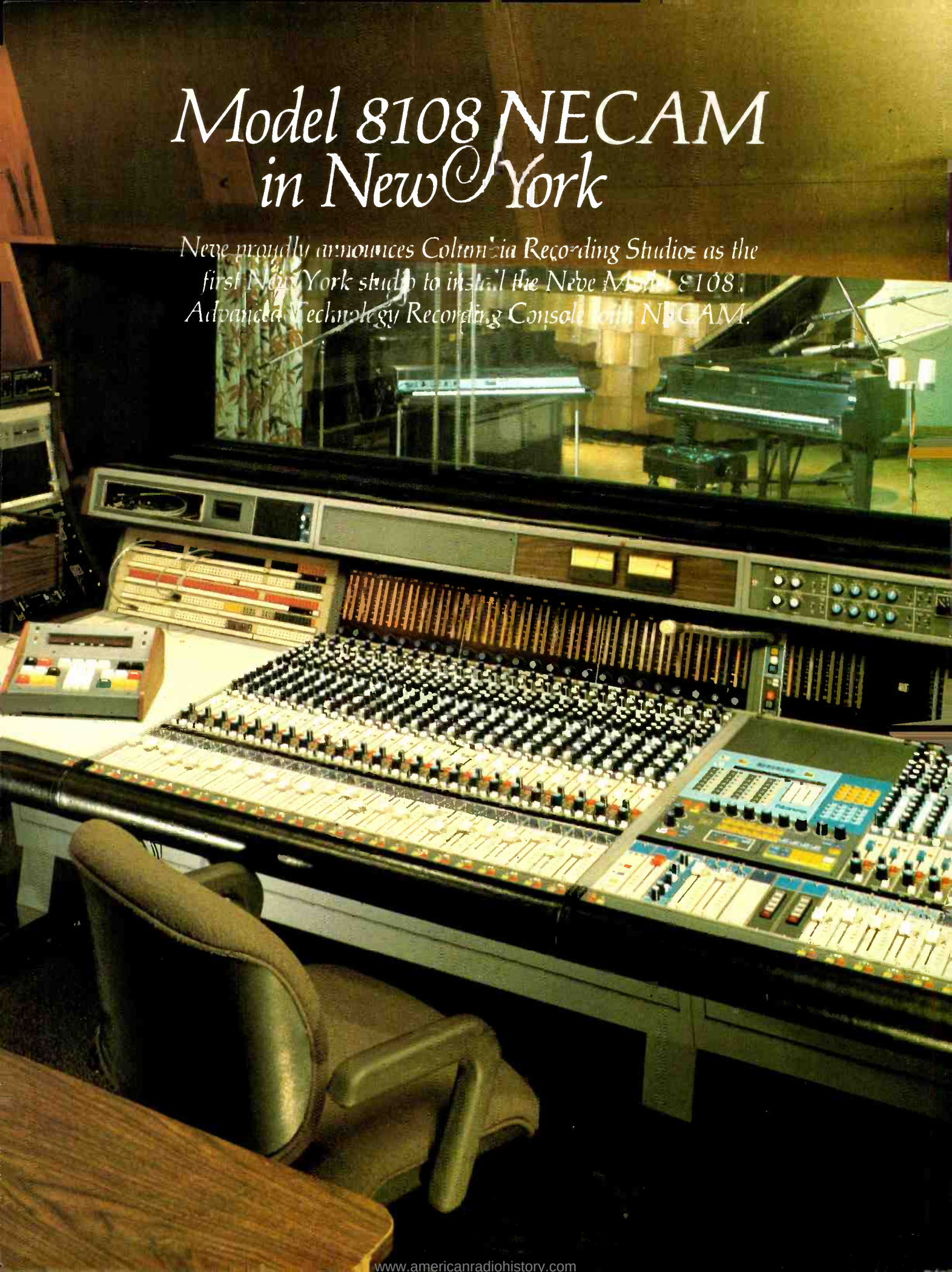

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October 1981
Volume 12 — Number 5

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Original illustration by **Thomas Warkentin**, a Venice, California-based graphic artist whose work has appeared in *Star Trek — The Motion Picture*, and *Heavy Metal*. A fictitious tour of Studio Ultra, an audio/video recording facility of the next century, appears on page 12.

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— the magazine to exclusively serve the **RECORDING STUDIO** and **CONCERT SOUND** industries . . . those whose work involves the **engineering** and **production** of commercially marketable product for:
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— **Film**
— **Live Performance**
— **Video** and **Broadcast**

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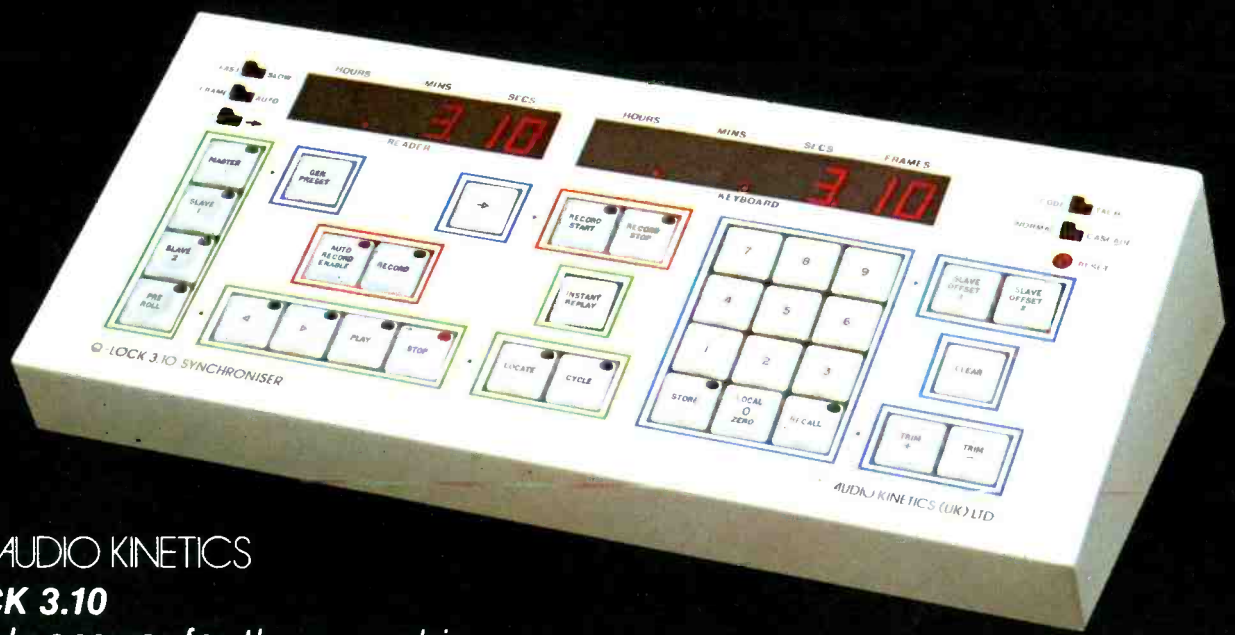

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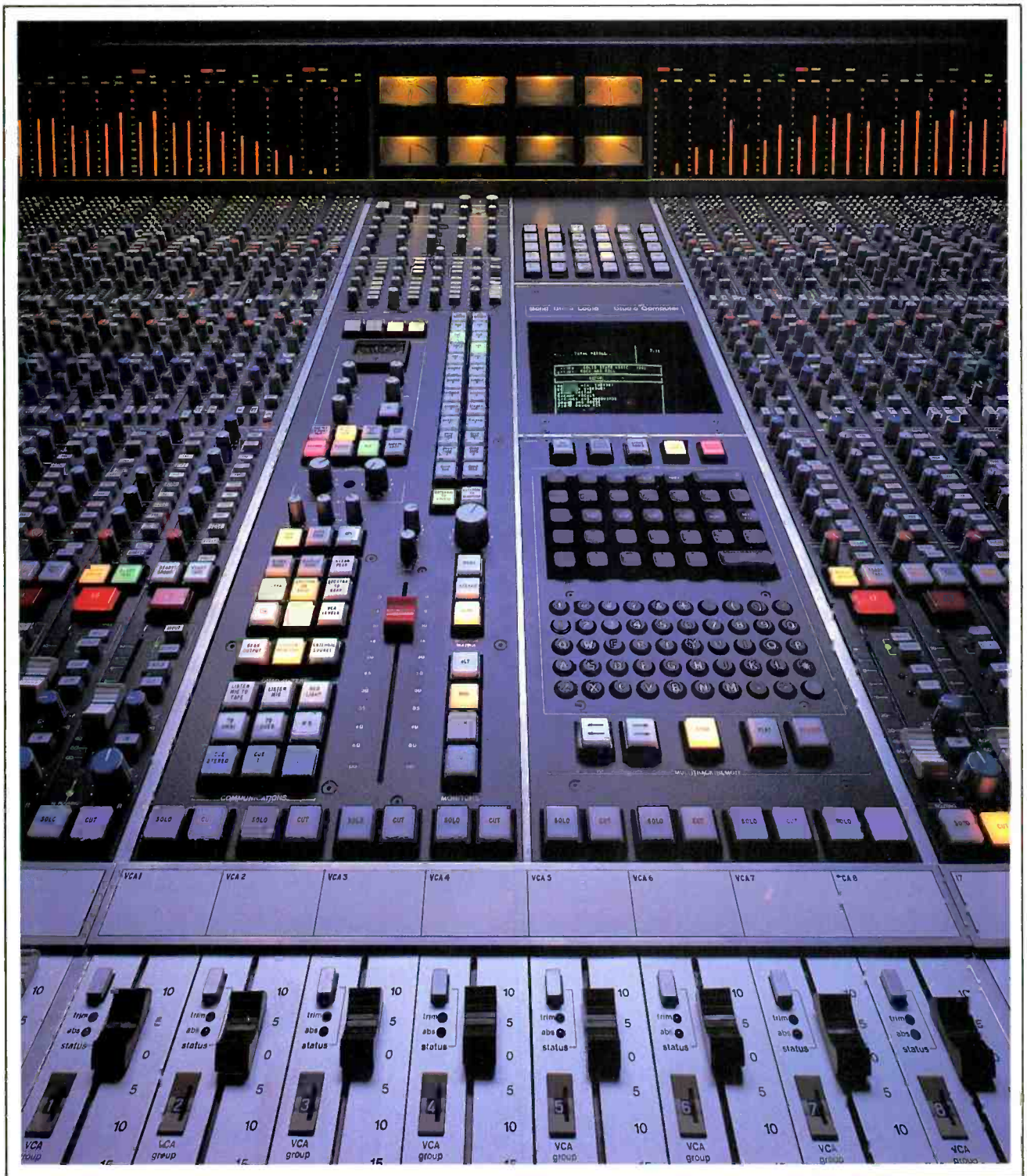

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views & news

— A View of the Future —

A Flight into 2000 . . . and Beyond

STUDIO ULTRA

from: **Jim Shifflett**
Vortech Studios
Los Angeles, California

Here it is — your chance to travel into the imaginary future of recording studios.

The elevator's back-lit liquid crystal display says "Penthouse — Studio Ultra." I've been through the ground floor offices to reach this private elevator. The doors open silently. I step out into the usual plush carpet, wood paneling and stone-walled reception area. So far, nothing is too different; there's a generous use of microprocessor technology, CRTs and magnetic files.

The receptionist smiles and tells me I am expected, to go through the door down the hall, and enter the door labeled Studio 4. I approach the door indicated, and it slides back to reveal a long, deeply carpeted hallway — floors, walls and ceiling — and dimly lit. Traversing the hall I pass several alcoves with life-size, moving holographic images of artists that have recorded here.

Ahhh, here it is: Studio 4. The door slips into the wall and I walk on to a balcony 30 feet above the floor in a large round room. A glass wall seals the balcony from the studio. Traveling half the circumference of the room, the balcony is filled with contoured couches and coffee tables.

I am looking down into the studio which for all the world reminds me of the ultimate, intimate concert environment. A five-foot high stage on the opposite side has been built into the wall, and fills one quarter of the room. Each side of the stage is flanked with a 25-foot diagonal video screen. On ceiling-mounted tracks, suspended from telescoping shafts, are three what appear to be automated cameras. The rest of the room seats about 3,000 on an incline, and is an indoor cross between a modern opera house and a television studio.

From where I have entered at one end of the balcony I am able to see two sets of sliding pneumatic glass doors. One set is open with a young woman standing before it, looking my way. I guess correctly; she is my guide, Helene. She waves for me to come up that way.

The two sets of doors, which form an air lock, are an entrance to a small hallway leading up a ramp, I presume, into the control room.

"Hi, I'm Jim, are you Helene?," I ask.

"Yes," she replies. "I'm glad you're on time. We have only 30 minutes before an overdub session begins."

We ascend the ramp into the control room. The room is big with a 13-foot ceiling. A three-foot high stage dominates the floor. On the stage rises a pedestal supporting a 25-foot long and 3-foot deep curved console. Behind the console to either side are two more of those comfortable looking contoured couches. Directly in front of the console is a video screen, on each side of which are speaker panels. Flanking this whole arrangement are two more video screens.

"I'm sure glad you got me here early," I say, as we walk up the gentle slope to the console.

"Since you hadn't seen a studio like this I wanted to have time to answer some of your questions," Helen offers.

"O.K., I count 40 faders on the console. How many tracks can this room record, and where are the tape machines?"

"This is a 1024 track console and there are no tape machines; it's all stored by the console," Helene explains. "This 'console,' as you call it, is one terminal of a computer which is located in another area of the complex. The central processing unit cruises at 500 million instructions per second, with 100 megabytes static RAM and 10 trillion bytes of bubble storage. Typically no more than 200 tracks are used. However, the engineer can request that more memory be assigned for a special project.

"There are, in addition to the CPU, over 1,000 32-bit microprocessors in the console. In other words this is a distributed processing system. The console stores all processing information about the program as well as the

— the author —

Jim Shifflett, as a ten-year veteran of the record industry, has to his credit indepenedent productions for United Artists/Blue Note, Mercury Record Company, and RCA. As a recording mixing engineer his credits include five Sylvers' albums for MGM, and numerous other albums for United Artists/Blue Note, Casablanca, RCA, Motown, Solar, Capital, Atlantic, Elektra, and Curtom Records. He has worked as a sound reinforcement engineer. And in Los Angeles, he has experience working in every major studio, and a few "not-so-major."

Currently, he owns and operates his own computer software business, and is also President of Vortech Studios, a company that plans to build a state-of-the-art audio/video room in New York City, to be known as Lyntech International.

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For additional information circle #5

STUDIO ULTRA

music. There is no outboard equipment, since all the signal processing is done by the computer through the console, and is user/software definable."

"Let's look at the signal processing chain," Helene continues, taking obvious pleasure in the technology. "The analog or digital signal input is first scanned to determine whether or not it is digital. If it isn't the input is routed through an analog-to-digital converter. The ADC has a sampling rate of 100 kHz."

I'm intrigued. "That seems to indicate that there are analog as well as digital microphones, right?"

"Yes, Jim, there are still analog dynamic and condenser microphones around."

"Helene, what's your favorite microphone?" I ask.

"Right now I am hooked on the PZDM, or Pressure Zone Digital Microphone. I use it for vocals, strings, pianos, acoustic guitars, and so on. However, I still prefer some dynamics for certain sounds. On one level you could argue that it's all the same, since at some point the physical energy must be converted to digital. But there is often a qualitative difference between analog-to-digital converters in a microphone and those in this console; the latter being better. That is why, generally speaking, only condenser microphones have become digital.

"Alright, back to the signal chain. Next is the level guard, which tests level information from a portion of a 32-bit word. That word also carries frequency- and time-domain information. To the console, a signal is either present, not present, or in overload. This status is representedby a two section (red/green) indicator. *No signal* or *Signal Too Low* conditions are represented by neither section being lit. *Signal Present* lights the green section, and *Signal Overload* the red. This indicator replaces the level meters you're probably used to.

"The signal now goes to the processing section for equalization, limiting, noise gateing, attenuating, special effects, etc. After this, the signal is split and sent to the monitor section and, if 'in record,' to a buffer RAM and on to bubble storage."

"Tell me how 40 faders represent 1024 discreet channels?" I query.

Helene's eyes sparkle as she mentally organizes her next explanation; they seem a natural extension of that sleek mushroom of metal and glittering lights glowing at her fingertips.

"The way the console is programmed right now," she offers, running her hands across the front of the desk, "the first 32 positions are sub-group faders; any number of channels from 1 to 32 can be assigned to them. The next seven faders are designated group masters. They group any combination or all of the sub-group faders. The last fader is the group master fader, and It controls all of the group masters. Generally, I don't assign more than 32 tracks to a sub-group, simply because there are only 32 physical positions."

Visually checking my comprehension, Helene continues, "See this button with 'CALL' next to it?"

"Yes, but hold your thought and tell me about all the inscriptions on the console," I ask.

"No problem. You've noticed the back-lighted LCDs. They are used for all labeling, since all the functions are software definable. Let's say on channel #130 I need equalization, a noise gate and limiting. I would first look at the two LCDs right above the fader on each position to see which one was the sub-group master for that channel. Then . . . "

"Wait a minute, Helene," I interject, "would you break that down?"

"Of course. Look at sub-group fader #10. Right above the fader and below the two rectangular buttons labeled 'ASSIGN' and 'CALL,' do you see the two LCDs?

"The LCD on the left, under the ASSIGN button, tells you the lowest

. . . *continued on page 18* —

Sound Workshop on the right to bear ARMS.

When Sound Workshop introduced its computer automation system several years ago, we named it ARMS — a tongue in cheek acronym for the **A**uto-**R**ecall **M**ix-down **S**ystem. At that time, recording industry use of console computer automation was focussed on the multitrack mixdown process and a system designed to aid that process would thereby provide additional "arms" for the engineer.

Technology has continued to evolve since that time, and so has the idea of using a computer to do more than just assist in the mixing process. One can spend more than a quarter of a million dollars for a computerized recording console nowadays. And the computer in that board will eliminate the use of pencil and paper forever by allowing the "recall" of virtually all of the console set-up information. A definite advantage in the creative process, but the price tag can be forbidding (even when you consider the money saved on pencil and paper).

Sound Workshop is not presently building consoles in the highest price brackets. We have concentrated our expertise on designing and building cost-effective professional console systems that in many ways outperform their more expensive counterparts. The Series 30 shown here provides a perfect example of what we do. And we have maintained this same approach regarding console automation.

Although ARMS was specifically designed to aid the recording engineer during complex mixdown situations, it actually functions throughout the recording process by providing computer control/assistance to a number of mechanical operations previously done manually, with the help of other engineers, or not at all. ARMS Automation includes the following functions:

- Automated control of channel levels (Level Write)
- Independent automated control of channel on/off status (Mute Write)
- Full In-Place Solo System
- Total integration of all automated functions into all group structures
- Super-Group

The most vital aspect of ARMS Automation is its ability to control the on/off status of each input channel totally **independent** from its control of channel level information. Even if ARMS was used just to turn channels on and off without writing level information (i.e. having the system control the actual "mix," normally the stated purpose of automation), a number of mechanical operations common to nearly all mixdown sessions would be eliminated. These include: noise gating; erasing unwanted sections on the multitrack master; selecting proper tracks from duplicate performances; switching between "time shared" tracks; changing EQ, Echo, Panning etc. during specific "sections."

Another major asset of ARMS Automation is its computer-controlled sub-group system named **Super-Group.** Super-Group permits all grouping functions to be controlled by the computer, eliminating previously awkward systems of group selection, modification and visual confirmation. Conventional systems require the user to scan each input module's thumbwheel switch (or digital display) to determine which inputs belong to a given group, an often cumbersome process on today's larger consoles. With Super-Group, the user merely pushes the button on any channel and all members of that group light up — **instant visual group confirmation!** Other Super-Group features include:

- **Solo Dim** Allows all channels except the one (or ones) soloed to be attenuated by any preset amount.
- **Negative Grouping** Allows instant selection of a group consisting of all channels **except** those selected.
- **Grand Master** Any fader may be established as the console Grand Master.
- **Local Control** Any Group master can be changed over to local channel control without affecting the group level.

ARMS Automation is available in the Sound Workshop Series 30 and Series 40 recording consoles. The exceptional performance and practical value of these consoles can be confirmed by sitting behind one of them or by consulting with a studio who owns one. Twenty-four track automated consoles from Sound Workshop start at less than $25,000.

Sound Workshop's ARMS Automation is genuinely innovative and amazingly cost-effective. Much more than just a mixdown aid, it provides a variety of functions not found in other systems regardless of cost. And Sound Workshop will soon be introducing DISKMIX™ — a disc-based storage system designed to augment ARMS with the capability to store and merge a number of mixes while providing off-line editing, computer control and storage of session documentation.

Just a part of your right to bear ARMS.

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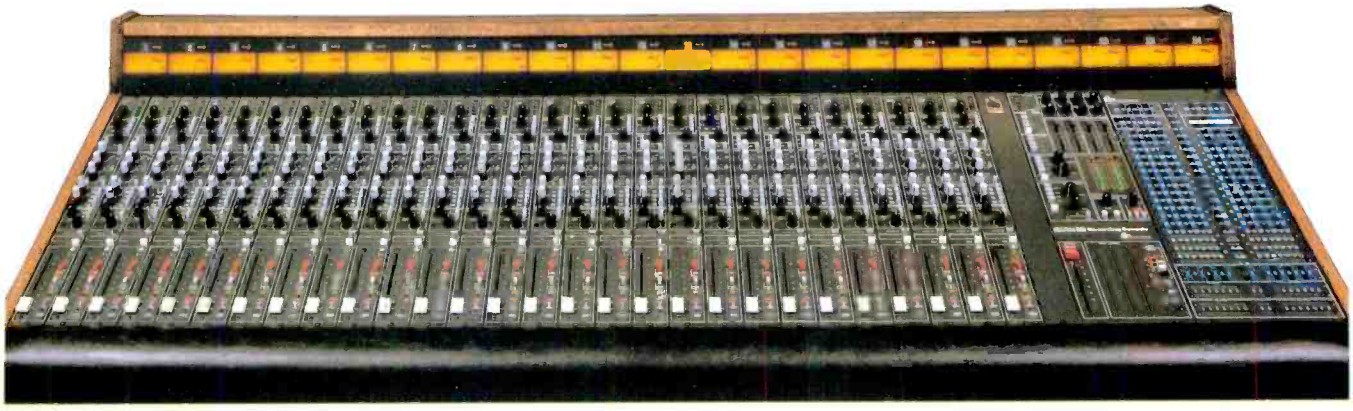

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Still The Best Investment In A Professional Two Channel Tape Machine.

The Otari MX-5050B

There's a very simple, straightforward reason the MX-5050B has become the world's best-selling professional tape recorder: value. If you were to ignore all of the production features, dismiss the six year track record for unsurpassed reliability, you would still discover that the "B" is the best performing machine for your money. When you shop around you'll find out that it's easy to spend a little less or a lot more, but very difficult to justify to yourself that you are getting more. When you compare other machines, spec' by spec', you'll begin to see why there's more value in putting your money into an Otari. Spec's of course, don't tell the whole story. But, it's a damn good place to start your serious comparisons.

To experience the full potential, and thus the value of any product you purposely put it to the test. After a few hours in the studio or on location, you can become painfully aware of the differences between a professional machine and those with a Hi-Fi heritage. Because Otari's only business is to serve the dedicated audio professional, you won't find cosmetic facelifts every couple of years; or, dredged-up product from another era that's labeled "Pro." At Otari we improve each product by subtle engineering refinements that make the basic product that much better—without fanfare and expensive model changes that you end up paying for. And the "B" is the embodiment of this philosophy. It's been around for three years (5050 Series, 6 years) and we plan you'll keep it around a lot longer. If you're a knowledgeable audio person who already owns an Otari you'll know what we're talking about. If you're not, then it is well worth your time to review the Performance and Feature facts we've detailed in this ad. If you're in the market for a fully professional, super-reliable two-track, the time you spend to acquaint yourself with the "B" just might mean the difference between spending your money on a machine that will do for now—or deciding to make the investment in a basic creative tool that will pay you back handsomely in the years to come.

THE FACTS: PERFORMANCE.

Overall Signal-to-Noise: 66 dB unweighted @ 520 nWb/m, 30 Hz to 18kHz.
Dynamic Range: 72 dB unweighted: 30 Hz to 18 kHz.
Headroom: +24 dB. Maximum output: +28 dBm.
Overall Frequency Response: 30 Hz to 22 kHz ±2.0 dB (15 ips @ +4 dBm).
Playback Frequency Response: 31.5 Hz to 20 kHz ±2.0 dB (15 ips @ +4 dBm).
Distortion: less than 0.7%, 1 kHz @ 250 nWb/m.
Crosstalk: greater than 55 dB, 1 kHz, adjacent tracks.
Wow and Flutter: less than 0.05% (15 ips).
Rewind Time: 90 seconds for 2500 feet.

THE FACTS: FEATURES.

Three switchable speed pairs: 15/7½ or 7½/3¾ ips (automatic equalization).
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THE FACTS: PRICE.

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Your nearest Otari qualified professional audio dealer has The New Workhorse in stock. Check-out for yourself why you should place your money on the MX-5050B. If your dealer shows you anything but an Otari, tell him, "No thanks, I'm only interested in making a sound investment."

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For additional information circle #8

— continued from page 14 . . .

views

STUDIO ULTRA

channel in the group, while the one on the right under the CALL button tells you the highest."

"O.K., I get it. Since 130 falls between 107 and 140, then it's in sub-group #10."

"Right," Helen says, pushing the CALL button on sub-group fader #10. The CALL button on 10 begins to flash. The LCD under the ASSIGN button now displays 116; a yellow LED just over the ASSIGN and CALL buttons lights up on the first 20 positions. The CRT informs us in one-inch letters "SUB-GROUP 10," and under that there is a numbered list starting at 107 and going to 140. A quick glance tells me it's a track assignment sheet.

"What we have here is that the console now is representing the sub-group labeled 10. From left to right you have positions 107 through 140. The flashing CALL button indicates it's the sub-group master. The yellow LEDs indicate that the faders represent individual tracks rather than sub-groups. I'll now depress the ASSIGN button."

As she did so, it too began to flash. "And using this combination of alphanumeric and dedicated keys, depress the keys labeled: 'LOW EQ;' '=;' 'A.' I now depress the ASSIGN button a second time; it will cease to flash. You now have the LCD above the top pair of knobs reading 'L/EQ,' and the LCDs next to the knobs read 'FREQ/0' and 'DB/0.' What range the LOW EQ operates in has already been defined, but it could be changed if it were necessary.

"If I had only typed 'EQ' and hit ASSIGN," Helene continues, "the console would put four bands of parametric EQ on 130. Suppose I want EQ on all channels of the sub-group. I depress the CALL button, which returns the console to the sub-group/group master configuration. Now, when I depress the ASSIGN button, whatever I do happens to the whole subgroup."

"And the same goes for the group masters and master group?" I ask.

"Yes. Likewise, the same procedure for a noise gate, limiter or aux sends, there being 12 pairs of knobs labeled A through L per position."

"If I understand you correctly, Helene, the CALL button on each position allows the console to represent one of the groups, for ease in making changes such as balance, pan, EQ, sends, whatever."

"Well Jim, you're a quick study. Any more questions?"

"Yes, thousands," I reply, "but, sticking with the console, what sort of recording assignments are typical?"

"The long and short of it is simply that all inputs are retained discreetly," Helene explains. "That way in mixdown you can totally re-balance or re-equalize an instrument or section. Or leave it alone if you've got it right."

I was becoming totally enthralled with the console's immense flexibility. And Helene's.

"What advantages are there from your standpoint?" I ask.

"I would say that one advantage is 'practical' total recall. I'm sure you remember the first automated consoles that had recall of fader levels, with some having EQ and pan recall. While these early consoles were not adequate for mix recall, they did make mixing with 24 to 40 track consoles a breeze. Then with the entrance of computer-interfaced peripherals and non-mechanical digital faders, the foundation was laid for this console."

Helene caressed the console with affection. "This console is an audio imagination machine. How I can manipulate sound is limited only by what I can conceive, and have the patience and discipline to execute."

"So the delays and ambient effects are generated by the console?" I query.

"Yes," Helene continues. "All special frequency- and/or time-domain change parameters are software programs. You can, create your own, of course, and store it in the system or store it on a control card. Would you like to see one?"

— continued overleaf . . .

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For additional information circle #10

STUDIO ULTRA

Helene reaches down into a pocket in the side of her pants, and removes what appears to be a plastic card about the thickness of a credit card and the size of a cassette. She hands it to me.

"That's a control card?" I demand. The card in my hand is made of polished, seamless plastic. One edge is rimmed with blue. There is writing on one side which says "Parthenon Series 2000" and, under that, "Helene Doric."

"Yes, this slice of plastic uses a bubble memory with a capacity of 2.5 megabytes," she explains.

"You've hooked me with that; how is it used?"

"To put the control card into the system, you type 'EXIT' and hit 'ENTER,'" Helene says, moving towards the board. "Now, no matter what mode the system is in, the console will continue to do that. But the CRT and keyboard are now dedicated to the identification and entering of the card, and loading its information. The system is actually doing it in the background. The screen will now prompt with 'IDENTIFICATION NUMBER.' I type in my 7-digit number, and press 'ENTER'." As Helene completes this, a 7-inch wide by 3-inch high panel swings up and out of sight inside the console, right under the CRT. It reveals two slots sized to receive two of the cards. Helene hands me her card.

"Does it matter which way I put it in?"

"Yes, the printed side is up, the blue edge goes in first. When you feel it pull, let go. Either slot."

I slipped the card into the left slot and slowly pushed. It took hold about a quarter of the distance in. The card disappeared until it was flush with the top surface, and a blue light came on under the slot. The panel revolved shut again and I realized it was dark smoked plastic, which allowed the blue light behind to be visible.

I gave a slow whistle of appreciation. The CRT now displays a menu. Helene hits the key marked "CONT" and turns to face her student.

"I can now modify the primary parameters of all functions." "They are automatically loaded when the system powers up. Basically the control card unlocks the system and stores changes."

"This is real nice, but what does it all sound like," I query, wishing to make most of the time available during my visit.

"Pull up a chair and I'll show you. First I'll call up a music program which has already been stored in this system. I should explain that this console and related system is an intelligent terminal for a central system. All music programs relating to the upcoming session were loaded in to this system by the office. At the end of a session, the central system interrogates this system, stores the changes and any mixes, and erases the music programs in it."

"Well, how would you get a copy of what you did?"

"Sheet music and audio-visual records can be picked up at the office, or transmitted via phone," explains Helene.

She pushes a button marked PLAY, located in a section that looks just like the old tape transport remote controls. Then she slips her fingers into the slight recess of the group masters. The console becomes animated by lights. The LED attenuation indicators beside the faders light, and seem to grow in time with her motion. The speakers come to life and I am immediately impressed with high-energy performed, transparent, large-image, high-definition sound. The music wraps around one with "live" warmth.

"Jeez, what kind of speakers are these? They sound like high-level electrostats," I offer.

"The speakers are called 'Plasmatrons' and they operate by hydromagnetic principals. Roughly what happens is the speaker takes in air from the room, forces it through a negative

... continued on page 24 —

If you're ready to move up to a specialized mixer, you're ready for Ramsa.

The Sound Reinforcement Specialist: Ramsa WR-8716

When your sound says you're professional but your mixer doesn't. When you're wasting your subtlety and style on "make-do" boards. When you're creating compromises instead of clear-cut distinctions. Then you're ready for Ramsa — the new mixers that are specialized so you won't have to compromise.

The WR-8716 is a fully modular sound reinforcement console with 16 input modules, 4 group modules, and 2 masters. It features 16 input pre-fader solo buttons, 4 group modules with pre-fader insertion patch points, and lockable post-fader solo buttons. There are 6 illuminated VU meters with peak LED's for easy outdoor reading and a separate stereo variable frequency EQ for monitor sends. Pan pot controls allow panning to the left or right masters while level controls permit 16 x 6 board operation. The left and right direct channel assign function lets you bypass the group modules for individual sources. Portable operation is a snap with easy access connectors.

And the WR-8716 features plastic conductive faders for greater reliability and smooth, low-noise operation; external power supply for light weight, and switchable 48V DC phantom power for condenser mics.

RAMSA

The Recording Specialist: Ramsa WR-8816

The WR-8816 recording console includes the same modular construction, input modules, power supplies, and faders as the WR-8716 plus many important recording advantages. Like direct outputs for 4, 8, or 16 track recording and peak-reading LED meters that let you monitor any 4 out of 24 signals with clear, quick response.

You'll command a variable frequency EQ section with 3 frequency settings for the high and low frequencies plus continuously variable midrange. Stereo echo send replaces the separate mono controls you'll find on competitive boards. And you get two independent stereo monitor controls—one for musician's headphones, one for control room monitors—a special feature for any mixer in this class. And there are other important features like low noise electronically balanced mic inputs with new high-speed IC's, 16 switchable post-fader solo controls and XLR-type mic connectors.

Ramsa offers a full line of specialty mixers including the more compact WR-8210 recording mixer and WR-130 sound reinforcement mixer. So don't hold down your professional sound, call (201) 348-7470, because you're ready for Ramsa.

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For additional information circle #13

— continued from page 20 . . .

STUDIO ULTRA

ionization process, and then up a six-inch diameter, four-foot, fine wire mesh cylinder with a positive charge. Oscillations in the power level and of the charge causes the air column to contract and expand what is referred to as 'the minimum mass diaphram.'"

"That sure gets the job done! Can I see something on the screens?"

"Sure. Watch the center screen."

Helene reaches over to her right and lightly taps several keys, causing the screen to burst into color. The image is a male singer's head, floating in front of me, while the scene behind him is racing back to a point directly to the rear of his head. An implosion of color with tremendous depth results. The colors are rich and vibrant. The depth is breathtaking, and so is the sound.

She has raised the level of the mix and a guitar solo seems to be trailing off into a huge open space, as if we are physically leaving it in the distance. The head explodes into a thousand pieces, emitting colors of all hues as the music climaxes on a pregnant pause for the last chord. The explosion resolves into a shot of the stage with three guitar players and the singer floating down in slow motion from a leap whose beginning I didn't see. They come to the floor gently as leaves. Upon contact the chord strikes and normal motion returns. There's the roar and scream of their fans. A long shot of the stage from the audience exists momentarily, then video and audio are extinguished.

"How did you like it?" Helene asks.

"It knocks me out. Was it all done here? Is it always done with an audience? The depth in the video was so realistic; is this some sort of 3-D process?"

"Whoa, slow down a bit. Yes, it was all done here. There's a computer video control room below this room. It has a corresponding ability to manipulate video. And, like this room, it stores its program information in bubble memory. There is total communication between the video effects-editor-switcher and this console.

"You see," Helene continues, "We get a rough mix with this console accessing the corresponding video memory, and displaying it on the three screens before you. Meanwhile the video people are getting some sense of additional program effects and sequencing, with their switcher accessing the audio memory. Then this console is slaved to the video switcher. Both rooms watch and listen to the edited playback. Then the fine tuning of the program begins. The final work of art will take days to create, sometimes weeks.

"As to your second question: Yes, it's almost always done with an audience. Primarily this is done to achieve the psychic energy interaction between an artist and his audience. The artist rehearses his concert for at least 30 days. He or she then comes here and records the entire concert two times in front of two different audiences. The rest of the acts on a particular program do the same thing. Each audience sees only one artist. The best performances of each artist are joined with additional special effects, and put on the market as a package."

"That makes a lot sense," I offer. "The process has been optimized on all levels to be a catalyst from a very high intensity performance."

"Artists always seem to give more in front of an audience," Helene assents. "It's something special to capture."

"You've got to tell me about the video," I demand.

"Wait a minute, I thought your angle was the evolution of audio recording?"

"It is, but just give me an idea of how it's done. After all, at this point in time there is no longer the separation in presentations."

"O.K., I'm trapped," acknowledges Helene. "Are you familiar with concepts in holography?"

"Yes, but I could use a refresher course," I confess.

"Using coherent light generated by a laser, the beam is split in two; one side is bounced off the subject and then

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For additional information circle #15

illuminates a photographic plate. The other beam goes to the plate directly. There results on the photographic plate an interference pattern which, when developed and illuminated from behind by coherent light, reproduces the subject in 3-D.

"The only difference now," she continues, "is that the photographic plate has been replaced: in the first instance by a TV camera, and in the second by an 'electronic negative.' All program information is stored in 'bubbles.'"

"Fantastic, an electronic negative," I enthuse. "The session coming up, is that going to be played on the two keyboard instrument next to the console?"

"No, it won't be, but it could have been executed that way. The keyboards are part of the console, and are known as the voice control section. They can be used to generate any sound or instrument of a particular kind, or to generate as many as 32 different voicings per pass."

"For example, the overdub session coming up will be for strings. Only the first chair for each section will actually be here. The rest of each section will be generated by the console voicing section, by using the first chair to key a cluster of doubles with varying delays and textures."

"Sort of the ultimate in auto-double tracking," I offer.

"Yes. And it's possible technically to change the notes and timing of a performance *after* or even while it's being stored."

I have to ask the obvious next question: "How much does this room cost to use?"

"This audio plus video studio goes for $1,600.00 per hour plus the charge for seating, which is from $25 to $50 per person depending on the drawing power of the artist. Of course, the hourly charge is lower for overdub sessions."

"What form does the final product come in?" I query.

"The broadcast networks air excerpts from the concerts as advertisements, as well as portions from different concerts to form a new concert. This is then sold and/or broadcast. When you desire a copy, you call the station that played the advertisement. They, in turn, will display an index of programs on your Information System, and you make the selection. The choice is then loaded into your system's memory for storages on any medium, and credits are taken out of your bank account."

I hear the swoosh of pneumatic doors and voices; the session was about to begin.

"Helene, my last question. What year is this?"

"It can be any year you like. From this moment, forward or back in time, it's possible for you."

HIS VIEWS ON PRODUCTION MICROPHONE TECHNIQUES

by Jack Douglas

People frequently ask me how I get drum sounds, bass sounds, guitar sounds or whatever, so I'm glad to have an opportunity to express my opinions on these matters, as well as pass along some techniques I've discovered over the last decade.

Actually, I don't really think there is a "Jack Douglas Sound." I can recognize a Roy Thomas Baker style from my kitchen, even if the record is playing two rooms away. Mike Chapman's style is also very distinctive. However, I've

— the author —
Despite his working with a variety of artists over the last decade — including Patti Smith, The Knack, Graham Parker, Aerosmith, Cheap Trick and Ronnie Montrose — **Jack Douglas** is probably best known for his co-production work on *Double Fantasy* with John Lennon and Yoko Ono.

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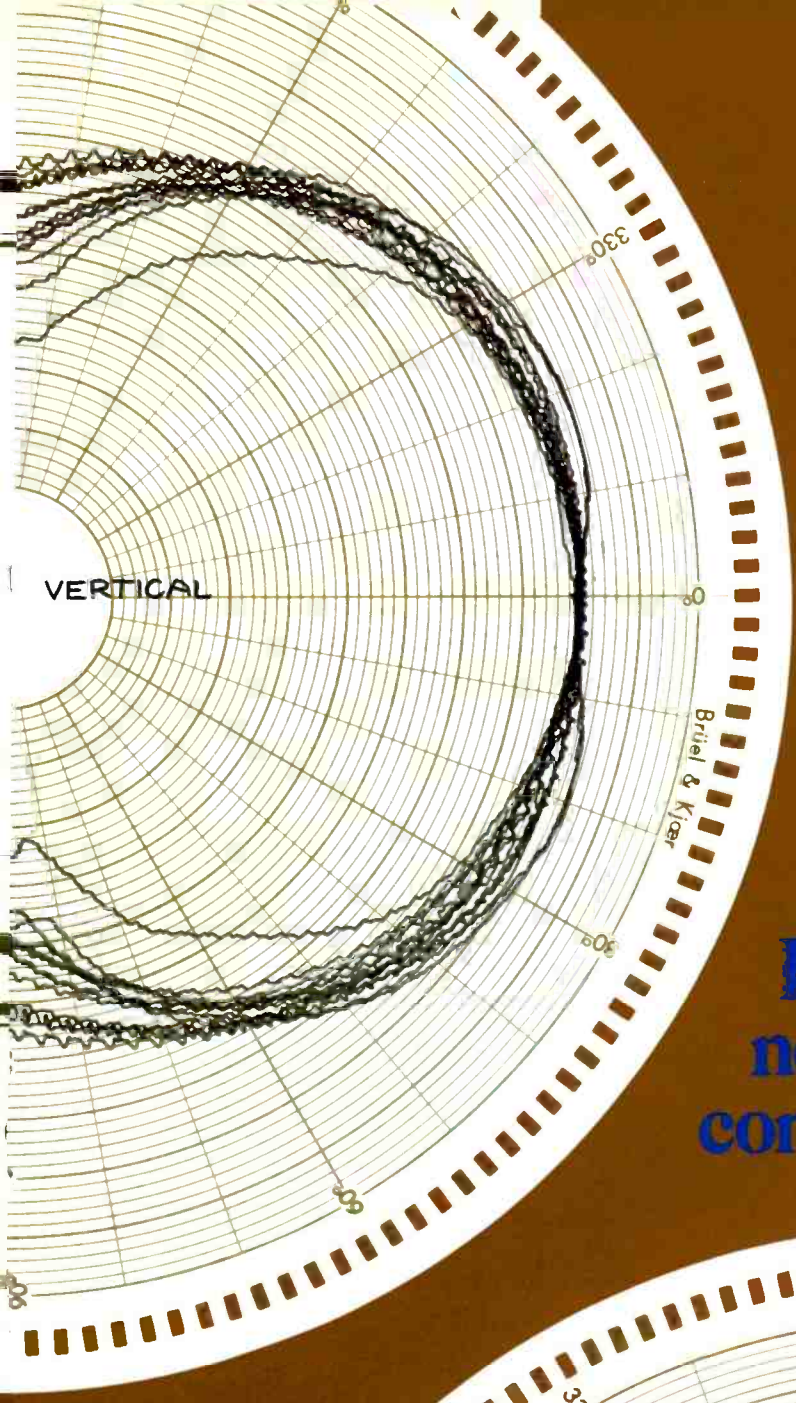
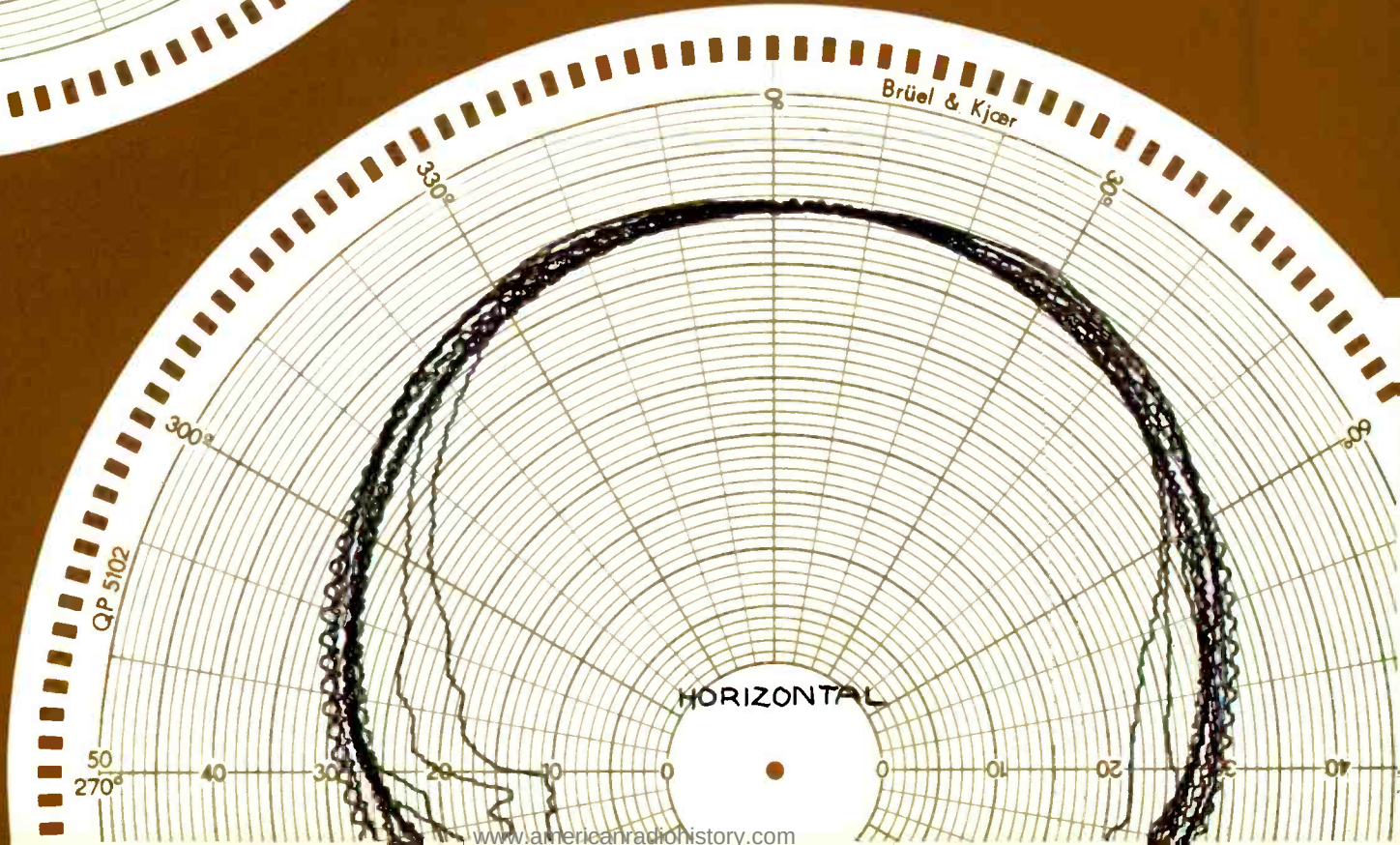
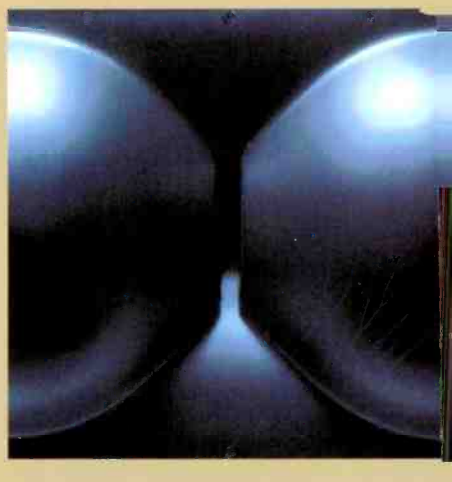


Before you invest in new studio monitors, consider all the angles.



Introducing the JBL Bi-Radial Studio Monitors.

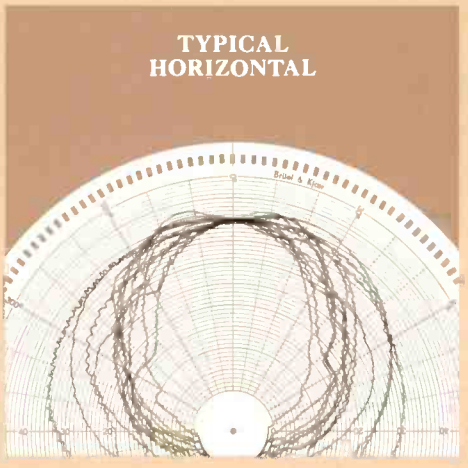


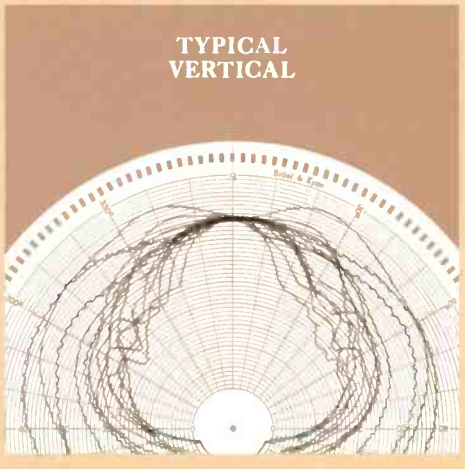
No one has to tell you how important flat frequency response is in a studio monitor. But if you judge a monitor's performance by its on-axis response curve, you're only getting part of the story.

Most conventional monitors tend to narrow their dispersion as frequency increases. So while their on-axis response may be flat, their off-axis response can roll off dramatically, literally locking you into the on-axis "sweet spot." Even worse, drastic changes in the horn's directivity contribute significantly to horn colorations.

At JBL, we've been investigating the relationship between on and off axis frequency response for several years. The result is a new generation of studio monitors that provide flat response over an exceptionally wide range of horizontal and vertical angles. The sweet spot and its traditional restrictions are essentially eliminated.

Polar response of a typical two-way coaxial studio monitor:



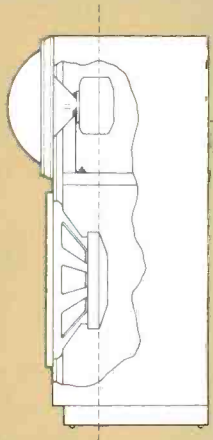


Polar response of a 4430 studio monitor.

The Bi-Radial Horn

The key to this improved performanc lies in the unique geometry of the monitors' Bi-Radial horn! Developed with the aid of the latest computer design and analysis techniques, the horr provides constant coverage from its cross over point of 1000 Hz to beyond 16 kHz The Bi-Radial compound flare configuration maintains precise control of the horn's wide 100° x 100° coverage angle. Since this angle is identical to the cover age angle of the low frequency driver a crossover, the transition from driver to driver appears seamless and the monitor present a fully coherent sound source.

And the Bi-Radial horn's performance advantages aren't limited to just beamwidth control. The horn's rapid flare rate, for instance, dramatically reduces second harmonic distortion and its shallow depth allows for optimal acoustic alignment of the drivers. This alignment lets the monitors fall well below the Blauert and Laws criteria for minimum audible time delay discrepancies.



Acoustic alignment of drivers (4430)

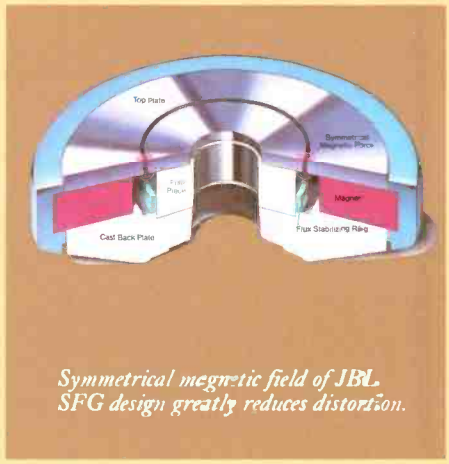
The practical benefits of the Bi-Radial horn design include flat frequency response and remarkably stable stereo imaging that remain valid over a wide range of listening positions. The design also allows considerable latitude in control room mounting. Finally, the flat on and off axis frequency response of the horn means that less high frequency equalization will be required to match typical house curves.

But while the Bi-Radial horn offers outstanding performance, it's only part of the new monitors' total package.

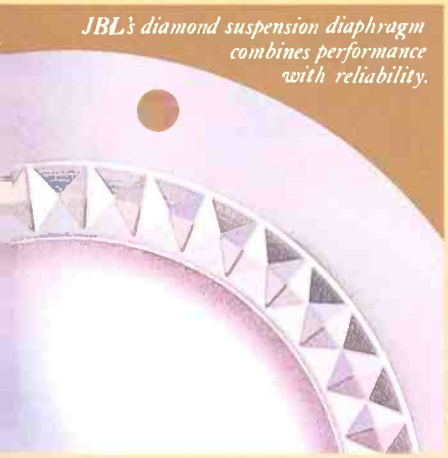
xtended Response in a wo-Way Design

Coupled to the horn is a new com-ression driver that combines high liability and power capacity with tended bandwidth and smooth, peak-ee response. The driver features an uminum diaphragm with a unique ree-dimensional, diamond-pattern rround.[1] Both stronger and more exible than conventional designs, this rround provides outstanding high equency response, uniform diaphragm ntrol, and maximum unit-to-unit erformance consistency.

To ensure smooth response to the lowest octaves, controlled midband sensitivity, extremely low distortion, and tight transient response, the Bi-Radial monitors also incorporate the latest in low frequency technology. The loudspeakers' magnetic structures feature JBL's unique Symmetrical Field Geometry (SFG) design to reduce second harmonic distortion to inconsequential levels. Additionally, the speakers utilize exceptionally long voice coils and carefully engineered suspension elements for maximum excursion linearity, and complete freedom from dynamic instabilities for tight, controlled transient response.



Symmetrical magnetic field of JBL SFG design greatly reduces distortion.



JBL's diamond suspension diaphragm combines performance with reliability.

Blending the Elements— The Dividing Network Challenge

Tailored to the acoustical characteristics of the Bi-Radial monitors' high and low frequency drivers, the dividing network provides the smoothest possible response over the widest bandwidth while restricting any anomalies to an extremely narrow band. During the network's development, JBL engineers paid considerable attention to on-axis, off-axis, and total power response. As a result, the electrical characteristics of the network are optimized for flat response over the monitors' full coverage angle.

The network also provides equalization of the compression driver for flat power response output. This equalization is in two stages with separate adjustments for midrange and high frequencies.

Judge For Yourself

Of course, the only way to really judge a studio monitor is to listen for yourself. So before you invest in new monitors, ask your local JBL professional products dealer for a Bi-Radial monitor demonstration. And consider all the angles.

1. Patent applied for.

4435

4430

Specifications	4430	4435
Frequency response (± 3 dB)	35 - 16,000 Hz	30 - 16,000 Hz
Power Capacity (Continuous Program)	300 W	375 W
Sensitivity (1 W, 1 m)	93 dB	96 dB
Nominal Impedance	8 Ohms	8 Ohms
Dispersion Angle (− 6 dB)	100° x 100°	100° x 100°
Crossover Frequency	1 kHz	1 kHz
Network Controls	Mid Frequency Level High Frequency Level Switchable Bi-Amplification	

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— continued from page 26 —

PRODUCTION MICROPHONE TECHNIQUES

by Jack Douglas

always admired George Martin, who was, and still is, a very versatile producer. Some people say that the Beatles' sound was down to George Martin, but that's not true. If you listen to the work he's done with other artists, you'll find that they don't resemble the Beatles at all. George created that particular sound for the Beatles *from* the Beatles; he creates sound from the band he's working with. Even though George is a strong producer, it's not his personality that takes over. I've had the pleasure of working with him on the *Sgt. Pepper* movie soundtrack. We co-produced "Come Together" for Aerosmith, and I had the chance to talk to him about this very point.

I've always thought that if I was going to produce records, I would want that same versatility. I like to think my records change from one artist to the next, and to do that requires a willingness to try what may seem like radically new ideas. As the producer, you must be open to change.

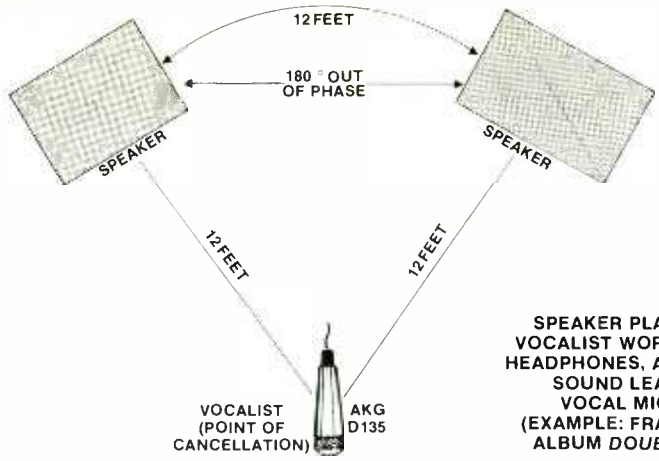
This article explains some of the things I've done, but they're only examples that have come from my own experimenting. I present them here in the hope that such techniques will offer a starting point for your own curiosity and desire to find new methods and effects.

From experience I've found that an engineer can easily spend all day moving one microphone around in an effort to obtain a specific sound. He ends up adding EQ, and doing a lot of work that he really doesn't have to do. Or, in the case of the purist, he moves that same mike around all day, decides that's not the one, and starts the whole process all over again with another mike — only to find that it's just as inappropriate.

The alternative is to go with something that will cause the cancellation you want naturally, and get the sound a lot faster, instead of spending all day with just the guitar, for example.

I very rarely use a solitary microphone on guitar or bass. I generally use three in close, and bus them to one track. Then I start changing the phase relationships between the mikes in order to get phase cancellation, because there may be a cancellation in there that I really like. I find I can get extremely varied sounds without using any EQ, simply by utilizing the phase relationships to make big "V's" or notches in the resultant frequency signal.

At first glance, you may think that manipulating the phase of three microphones would be particularly difficult, but three mikes are actually easier to work with than two. When you have three, one should be positioned dead-on center, and the others placed outside the first — one on either side. We that know the center mike is going to remain pretty constant no matter what we do with the other two. That's the main sound we go after. The central mike may be some kind of condenser, such as a Neumann U87, but it depends on how much level is coming from the guitar or bass amplifier. Although too much level can collapse the capsule, most applications are relatively safe. And, if you throw in the pad, the sound is not too bad.



SPEAKER PLACEMENT FOR VOCALIST WORKING WITHOUT HEADPHONES, AND TO PREVENT SOUND LEAKAGE INTO VOCAL MICROPHONE (EXAMPLE: FRANKIE MILLER'S ALBUM *DOUBLE TROUBLE*)

Now the pair of mikes outside the condenser start to phase with each other. They can be pulled back a little to let the center mike dominate. Dynamic mikes work well in these two outer positions, especially when they're both equidistant from the center mike. By way of an example, the one on the right may be a Sennheiser MD-421, while a Shure SM-57 could be perfect on the left.

Older Sony mikes, like the C-37, are another great choice for the center, because they're really warm sounding. The Sennheisers and Shures are brighter, and more brittle sounding,

. . . continued overleaf —

PRODUCTION MICROPHONE TECHNIQUES

whereas the C-37 will give you a warm, fat sound.

Positioned quite a ways back in the room (approximately 10 to 15 feet) I'll have another U87, but this choice will depend on amp level, type of speaker, and the size of the room. I can manipulate the phase of this microphone, and blend its sound with the other three close mikes. All four are brought up on separate channels and bussed to a single track.

Still farther back in the studio — between 20 and 30 feet from the amp — I'll use a shotgun, or some other kind of exotic mike, pointed off to the side of the room — maybe towards the glass of the booth, or even straight up. This mike captures ambient sound that will enable me to match up an overdub with the basic tracks. Since your basic tracks will have a certain amount of room sound on them, when you add a close-miked overdub, the part sounds cold compared to the basics. By recording the most distant microphone on a separate track from the other four mikes, the overdub can be made to sound much more real.

During the mix, you place the guitar at any given pan location as you normally would. Then the separate ambient track is moved over towards the drums. This places guitar ambience behind the drummer, and affords the illusion that guitar and drums were recorded at the same time.

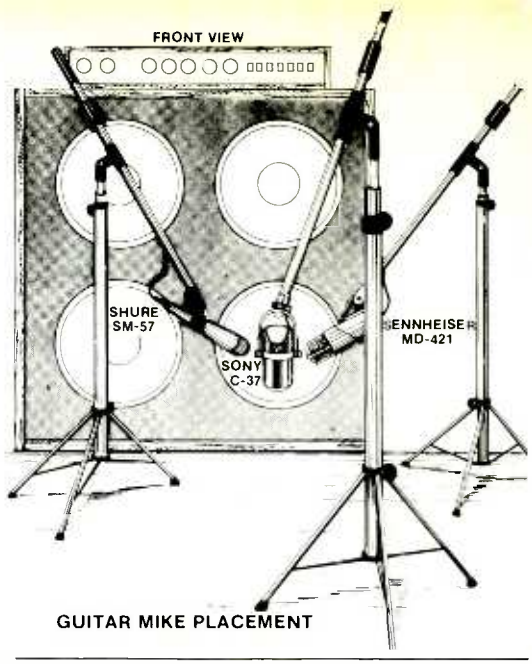
I'll also use this technique with a bass overdub, but very seldom with any keyboard instruments. Keyboards are naturally not loud instruments — at least not in relation to a rock and roll band. In the studio, you very rarely hear a really loud piano or synthesizer getting into the drum mikes. You'll hear bass and guitar leakage on the drum tracks, but the guy sitting at the piano is more likely to have sounds leak into his mike, rather than vice versa.

If it's a keyboard overdub, I usually try to create the illusion of the drum kit leaking into the grand, rather than the other way around. If I'm working with electric keyboards, I'll record them with some kind of effect to bring it into the track. But again, that's not the type of instrument you hear bleeding into the trap set.

In regards to the size of amp you may be recording with, keep in mind that larger amps, such as Marshalls, were made to come to life quite a distance from the speakers. You have to give the speakers a chance to breath, especially in the lower frequency range. If your room is not too large, you have to recreate that sound as best you can. Smaller amps, however, will give you that depth up close. I'd use the same multiple mike set-up described above, because what I'm looking for are the dips and peaks I'll get from the phasing.

Once I have roughly the sound I'm looking for, I may look towards processing the instrument in the booth. Before the remix session starts, I have six busses assigned to various pieces of

. . . *continued on page 36* —



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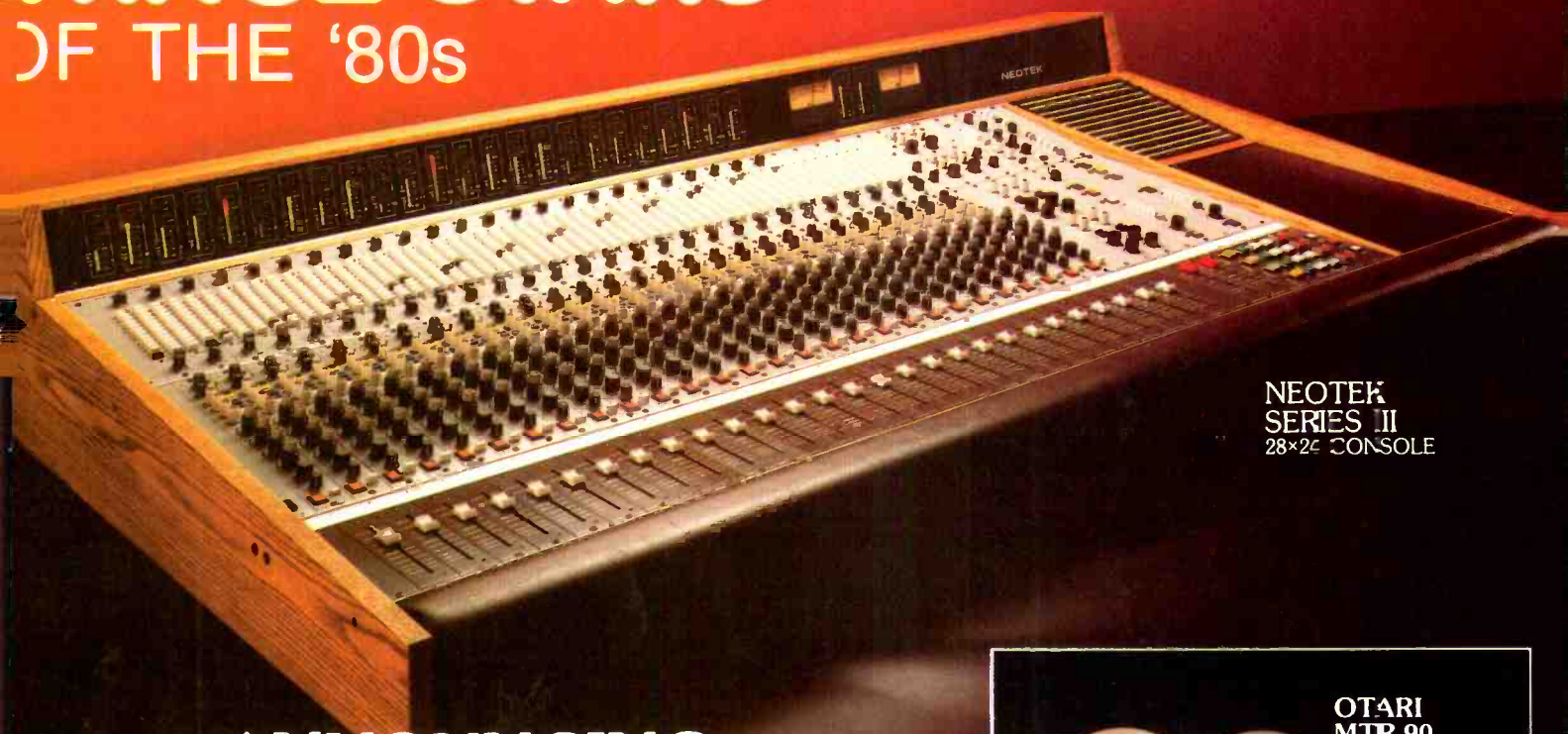

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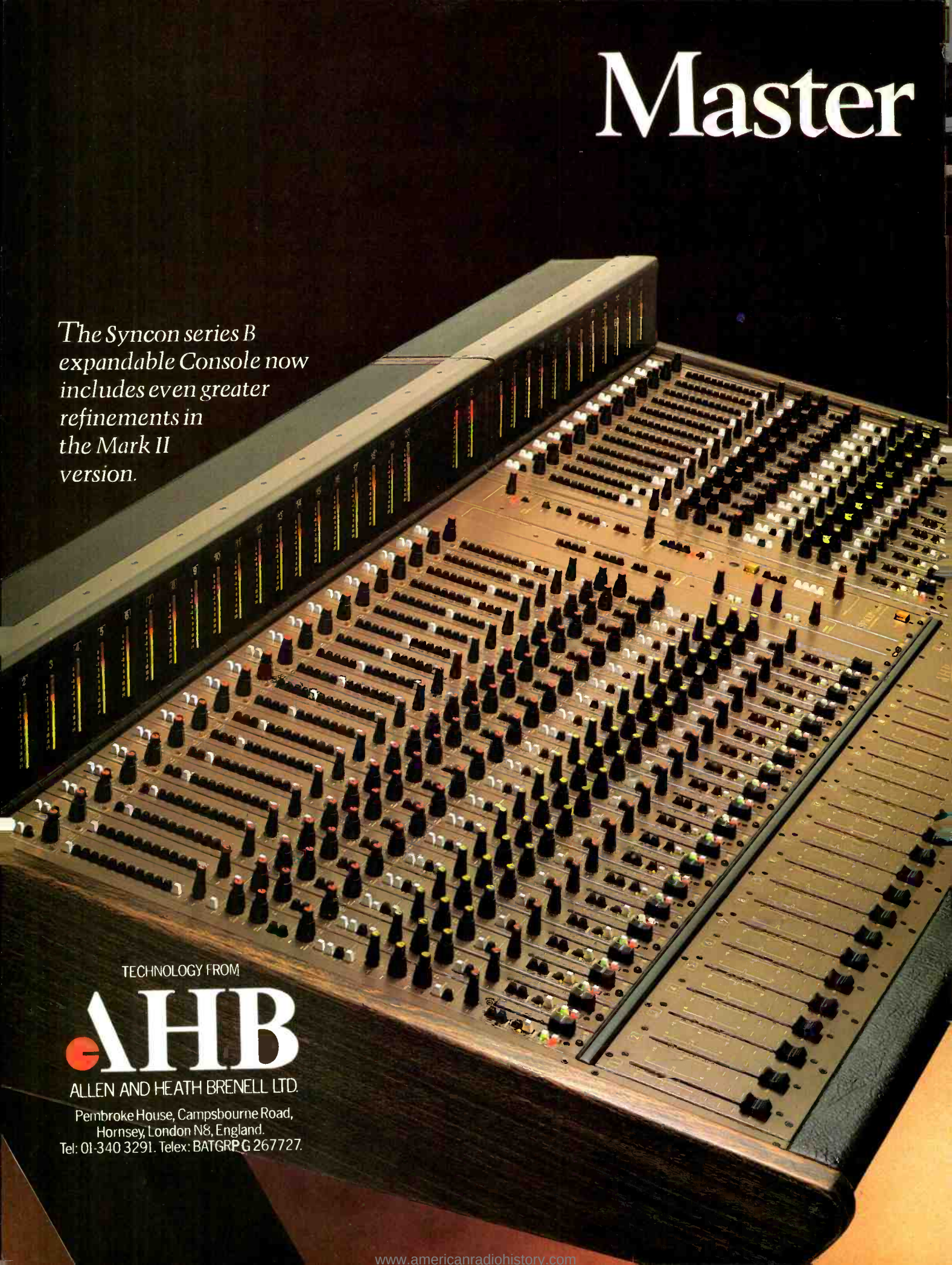

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PRODUCTION MICROPHONE TECHNIQUES

— *continued from page 32* . . .

outboard gear. By the time I've walked into the booth, the assistant will have taped the board, and marked all the returns along with the bus that's feeding it. All I have to do during the session is assign via the board where I want these things to go. Then I can bring them back, and mix them into my track.

For example: let's say that I want a little flanging to cut through the middle of a sound. Instead of patching the flange to every tape track, I'll just send over some kind of combination to the flanger, control the input very carefully so as not to overload it, and return only what I want of the effect signal to the mix. That way it ties in inconspicuously, and becomes the sound. It doesn't sound like it's been obviously flanged; it tends to be natural.

I may use a limiter across the entire bus, or some type of Pultec. Or I might take another bus, run it through a series of events, and bring it up on another channel. Another possibility is to mix all of the guitar mikes together and super-compress them. While I've got the normal sound going down the bus, I'll bring this tight, super-compressed sound that's breathing with compression up into the mix as well. I'm really creating an illusion. There might be all sorts of strange things going on inside a sound — perhaps lots of delay — but when it comes back up in the mix, it sounds natural.

Guitar and Vocal Effects

Some examples of tricks with guitars can be found on the *Double Fantasy* album. The rhythm guitar on "Dear Yoko" is tied to five tracks of harmonica playing the same rhythm as the guitar. But not only did they play the same rhythm, we also gated the harmonicas to the guitar through a series of noise gates. In turn, the guitar was gated to the gated harmonicas. It sounds like a breathing guitar, because the whole thing really pumps.

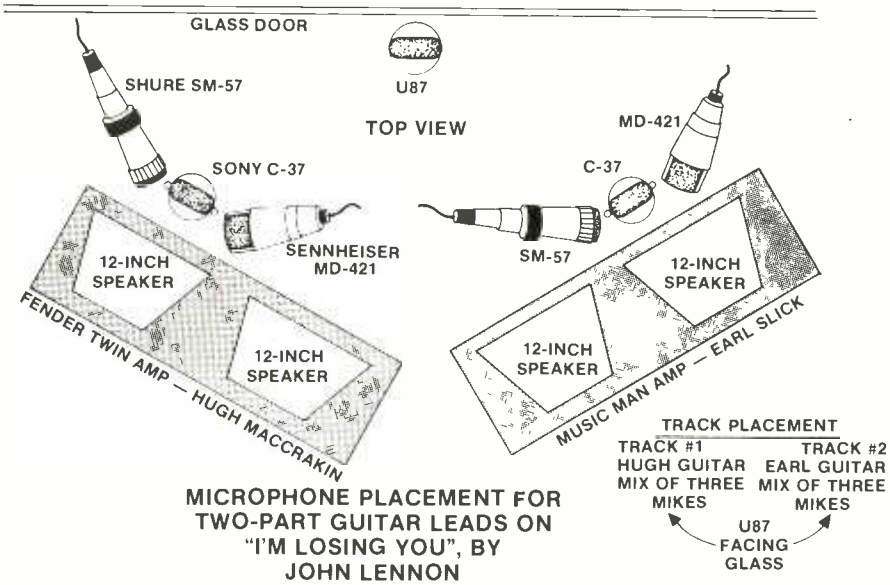
The acoustic guitar on "Starting Over" was the big Gibson, capoed so that it was all played up high and open. In front of the hole there was an 87 in close, a Sony C-22 on the side of the body down by the strap peg, and another 87 four or five feet back, all mikes being bussed to one track.

Occasionally I'll set three microphones up for the vocalist, too. The artist may choose to sing the verse on one, move over an sing the chorus on another, and then the bridge only on the third. It can be an old Altec 639 "Birdcage," an RCA 44, or an 87. We may want warm, close sound for the verse, and then all of a sudden a brighter sound to cut through the difference in his headphones, and know how to handle the performance accordingly. Here, too, I may place a shotgun in the room to capture the ambience.

Many times the artist will do an ad lib, and such tracks are much more effective if they sound like they were done by someone in the band while the tape was rolling. Close-miked ad libs have a contrived aura about them. At the end of "Dear Yoko" on *Double Fantasy*, John Lennon says, "Next time you come by, don't sell a cow. Stay awhile . . . " That was recorded by an ambient mike.

John's vocal on "Starting Over" is slightly phased electronically with an

. . . *continued overleaf* —



MICROPHONE PLACEMENT FOR TWO-PART GUITAR LEADS ON "I'M LOSING YOU", BY JOHN LENNON

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PRODUCTION MICROPHONE TECHNIQUES

Eventide Flanger. In the part of the song where the vocal flies up in the center, we chose old-fashioned two-machine flanging. Incidently, the drum fill coming out of that tacit or non-playing section never took place at the date; it was all edited together from bits and pieces of drum fills, then double-tracked with real drums.

Yoko's vocal on "Kiss, Kiss, Kiss" is a good example of what can be done with a super amount of limiting. There's a lead vocal up high in the center, as well as additional vocals panned far left and far right, which are actually love-making in Japanese. I put her in a house so she couldn't see anybody. She did the part in a whisper; it was so quiet she could barely be heard, and an excessive amount of limiting was necessary to pick it up. Of course, all sorts of breath and lip sounds also became amplified.

Now, in order to get that part big enough to come out over the track, I limited it again, and panned it to the center. Since I had two tracks of vocal, I would alternate the two by moving the respective faders up and down. When one track would get too loud, the second limiter would grab it and put it low in the center — about even with the ones panned to the extremes. It gave the effect of a third voice jumping up in the middle of your head. This is all in addition to the primary lead vocal positioned higher in the center.

I've always liked to bring things out beyond reality in a mix, and I use limiters to do that. I can continue to increase the volume of a given track with the knowledge that the meters will never pin, and I don't have to have the entire mix at -3 VU, in order to get the solo to be +2. Bus limiting is especially effective, because I can keep pushing a solo up until I run out of fader. It'll keep getting louder, but will flatten out and force other instruments to move back, thereby creating the illusion of the lead instrument taking over.

Drum Effects

An effect I like on the trap set is to tape a pair of Sennheiser Binaural microphones to the drummer's headphones. Through the binaurals I can hear exactly what the drummer would hear while playing the kit without his headphones. I'll route the binaurals to a pair of separate tracks. When he does a crash or drum fill around the kit, the drummer moves his head and the perspective changes; the pan in the monitors changes as his head turns.

During the mix, I can pull some aspect of the drums out, and replace it immediately with the sound of the Binaural mike, even if it's just for the chorus. Then I'll zip the binauarals out, and bring the other tracks back in. As you're listening through headphones, you suddenly start spinning, because the drummer's doing a fill and turning his head; you get the physical movement in the 'phones.

I've also tried 87's over the top of the vocalist's head to pick up head tones. It works!

Outboard Effects

One piece of outboard equipment I keep coming back to is the Publison DHM89, which is made in France. I discovered it about a year back, and finally learned how to operate the device about six months ago. Unfortunately, the instructions are in pigeon English, and it took a while to figure out the machine.

Basically, the Publison will do just about everything. It is stereo, and has combiners built into it so that either channel can feed the other. It's an amazingly clean DDL that sounds like tape; it'll even make things sound backwards. You can use it as a tape delay, flanger, phaser, octave instrument, or pitch shifter. I'm waiting to get a keyboard controller for it.

Putting delays perfectly in time with the track is a snap. I can run the snare drum into the Publison to define the

. . . *continued on page 42* —

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The S0112T speaker system utilizes two woofers (a 12" Yamaha JA3061 and a 10" JA2507) and four 2" Yamaha JA0554 tweeters in a portable bass reflex cabinet.

The S0110T utilizes a 10" Yamaha JA2511 woofer and a JA0556 tweeter in a heavy-duty ported enclosure offering high sensitivity and very compact size.

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All the single-enclosure systems are ruggedly built, highly portable, and ideal for a wide range of applications including PA's, keyboards, and vocal monitoring.

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— continued from page 38 . . .

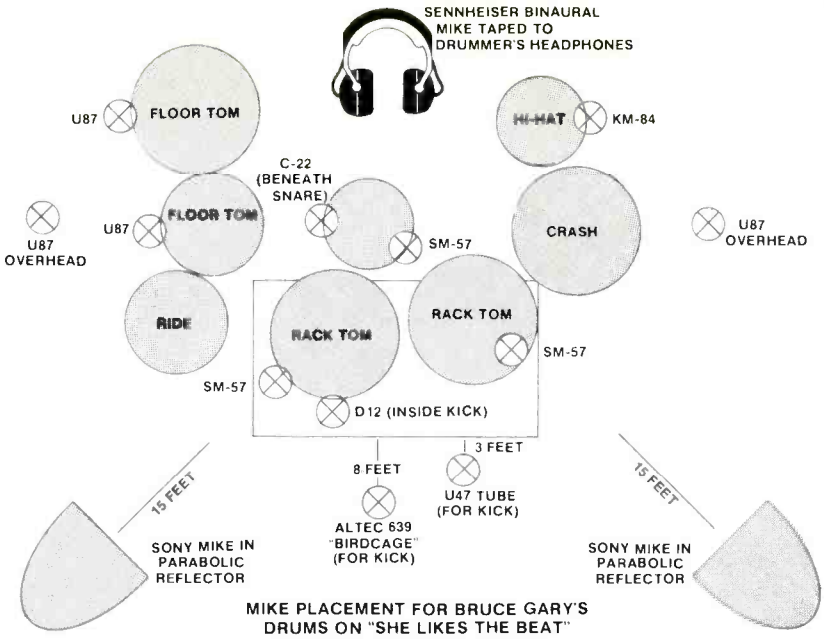
views

PRODUCTION MICROPHONE TECHNIQUES

time, take the snare out, and replace it with whatever I want. If I want to go half time, or double time, one switch will do it. I can set one side half time, the other double time, and bring up each effect on separate faders. I can add a double to it, or make strange rhythms out of it, like paradiddles or anything I want. But that's just on the delay side of it. Within the same machine, I can flange the delays, or flange the delays and add a slight pitch variation. Now I have delayed paradiddles that are phased, and the Publison will bring the end one up in pitch. The machine is a real adventure.

On Karen Lawrence's *Girl's Night Out* album, the background vocals for "I Won't Stop" give the feeling of being under water; in fact they were processed through a Publison.

Vocal doubling doesn't always have to be done in the same octave. Doubling in octaves can do magic tricks — especially in the lower octaves. I attach that double to the original lead or background vocal track, but at a much lower volume. It makes for a really strange coloring.



MIKE PLACEMENT FOR BRUCE GARY'S DRUMS ON "SHE LIKES THE BEAT" BY THE BEAT

In the case of the upper octave, where, of course, hardly anybody can sing, I use the Publison DDL. If I were to solo the track, you'd say, "Oh great! A Chipmonks' record." But you have to remember that it's perfectly aligned with the real vocal. When you add it to the mix, it sounds more like somebody with a harmonic on their vocal. You don't hear the chipmonk; you hear a lower octave and a harmonic on top.

Keyboard Effects

The song "Watching the Wheels" was a good exercise in working with keyboards. When I received a demo of the song, it was up-tempo, and very

. . . continued overleaf —

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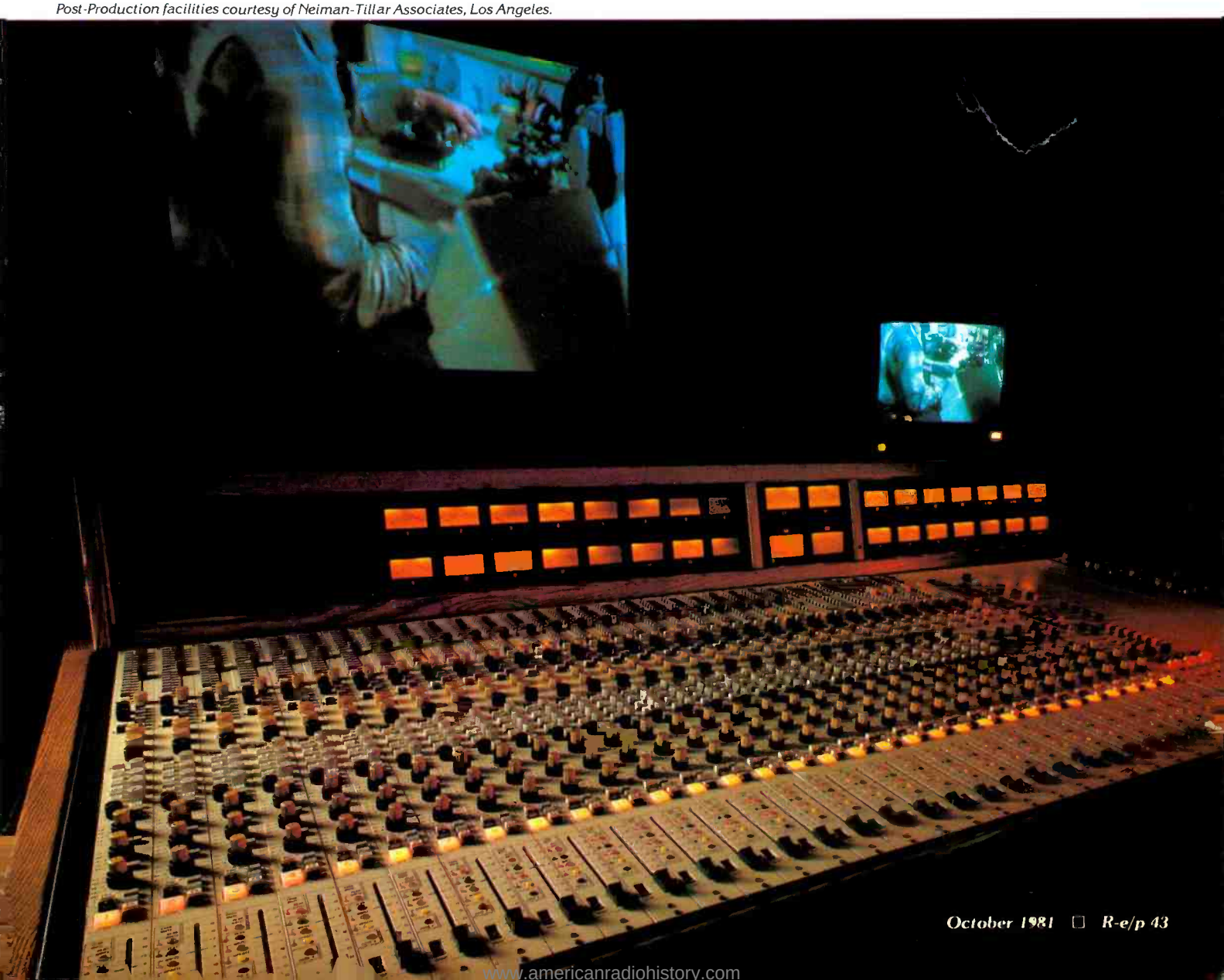

PRODUCTION MICROPHONE TECHNIQUES

Dylanesque. I wanted it to have the feeling of wheels spinning around, and suggested that a perfect instrument for the chorus would be a hammer dulcimer: an instument that sits on the ground, and is played with little mallets.

Most of "Watching the Wheels" is two keyboards played by John Lennon and George Small. John's Yamaha electric grand piano is mixed slightly left and right of center. George's acoustic grand is surrounding the electric, and playing either in unison, or a backbeat to it. Then there's a Prophet synthesizer that comes in at the end of the chorus, and which is set up like a tacky piano. The whole phrase, "I just had to let it go!" is the hammer dulcimer. It comes in as the other instruments fall away a bit, and takes over just about where the range of the Prophet leaves off.

"Beautiful Boy" is orchestrated with steel drums doubled by an Oberheim synthesized version of steel drums. String parts were all synthesized by a computer-operated Oberheim; there are no real strings anywhere on the entire *Double Fantasy* album. The rich and thick synthesized strings were augmented with acoustic piano. We removed the attack of the piano notes, but kept the rest of the envelope by manipulating the faders on the console. I love to take synthetic sounds and augment them with organic instruments, or vise versa. The result is always something new that neither sounds completely organic or completely synthetic.

I find that if I can free myself from too much conventional thinking, I'm always surprised at the possibilities available to me, and it makes every day in the studio an adventure. I hope these examples stimulate your imagination as the people I've worked with have stimulated mine.

— *The State of the Direct-to-Disk Art* — TOWER OF POWER ON SHEFFIELD LABS

by Larry Brown

Ever since engineering the first Sheffield Lab direct-to-disk, I've looked forward to making them an album whose musical excitement matched their sonic quality. Finding a band to pull this off, and which also had the ability to cope with the perils of direct-to-disk recording, wasn't easy. However, after hearing Tower Of Power perform live, I knew *this* was the band.

The next thing to do was to try and get all the parties involved as excited as I was about the project. I contacted Doug Sax of Sheffield Records, while Spencer Proffer (my partner at the Pasha Music House) called Ron Kramer, the band's manager. "Yes," came the reply, the band was interested, and a trip to hear them with Doug and Lincloln Mayorga convinced the label.

The only remaining question was whether or not Sheffield's console was sufficently large and flexible to handle the band. As an engineer used to the convenience and ease of operation of a modern 24-track board, my initial reaction to Sheffield's console was: "You've got to be kidding!" At the time, engineer Steve Haselton was in the

— the author —

In 1968 **Larry Brown** served as engineer for the first modern direct disk record, *Lincoln Mayorga and Distinguished Colleagues*, for Sheffield Lab. Again in 1971 Larry engineered Sheffield's second release, *The Missing Linc*. Over the last several years Larry Brown's reputation has grown, not only as an engineer-producer, but as one of the finest drummers in Los Angeles, an excellent keyboard player, as well as a composer.

In 1977 Larry designed and built The Pasha Music House, in Hollywood, California, which comprises two, state-of-the-art 24-track rooms. Over the last four years, he has recorded many feature acts.

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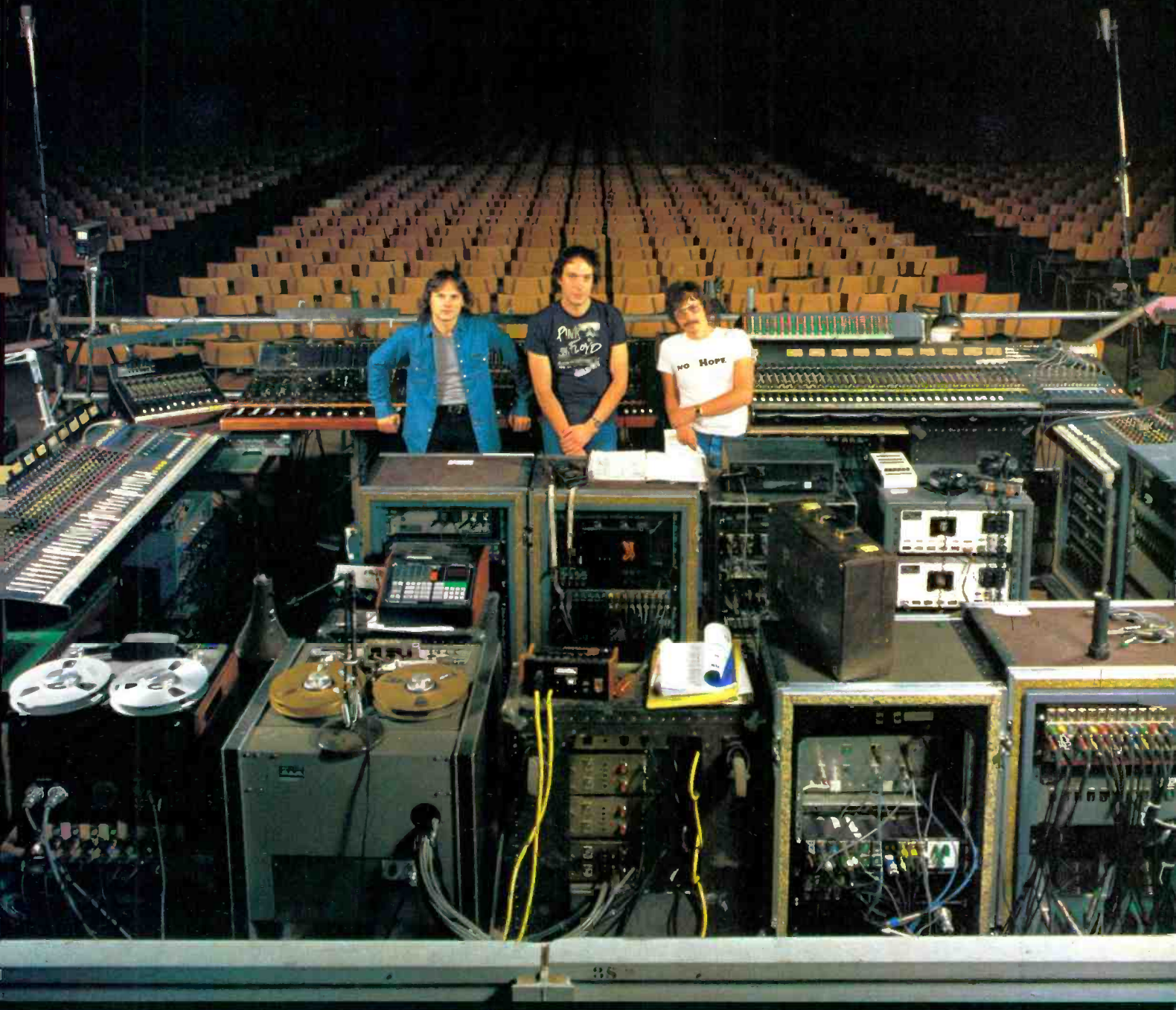

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For additional information circle #29

"Tower Of Power"
Direct-to-Disk

process of building their new 32-input console, but couldn't have it ready until January of '82. Which meant that I'd have to use their two highly-modified Quantum Audio Lab QM-8 boards. They certainly sound great, but what a cluge to mix on.

Sheffield Lab's philosophy in building their board was: Sonics first; Convenience and Cosmetics second. This meant . . .

— NO board solos — extra relays meant signal degredation

— NO board EQ — the EQ in the console was not up to Sheffield's standards, and therefore not used

— NO grouping

— NO patch bay — all patching was done on XLR connectors behind the board

— ONE cue system — mono only for rehearsal; stereo bus for cutting

— ONE echo send

The QM-8 console — or rather, Sheffield's modified version of it — has only 16 inputs on which to mix 12 players and six singers. At best it would be tight, but we decided that with some very careful pre-planning it could be done.

A starting date of June 22, 1981, was set, and within a week I was on a plane to Lake Tahoe, Nevada, to begin pre-production with the band at Harrahs Club. During a direct-to-disk recording the engineer is performing along with the musicians, so I had to be familiar with their music and arrangements. Two shows a night and 10 days later I felt like the 12th band member.

Picking songs to record from the Tower's large repertoire wasn't easy, and with only 15 minutes or less of music per side (for optimum fidelity and level on the disk) the task was harder. Six songs were chosen for their musical and sonic content, and I headed back to L.A.

The Tube Microphones

At first glance one's impression of the Sheffield line-level, transformerless tube mike is that it looks like an old lamp fixture, or a high school Electric Shop #1 reject. But who cares about looks when something sounds this good. Doug Sax gave me a double-tube model to take back to Pasha Studios for trials. Mike Sanders, Pasha's head of maintenance and my assistant engineer on the project, and myself tested the mike against a U87, C414, M49, C251, and the new Milab LC25. The 87, 414 and 49 were not even in the ballpark. The AKG C251 had similar characteristic (the Sheffield mike and the C251 both use an AKG C12 capsule), but wasn't as "open." The LC25, a Milab transformerless line-level, solid-state model, was the closest to Sheffield's mike, but sounded a bit more noisy and, like the 251, not as open. Sheffield's mike, a joint development with AKG, was designed by Sherwood Sax, and specs out at within 0.2 dB from 15 Hz to 17 kHz, with total harmonic distortion of less than 0.009% from 20 Hz to 20 kHz at +10 dBm output. It has a signal-to-noise ratio greater than 116 dB, including capsule noise. Knowing that I had 13 of these marvellous mikes to work with (plus two stereo M-S models of the same design) was a big plus.

The Sheffield Microphone

The Recording Studio

My first look and listen to Sheffield's studio on the MGM lot in Los Angeles came during the making of Amanda McBroom's second LP, *West Of Oz*, another direct-to-disk with Bill Schnee engineering. The large 67- by 97-foot studio with its 33-foot high ceiling sounded exquisite on Amanda's soft, pop and country music. But how would it sound with Tower Of Power's high energy unleashed in it? I'd have my answer soon.

The day before the first session, Mike

. . . continued on page 49 —

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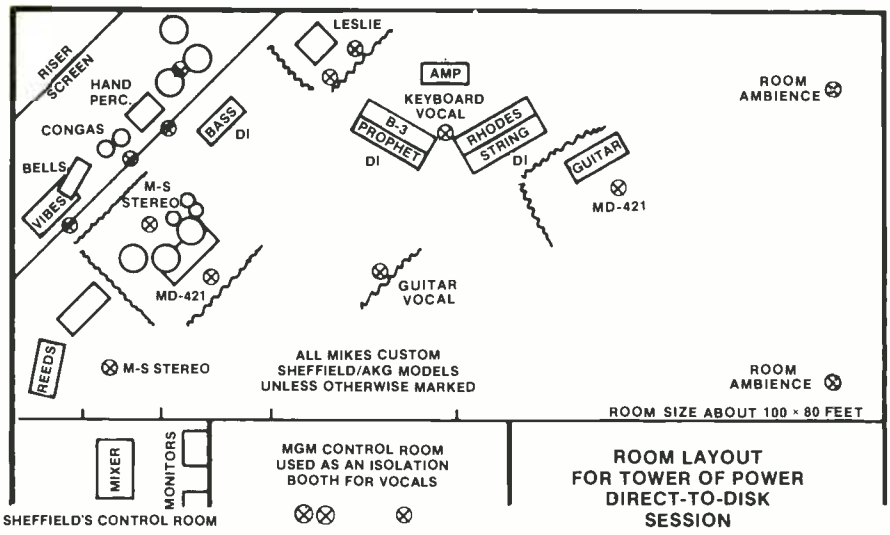
CUT OUT AND KEEP FOR YOUR FILES.

— continued from page 46 . . .

"Tower Of Power"
Direct-to-Disk

Sanders, Doug Sax, Steve Haselton and myself met at MGM to set up the room. The goal sound-wise was to capture Tower Of Power's energy and realism in this large, live room. The band was set up exactly as they performed live, using the corner of the studio closest to the control room. This gave us some visual contact, and the full length of the room to work with for ambience.



ROOM LAYOUT FOR TOWER OF POWER DIRECT-TO-DISK SESSION

Mike Placement

As few mikes as possible were used for the session, in order to maintain perspectives and placement of the band members, and also eliminate the phase problem of heavy multi-miking. Only two mikes were used for drums: a stereo M-S overhead, and a kick mike. The other stereo M-S mike covered the horn section. Four more mikes were needed to record Victor Feldman's large array of percussion. However, due to the lack of console inputs, these had to be selected two at a time via A/B switches.

Keyboards used the same set-up, the two mikes on the Hammond B-3's Leslie Cabinet being the same two faders as the Fender Rhodes electric piano taken direct through two line-level direct boxes. The Sequential Circuits Prophet V and String Ensemble synthesizers were also taken direct, but simultaneously ran through an amplifier in the room to maintain ambience. One mike on guitar and DI bass completed the instrument miking. Which left us with five mikes, and three open inputs.

Michael Jeffries sang lead on all but one tune, a blues sung by guitarist Willy Fulton. Mikes on Michael and Willy were routed to one fader via an A/B switch. The background singer's two mikes were placed on the last two faders. On side two of the album, Willy's mike and a mike for keyboardist Chester Thompson were submixed with the background mikes.

For room ambience two mikes were hung approximately 30 feet in the air, and about 70 feet from the band. Since all 16 inputs had now been assigned, the room mikes were patched into two of the console's four echo returns, with an EMT stereo 140 plate appearing on the other two returns.

The Lathes and Recording Chain

Directly adjacent to the control room on the MGM lot is the lathe room. Looking much like an isolation booth with its glass window, this room contains Sheffield's four manual Neumann lathes, linked in tandem with a servo-drive designed by Ed Hukoveh. The Neumann SX-74 cutter heads driven by Mastering Lab cutting amps are the last stage of Sheffield's recording chain. This esoteric system is 600-ohm matched throughout, and starts with a line-level mike or line-level direct box into a fader at 0 dBm, followed by a solid-state buffer (the only solid-state device in the chain) for gain recovery.

The next stage is a passive non-inverting summing network, followed by two tube line amps that directly feed the four lathe cutting amps. There are four additional isolated feeds, three of which went to back-up tape machines, and the fourth into the monitor system consisting of two Sheffield Lab physically time-aligned speakers driven by Mastering Lab amplifiers.

For one to say that the recording chain and monitors are sonically pure and accurate is an understatement. While testing two identical Sheffield mikes, we were able to hear the difference between a Switchcraft and Cannon female XLR. Now that's accuracy!

Since the lacquers could not be played until they had been processed, our playbacks for performance evaluation would have to be done from tape. The

"Tower Of Power"
Direct-to-Disk

machines used were an old Scully 280 and an Ampex ATR-102, half-inch two-track running Scotch 226 tape. A Mitsubishi X-80 digital recorder was also run for later evaluation.

The Sessions

When I arrived at MGM for the first of our three days of recording, lathe operators Mike Reese and Lois Walker were already hard at work calibrating the equipment and checking the lacquers. Their job on the session was extremely difficult. Since the album would be recorded in real time, no preview head or computers could be used, which meant that all four lathes would have to be operated manually. Lincoln Mayorga planned to be in the control room giving musical cues to me and to the lathe operators through a Clear Com system. This system also went out to the studio area, where MGM stage manager Dave McDonald would provide the band with their visual starting cue.

The band members arrived and Doug Sax ran down the recording schedule, explained the recording process, and then gave them his deluxe tour of the studio.

The studio setup at MGM, prior to the first session —

Photography by: Miguel

My first matter of business was getting sounds and, since no recording would take place at either of today's three-hour sessions, the pressure was off. Starting with drummer Mark Sanders, I opened the stereo overhead faders. His kit sounded fantastic! Why, I wondered, have I wasted so much time in the past with multiple drum miking, when this single stereo mike sounds so balanced, and open. The kick drum needed a little work, however. Opting to use one of the seven available UREI Model 500 equalizers, and changing mikes to a Sennheiser MD-421, brought it around.

Several of bassist Vito San Filippo's instruments were tried before deciding on his Fender Precision. Since he hammers, the R&B style of playing bass — where the strings are hit as well as plucked — a Mastering Lab modified LA-2A limiter was patched in to help

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"Tower Of Power"
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contain levels. Another Model 500 equalizer was used to add a little top to his bass. Our keyboard setup needed only minor mike placement modifications, and no additional EQ. The Sheffield mike proved to be a little too good for the guitar amp; here again we changed to a Sennheiser MD-421.

The trickiest mike placement was the horns. Our initial setup, with the brass on a riser behind the saxes, sounded too thin, and proved awkward for the soloists who had to move up to marks on the floor for their solos. After some juggling we decided on a "V" placement, with brass on the right and reeds on the left. This not only sounded best, but was also easy to work with for solos. The problem now was the 125+ dB levels coming off these six guys. With the placement fixed, the only solution was mike padding, which was achieved by adding a capacitor across the capsule.

The stereo horn mike provided the basic drum ambience for the record, but the drums proximity to the left side of the horn section caused an imbalance. A large rolling baffle was placed between the drums and the horns for isolation.

The second session began with the arrival of our percussionist and background singers. Again with some minor placement adjustments our original percussion setup worked fine. As soon as we cracked the background vocal mikes, however, it became blatantly clear that three human voices were no competition for these six horns plus rhythm. While I rehearsed parts with the background singers, the two background mikes and Michael Jeffrie's lead mike were moved into MGM's control room — which was being re-modeled at the time — and placed between the ladders and the 2 by 4's. Our rundowns towards the end of the session showed that this makeshift isolation booth would work fine. This had been our first chance to hear everyone together, and while we knew that we were in the ballpark, we still had our work cut out for us the next day.

On Tuesday afternoon we began running side one in its entirety. Our situation here was different than on previous multi-mike albums that Sheffield had recorded, in that the band was ready to go from the moment they walked in, and *we* were the ones that needed rehearsing. Our level, pans and switching moves had to be practised, and here the band proved that patience was truly a virtue. They became human multi-track and played the sections we

The four tandem lathes prior to the first session —

needed over and over. We marked the percussion and keyboard instruments changes on the written score from which Lincoln would cue. Mike Sanders helped on the A/B switching, as well as some pan moves, so that I could concentrate on balance and performance.

It was during this session that we cut our first lacquer. Once the band was ready, output of the board was turned down and Mike Reese announced "stand-by" as test cuts were made on each of the four lathes. When he was satisfied that all lacquers were okay, he would announce "coming in" and begin to cut the lead-in grooves. This is when the palms get really damp, because any error from here on would blow four lacquers and any performance on them. Once the lead-in grooves had been cut,

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Playback! . . . Inset: The mixing position —

we would hear "go," the board pots were open, the band cued, and we were off on side one. It wasn't until we finished the side that Sax bothered to tell us that we ran long and, if used, the last minute of music would be under the record's label! We trimmed some time out of the solos and tried again.

This time an over-energetic bass note lifted the cutter halfway through the side. With only a few minutes left in the session, we gave the band an early dinner break and Doug and myself used the time to evaluate the blown lacquers. This was also our first chance to compare the disk against tape. It proved to be a real treat to hear the energy, sock and fine detail the disk preserved. If ever I had a doubt of direct-disk versus tape it was erased forever.

Tuesday's second session was devoted totally to side two. We worked out the mechanics and started rehearsing. By the third hour of the session we were ready to try for a keeper. This yielded us our first good lacquer. Once the lacquers passed Mike Reese's visual inspection, a messenger would deliver two of them to KM Records, and the remaining two to Sheffield Lab Matrix for processing within the hour. Lacquers were split up so that if either plant had a problem in processing, the performance would still be preserved. With one set of lacquers in the bath, and both sides well-rehearsed, we were ready for Wednesday.

Now or Never . . .

This was our last day of recording. Even though we had a good lacquer on side two, it was by no means what any of us felt to be the definitive performance. So, deciding to stick with the side, we started the day's recording.

We did one run through to re-fresh everyone, then lacquers were loaded on to the lathes. "Coming in . . . Go." The band was cued, and the first song counted off. "Stop, stop! Somebody just walked into the iso booth," piped singer Michael Jeffries. Apparently nobody had told the MGM workers that we were using their control room today. With their crew now alerted the lathes were re-loaded.

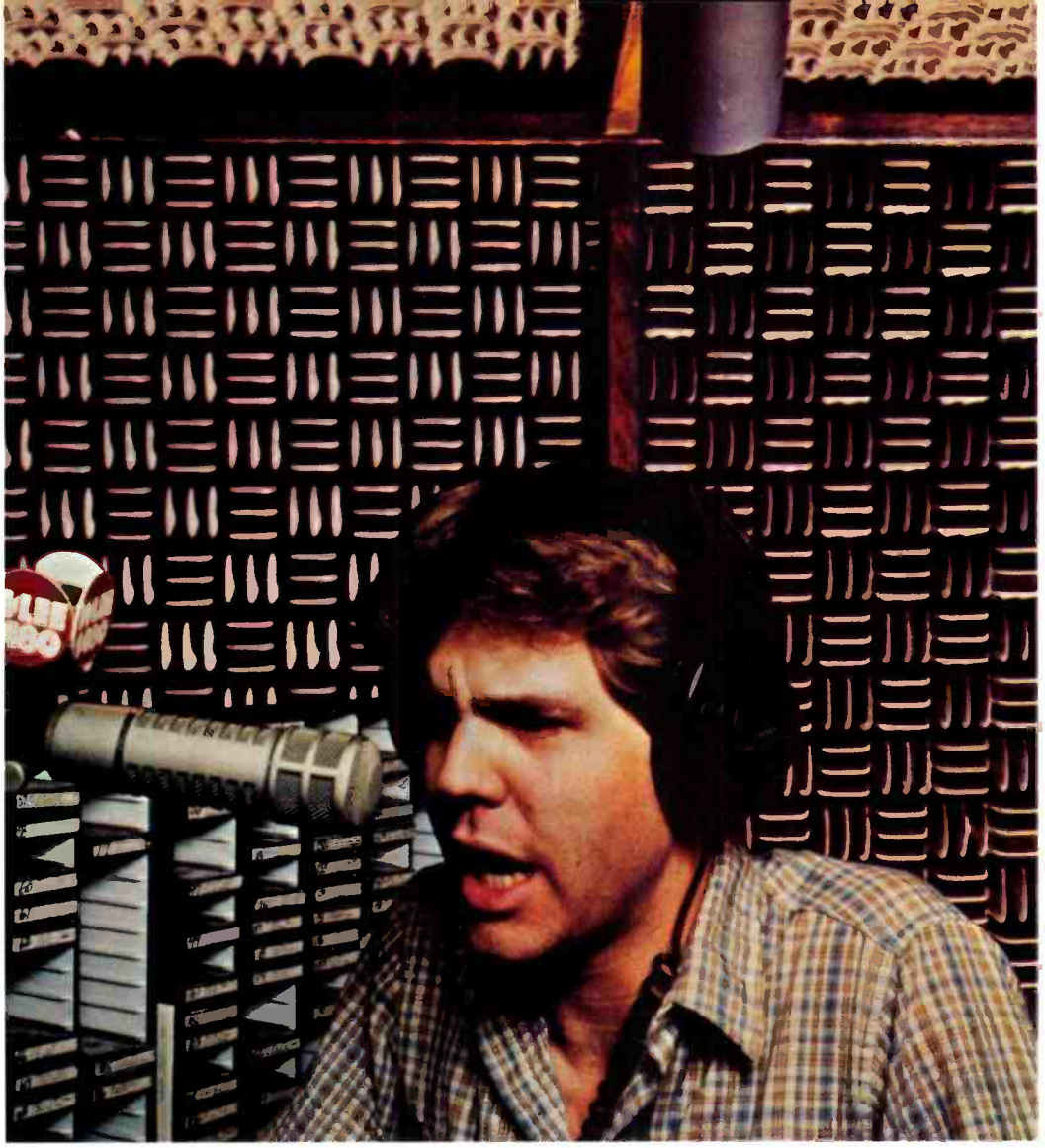
The next pass gave us our first lacquers of the day. The band asked for a playback. By the time all 15 musicians and singers had squeezed themselves into the control room, listened to the 15 minutes of music and discussed the performance, a half hour had passed. The take was good, but we all knew that we could do better. And we did. The next pass was spot-on. With thumbs up from the lathe operators, and smiles on everyones faces, we had half the album completed.

The second session started with everyone's spirit and confidence at a new high. We immediately went to lacquer even though the band hadn't played side one since Tuesday morning. This performance wasn't exactly the tightest, so we re-loaded the lathes and with no playback went right into another take. The next pass was magic; Tower Of Power truly lived up to their reputation. A nod from the lathe room assuring us of four good lacquers sent champagne corks flying.

Within three days and less than eighteen hours of studio time, we sat toasting our finished album, which was already on its way to be plated.

Acknowledgment

My thanks go to assistant engineer Mike Sanders, who provided me with a great deal of assistance and information regarding the technical aspects of the Tower Of Power session. □□□



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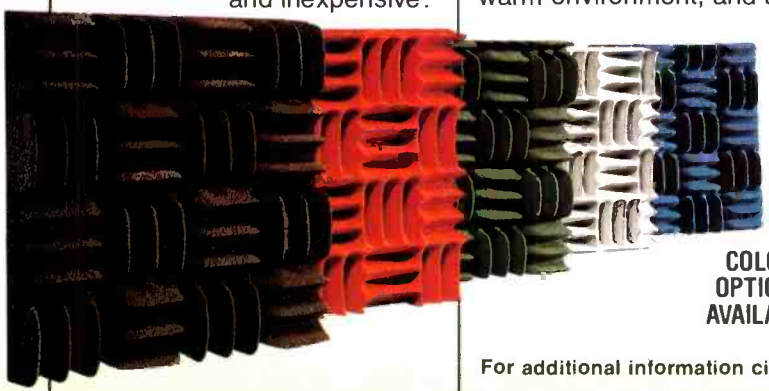

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Photography by: Kathy Cotter

The Production and Musical Perspectives of . . .

Humberto Gatica

by Robert Carr

At the age of 16, Humberto Gatica came to the United States from his native Chile, looking for the freedom to get a good job, work hard, make some money, and live a comfortable life. Little did he expect that a chance visit to MGM Recording Studios would lead him to, literally, such a golden opportunity. Humberto began work at the studios as a go-fer and janitor, and within nine short years has accumulated 22 Gold and Platinum record credits as an engineer. Artists he has worked with include Hall and Oates, Kenny Rogers, Alice Cooper, Average White Band, Leo Sayer, Lou Rawls, Denise Williams, Ella Fitzgerald and, most recently, The Tubes.

R-e/p (Robert Carr): Working with so many different producers, do you prefer ones that used to be musicians, as opposed to producers who may have been record executives, arrangers, or even engineers?

Humberto Gatica: I work with a lot of different people, but David Foster is the person with whom I do most of my work. I like what he does and we work pretty good together. He's an incredible musician, and his attitude in terms of making a record is similar to mine.

Generally, you can tell right away where the producer is at by a couple of directions he will give you. There are a lot of producers that are always waiting for what you can give them. I like to get to know them right away in terms of what they're after; I want to make sure they are pleased, but I also have to make sure I do it the way I want, and there is a way that you can have both. My case is a little different, because I'm leaning towards production. There is no way that I can sit down behind the board, never say a word, and only carry out my technical role. I always get involved when it's the right time to open my mouth.

Most of the people that I work with already know where I'm coming from and they ask me what I think. Or many times I like to find out: "What is the concept you have for this song? What kind of mix do you want to hear?" I don't want to be there for 10 hours, and then find out that's not what they want to hear.

No, it doesn't make any difference whether or not a producer has a musician background, or is an arranger or record company executive. I really respect and believe in people that are making music by instinct. There are a lot of successful producers that have a very limited music knowledge, but they have this way of knowing about feel, what kind of groove, what kind of tempo they want to establish. A creative guitarist may play a perfect lick or a line just once, but an aware producer will catch it, and say, "He only did it one time in the song, but now when we do horns, I want to catch that line and make it a hook."

Or maybe the band is just doing a rundown of the take, and somehow the tempo takes a different direction. I say, "Wait a minute! We have got something! What if we put this section here, and this part there . . . " Studio musicians are always so creative, so fast! They know exactly what you are trying to say, and many producers are so successful just doing that.

Then you have the other guy that is real musical. Everything is based on chords, the structure, how important it

When he was only 16, Mick built a studio in his basement, which later became PCI Recording of Rochester, New York. In 1971, he met another Rochester resident named Chuck Mangione. The two have worked together ever since. Mick spent a year at Act One Studios in Buffalo, then returned to PCI, before his association with Mangione brought him to L.A. in 1975. Since then, he's been an independent engineer, working with people like Peter Mclan, Cher and Lani Hall.

ON GEOGRAPHY

"The difference used to be that there were different players, different producers, different artists recording in different cities. The records out of New York were a little more hard-hitting, energetic kind of records. The records that came out of L.A. were a little smoother. Stylistically, there was a difference. Now, they're moving around, recording different parts of albums in different places. I can't tell anymore. Half the time, I see a lot of the people I know from rhythm sections in New York out here. And when I've been in New York, I've seen a lot of friends from out here there. So you can very easily be fooled into thinking something is done where it isn't."

ON STEREOTYPING

"The first year I was here, I had to work on a lot of demos for people for practically nothing to demonstrate that I could record something else besides what Chuck did, because that would give me a very limited amount of work. It took a little while to get out of that. So I had to give away a lot of time to prove it."

ON HONESTY

"I don't like second-guessing. I mean, 'Yes, well, will the public like this? Will they love this?' I can't tell. And I think that really few producers really can tell in advance if the public is going to love the record or not. I think the best thing you can do from everybody's standpoint—artist, producer, musicians—make an honest record that everybody involved with loves."

ON SPECIAL EFFECTS

"I really haven't heard anything new for quite a while. I think that was mostly all explored by George Martin and the Beatles in the '60s. Now, it's refinements on that, putting different things together, you know. I don't think that I have heard a new effect in years—a new specific sound."

ON TAPE

"3M's new formulations came out first, usually. As a matter of fact, I know that, because 206 came out before 406 did. 250 came out before 456 did. 3M's been a leader with new formulations on tape.... I think 3M is ahead. The difference in audio is minimal. The difference in durability is great. After several hundred passes through the machine, 250 still has more oxide left on it, which is a big advantage. I'm not plugging the tape to get the ad. I really am using it, finding it more rugged. That's my main point."

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For additional information circle #39

should be — the more sophisticated the better.

R-e/p (Robert Carr): He is thinking strictly in terms of theory.

Humberto Gatica: Right! To me the average person who buys records is not into music technology. Take an average 16-year-old, who hears a record on the radio and says: "Man, I love that record." If I asked him why he bought the record, he's not going to tell me, for example, "I love those chord changes!" He isn't going to care about it. All he cares about is that the record feels good, and sounds good. Believe me, kids know when a record sounds *good*.

R-e/p (Robert Carr): After working with all of these different kinds of producers, is there one thing that sticks out in your mind as really getting on your nerves? A technique or something producers do that annoys you, and which you make sure doesn't happen when you move into production?

Humberto Gatica: Yes. Overproducing. There are producers who use every trick possible in order to obtain success with a particular record or song. For example, they say to you "Let's make this piano part sound like a Doobie Brothers record." Or, "I want the drums to sound like this particular record."

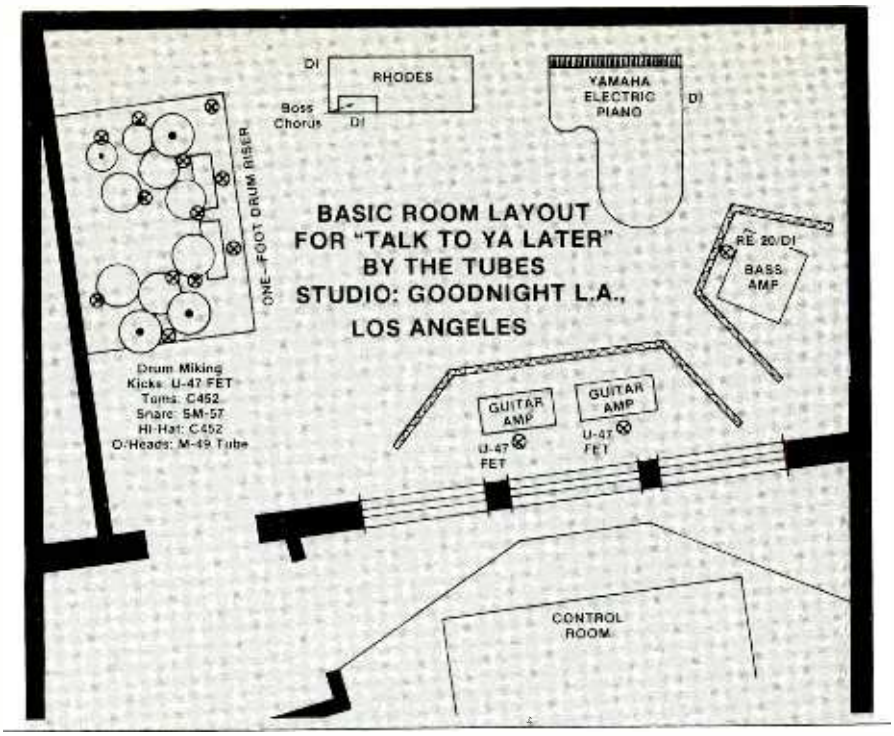
They bring in various records, tapes and cassettes, and you say to yourself, "Wait a minute, *what* does he want?" You can create confusion by trying to make a record using a mixture of different records. I don't like to do that. I like the original.

I believe music should be simple. There are kinds of music where you can use as many tracks as you want and a lot of instrumentation, and it works. There are people who have that formula down pat. A good example of a band which has that formula — and are successful — is Earth, Wind and Fire.

I have a lot of respect for their sound. I think it has always been one of the top R&B sounds I've ever heard. Quincy Jones Productions is another one: very creative, and so is the sound. If you study the structure of both Earth, Wind and Fire and Quincy Jones' instrumental and rhythm parts it all blends together. Somehow, they achieve a wall of sound, and yet within that sound is transparence. That works great!

Sometimes I run into records that pretend to be that way. They use really heavy instrumentation: for example, three different guitar parts, two or three keyboards, synthesizer parts, strings, horns, background, lead vocal, and percussion. Some of these records are simple at first, then little by little you fill the stereo spectrum with overdubbs, and you wonder to yourself,' 'Where in the world am I going to place all of these things!?"

I have always been really concerned about clarity in my records. I do anything and everything that's possible to achieve that clarity,



transparence and punch. But sometimes you have no choice, because there is so much going on, and only so much you can put up front.

On the other hand, if you place things way back in the mix without any clarity, you create another problem. For example, you may have this piece of music in which the string parts are very important. But if you don't hear them very well, somehow you're going to affect a synthesizer part that's being played against the strings. As a result, it's going to sound like it is out of balance. The same thing with background, or the horn parts, or the guitar.

There is nothing I like more than when you do a basic rhythm track with four or five pieces and rough vocals. Then you can do a pretty decent rough mix, and it already starts to sound like a finished record; you can tell this is a great tune. But a lot of producers become insecure and add too many overdubs. All they tend to get in their mind is the musical part; they're not thinking about the final mixdown. Then he says to you, "How come the record isn't as punchy as so-and-so record?" Well, the record he's referring to only has about five elements playing. Right there you immediately have limitations.

In order to make up for this lack of space in the mix, you use tricks: you EQ instruments, you blend things together, or you pan them in a way that gives the illusion that the sound isn't so big. It's the apparent level you get on tape, and the way you surround anything, that gives you the illusion that the mix is very big and broad.

R-e/p: Do you mix visually, or by feel?

HG: When I mix, I literally create a picture in my mind; I see things like placement, and depth.

R-e/p: Do you consciously try to balance one instrument on the left, for example, against one on the right?

HG: I begin to create my balance, and determine how the rhythm part should blend. I begin to put this instrument against another, to create maybe one solid rhythm part. But then if you want to separate them aurally in the mix, you can. It's a marriage of the individual parts into one flowing piece.

Also, I begin to use EQ to emphasize a part, if that's what's needed. Or if the part is too broad or too big, I begin to reduce it a little bit so that I can make it much louder in one place, without taking too much space, and being distracting. You have to be so careful that none of the little parts are going to draw your attention away from the whole piece.

I'm a very emotional type of person in a way. When it comes to mixes, I do it the way I feel. I'm not saying that if I'm in a bad mood, the record comes out bad. I just don't like to always be the same. If you take the last 10 albums that I've done, there is a consistent overall concept. But there are also very different and individual types of approach, in order to match the specific musical concept. If it's a rock album, I have a lot of ways to get into a "punch" concept. If the album is real clean and tight, the approach I use is different. And if it is an R&B project, the choice of EQ will be different. I record vocals in ways that match the type of music by choosing mikes that emphasize the particular characteristics of whatever style we're working with. For example, I don't want to have a beautiful concept album with some strange heavy digital effect on the vocals.

R-e/p: Have you had much experience with automation systems?

HG: I used to be against computers —

automation — because there's a natural feel that you put into a mix when you know you have to do a pass. You have to *perform* in the pass; whether or not the mix is right or wrong, you find out very soon. I would rather have someone like the second help me. I'll say, "Look, you do these movements in the chorus when I tell you," or, "Write down the numbers from the locator here, so we know when to make the moves. You take care of this row of faders." I would rather have another human hand helping me move one thing or another in and out. The results have always been great.

When we did The Tubes album, we went to a studio called Studio 55. They have a Neve console with Necam automation, which I believe is one of the best; I have used all the other ones since then. That was my first experience with automation on a project. The project was very involved and took a lot of hours to mix; those very creative instrumental overdubs required more time.

I found out that I had to be aware of how far I was pushing the automation in terms of how many passes we'd do. People can get totally crazy doing pass after pass. "Let's fix the hi-hat in one pass; let's do the bass drum in the next pass." And so on. I know people who make a pass for every instrument! They want to move the bass volume up and down as the song goes on. They do the same thing with the bass drum.

When you hear the final mixes, they sound fairly electronic, because you don't have any actual feel — any human movement. Well, you do have human movement, but it ends up sounding electronic; everything is so precise that you begin to lose a lot. When the drums are played, I don't care what anybody says, there are variations in the accents.

R-e/p: The emotional expression.

HG: That's the power of the record! That's what makes the take feel good. But with the computer, you can lose that so easily. Anyway, I've found that you can still get the feel if you just go for one pass; just set up your mix with the computer, and then kind of put the computer away like it's not there at all. If it doesn't feel right, do it again, but try to keep the number of passes to a minimum. From my personal experience, there is always a limitation on everything.

Sometimes the mix is not quite right. You may have been mislead by the producer, or you may have mislead yourself. I would rather spend as much energy as I can put in, during one day, and do it. If it feels right to the end of the day, that's great. If not, I would rather come back later — maybe at the end of the final album mixdown. Then it's easier to say, "I can do better, and I know why. I listened to the track at home, and *this* is the problem."

R-e/p: You have a fresh attitude that way.

HG: Certainly. But when you begin to use the computer, there's a tendency to just keep doing it. There you are for 20 hours doing pass after pass. You come back the next day, and it's the same song. You get burned. You don't *feel* it anymore; you have a mix that doesn't mean anything. Everything is so well planned that you lose the feeling. It's like a vocal take that you sing over and over. There has got to be a time when you say, "Look, I've lost it. I don't even know what I'm singing anymore." It's the same with anything: mixing and playing.

R-e/p: Having been involved with a lot of varied projects, is there one room that you seem to keep coming back to?

HG: I used to do a lot of work at Sunset Sound in Hollywood. I found it was a very easy place in which to work, and to get the sounds I wanted. Acoustically, there is a little bit of magic in that room. I've done approximately 35 to 40 albums at Sunset 2, which used to be a beauty salon. It's a square room, and fairly live, but there's something about it that gives me this sound consistency on anything I record there; any sound I want I can get in that room.

The board is fairly small, and looks like a toy to me. When I first saw it I said, "What?! You guys make records on this?" The board was designed by Sunset Industries, which is a division of Sunset Sound, and has 32 inputs and 12 outs. It has very few transformers in it, and gives me a very punchy, clean sound. I take tapes out of there and, no matter where I go, they always sound the same way.

Usually when you start moving tapes around to other studios, the room acoustics, machines and electronics are different. But what happens is that the tapes sound just exactly the same way I heard them at Sunset: the same amount of top end; the same bottom; clean separation between the instruments.

. . . continued overleaf —

The Visual Perception Of A Mix

When Humberto Gatica sits down behind a board to begin a mix, he has an explicit picture in his mind's eye of where he wants everything to go. It's not necessarily the same picture every time, because he reacts to the song, and the song dictates the final choices.

Gatica visualizes the components of a mix in terms of three-dimensional space. For example: if the lead vocal has too much echo, its resultant depth could interfere with whatever is behind it. It's analagous to a man standing in a crowd: when he takes a step backward he may walk on somebody's feet, or bump into them. It's the same, visually and aurally, in a mix. Parts require a height, width, and depth, in order to take on a *living* quality. Generally the longer the effect, like echo, delay and reverb, the farther back the part goes. Height is controlled by the range of frequencies from low to high, and width by the panning spread.

This kind of "mixing picture" can be a tremendous help for not only saving time when doing your own mixes, but also for analyzing and graphing other engineer's mixes.

Here are Humberto Gatica's impressions, approach, and philosophies when dealing with a sample mix:

"Let's consider the bass first; it rings, but not to the extent that it will make things muddy. The bass sits right in the center of the stereo soundfield — it rings, travels back, and disappears. I visualize the bass as being round and tight at the same time, and it's important to be able to hear the weight. There are so many bass sounds that vary according to the type of pickups, or the brand of strings. If I know a player well, I'll request that he begin a session with a new set of strings, or with a specific bass that I know he has. I usually boost the signal about 2 dB at 1.5 kHz, and a couple of dB at 100 Hz, as well as cut 2 or 3 dB around 12 kHz to get rid of some hiss.

"A concentrated, punchy bass drum sound also goes in the middle, along with the snare that sits right on top of the kick. These are the three most important elements in a good mix; they are the first impression someone gets when they tune into the song. If these sounds are poor, the first impression is bad, and psychologically the overall sound will be discounted.

"I like to use a Shure SM-57 on the top of the snare, and another 57 out-of-phase at the bottom. When mixed together and equalized, this sound becomes my main snare track. In addition, I'll use a third microphone — an AKG C452E with a 10 dB pad — pointed at the top of the snare, and recorded on a separate track. I'll experiment with the EQ (I usually add a lot of mid-range about 4 or 5 kHz), and blend that with my main snare sound. This isn't a strict rule. Occasionally the C452 will become the primary tone, and the pair of Shures will enhance the overall quality.

"The hi-hat is placed off to the right side. The toms and cymbals are panned across the stereo field as though I were looking at the set on stage from the audience.

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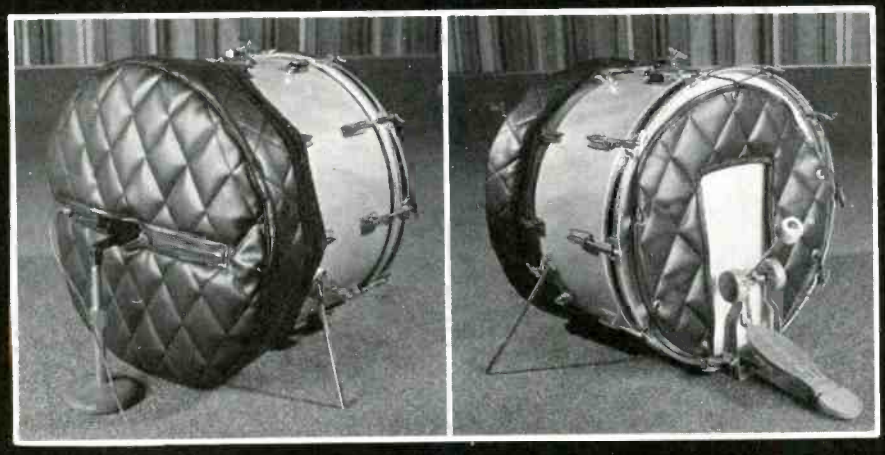

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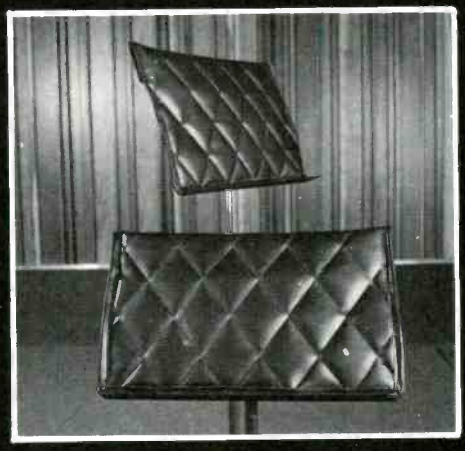

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R-e/p: Is Sunset 2 a live-end/dead-end type of room?

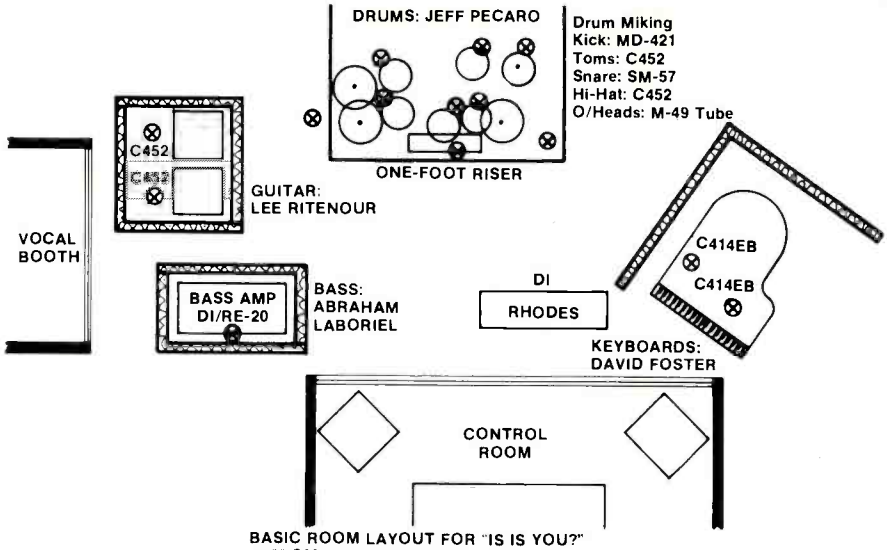
HG: This is literally one square room, with some absorbers on the wall that are like doors. You can open and close them to either deaden the room or liven it up. I experimented with the room by moving the drums from one side of the room to the other, in order to find the specific place where I can really take the most advantage of the instrument in terms of clarity.

When I go to a new room, I usually depend on seconds to tell me where other engineers generally record their drum kits, so I have a point of reference. Once I'm happy with the drum location, I request a platform. I've always been into keeping the drums away from the floor.

R-e/p: An enclosed platform that's hollow underneath?

HG: It's open at the sides and bottom, and about four feet high. That way the drummer is above everybody, looking down. It really helps.

R-e/p: Do you ever have a problem with resonance in the space beneath the riser?



BASIC ROOM LAYOUT FOR "IS IS YOU?" FROM LEE RITENOUR'S ALBUM *RIT*
STUDIO: MONTEREY STUDIOS, CALIFORNIA

HG: Actually, when you put the drums right down on the floor, there is a lot of low-frequency waves travelling along the floor, too. Even though you can cover the bass guitar amp, or build a little house around it, those bass notes can still interfere with the bass drum. Or many times the toms will start to vibrate when the drummer is doing this number. [Gatica starts beating out a straight quarter-note bass drum rhythm with his foot.] Or the bass drum can leak into the piano or guitar.

All that stuff begins to get picked up in the mikes, especially when I'm using 12 or 13 on a kit. Using a platform gives the low frequencies a chance to kind of travel down and spread out in a way that never reaches the other instruments, or open mikes.

Sometimes we put carpet not on, but around the platform, so the bass never gets picked up by the other instruments at all.

R-e/p: It gives the instrument a chance to couple with the room, and the sound grows.

HG: Exactly. You can really notice that quality on violins; all strings, in fact. The concept can be applied to drums and other instruments. We often put amplifiers on top of chairs, so they "breath" more. You begin to get more room sound, and a cleaner result, as opposed to miking something on the floor. I like to do that even when I mike close things.

R-e/p: I would think that raising the drummer would also be great from a psychological point of view; it would make him feel like he's performing.

HG: That's very true. It makes him feel like he is in control, and everybody can see him. Eye contact is very important, and I find the platform works fine.

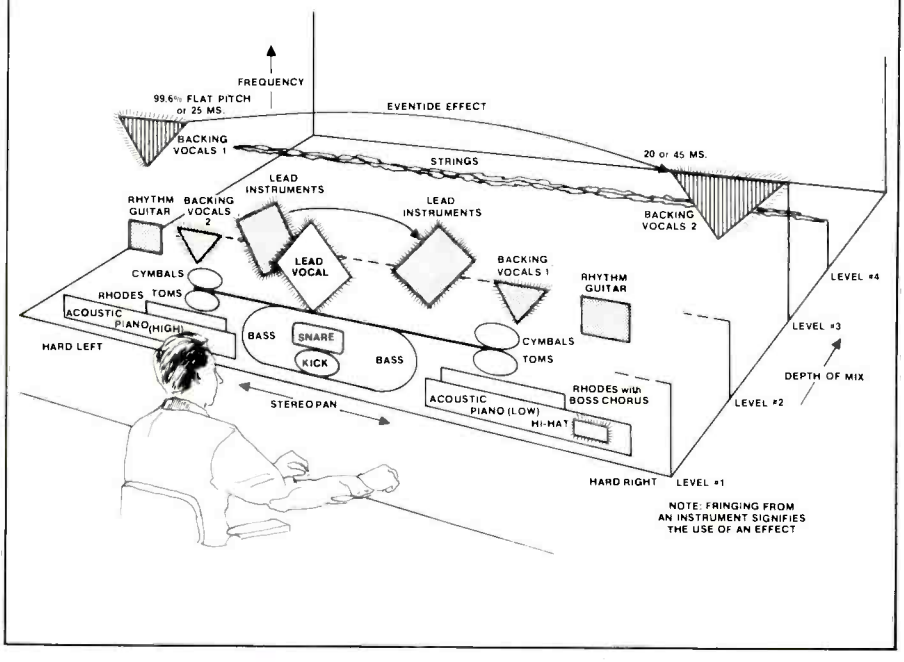
R-e/p: On the recent Bernie Taupin album you acted as engineer and producer. Is that what you plan on doing in the future? Or would you hire an outside engineer to handle the technical chores?

HG: No, there are two aspects that I want to handle when I move into production. One would be to lay down the basic tracks, and establish the sound pretty close to the way I want it to be. And the second is mix it. For the rest

The Visual Perception Of A Mix

"Background vocals are two distinct signals. I can achieve the effect of a full wall of sound by running them through a stereo Eventide H949 Harmonizer. The vocal track on the left is set a little flat at 99.6% pitch shift, and the signal on the right has a slight delay of 20 or 21 milliseconds. This creates the illusion that they are connected by a solid line, yet you can hear them as two separate tracks. It makes the vocal very 'thick'.

"I hear the lead vocal being right in the center of the mix, and up front, but it must have a depth to it. What helps me the most with that aspect is the EMT 250 Digital Reverb. I can dial in a very short reverb time so that it sounds like a perfect resonance in a normal room — a natural room sound. On top of that, I use a short echo. Actually, there is plenty of echo, but it disappears very fast. Occasionally, I'll use the Lexicon DDL for that. I want just



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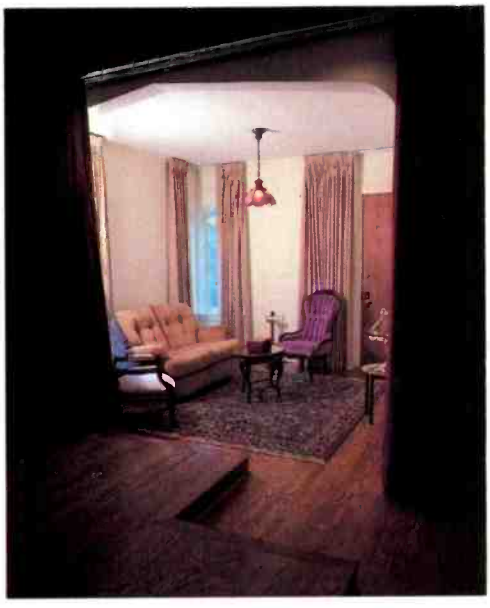

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For additional information circle #41

The Visual Perception Of A Mix

enough echo for some depth — a third dimension — but not enough where it will run into the background vocals that are making the line behind it.

"Sometimes the lead vocal and backgrounds end up just a little too close to each other. That placement is good if I want to make the vocals blend for a group sound. But if I want to separate them to make two distint parts, I increase the delay time to 25 milliseconds on the left, and 45 milliseconds on the right for the vocals in back. In essence, it's like telling the singers to step back a few paces, and sing their part from there. There's a slight additional ambient kind of sound on the track that detaches the two vocal parts.

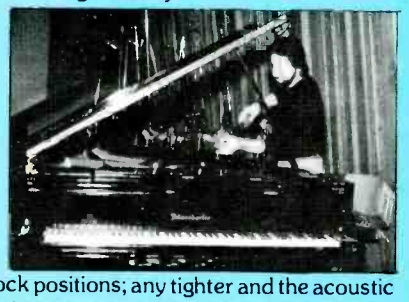
"One thing you have to take into consideration is the definition of their enunciation. That can be taken care of by playing with the EQ, and making the part cleaner. The farther back anything goes, the more mushy it becomes. I like distance and clarity together. Less lows and more highs seems to achieve that.

"Even though I have a strong background in the technical aspects of recording, I am not a technical engineer or producer. I like to do things by instinct. I know how to use the equipment, and what the limitations are, but I'm not crazy about using effects all the time. I pull them out only for specific reasons. Using outboard gear wisely, and only when it's effective for the record, is one of the secrets of a good mix.

"There are several songs on The Tubes' album where two background harmony sections are singing at the same time; 'Let's Make Some Noise' is one case. By placing the first set of background vocals way in the back, as we discussed previously, the second section can sit right in between the lead singer and the distant vocalists. Choose the right 'short-amount' of echo for that middle spacing, and maybe utilize another stereo Harmonizer for the fullness, but omit the delay. Contrasting effects or combinations of effects aids in defining a part's space in the mix.

"The second set should also be a bit tighter towards the center, but not so much as to squeeze the lead vocalist. He needs room on either side to breath, just as he would in real life. In the absence of a second vocal section, that same area is often a good location for percussion, horn lines, or a synth line. It's pretty flexible.

"If there is a sustained string or synthesizer part, I picture that as a long, smooth line way in the back. The effect requires a very long echo or digital delay.



"Acoustic piano works well up front — dry with no effects — and positioned as though it were being viewed from the audience. I mike the piano towards the center with two mikes about one-foot apart, and about one-foot above the strings. The bass microphone is angled approximately 30 degrees, while the treble mike is facing straight down. This technique gives me the capability of spreading the piano out across the entire front of the stereo spectrum. I'll pan only the acoustic and strings to the 7:00 and 5:00 o'clock positions; any tighter and the acoustic piano will start to sound mono. (The mikes are only a foot apart.) By their very nature, the strings need the space.

"The mono Fender Rhodes signal is also spread, and set right on top of the acoustic, but not to the extreme left and right; the setting is more like 9:00 and 3:00 o'clock. For contrast, I'll run the right side through a Boss Chorus effect. The same effect on the left would be masked by the attack of the high acoustic notes. The Boss Chorus seems to stand out better against the bass side of the acoustic grand.

"Rhythm guitar fills the space about 9:00 and 3:00 o'clock. A lead guitar, sax, or synth fits well just to the left or right of center — never in the middle. That's only a personal preference. I like to keep the lead instrument at least a short distance from the bass and central drums.

"Many times the producer will say, 'Let me hear such and such an instrument louder.' The simple thing to do is to crank up the volume. It's not necessarily the best way, however, especially when the track sheet lists everything in the studio.

"I EQ the trouble parts so that they sound hot by boosting the mid-range (5 to 7 kHz) a couple of dBs. That tends to create the illusion of loudness within a small space. For example: a guitar that takes up a lot of space can be reduced in level at the fader, but compensated in audible or apparent level by boosting the mid-range. The result is a thinner guitar that still jumps out of the mix.

"Boosting the low frequency, on the other hand, does increase the line level as well as the audible level. By adding 8 dB at 100 Hz, a snare drum level will increase incredibly. Another 4 dB at 10 kHz creates a real tight, aggressive sound with a lot of impact. The fader has to come down. The 100 Hz setting is for tone and volume, 10 kHz the attack. In this case, I'd probably give it two more dB around 5 kHz to keep the overall sound consistent. It's really all a matter of taste.

"I've worked with a number of producers who look at the board and tell me the settings don't look right. I try to remind them that where the knobs are doesn't mean a thing. If the music sounds right, and feels right, it is right." □□□

of the recording there is a number of very talented second engineers who never get the chance to work independently. I would just call one of them and say, "Look, overdub this thing for me. I don't want to worry about it."

Of course, I will always be aware of what kind of sound I want to hear. The advantage an engineer has when he produces and engineers himself, is that he bypasses that middle communication with an engineer. You can do things fast. If I'm producing, let's say, a rock and roll band, I know what kind of vocal sounds I want to hear when I get to mixdown. I know what kind of drum sounds I want when I'm playing the track, and how much room I'm going to use. It's easy for an engineer/producer to get those sounds without spending quite a few hours trying to understand what the producer hears in his head.

I always think about how the record is going to sound when I sit and listen in my house. I want that record to sound so clean and well balanced that it's incredible. I relate to how it is going to sound on an average stereo system.

R-e/p: Did you use that criteria with the single, "Is It you?" from Lee Ritenour's album Rit.

HG: With that I think "Radio." "Is it You?" was one of the most R&B orientated tunes on the album. Basically the rest of the album was done for the home, but now FM radio is as popular as AM. FM and home systems is what its all about. But for this single I was thinking about just regular straight-ahead AM radio, and a lot of air play.

R-e/p: What does that concept translate into, in terms of what you did on the record from an engineering standpoint? What did you do with "Is It You?" as opposed to the rest of the songs on the album?

HG: I brought instruments more upfront. Things on AM radio tend to get lost if they are placed to the extreme left and right. For this single I kept things tighter, because I didn't want to lose the unique guitar parts that form the hookline. The guitars are played together with a flugel horn. I brought those really close together, and created kind of one sound within. But always making sure that Lee's guitar was on top.

Many times I boost the upper end a little bit for radio. You begin to approach things with a little bit hotter EQ, so you always make sure they sound nice and clean. Possibly my car has a good sound system, but somebody else may have a VW with just one speaker that's very funky. You balance things so that they sound good even on bad speakers.

For instance, echo gets lost on the radio. If fact, considerable amounts of echo sometimes gets totally lost. Actually, when it goes on to the record, echo begins to sound a little bit different

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from the way you had it in the studio. You learn to compensate.

There are people that mix records exclusively for radio. When they go in the cutting room, they add overall EQ for radio. Again, a good example of that approach is Earth, Wind and Fire. Their concept of mixdown is based on how good it is going to sound on the radio.

R-ep: Ritenour often plays in stereo through two amplifiers. Do you tend to collapse the stereo guitar, too? A lot of times if you try and reduce a stereo spread to mono, it just doesn't work at all.

HG: No, but you can do a lot of tricks. For instance, Lee has a stereo guitar. What I do sometimes during mixing is to use just a bit of digital delay that returns left and right to the console — in other words, one DDL send and stereo returns. You can do the same thing with this new Eventide H949 Harmonizer. I have a specific setting where I can give the illusion that whatever is on the right side seems to appear on the left side as well. I set up a real close delay to the opposite side from which that instrument is panned, and create a line.

R-e/p: So instead of two separate sounds, like a call and echo, you have a very short delay time that gives the illusion of the sound actually traveling from one side to the other. But the sound appears continuous — not as two distinct sounds?

HG: The sound can travel very fast, and is always thick, or I should say stereo.

R-e/p: Do you just have the sound panned left and right, or do you have it actually left, center, and right?

HG: On Lee's guitar I always have it panned hard dead left and right, because of that delay effect that I put on it. The amount of delay is so small that it is hardly noticeable. It just sounds like one thick stereo guitar, as if the guitar is actually on three tracks: left and right, and a little bit in the center. So it will never get lost.

While mixing, you check how it is going to sound when you collapse the balance to mono. When you flip into mono you lose echo immediately. So you have to always be aware of the effect and check things like that. But it gives you a pretty good idea of how things are going to sound when eventually they're played on the radio, or a single-speaker system. There are many cars out there that have FM that comes out of only one speaker.

So right away when I hear the word "single," my approach is a little different. If there are five potential singles like that, I will put the same care into all five of them. It doesn't mean they'll be treated any differently from the other tracks on an album, but I add a little bit of detail that perhaps no one will ever notice; such embellishments are meant to make the mix work when played on an average system.

R-e/p: Can you be more explicit in terms of what kind of reverb or echo settings do you use, for example, with the guitar, in order to get that feel?

HG: The new H949 Harmonizer has two sections of delays that run from 6.5 to 200 milliseconds. One side is totally delay, and the other is a pitch control, which also has several choices of delay. You can have the pitch go up or down, and then put delay on it, so that it sounds like it's real far away.

What I did with Lee's guitar was to set the pitch side to 99.6% — just a little bit flat. On the other side I use approximately a 20 millisecond delay time. What I create is the illusion of a litttle bit left and right movement, like a shift from one side to the other one. But very smooth. The only way you can tell it's happening is to hear just the output of that particular effect.

If I put the bass guitar through such an effect, you begin to hear that the bass has been drastically shifted from left to right.

Overdubbing?

"... the one stage in the recording process that's a little boring ... I don't enjoy babysitting a fader 10 hours a day in the studio!"

R-e/p: Do you always use that effect on bass?

HG: No. I pick the bass because it is the most consistent instrument to balance my effect; that's what I use to establish my left and right, and make sure the Harmonizer is working properly, since the bass plays a lot of sustained notes. I use it as a reference, and then take the bass out of the effect.

Many times I use this effect on guitars and background vocals. It gives them a nice hi-fi quality. And, by using this particular effect on background vocals, you can create a consistent and broad sound.

R-e/p: You have been doing engineering for nine years now. Is the reason that you are moving into producing because you feel there is no real room for growth in straight engineering?

HG: No. I used to think that way, but I have noticed that within me there is a sense of always wanting to be more creative. I feel that I have a good instinct for making records, and it's the only way I can be in control of what I want to hear. Many times while doing sessions you wonder, "What are these people doing here? What are these people doing spending all this money?" When you really know that this record is never going to make it! I'm getting tired of being in studios where people waste money. I want to be more creative, and I know that I can still do my engineering; I'll still do it.

There's one stage in the recording process that can become a little boring: overdubbing. I don't like to spend 10 hours in a day doing a guitar solo! Or background parts, where people are searching for different parts, and there I am just babysitting the fader for 10 hours at a stretch. First of all, it costs a lot of money for producers to have a guy sitting there in the control room. Many times I like to just get away, unless it's something that I really want to be a part of from top to bottom, and not let one little thing go.

Many times I work into a project where I'll say: "I'll cut the basic tracks for you, and I'll mix it. But I'm going to have this other fellow do the overdubs for me." I still supervise the overdubs, and give them input on how I want to hear the horns or lead vocal. I still have input during the overdubbing. There are a few producers that work with me that way. So I'm not burned out from doing two months of overdubs, and I can be more creative during the mixdown.

R-e/p: On the .Rit *album you worked with a Linn Drum Machine. How easy was it to work with, or do you prefer a live drummer . . . ?*

HG: There's nothing like having a real drummer in the studio. My impression is that the Linn is one of the best drum machines around. It's extremely clean and flexible because it is possible to record everything separately. I wouldn't use it for more than two or three cuts on an album; it gets a little bit too stiff after a while.

R-e/p: I could pick from the album which tracks were live percussion, and which were drum machine.

HG: Right, that's because the Linn was taken direct. Here you have this machine that can do anything you want. There are endless possibilities. The Linn is perfect for writing songs, and for experimenting with different feels.

The only problem that I've experienced so far with the Linn drum machine is that it's so tight and mechanical, that you become used to hearing the consistency on a demo tape. Then when you begin to cut basic tracks, you gain the natural feel of the drummer, but usually you lose some of that consistency in tempo that you've been hearing on the demo tape.

□□□

Hz is due both to irregular amplitude response, and to network characteristics.

In the case of the time-compensated Altec 604, we note that the acoustic centers of high- and low-frequency sections are precisely aligned. The small bumps at 500 Hz and just above 2000 Hz are likely due to irregular amplitude response in these areas. Below 250 Hz, all the group delay curves show a marked increase in delay. This is due to the inherent low-frequency roll-off of the systems.

In the design of the JBL 4430 (and 4435), the step in the group delay curve was used to advantage: it made possible an optimization of vertical off-axis response for listeners located on or above the normal axis. Details of this offset are shown in Figure 2, and the resulting normalized response curves in Figure 3. Because these systems are not coaxial, there are bound to be certain vertical off-axis angles that will exhibit phase cancellations. As the curves in Figure 3 for 10° and 20° upward show, smooth response can be maintained over a wide vertical area because of the time offset.

If one accepts the Blauert and Laws data, then time-domain alignment takes its place in the general design equation as a variable to be balanced along with flat axial response, smooth power response and a concern for proper driver protection. □□□

References

1). J. Blauert P. Laws, "Group Delay Distortions in Electroacoustical Systems," *Journal of the Acoustical Society of America*, Vol. 63, pp. 1478-1483 (May 1978).

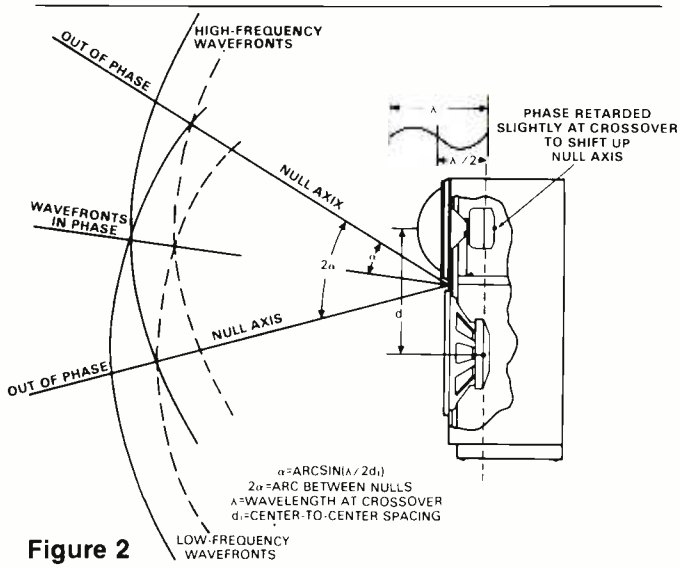
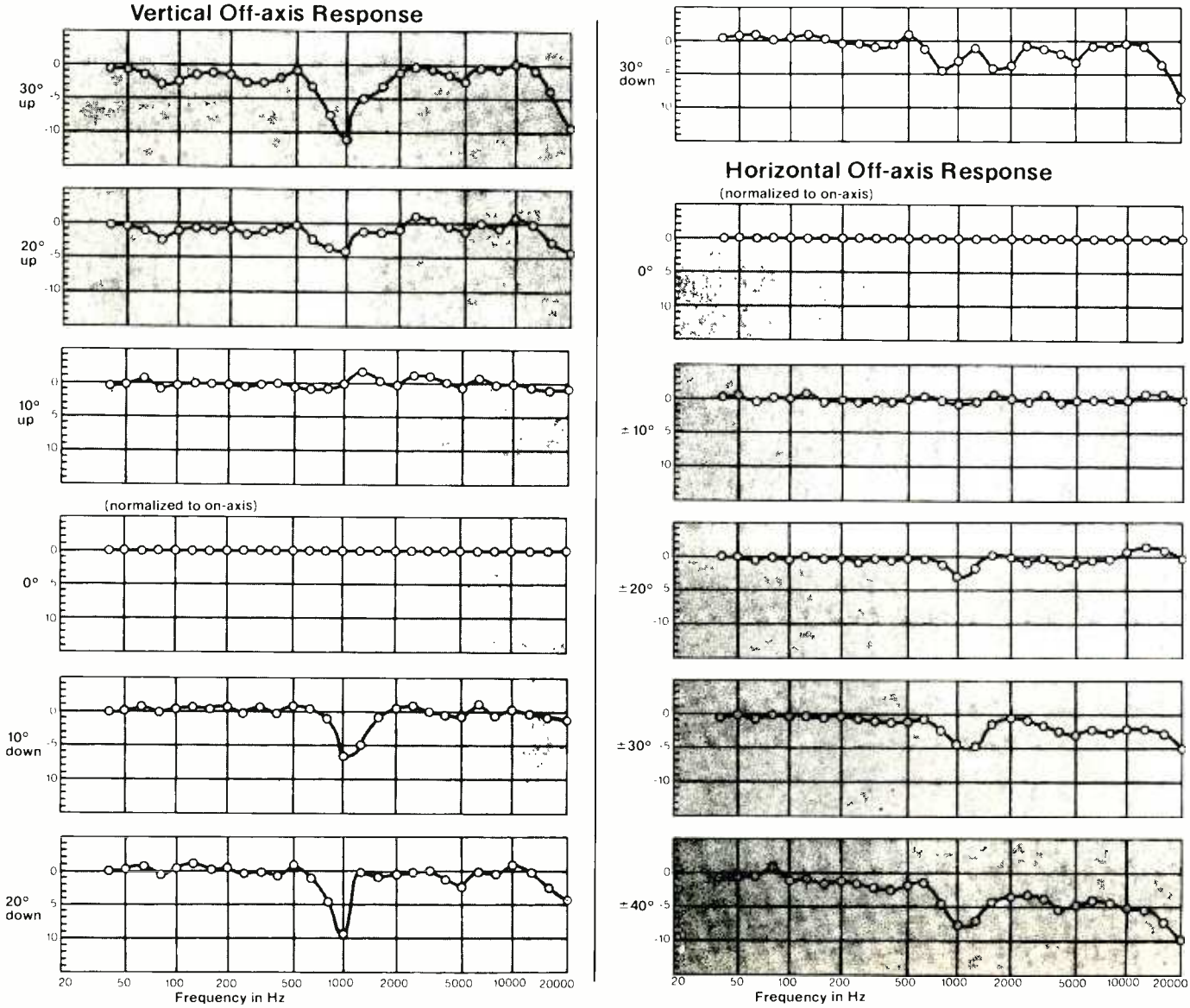


Figure 2

Figure 3



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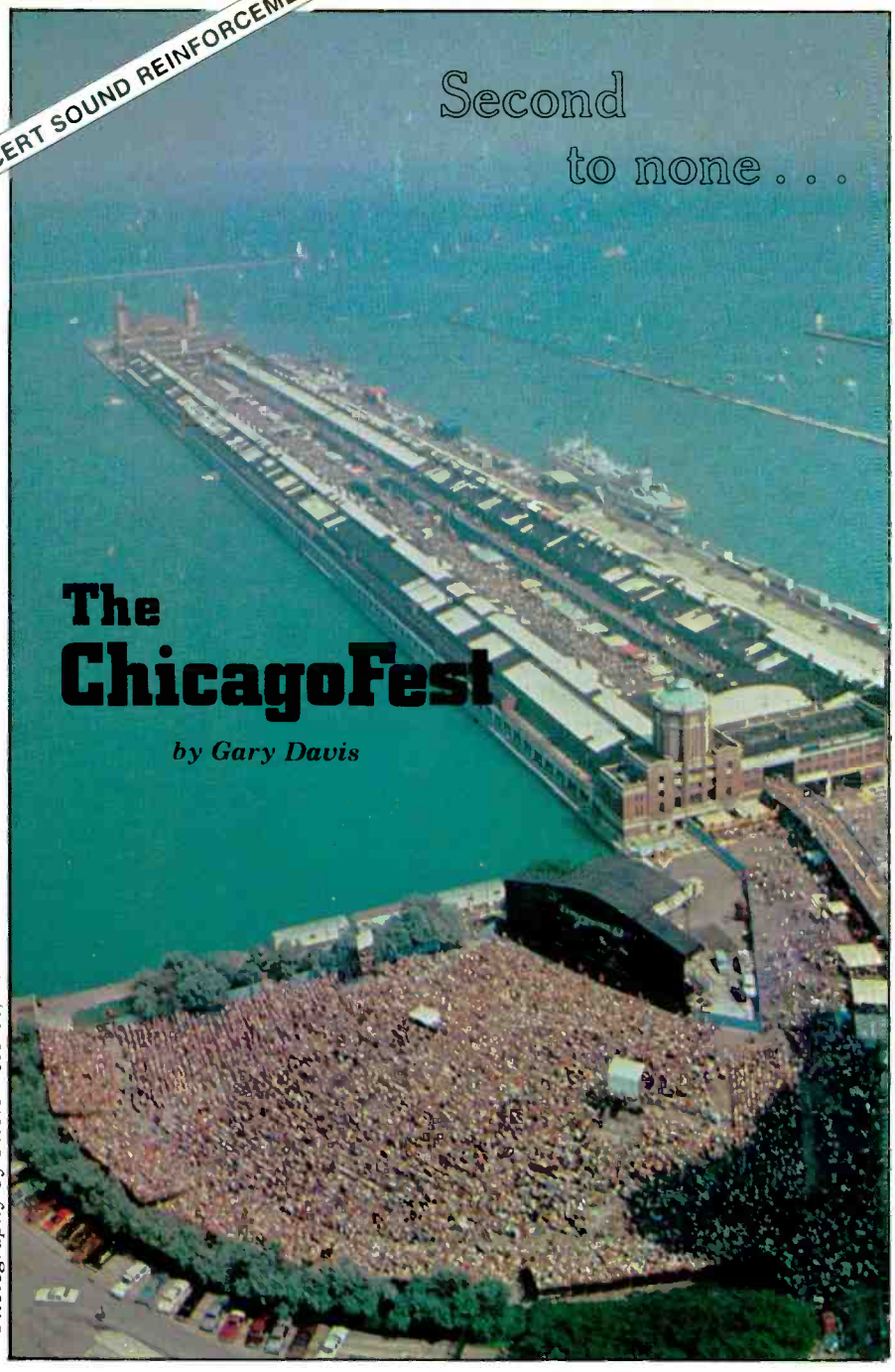


Photography by Photo Reserve, Paul Nutkin . . .

The ChicagoFest

by Gary Davis

I took off for the *second city* knowing virtually nothing of ChicagoFest. I imagined that it would consist of a large stage with maybe 25,000 to 50,000 people listening to afternoon jazz or rock music at some lush green park. My conception could not have been less correct.

ChicagoFest was billed by its promoters as the country's largest musical festival, which is undoubtedly so. The event spans twelve days, with between 350 and 450 acts playing on 14 different stages located along Lake Michigan's huge Navy Pier. Over a million people participated in this fourth year (125,000 plus on Saturday, August 1, the day of *R-ep's* visit). Audiences were to consume $3.3 million worth of food and drink, sold by major brewing and soft drink sponsors, as well as 70 Chicago-area restaurants that set up portable kitchens. In fact, of nearly 8,000 people working at the Festival, approximately 7,000 were vendor personnel. These statistics are offered to communicate the vastness of the Festival, which in turn is helpful in understanding the scope of the planning and production required to stage the event.

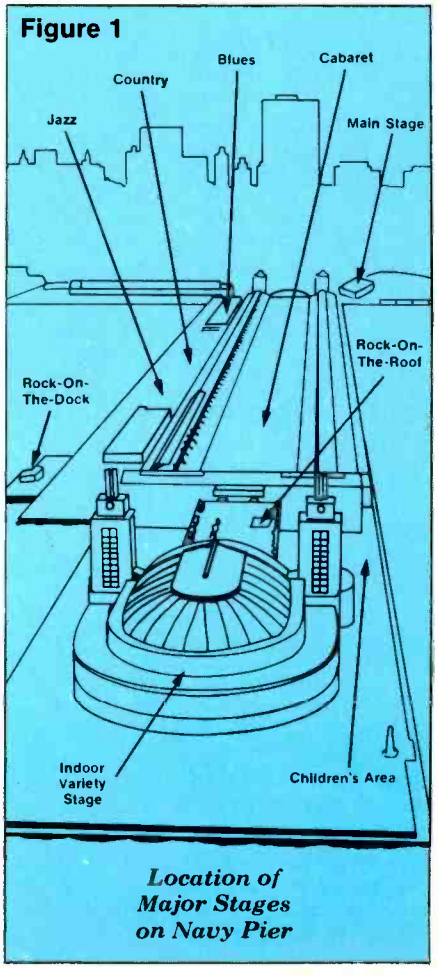
The Navy Pier is over ⅝ of a mile long by 350 feet wide by two stories high (actually three stories, counting the roof stages). An adjacent land area accommodates the 18,000 seat main stage, ticket booths, and a handful of additional concessions. The City of Chicago not only sponsored the festival, but its Mayor also got top billing. "Mayor Byrne's ChicagoFest" was displayed on all the posters and literature. The city cooperated by providing a security force of up to 540 Chicago Police at peak times (making ChicagoFest's police force the 15th largest of any in the U.S.). With added private security guards, things ran very smoothly, despite the 150,000 cups of beer sold to the crowds each day.

Simultaneous Performances on Nearby Stages Posed Challenges

About a dozen stages were located on the pier itself. Each day, from noon to midnight, the stages were booked solid with various performers or groups. There were also 13 radio stations on the pier, most in outdoor gazebos with sound systems "broadcasting" to the nearby crowds. Naturally each act wanted its sound to be plenty loud, and the relatively close proximity of all these sound systems made it a real challenge to please the fans, while avoiding cacophony.

With three exceptions, the sound systems were provided by one contractor, who used various setups to satisfy the different coverage requirements and different types of music being performed. This article would be too long and repetitive if we were to detail each and every stage's sound system. Table 1 lists the various stages and approximate coverage areas.

The pier layout shown in Figure 1 illustrates the difficulty of obtaining adequate coverage without getting too



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THE CHALLENGER

Phil Dudderidge • Graham Blyth

much sound overlap between stages. Not detailed on the diagram are most of the radio station gazebos, which were located primarily along the pier's central corridor, mixed among food vendors.

Sound reinforcement systems for most of the stages were engineered by Bridgewater Custom Sound, a local contractor hired by Festivals Incorporated, who produce ChicagoFest. Bridgewater handles Bose, E-V/Tapco, Audio Technica, and Biamp, the equipment used predominently at ChicagoFest. Sound for the Main Stage and Rock-on-the-Roof stages was handled by dB Sound, Inc, Chicago, another local contractor. Bruce Gordon of dB Sound says that at the time he had four major systems on tour (with REO Speedwagon, Heart, Kansas and the UNESCO Music Festival), so his company sublet a lot of equipment from TFA (Los Angeles) for the Main Stage.

CHICAGOFEST FINANCES

Because economics of the ChicagoFest may be of interest to engineers and producers, we gathered the following basic statistics. The 1981 production budget was $5 million, of which $1 million went toward entertainment. Only a part of these funds came from the gate; 180,000 one-day tickets were sold at $4 each, the remainder being sold at the gate for $6 a day.

The balance of the income came from a number of sponsors, including several brewing and soft drink companies (Augsburger, Hamms, Miller, Olympia, Pepsi Cola, and RC Cola), who each paid up to $75,000 to sponsor a stage. Coca-Cola paid for half a million brochures, and Chrysler Corporation donated a dozen new cars to transport VIPs (the cars were later raffled to raise more funds). The Festival collected a commission of 20% on the estimated $3.3 million in food sales, and of course there was a sizeable income from food and hotel taxes on the out-of-town visitors. (The Chicago Convention & Tourism Bureau cites the ChicagoFest as having raised August to their #1 tourism month.) The city says it will use the profits to finance a needed $250,000 refurbishing of the Navy Pier; ironically, this may mean the Festival must move elsewhere next year amid the pier's reconstruction.

Major promotion was also provided by the 13 radio stations that had booths and did many live remotes from the Fest. In addition, local TV stations did a handful of remotes as well.

Table 1: General Description of ChicagoFest Stages

Site	Coverage Area Dimensions	(Approx) Sq. Feet	Est. Size Audience	*
Blues	100'×154'	15,400	3,000	O
Country	100'×154'	15,400	3,000	O
Jazz	100'×154'	15,400	3,000	O
Rock-Around-The-Dock	100'×154'	15,400	3,000	O
Rock-On-The-Roof	220'×75'	16,500	2,000	O
Comedy	120'×60'	7,200	1,200	I
Cabaret	120'×60'	7,200	1,200	I
Childrens	100'×50'	5,000	250	O
Gazebos	100'×50'	5,000	250	O
Variety	130'×140'	18,200	2,500	I
Senior Citizens	180'×75'	13,500	1,200	I
Main	275'× from 144' to 385'	75,000	18,000	O

* O = Outdoor; I = Indoor

The Rock-Around-the-Dock stage was handled by Southern Thunder Sound.

Blues, Jazz and Country — Three Identical Stages

The Blues, Country and Jazz stages were all lined up on "ground level" along the east side of the pier. The three stages were about 380 feet apart, with only a 200-foot buffer zone between audience seating areas. Making coverage particularly tricky, the seating consisted of ballpark-like bleachers that rose up to one story above the stage; close behind the bleachers was the wall of the pier building's upper story — a hard, reflective surface. (Doors in this rear wall also led to an indoor arcade area, where additional fill speakers were used during major performances.)

Each of the systems used for these three stages consisted of a Tapco 7416 mixing console, Biamp Systems 270A or Tapco 2230 third-octave graphic equalizer, 26 Bose 802 speakers with one channel of Bose 802-E equalizer per mix, seven Bose 1800 power amplifiers, and an assortment of Audio-Technica and E-V microphones (Figures 2 and 3). No compression or limiting was used. All lines were balanced, with rubber-jacketed multi-pair snakes being used to connect stage mikes to the mixer. The on-stage mike cables were Pro Sound Lifelines, a type Jay Bridgewater says he doesn't mind paying extra for, because the Switchcraft ends are potted

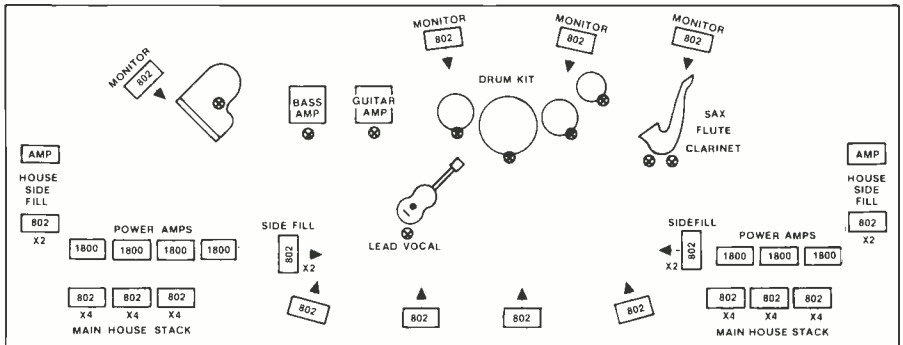

Figure 2: Jazz Stage Layout.

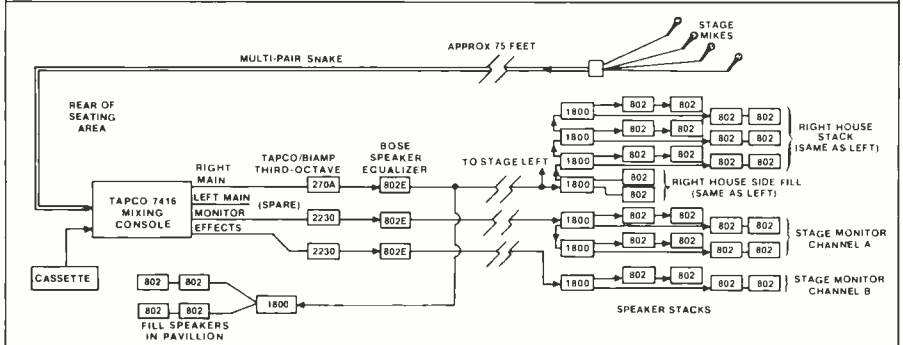

Figure 3: Sound System block diagram for Jazz Stage.

in epoxy and covered with shrink tubing, making them very resistant to abuse and moisture. (It has been known to rain in Chicago.)

The 16-in/stereo-out Tapco board provided a mono house mix, the second output being reserved as a spare. The mix was fed from the back-row mixer up to on-stage amps, two main stacks of 12 speakers each, plus two audience side-fill speakers. Two-channel stage monitoring was accomplished using the monitor bus plus the effects bus of the Tapco board, connected via third-octave EQ and Bose EQ to about 12 additional Bose 802's powered by three Bose 1800 amplifiers.

It should be pointed out that, as a condition in the performer's contracts, no group was allowed to bring its own sound system. In some instances, however, groups did specify certain effects devices, etc. As a result, each sound system provided at the Fest had to be suitable for use by a variety of acts.

Concert-Sound Loudspeakers and Amplifiers for ChicagoFest

Could Bose's direct/reflecting home stereo speakers even be considered for an out-of-doors music festival? Obviously not, but the company does have another line of professional products.

The Bose 802 speaker does not utilize the direct/reflecting principle. Instead, eight full-range, 4½-inch cone-type drivers are mounted in a ducted-port enclosure of mica-filled structural foam construction with integral stacking grooves. Single unit dispersion is 120° horizontally by 100° vertically; stacking four units narrows the vertical pattern to 40°. The speakers have snap-off covers that also serve as a stand when it is used as a slant monitor. Sensitivity is 98 dB from 1 watt at 1 meter in the mid-band, falling off to 89 dB if rated from 40 Hz to 16 kHz. Rated at 160 watts continuous sinewave (300 watts program power), the 802 requires that an 802-E equalizer be used ahead of the power amp to broaden the frequency response. (The EQ has a +13 dB peak at 70 Hz, and a gradual rise above 800 Hz to an 18 kHz, +17 dB peak.)

The Model 1800 power amp is a 2-channel, rackmount unit rated at 400 watts continuous average (RMS) per channel into 4 ohms. It features 14 output devices per side, modular circuitry, LED peak output displays, dual fans in its transit case, turn-on delay, and current limiting protection. ChicagoFest was done largely with modular setups of a Model 1800 driving four 802's: two 802's in parallel per channel. Only one 802-E equalizer was required per mix.

Used for a small cabaret stage during ChicagoFest was the Bose PM-2 Powermixer, a six-mike plus one-line input/dual-mono output mixer, which includes a built-in Model 1800 amplifier, 802-E speaker equalizer, and three-band ParaGraph parametric EQ. Its mating Model EX-6 six-channel expander was also used.

The Jazz/Blues/Country Systems

Much to this author's surprise, sound coverage was excellent throughout the seating and standing area for each of these three stages, there being minimal overlap of adjacent sound systems. According to producers Lou Volpano and David Asher, of Festivals Incorporated, in past years it had proved difficult to obtain adequate coverage using horn-loaded systems; unless, that is, they were willing to accept spill into the adjacent areas. Valpano and Asher were very pleased with the coverage that Bridgewater obtained using Bose 802's, which are full-range direct-radiating speakers. Volpano also was reported to be pleased with the compact stacks, which allowed an extra 16 feet of useable stage with a correspondingly wider view angle. Their light weight — 37.5 pounds per speaker — required far less rigging. Because setup of the entire Fest took the union crews (at about $1,000 per hour) just two days, and they tore it down in six hours, Festivals, Inc. enjoyed a significant cost savings.

Regarding the system's frequency response and dispersion specifications, Jay Bridgewater says that during initial setup before the Fest, an Ivie IE-30 real-time analyzer was used to adjust the third-octave graphic equalizers for flat system response between 80 Hz and 1 kHz. The EQ was attennuated by 12 dB on the 63, 50 and 40 Hz bands, creating an 80-Hz cut-off to eliminate possible non-musical stage noise from the mix. Also, a 3 dB per octave roll-off was set above 1 kHz. The Bose equalizers, used to flatten the frequency response of the Bose speakers, followed the graphics.

Using the IE-30 analyzer and pumping broadband pink noise through the system, Bridgewater and Bose personnel measured the frequency response and SPL at the mixer's position (last row of seating area), and all along that row. They claim that the measured response was flat to within 5 dB from 80 Hz to 10 kHz, not only at the mixer, but across a 102° included angle from stage center. (This performance should not be equated to a polar dispersion specification, because Bridgewater walked the analyzer in a straight line parallel to the stage front, not in an arc, thereby increasing the distance near the edges of the measured area. Polar response was probably a dB or so better than the figures quoted above.) While we were unable to confirm these figures — having no test equipment with us — the Bridgewater/Bose claims do seem realistic based on careful listening assessments during various concerts.

Mixing Booth for Rock-Around-the Dock Stag

Sound levels were measured both with broadband pink noise, and during actual performances. The Ivie's SPL meter was used in three modes — "slow scan," "fast scan," and "peak scan" — corresponding to long-term average, short-term average, and instantaneous sound-pressure levels. Pink noise measurements were made after turning the gain up to the onset of power amp clipping, and then backing off about 1 dB. By comparing peak to slow scan SPLs of pink noise, one can obtain a reasonable idea of the headroom available. By comparing these same numbers during actual performance, one can assess how much headroom was actually used (or how much clipping was acceptable).

In practice, the pink noise and live show figures given in Table 2 were identical on all but the Blues Stage, where the presence of more guitar amplifiers, etc., raised the levels a dB or so.

Table 2: Measured Sound Levels At The Mixing Board (Last Row)

	dB SPL, Pink Noise		
Stage	Slow	Fast	Peak
Jazz	103	108	118
Country	103	108	118
Blues	103	108	118
	dB SPL, Live Show		
Stage	Slow	Fast	Peak
Jazz	103	108	118
Country	103	108	118
Blues	105	108	119

The measurements indicated that there was between 10 and 15 dB of headroom — plenty for a live-performance sound reinforcement system. Again, these measurements could not be verified without test gear. However, observations made during actual performances — which varied from The Neville Brothers, to Asleep at the Wheel, and Lionel Hampton — appear to support such claims. For the most part, distortion was low and the sound natural. An occasional raucus peak could be detected; investigation revealed that the person operating the mixer had reached down and tweaked the graphic equalizers. Union stage-

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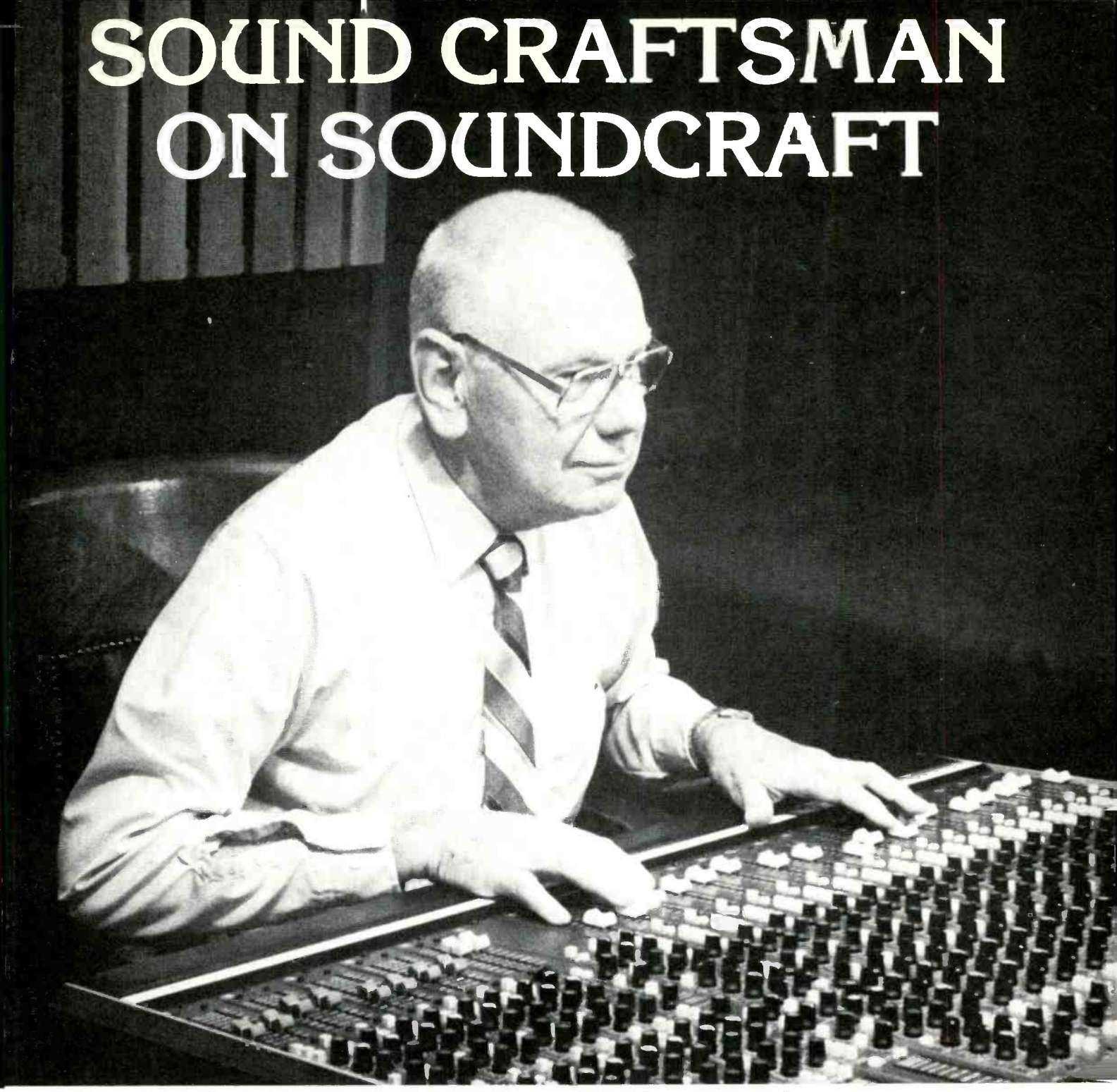

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hands were hired to operate the mixing boards, not Bridgewater personnel. As a result, there was no uniform philosophy of how to do the mixing. In one instance, terrible clipping occurred — the mixer had turned the mike pre-amp gain way up and pulled down the fader, obviously misunderstanding the gain structure of the board. During our two days at the festival it was observed that most of the union mixers made use of only moderate channel EQ on the Tapco boards, a good practice in our opinion. While the mixers did a good job overall, the stagehands might have benefitted from a crash course in operating the equipment.

The Rock-On-The-Roof System

One of the aspects that Festivals, Inc. said it liked about the Bose systems was their compact size, and the fact that a non-biamplified or tri-amplified system is less complex and therefore easier to set up. For example, initial setup of the Jazz, Blues, Country, Rock-on-the-Roof, and Variety Stages all began at 8 am; they were cabled and ready in time for a noon stage call.

Although the performance of the Jazz, Blues and Country systems left little to be desired, it was felt that the Rock-on-the-Roof system should be capable of even higher SPL, since the audience area was larger. This was the primary reason for bi-amplifying, not because of frequency response considerations. In fact, calculations showed that sound for the Rock Stage could have been achieved just as well using only 802's, but that it would have required about three times as many speakers, plus the amps to drive them.

The roof system also used a Tapco mixer and Biamp EQ plus a separate stage monitor board with Crown amps and JBL speakers in dB Sound monitor cabinets (Figure 4). There was an interesting variation in the method of bi-amplification. Bottom end was handled by horn-loaded bass bins fitted with Gauss 18-inch woofers, and driven by older BGW Model 1000 amplifiers. A Tapco CPX crossover had been set for a 250-Hz, 12 dB per octave transition to two stacks of 12 Bose 802 cabinets. (For longer throw these 802's were stacked six high by two wide, rather than four high by three wide as with the previously described stages.) The interesting aspect, however, is that a Tapco octave-band EQ was inserted *after* the crossover's high-frequency output, just ahead of the Bose 802-E

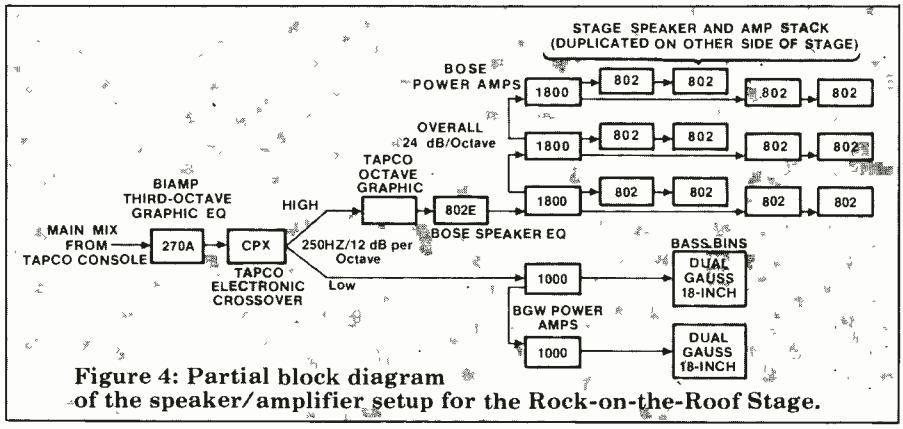

Figure 4: Partial block diagram of the speaker/amplifier setup for the Rock-on-the-Roof Stage.

Table 3: Measured Sound Levels At Rock-On-The-Roof Mixing Board (About 120' from the stage.)

dB SPL, Pink Noise		
Slow	**Fast**	**Peak**
100	107	120
dB SPL, Live Show		
Slow	**Fast**	**Peak**
97	104	117

speaker equalizer. All bands on the graphic below 250 Hz were rolled off fully.

The net effect of the crossover and graphic EQ was to create a two-pole low-pass filter at 250 Hz (12 dB per octave), and a four-pole high-pass filter (24 dB per octave). Such an arrangement not only resulted in the desired frequency response, but it also avoided over-driving the Bose EQ (which could have happened had it and the octave-band graphic been reversed in the signal path).

It can be seen from Table 3 that, while the measurement distance was 60% greater than that of the Jazz/Blues/Country systems, pink noise SPLs were comparable; one might expect a 4 or 5 dB fall off due the increased distance, but in fact the peak SPL was a few dB higher. This demonstrates the added level and headroom obtained by means of bi-amplification. (The live readings, by the way, were taken during a performance of the band The Buckinghams.)

While the system frequency response was comparable to the non-biamplified systems, coverage was somewhat more narrow (but so was the audience area). The only problem proved to be slap echo off the back wall, something that would have been very difficult to eliminate without flying the speakers — a difficult option, but one that the contractors may try next time.

Variety Stage — The Jazz/Blues/Country System Used Indoors

The same equipment complement that served the Jazz, Blues and Country Stages out of doors was used indoors for the Variety Stage, which handled everything from Woody Herman to Second City, Tom Paxton and Bob Gibson, and even a Jamaican Limbo performance. The sound indoors was acceptable, considering the abominable acoustics of the room: circular in shape with a domed ceiling and nothing but hard concrete, plaster or glass surfaces. SPL at the mixing board, situated about 50 feet from the stage, measured 5 dB above the same system outdoors, as shown in Table 4. During the performances, however, levels usually were lower, probably due to the nature of the music, and to the fact that many people were sitting around at tables eating and talking. Consequently, the mixer possibly felt that it was appropriate to pull down the master a few dB.

Table 4: Measured Sound Levels At The Variety Mixing Board (About 50' from the stage.)

dB SPL, Pink Noise		
Slow	**Fast**	**Peak**
108	113	123
dB SPL, Live Show		
Slow	**Fast**	**Peak**
92	98	111

The Main Stage — Playing to an Audience of 18,000

Situated in an amphitheater-like setup on the mainland, next to the pier, the Main Stage featured completely separate main house and stage monitor systems, fed from on-stage splitter boxes using Jensen transformers. The main mixing booth was on an elevated platform about half way back in the audience, while stage monitor mixing was done behind the speaker stacks to one side of the stage. The booth contained the following hardware:

Two Midas 40-input/8-bus boards, interconnected
Two dbx Model 160 compressor-limiters
One dbx Model 162 stereo compressor-limiter
Two Biamp Model 270A third-octave equalizers
Lexicon Model 102 stereo digital delay line
Advanced Audio Designs D-250 delay

MXR Flanger/Doubler
Two MXR Auto Flangers
Two MXR Auto Phasers
Symetrix CL-100 compressor-limiter
Furman RV-1 reverb unit
Quad-Eight RV-10 reverb
Patch bay

The eight busses from the pair of Midas consoles served as subgroups for vocals, keyboards, strings, horns, drums, percussion, instruments (primarily guitar), and effects; all eight were also subject to a grand master fader.

The main speakers, crossover and amplifier stacks, which were divided into two stacks, comprised:

36 JBL 6233 power amplifiers
Four Crown PSA-2 power amplifiers
Two Wow Sound 4-way electronic crossovers
Two H/H S500D power amps
48 R&R Case speaker cabinets

The R&R cabinets consisted of the following:

•Bass-only Bin containing two JBL E-140 15-inch drivers in a front-loaded, sealed-back horn, supplied by TFA.
•Bass/Mid Bin containing two JBL E-140 15-inch drivers in a front-loaded, sealed-back horn; plus two JBL 2482 drivers, one each on short-throw and long-throw 90° McCauley horns, supplied by dB Sound.
•Mid/High Bin containing two JBL E-130 12-inch drivers in a front-loaded, sealed-back horn; a JBL 2440 or 2441 driver on a 2350 horn; and two JBL 2420 tweeters, supplied by TFA.

Arranged in two huge speaker stacks of 24 bins each, all the units had been concealed behind black scrim on either side of the stage.

The main stage monitor equipment included:

Midas 24 by 10 monitor mixing board
Four Crown DC-300A power amps
Four Crown D-150 power amps
Crown PSA-2 power amp
Gallien-Kruger 100-15B power amp, with built-in crossover
Ashley SC-22 electronic crossover
Eight Biamp Model 270A third-octave equalizers
Two Biamp octave-band equalizers
Clear-Com intercom

Approximately 16 R&R Case monitor speakers, each consisting of a JBL E-130 woofer, an Emilar or JBL 2482 driver, a 90° McCauley horn with slant plate lens, or a 90° radial horn, and a JBL 2220 tweeter.

Main Stage acts included: Chaka Khan, Teddy Pendergrass, The Reddings, John Prine and Steve Goodman, Chicago, Lee Ritenour, Bobby Vinton, The Lennon Sisters, Aretha Franklin, The Four Tops, Air Supply, Jim Photoglo, Cheap Trick, Cold Chisel, The Commodores, .38 Special, The Dregs, Crystal Gayle, Rodney Crowell, Mickey Gilley-Johnny Less and the Urban Cowboy Band, and Hank Williams Jr. Obviously, not all of the equipment was used for each act.

Stage Layout for the Bobbie Vinton performance is shown in Figure 5.

AC Power Distribution — The Largest Single Obstacle to Achieving a Good Sound

The Navy Pier had three-phase power buried in along its length. Distribution to the various stages was handled by a single union electrician, which caused some delays. All the lighting was loaded on phases A and B, phase C being reserved for the sound reinforcement and stage sound equipment — a practice Jay Bridgewater recommends to minimize problems. Unfortunately, there remained large potential differences in the AC grounding, leading to hums and buzzes after initial setup.

Bridgewater sank ground rods locally at each stage, and tied the stage's sound system to that ground. Ground-lift adaptors were then used systematically to isolate shields. Somehow logic did not prevail and the systematic approach didn't work, so a cut-and-try method was used. Eventually things quieted down. After noticing the large neon lights just above those brewer-sponsored stages, observers were impressed that there was no accompanying buzz!

dB Sound used its own AC distribution system on the Main Stage, which normally would tend to simplify grounding. Unfortunately, this stage had the worst problems with hum and buzz. For one thing, the 225 KVA power transformer supplying the entire pier was located about 30 feet from stage center. In addition, nearby TV Channel Five's transmitter was bathing the stage in RF. The average hum/RF field on stage had a 25- to 30-volt field strength, according to dB Sound's Bruce Gordon. Despite valiant efforts at isolation and ground manipulation, there remained a noticeable hum whenever the performing group would pause; when they were playing, their music masked the noise.

This is not intended as a criticism of dB Sound, however. The Main system was massive, far more complex than any of the others at the Fest, and was comprised of much equipment that was not normally part of the company's sound system. During a performance by Chicago, the audience was largely unaware of the buzz; in fact, the musical

experience was so powerful that even this author was swept away and ignored his analytical role for a time.

Reliability

The ChicagoFest sound contract specified that the sound reinforcement contractor would be billed back for all charges in the event of a show having to be cancelled because of sound system failure. The liability amounted to tens of thousands of dollars for many individual acts. Needless to say, reliability and back-up were essential. Luckily, there were no catastrophic equipment failures at the Fest. To thwart the effects of rain and morning moisture, a lot of plastic sheeting covered the gear overnight — and hair dryers were used when that didn't work. With over 150 microphones and 400 mike cables, Jay Bridgewater refused to jeopardize the million dollar entertainment lineup by using cheaper cables. He, as well as Festivals Inc, was pleased by the equipment reliability. Also, the modular concept, using similar equipment wherever possible, made it easier to provide backup. In fact, an entire sound system had to be assembled at the last minute, because of an oversight in the original contract. The contractors were able to do the job using spares, and by "borrowing" temporarily from other systems. Bridgewater also made sure repair personnel and equipment were on the premises at all times.

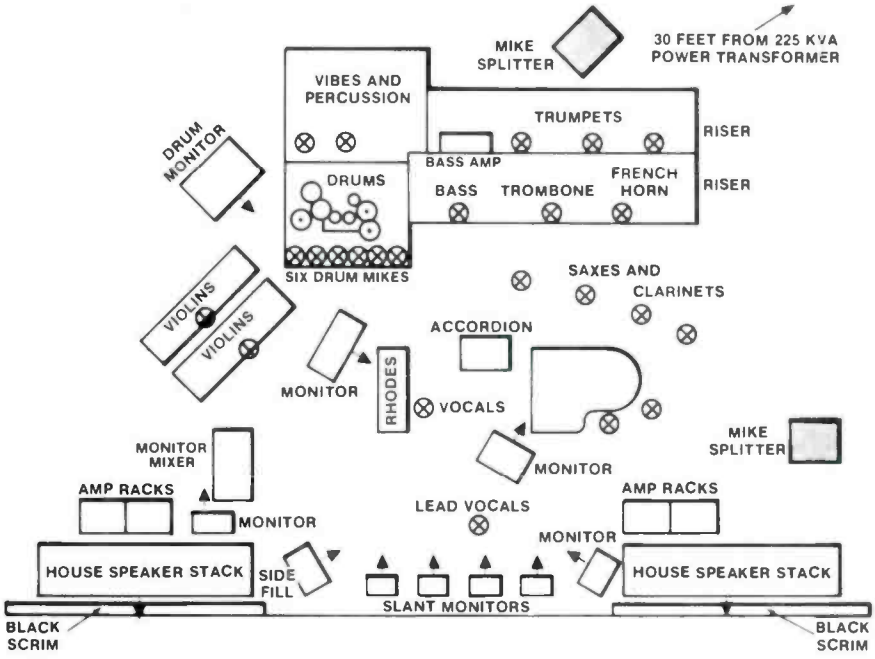

Figure 5: Main Stage layout for Bobby Vinton performance.

What Does The Future Hold?

An unusual phenomenon was observed at this year's ChicagoFest: a number of festival goers gathered around the speakers adjacent to one or another radio station's gazebo, and listened for hours to canned music from on-the-air broadcasts — instead of walking 50 yards and hearing the live acts! (Could it be the disco influence is perverting our youthful listeners?)

What if this trend grows? Will our future music festivals consist of recorded acts, perhaps with an occasional live act to fill the intermissions while the DJ cleans a stylus or eats lunch? Here's hoping that it never comes to pass. □□□

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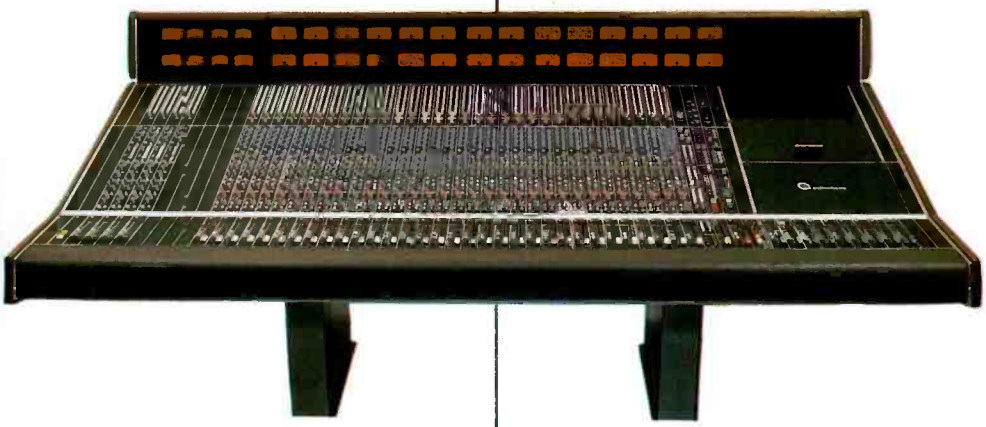

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Using Minicomputers for Audio System Analysis

by Chris Foreman, Community Light & Sound, Philadelphia, Pa.

While travelling in Japan last summer, I received one of the new Sharp PC-1211 Pocket Computers as a gift. It was the beginning of a love affair. I spent the entire 9-hour flight back from Tokyo learning how to operate this fascinating instrument — quite a feat since the instruction manual was written entirely in Japanese! Fortunately, Radio Shack is now importing the PC-1211 — as the Model TRS-80 Pocket Computer — and I obtained a copy of the appropriate English-language manual.

The PC-1211/TRS-80 Pocket Computer accepts programs written in a version of Microsoft BASIC, results being displayed on a 24-character LCD readout. Program and data memory are shared with a total of 1,424 program "steps," or 178 memories. Apparently, that amounts to about 1.9 kbytes of memory; sufficient for some quite respectable programs. Programs and data may be recorded on a standard audio cassette-recorder with an optional adapter. (Rumor has it that an add-on printer will be available in the near future.)

The advantages of a computer like this over a hand-held calculator is that it has a much larger display, prints results, and gives prompts in words as well as numbers. These aspects make a well-written program usable by someone who understands very little about the machine. I'm not selling this computer, by the way, just explaining its benefits as an introduction to my programming philosophy!

Sound System Analysis

With the capabilities of this new tool in mind, I set the following goals for a Sound System Analysis program, goals which became the program's main features:

1) **Qualitative Analysis.** The program had to help the user answer three of these four basic questions about sound systems:

a) Is the system loud enough? (The Electrical Power Required formula helps answer this question.)

b) Can everybody hear? (This question is primarily concerned with loudspeaker coverage patterns and is not answered in the program.)

c) Can everybody understand? (The Critical Distance, Reverb Time and ALCONS programs help answer this question.)

d) Will the system feed back? (The PAG/NAG program helps to answer this question.)

Incidentally, it is my belief that if you can answer those four questions, you know most of what you need to know about a sound reinforcement system!

2) **Interaction.** The Program had to interact with the user, through the display, in such a way as to allow maximum flexibility. Existing sound system "design" programs lead the user through the design process as if it was a one-way street. I wanted my program to allow the user to make decisions, backtrack, and branch easily from one part of the program to another.

3) **Data Input.** Some programs force the user to re-enter data each time it is needed. I wanted to be able to re-use existing data over and over again, re-entering the data only if it changed in value. In addition, the program could not be allowed to alter data indiscriminately, but could only suggest changes in values which the user could accept or reject.

4) **Prompts.** I wanted to take maximum advantage of the 24-character display on the PC-1211 pocket computer, by using high information-content input and output prompts. I was only moderately successful on this last goal. After being as clever and miserly as possible about my usage of program and data memory, I still used up all but 25 steps of program memory (out of a possible 1,424), and had to abbreviate some prompts. Fortunately, I was able to use common sound-system abbreviations so that most users will be able to follow the program easily.

Those readers with access to a larger computer running BASIC may wish to implement this program. With larger memory space, I would expand the prompts and modify the PRINT and PAUSE statements to take advantage of a CRT/printer combination.

How To Use The Programs

1) Load the program into the computer. ("PRO" mode on the PC-1211)

2) Type RUN; press ENTER. ("RUN" mode on the PC-1211)

3) The display will show a "menu" of available programs. Select the desired program by keying the program number, and pressing ENTER.

The abbreviations are as follows:

DC is **Critical Distance** (that distance where direct and reverberant soundfields are equal in intensity). Key 1; press ENTER.

T60 is **Reverb Time.** Key 2; press ENTER.

EPR is **Electrical Power Required** (how large an amplifier is needed for a required SPL at the farthest listener). Key 3; press ENTER.

AL is **Articulation Loss of Consonants** (ALCONS), a program to estimate whether or not the farthest listener will be able to **understand** the spoken sound from the system. Key 4; press ENTER.

PN is **PAG/NAG,** a program to calculate **Potential and Needed Acoustic Gain** (in other words, will the sound system feed back). Key 6; press ENTER.

Explanation Of Prompts

Each program requests needed information using abbreviated prompts. Abbreviations are standard for the audio industry and should be easy to remember. Program constants assume Imperial (English), not metric, units.

If you enter a given variable in one program, the computer remembers that variable until you change it. Thus, if you enter a value of Q in the DC program, you do not have to re-enter the value of Q in the T60 program, unless it needs to be changed. When a program asks for a variable that you have already entered, simply press ENTER without keying a number.

DC Program Prompts

Q is the Q of the loudspeaker; programs use this single value of Q for all calculations.

S is the total surface area for the room, in square feet.

ABAR is the average absorption coefficient for the room.

T60 Program Prompts

V is the total volume of the room in cubic feet.

S and **ABAR** are explained in the DC Program Prompts section.

If you know **T60** but do not know **ABAR**, key 0 for **ABAR;** the program will ask for **T60** and calculate a Sabine **ABAR**.

When calculating **T60**, the program asks for your decision on Sabine (key 24; press ENTER), or Norris Eyring (key 25; press ENTER) formulas.

EPR Program Prompts

This program branches to the DC program to gain certain variables needed for the calculations. Thus, a value of DC will be displayed first.

SPL is the SPL Level you require at the farthest listener (at D2). Since the program adds 10 dB of headroom, you should key the **nominal** SPL level required.

D2 is the distance from the loudspeaker to the farthest listener, in feet.

SENS is the 1-watt/4-foot sensitivity of the loudspeaker cluster in dB SPL.

PWR is the available power (size of power amplifier you intend to supply). In most cases you should use the power capacity of the loudspeaker, rather than the power amplifier size in this calculation, since the maximum SPL is usually limited by this power capacity **before** it is limited by amplifier size.

The final **SPL**= value is the nominal SPL (10 dB headroom above this level) that can be heard at D2 using the entered PWR level.

ALCONS Program Prompts

Q, D2, T60 and **V** are explained above.

N is the total number of loudspeakers producing the same level as the loudspeaker pointed at the farthest listener. For example, if there are three horns in the system, all producing the same level, and only one horn is pointed at the farthest listener, then N equals 3. If there are four horns, two of which are pointed at the farthest listener, the situation is equivalent to two horns with one pointed at the farthest listener. As a result, N equals 2. If the horns are not producing the same level, or there are multiple different loudspeakers with multiple different levels pointed in lots of different directions, finding N can be a complex calculation. The program does not aid you in finding N.

After finding the %ALCONS, the program calculates the value of certain variables that will make **ALCONS** exactly equal to 15%. Press ENTER after each display to calculate the next variable.

PAG/NAG Program Prompts

DS is the distance from the talker to the microphone, in feet.

D1 is the distance from the microphone to the loudspeaker, in feet.

D2 is the distance from the loudspeaker to the farthest listener, in feet.

D0 is the distance from the talker to the farthest listener, in feet.

NOM is the Number of Open Microphones; that is, the maximum number of microphones all in use at the same time.

EAD is the Equivalent Acoustic Distance. This is the distance the farthest listener will think he is away from the talker when the sound system is in use.

Other variables are as described earlier. Like ALCONS, the PAG/NAG program prints a value of PAG and NAG, then calculates the values of several variables for PAG equal to NAG. Press ENTER after each display to calculate the next variable. When PAG is much less than NAG, it may not be possible to find a value of D1 large enough to make PAG equal to NAG. In this case, the program sets D1 equal to 45 feet, and displays the actual values of both PAG and NAG. When PAG is much greater than NAG, a very large value of D2 is possible. In this case, the program allows D2 to reach a maximum value of D0.

Running the Programs

The following points should be noted:

1) After each program, the computer returns to the Select Program Routine. You may branch to a new program or choose to re-run the previous program by keying the appropriate number, and pressing ENTER.

2) The program rounds off variables to the second decimal place before displaying them. However, the exact numerical value (before rounding) is always used for calculations.

Typical Input Values and Expected Results

When working with any new computer program, it can be very useful to have some idea of the **expected** results — expecially if you intend to use a modified version of the listing to program, for example, an Apple, Commodore PET, Atari or Tandy TRS-80 personal computer. To help eliminate any "buggs" from your program the following list of inputs and expected results are provided:

I. **Critical Distance**

Input: Q = 5.0
S = 42,500 square feet
ABAR = 0.206

Output: DC = 29.51 feet

Using
MINICOMPUTERS

for
AUDIO SYSTEM ANALYSIS

2. Reverberation Time

Input: V = 500,000 cubic feet
S = 42,500 square feet
ABAR = 0.206

With Sabine,

Output: T60 = 2.80 seconds

With Norris-Eyring:

Output: T60 = 2.50 seconds

3. Electrical Power Required

Input: Q = 5.0
S = 42,500 square feet
ABAR = 0.206

A value of **DC** = **29.51** feet will be displayed.

Input: SPL = 85.0 dBA
D2 = 90.0 feet
S = 110.5 dBA (at 1-watt/4-foot)

(If specifications for your chosen drivers are given in dBA SPL levels for 1-watt/1-meter, subtract 1.75 dBA to compute the corresponding 4-foot value.)

Output: EPR = 1.41 watts

Input: PWR = 15 watts (using the example of an Altec 288 driver on a 90-degree radial horn)

Output: SPL = 95.27 dBA

4. Articulation Loss of Consonants

Input: Q = 5.0
D2 = 90.0 feet
T60 = 2.8 seconds
V = 500,000 cubic feet
N = 1 (microphone)

Output: %LOSS = 16.66

The Program then provides the following combination of parameters for 15% Loss of Consonants:

Q = 5.55
or/D2 = 85.39 feet
or/T60 = 2.66 seconds

If the program is re-run with the same input values, except that Q now equals 7.0, ALC will output a %LOSS of 11.9. Since Q has been increased, the values for 15% articulation loss will also be changed to:

Q = 5.55
or/D2 = 101.3 feet
or/T60 = 3.14 seconds

6. Potential Acoustic Gain/Needed Acoustic Gain

Input: Q = 5.0
S = 42,500 square feet
ABAR = 0.206
DS = 1.5 feet
D1 = 40 feet
D2 = 90 feet
D0 = 125 feet
NOM = 3 mikes
EAD = 8 feet

Output: PAG = 13.44 dB
NAG = 11.41 dB
MAX DS = 1.9 feet (for PAG=NAG)
MIN D1 = 24.39 feet (for PAG=NAG)
D2 = 125, PAG-NAG = +1.82 dB

(This indicates that there are certain cases where D2 can be changed to improve the PAG-NAG value — remember that for no feedback, PAG must be less than or equal to NAG — and make it more positive. For example, if the system is to be run in a larger hall, the speakers could be taken farther out into the auditorium.)

MAX NOM = 4.79 mikes

(Which tells us that the system can be run with as many as four open microphones without feedback problems.)

By way of a second PAG/NAG example, consider the following:

Input: Q, S, ABAR, D1, D2, D0, etc as before, plus
DS = 2.5 feet, which indicates that the person talking has moved farther from the microphone position.

Output: PAG = 9.20 dB
NAG = 11.41 dB

(Now PAG is less than NAG, indicating feedback.)

MAX DS = 1.9 feet
D1 = 45, PAG-NAG = -2.06 dB

(So moving the speakers further away from the mikes will not cure the feedback problem.)

MAX D2 = 30.77 feet

(But moving the farthest listener towards the speaker could improve matters.)

MAX NOM = 1.73

(That is, close off two of the three microphones being used.)

□□□

PROGRAM LISTING

```
1:PAUSE"SELECT PROGRAM":
 INPUT "DC=1T60=2EPR=3AL=4PN=
 6?";F:GOTO100*F
2:END
10:D=INT(D*100+0.5)/100:RETURN
100:PAUSE"DC":GOSUB110:GOTO1
105:END
110:INPUT"Q?";Q,"S?";S,"ABAR?";A
120:D=√ ((Q*S*A*)/(16*π)):C=D:
 GOSUB10
130:PRINT"DC=";D:RETURN
200:PAUSE"T60":INPUT"V?";V
205:F=.049*V
210:INPUT"S?";S
220:INPUT"ABAR?(0=UNKNOWN)";A:
 IF A=0 INPUT"T60?";T:
 A=F/(S*T):D=A:GOSUB10:PRINT
 "ABAR=";D:GOTO1
230:INPUT"SABINE(24),N-E(25)?
 ";D:GOTO10*D
240:T=F/(S*A):GOTO 260
250:T=F/(-S*LN(1-A))
260:D=T:GOSUB10:PRINT"T60=";D:
 GOTO1
270:END
300PAUSE"EPR":GOSUB110
310:INPUT"SPL?";L
320:INPUT"D2?";I
330:INPUT"SENS?";K
340:F=10*LOG(((C/4)△2+1)/
 ((C/I)△2+1))
350:D=10△((L+10-K+F)/10):GOSUB
 10:PRINT"EPR=";D
360:INPUT"PWR?";E:E=10*LOGE
370:D=E-10+K-F:GOSUB10:PRINT
 "SPL=";D:GOTO1
380:END
400:PAUSE"ALCONS":INPUT"Q?";Q
410:INPUT"D2?";I
420:INPUT"T60?";T
430:INPUT"V?";V
440:INPUT"N?";J
450:F=Q:GOSUB490:PRINT"%AL=";D
460:F=15:GOSUB490:GOSUB510:PRINT
 "Q=";D
470:F=T:GOSUB500:GOSUB510:
 PRINT"D2=";D
480:F=I:GOSUB500:GOSUB510:PRINT
 "T60=";D:GOTO1
490:D=(656*I△2*T△2*J)/(F*V):
 GOTO10
500:D√ ((15*V*Q)/(656*F△2*J)):
 GOTO10
510:PAUSE"FOR 15% ALCONS":
 RETURN
520:END
600:PAUSE"PAG NAG"
610:GOSUB110
620:INPUT"DS?";B
630:INPUT"D1?";H
640:INPUT"D2?";I
650:INPUT"DO?";O
660:INPUT"NOM?";M
670:INPUT"EAD?";R
680:U=(C/B)△2+1:W=(C/H)△2+1:
 X=(C/I)△2+1
690:Y(C/O)△2+1:Z=(C/R)△2+1
700:D=10*LOG((U*X)/(Y*W*M))—6:
 GOSUB10:P=D
710:D=10*LOG(Z/Y):GOSUB10:N=D
720:PRINT"PAG=";P;" NAG=";N
730:F=X:GOSUB850:PRINT"MAX
 DS=";D
740:GOSUB880:IFD>1 GOTO770
750:F=(C/45)△2+1:GOSUB860:
 D=10*LOGD-6
760:GOSUB10:PRINT"D1=45,P-N
 =";D:GOTO790
770:GOSUB880:D=C/√ (D-1)
780:GOSUB10:PRINT"MIN D1=";D
790:F=U:GOSUB870:IFD>1 GOTO820
800:D=10*LOG((U*Y)/(Z*W*M))-6
810:GOSUB10:PRINT"D2=";O;",P-N
 =";D:GOTO830
820:F=U:GOSUB850:PRINT"MAX
 D2=";D
830:D=(U*X)/(10△.6*Z*W)
840:GOSUB10:PRINT"MAX NOM=";D:
 GOTO1
850:GOSUB870:D=C/√ (D-1):
 GOTO10
860:D=((U*X)/(Z*F*M)):RETURN
870:D=(W*Z*M*10△.6)/F:RETURN
880:F=10△.6:GOTO860
890:END
```

Note: The symbol "△" has been used in place of the conventional ^ or power expression.

VARIABLE ASSIGNMENTS

These are the variables used internal to the programs and their relationship to the prompts:

A="A-BAR" (average absorption coefficient)
B=D_s
C=D_c (Critical Distance)
D=WORKING VARIABLE
E=Maximum Electrical Power
F=WORKING VARIABLE
G=EAD (Equivalent Acoustic Distance)
H=D_1
I=D_2
J=n (same as n+1 used in some programs)
K=Sensitivity of driver
L=Desired SPL at D_0
M=NOM (Number of Open Mikes)
N=NAG (Needed Acoustic Gain)
O=D_0
P=PAG (Potential Acoustic Gain)
Q=Q (Directivity factor)
R=EAD (Equivalent Acoustic Distance)
S=S (Surface Area)
T=T_{60} (Reverberation Time)
U=f(D_s), an internal function of D_s
V=Volume of Room
W=f(D_1), an internal function of D_1
X=f(D_2), an internal function of D_2
Y=f(D_0), an internal function of D_0
Z=f(EAD), an internal function of EAD

EQUATIONS USED WITHIN PROGRAM

These are the accepted sound system "design" equations (I prefer the term "analysis") obtained from **Sound System Engineering,** by Don and Carolyn Davis, manipulated to fit the PC-1211 more efficiently. The constant 656 in the ALCONS equation is a metric to English conversion of the constant 200 used by Peutz.

Critical Distance

$$DC=\sqrt{(QS\bar{a} / 16\pi)}$$

where $\bar{a}$=ABAR, the average absorption constant.

Reverberation Time

Sabine:

$$T_{60}= 0.049V/S\bar{a}$$

Norris-Eyring:

$$T_{60}= 0.049V/-SLn (1-\bar{a})$$

Electrical Power Required

$$EPR = 10^{(SPL + 10 - SENS + F)/10}$$

where F = 10 LOG [f(4)/f(D_2)]
and f(x) = $(DC/x)^2 + 1$

Articulation Loss of Consonants

$$\%AL_{cons} = 656 (D_2)^2 (T_{60})^2 N/QV$$

Potential Acoustic Gain

PAG=10LOG[(f(D_S)f(D_2))/(f(D_0)f(D_1)NOM)] - 6

Needed Acoustic Gain

NAG = 10 LOG [f(EAD)/f(D_0)]

by Paul Lehrman

Recording and Producing for Broadcast Syndication

The King Biscuit Flower Hour

Last February, the *King Biscuit Flower Hour* celebrated its eigth anniversary of presenting live rock concerts to FM-radio audiences across the country. The very first program of what eventually was to become the most widely syndicated show in FM-radio history, featured the Mahavishnu Orchestra, Blood, Sweat & Tears, and a then obscure folk-rocker by the name of Bruce Springsteen. That show, produced by two young men named Bob Meyrowitz and Peter Kauff, aired on a painstakingly put-together network of 25 FM rock stations.

Today, Kauff and Meyrowitz oversee a large staff of producers, engineers, salespeople, and office workers located in the MCA building on New York's Park Avenue. D.I.R. Broadcasting, as the company is now known, not only produces "The Biscuit," which is currently syndicated to some 300 stations every week across the continent via the ABC American FM Network, but is also responsible for *The Silver Eagle*, a bi-weekly 90-minute country show that airs on 400 stations; *Schaefer Rock City*, 90 minutes of live rock music broadcast every month on a dozen or so eastern stations; the annual *Rock Radio Awards;* and *Supergroups in Concert*, a semi-annual, two-hour live rock show beamed to hundreds of stations both in the U.S. and abroad.

The Biscuit borrowed its name from a show produced in the Thirties at a small AM station in West Helen, Arkansas, with legendary blues singer Sonny Boy Williamson. That show, sponsored by King Biscuit *Flour*, bore little resemblance to what is, today, probably the most technically sophisticated independent radio production and syndication company in the country.

photo — Lisa Tanner

D.I.R. Broadcasting (King Biscuit Flower Hour) live broadcast of Schaefer Rock City at the now defunct CBS 30th Street Studio. Sitting left: CBS engineer, Don Puluse. Standing: Tim Mulligan, D.I.R. chief engineer. Sitting right: Bob Kaminsky, D.I.R. director of production.

The Production Staff

Producing chores for the various shows are now handled by Bob Kaminsky and Paul Zullo. Kaminsky, who is director of production, joined the company in 1979 after working in record, radio, TV, and film production, and as an A&R representative for A&M Records. Zullo, whose title is operations vice-president, worked with D.I.R. in subscriber station relations for four years, before moving over to The Biscuit producer's chair early this year.

Post-production engineering is the responsibility of D.I.R. chief engineer Tim Mulligan, who also joined the staff in 1979. Mulligan was a free-lancer, working for a number of studios, and had done quite a few D.I.R. projects before the company had its own production studio.

"When we built our own facility," says Zullo, "Tim was the obvious choice to run it. He knew completely what we were doing."

Although both producers act as talent coordinators for the shows — negotiating with artists, record companies, managers, and the myriad other forces involved in recording a live concert — the two men's styles are very different. Kaminsky loves mixing music and has a heavy technical background, so he takes an active role in that end of things, while Zullo concentrates on the role of the diplomat, ironing out problems as they occur, and leaving the chores of operating the hardware to the studio or remote engineers contracted for each program.

. . . continued overleaf —

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The King Biscuit Flower Hour

D.I.R. operates on a barter system which, when the company first started, was unique in radio. The cost of producing the shows is made up by selling time to national accounts, such as Pioneer, Honda, and Miller beer, whose spots are included as part of the programs sent out to the member stations. The stations themselves are given time, in turn, to sell to their local advertisers. That time usually goes for premium prices, since it is not uncommon for a local station's rating to double when The Biscuit airs. The programs are now sent out on disks. Stations are authorized to play the disks once, and then are required to return them to D.I.R. Violations of the agreement occur occasionally, but the company takes swift action to prevent abuse from becoming rampant.

Acts that are recorded for the programs, and their record companies, generally give permission for D.I.R. to record their live shows at no charge. After a broadcast, according to D.I.R., there is almost invariably an increase in record sales of the artist. The tapes themselves, both multi-tracks and first-generation mixes, are made available to the artists after the programs are produced. Quite a few of the acts, including the Bee Gees, Rolling Stones, Rod Stewart, and Emerson, Lake & Palmer, have used the tapes to make live albums.

A *King Biscuit Flower Hour* starts, logically enough, at a live performance. Some of the best remote units in the country — Wally Heider's from Los Angeles, Fanta Professional Services out of Nashville, or New York's Record Plant Mobile — are hired by D.I.R. to record the concerts. Where the tapes are mixed is dependent on a number of factors. The company tries to find a studio that the artists or their producer are familiar with, and can get to conveniently. Tapes are edited, and announcements and commercials are added, in D.I.R.'s own production studios. They are then sent to the Master Cutting Room at the Record Plant, where the tapes are mastered onto disk.

Stage View at Orpheum Theater, Boston

The Concert Venue

On a spring evening, the Record Plant mobile unit is parked at the end of an alley that the city fathers of Boston laughingly call a street, dead-ending at the entrance of the Orpheum Theater. The bill tonight is Pat Travers and Rainbow, with a local trio, the John Butcher Axis, serving as the warm-up act. Both Travers' and Rainbow's sets will be recorded. While the Travers set will be put in the can for a while, Rainbow's set is scheduled to air in less than a month.

Originally, tonight's show was the only one scheduled, but ticket demand required the addition of another show, which happened last night. Sound and lights were provided by Showco, Inc., out of Dallas, Texas.

"Showco came in yesterday and left their set-up from last night," explains Record Plant mobile-recording director and chief engineer David Hewitt. "So we're using their mikes. We're putting our splitter box on stage, however, before their board and their pre-amps."

Under less restricted circumstances, the Record Plant might want to substitute some of its own mike collection for the tougher but often less-than-ideal-for-recording Showco mikes, but the situation makes that impractical.

The custom-built stage splitter box uses transformers made by Deane Jensen, with, in addition to two secondary windings, a bridge off the primary. The bridge, which is in effect a hard-wired connection to the microphone, is what is fed to the truck. In this way the truck, with its carefully regulated and redundant power supplies, can provide phantom powering for those mikes on stage that require it.

"These transformers," explains Hewitt, "were the first ever designed expressly for splitting mike lines. They present a higher impedance to the board than, for example, the old UTC transformers, and the consoles like that. The insertion and line losses are about 1.5 dB, as opposed to the usual 3 to 4 dB." [A more detailed discussion of such a system can be found on page 122 of the October 1980 issue of *R-e/p — Ed.*]

Even though the cable length from the stage to the truck is as much as 400 feet, the mike signals are still hot enough that some of them, especially those facing the guitar amps, need line pads. Every pair in the splitter box has its own ground lift, as do the Countryman phantom-powered active DI boxes, which carry the signals from the keyboards, the on-stage effects units, and the bass.

"There isn't a single stock item on the truck," says Hewitt. The snakes are custom-made, using Belden dual-foil shield, with separate cables for mike-, line-, and video-level signals being bundled together to form the snake. The whole cable assembly connects to the truck with a 144-pin A-MP Quick-Latch gold-pin connector.

Twenty-four track recording is handled by a pair of Ampex MM-1200 machines. On this "shoot," the tape-op and logging functions will be handled by David "dB" Brown.

"The logging is crucial," says Brown, "because tapes change hands so much. We also keep reels up on both machines all the time, so that we can go from one to the other while the band is between songs. That way, we don't run out of tape, and we don't have to do any 2-inch splicing."

The Ampex machines have no remote control, "to prevent accidents," and the "search" button can be disabled by a toggle switch hidden under the front panel for the same reason. A lamp that operates the servo on the feed reel — usually hidden under the head cover — has been fitted with a lens so that the engineer can easily see if it has burned out. Also, servos have been installed on the take-up side. Test points and status lights for the power supplies have been wired to the top panel of each machine, making fault diagnosis infinitely faster. The most visible modification is a custom-made puck, which is recessed above and below the 2-inch tape path.

"We found that it prevents the tape from slipping," says Brown. "With the stock puck, we discovered that sometimes it's the capstan itself, not the tape, that drives it."

Recording is done on Ampex 456 Grand Master, at 15 IPS without noise reduction, using a 250 nWb/m reference level.

"For this kind of music," says producer Paul Zullo, "there is just no advantage to recording at 30, and any noise reduction would just be an unnecessary complication. If we were recording a lot of acoustic instruments, it would be different matter."

Adds David Brown: "Anyway, this tape has a better low end at 15."

The recording console is a custom 32-input job, based on API modular electronics. An auxiliary panel is available that can add another 16 inputs. There are eight VCA sub-masters, each one equipped with a "kill" switch, which can come in very handy when the unit is doing TV or multiple-stage work, such as the Bee Gee's UNICEF Benefit Concert. Each input channel features an API 10-band graphic equalizer, and an easily set mike peak-level lamp.

Set in the front of the trailer are a pair of Westlake monitors in vertical cabinets, with the "duck lips" mounted in the center. They use custom crossovers, and are soon to be fitted with TAD elements. Power is provided by Crown amps, fed through White third-octave EQ. A pair of Auratones sits on top of the console. Also up front, behind glass doors, are distribution amps for live broadcasts, and the various power supplies.

"The truck is wired for 100 amps, but we typically use only 37," says Hewitt.

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The King Biscuit Flower Hour

Spaced around the walls are AC outlets, some of which are decorated with little green dots.

"Those are hospital-grade connectors," explains Brown. "They use them for respirators and other life-saving devices. They have little grips inside of them, so that the plugs can't be knocked out. They also have isolated grounds."

In addition to the 24-track machines, there is an Ampex AG-440 2/4-track deck, which is being used tonight to tape the monitor mix. Zullo will take that rough tape back to his office to help him decide which songs to use, and in what order, for the final product. Three cassette decks are mounted over the 2-track, which will be kept running all night. The cassettes will be given to the artists after the show so that they can mull over their performances as well. An NAD receiver serves as a line amp for monitoring the cassettes, as well as for off-the-air monitoring during live broadcasts.

Between the speakers are two large Sony video monitors: one color, the other black and white.

"The union crews love color," laughs Hewitt. "They think we're not professional if we don't have it!" On stage is a Panasonic color camera, at stage left, covering the drums. Just in front of the Panasonic is a small Sony black-and-white camera, mounted on a standard AKG mike stand, focussing on center stage and the keyboard platform.

The only other standard studio gear in the truck, besides lockers and cabinets full of mikes and cables, comprises a rack of UREI LA-3As and 1176s, ganged in stereo pairs.

"We modified the slopes and the gain structure on the LA-3s to make them act like LA-2As," says Hewitt. Indeed, the front plates have several strange markings and non-standard switches.

Phil Gitoner and "Kooster" McAllister make up the other half of the Record Plant's crew tonight, and they will be positioned on stage, near the monitor mixer, while the music is playing.

"It just happens that that's the way it worked out for tonight," notes Hewitt. "Actually, everybody is capable of handling anyone else's job: first engineer, tape-op, maintenance, stage manager, or driver."

David Hewitt (left) and "Kooster" McAllister of the Record Plant road crew

The umbilical chord that connects the stage crew with the truck is probably the most impressive piece of gear on board. It is a two-way intercom, built by a New York engineer named John Chester, and marketed under the name Chaos. It's a noise-cancelling unit with outstanding fidelity and intelligibility. On stage, the system is monitored with Beyer headphones, which render the signal completely comprehensible even under typical stage conditions of over 120 dB SPL. Headphones are available in the truck, but most of the monitoring is done through Auratones mounted near both engineers' stations. Attention is gained through call lights and, if the system fails, the recording console has a panic button which sets off the truck's alarm system.

The alarm itself features a built-in microwave transmitter, and beepers are in the possession of every member of the crew, 24 hours a day. If the call button fails, or if the stage crew is away from their station, the panic button gets them to report in a hurry.

While Hewitt is showing us the truck, a strange creature named Brian, who says he is a member of the house staff, comes in, completely covered from head to toe with black dust. All that can be seen of his face is a big smile and, after a few words with Hewitt, he disappears into the bowels of the theater. Seeing our puzzled expression, Hewitt explains: "There is no direct access from the stage to this street — the fire exit goes out to another alley. The snake had to be run up the first seven rows of the audience, and then under the raised side seats and out a corner at the front of the building. Brian had to crawl underneath the floor to run it for us. We'll make sure he gets taken care of later."

Setting Up for the Show

Because of the show the previous night, there will be no chance for a sound check, and Hewitt and his crew will pretty much have to wing it. Each of the mike lines is checked out, and grounds are lifted and added as necessary.

"Our biggest enemies are hum and buzz," grins McAllister, as he and Gitoner run back and forth from the stage to the truck. The Record Plant has installed six mikes for audience sound, a crucial factor for live recordings, and which will also provide large amounts of hall ambience. Two Shure SM-81s are mounted on the balcony, facing the upper reaches of the hall, and two more hang down from the edge of the balcony. Two AKG 452s with the short shotgun CK9 capsules are on the stage, pointing at the first four rows of the audience.

Bob Kaminsky, D.I.R.'s other resident producer, explains that putting audience mikes in the best place often results in someone possibly stealing them, so compromises have to be made. Although there are none here tonight, Kaminsky professes a great fondness for PZMs as audience mikes.

"We camouflage them," he says, "so people don't know what they are. Sometimes we dress them up as sprinklers, sometimes we put little 'Danger: Radio-active' signs on them. That usually keeps people away!"

Meanwhile, Paul Zullo, who is producing tonight's program, is keeping a low profile. He sees his job as "taking care of diplomatic problems — keeping the bands, their producers, the PA crew, and the house staff happy. With this truck and this recording crew, however, we rarely have any problems."

One problem tonight is a pile of garbage that is beginning to accumulate outside one end of the truck, as a janitor from one of the office buildings on the block puts out the day's rubbish. Zullo confers with the gentleman, they talk about the Boston Celtics' championship drive, and an agreement is reached regarding how and when both the garbage and the truck will be removed.

Bob Kaminsky explains the producer's job with a little more detail: "You have to walk in and not be ambiguous. Most of the time you're in a new place where you don't know anybody, so you have to talk to people. Make sure that the union crews know exactly what we're doing. Talk to the roadies, the monitor mixers and, of course, the soundman. He is the most abused guy in the business, but he can be your best friend. He knows the band, and he knows their idiosyncracies and their musical cues, as well as where all the plugs are.

"Above all, though, you have to talk

Track Sheet for Rainbow Concert
Record Plant Mobile, May 1981

1) Stage right Kick
2) Stage left Kick
3) Snare
4) Hi-hat
5) Rack Toms
6) Floor Toms
7) Overhead
8) Overhead
9) Gong
10) Leslie Cabinet
11) Yamaha CS-80 synthesizer
12) Yamaha keyboard mixer
13) Lead Vocal
14) Bass vocal
15) Keyboard vocal
16) Guitar Mike #1
17) Guitar Mike #2
18) Rhythm Guitar
19) Taurus bass pedals and Moog keyboard mixer
20) Bass direct
21) Bass Mike
22) Audience Near
23) Audience Far
24) Audience Far

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The King Biscuit Flower Hour

with the band. Let them know you're on their side. You're screwing around with someone's dreams, after all, so you have to make it clear to them that you want them to sound the best they can. Don't let them feel that you're challenging them, or trying to force your own ideas across. Before I do a show with any artist, I take the time to listen to their records, so that I can create a sound that's pleasing to them. If you show them that you care, and give them an environment where they can work, then they can relax and make music.

"The last thing you want the band to worry about is the recording process. For example, I like to use DI boxes on guitars, so that even if the amp or mike fails, I'll still have a track I can reconstruct in the mix. I also like to have a back-up mike on the kick drum. Snare you can recover from ambience, hi-hat, or overhead mikes, but not a kick. Showing them that you have back-up and insurance systems helps them to feel confident and at ease."

The Concert Taping

The first opportunity tonight for any kind of sound check comes during the brief set of the warm-up band, a Hendrix-style power trio. Hewitt is rapidly moving faders and EQ settings, patching in compressors, and double-checking lines. Although he is working at an incredible pace, Hewitt, who was at the board for the very first *King Biscuit Flower Hour*, is a portrait in cool.

When Pat Travers and his band take the stage, everything is as ready as can be. During the first song, Travers' guitar, which is hooked into a Schaffer wireless system, keeps cutting out, threatening to make the entire set a disaster, but soon the glitches disappear. Hewitt continues to add limiting to the bass, finally settling for about 10 dB gain reduction on a 4:1 slope through one of the UREI 1176's. When Travers switches from guitar to Farfisa organ, all of a sudden the sound is awful. It seems that he decided to plug the organ into his guitar amps, through all sorts of high-impedance effects devices, without using any direct feeds. The resultant distortion is horrendous.

About halfway through the set, some kids in the balcony notice the audience mikes, and start screaming Travers' name into them. McAllister, from onstage, notices the problem too, but he reports that there is no way that he and Gitoner are going to be able to reposition the mikes amidst this seething mass of hard-rock fanatics. The only potential problem that Hewitt has been warned about in advance involves a synthesizer track, which is being played back on a Sony cassette deck fed into the house-mixing board. The track serves also as a guide track for the musicians, and Hewitt handles it perfectly. Townsend Wessinger, Showco's chief engineer, warned the crew early in the day that the track would stop in the middle of the song, "Crash and Burn."

"It's not a malfunction," he assured everyone. "That's the way the song goes."

During the break between the bands, the stage crews frantically set up for Rainbow, while Hewitt resets the board and Brown puts the Travers tapes away, cues up two fresh 14-inch reels of tape, puts down tones, and tweaks the machines.

"I don't really know why I bother," he sighs. "No matter how much we bump around on the road in this thing, the Ampex machines never change."

A meter on one of the 24-tracks, however, is stuck, and so Brown hooks up a small outboard meter to it and lays it next to his intercom speaker.

"If the army really wanted to get things done," someone remarks as we watch the stage crew work on the video monitors, "they'd hire rock-and-roll roadies instead of soldiers."

"The real problem," someone else answers, "is that they pay their guys with money, while our guys get paid in; well you know with what, the trappings of rock-'n-roll, and the chance to be in close contact with all those incredibly famous people. Now *that's* how you motivate someone!"

Soon, the house PA is playing the soundtrack from *The Wizard of Oz*, and as a tape loop repeats Judy Garland moaning the word "Rainbow," the crowd goes nuts. The lights come up, and the band breaks into a heavy-metal version of "Over the Rainbow," as Hewitt once again shifts into high gear at the board.

The set, with its impressive lighting effects, smoke bombs, and loud, loud music, goes fairly smoothly. When the band announces that the show is being taped for The Biscuit, the crowd roars its approval. The set, however, is not without its moments of concern.

The keyboard set-up consists of a Hammond organ, Yamaha CS-80 synthesizer, ARP Odyssey, two Minimoogs, a set of Taurus bass pedals, and an optical-disk-reading device called an Orchestron. The Leslie Cabinet has its own mikes, and the Record Plant did manage to draw a direct from the CS-80. Everything else, however, is being fed through two high-impedance mixers — a Yamaha and a Moog — and going down on two tracks. The hassle is that the Orchestron, a delicate instrument even to have in a studio, is making lots of strange noises. Hewitt buzzes McAllister on stage. receives the reply: "The roadies say it's been trashed for a while, but he just likes to use it anyway." Fortunately, the keyboard player doesn't use it too much.

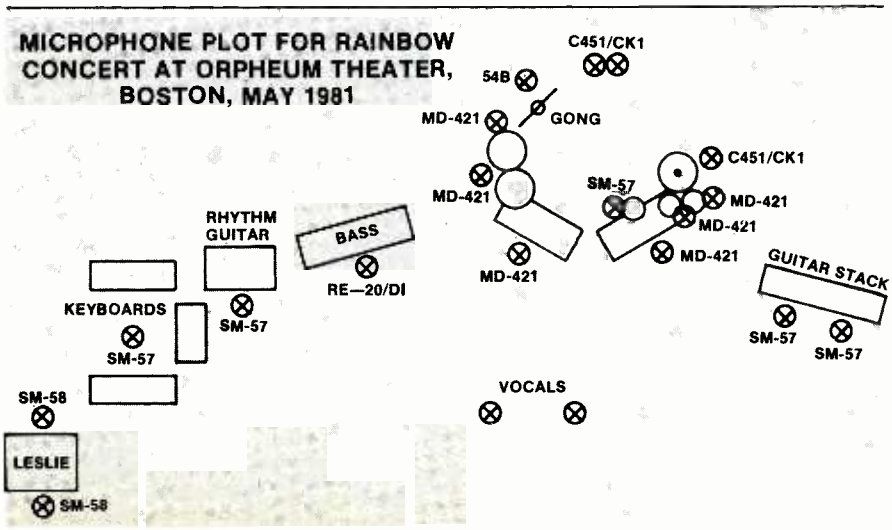
Another small problem emerges when Hewitt solos one of the two directs from the bass. The sound is thin, and terribly distorted. Again, McAllister has the explanation: "It looks like they hooked the DI box right up to the output of a Crown DC300; no pads or nothing," he says over the din. "I'm surprised it hasn't started to melt yet!"

After the last encore, Zullo pulls the last of the beer out of the refrigerator at the back of the truck (a testament to his skills as a producer: buying beer in downtown Boston after 5 p.m. is a trick that has eluded the natives for centuries) and, withing minutes, the tapes are packed, the equipment lockers secured, the snake wound, and the Record Plant mobile crew ready to head for their hotel.

"We park the truck out front," Hewitt explains, "usually in a loading zone. Most places we go, when the police see something this big, they figure we must know what we're doing, so they don't bother us."

The Mixdown Session

Exactly one week and 12 hours later, Paul Zullo picks up the Rainbow tapes at the Record Plant's Manhattan headquarters, where Phil Gitoner has broken them down on to 10½-inch reels. We are on our way today out to Syosset,



The King Biscuit Flower Hour

Long Island, to meet with Rainbow's bassist/producer, Roger Glover, and mix the tapes. Once we break out of midtown traffic, the drive takes about 25 minutes. Zullo spends the large amount of time he's in his car listening to a rather spectacular Alpine/Braun stereo system, for which he has yet to figure out how best to mount the speakers. He puts on a tape of the Greg Kihn Band that he recorded a few weeks previous, and proudly says that this tape too may well end up as a live album release.

Kingdom Sound Studios is located on the ground floor of a sprawling industrial park, among whose other tenants is the Harris Electronics Company. It is a one-room studio, with a well-equipped video lounge, lots of vending machines, and the usual framed record jackets on the wall. Chief engineer Clay Hutchinson, once Gloria Gaynor's guitar player, opened the studio five years ago as a 16-track house, and expanded it to 24-track about 15 months later. The studio also has a production comany, in partnership with Meco Monardo, producer of the very successful *Star Wars Disco* and its successors.

Unlike many suburban studios, the bulk of Kingdom's work is albums.

"Very little of our time is spent doing jingles." confides Hutchinson, "and those we produce ourselves." Several film scores are also among the studio's credits, and artists that have made albums here include Blue Oyster Cult, Jimmy Ruffin, and the Roches, with producers like Robin Gibb and Roy Halee.

Rainbow's Richie Blackmore lives a few miles east of the studio and, according to fellow band member Roger Glover, "he was fed up with having to drive into the city every time we wanted to work." So the band discovered Kingdom. With two albums, one of which has gone Gold, recorded and mixed here, Rainbow has effectively put the studio on the map.

"The whole area empties out at 5:00," says Hutchinson, "and we like that. There's no noise, nobody bothering us, but we're still in the middle of town."

Kingdom is very happy being a one-room facility, but there are plans to build a second, completely separate studio, perhaps in another part of the building.

"Our clients like the fact that they're the only ones here," says studio manager Nancy Sirianni. "It keeps them from feeling like they're in some kind of factory, with lots of other people doing other things around them."

The studio features a Harrison console, with Allison Research 65K automation, which won't be used on this mix because there are no spare tape tracks for the automation data. The outboard equipment rack is very comprehensive, and includes such goodies as a pair of Audio & Design F760 Compex compressor-limiters, three Eventide Harmonizers, two Lexicon Prime Time DDLs, and 24 channels of API 560 graphic EQ, as well as four Orban parametrics. There is a wide variety of reverb units, including EMT plate and Gold-foil, Lexicon Model 224 digital, and an AKG BX20. Tape machines are 3M M79 24- and 2-tracks, along with Studer and Ampex 2-tracks. Monitors are Big Reds, with the ubiquitous Auratones on sliding platforms sitting on the console. A pair of JBL 4311 speakers, separated by baffles, is set up in the studio, facing a pair of Neumann U87s — standard practice for Glover and Hutchinson in achieving a good, ambient sound.

The control room is completely wired for quad, and all that is necessary to do a four-channel mix, which Hutchinson did for Blue Oyster Cult and Black Sabbath's *Black and Blue* film, is to hang the extra two speakers.

Hutchinson takes out the audience tracks during the body of the songs and replaces them in the mix with the signal from the pair of U87s mounted in the studio.

"I need a more controlled ambience than I can get from those tracks," he explains. "But, of course, I put them back in at the beginnings and ends, and whenever the tune calls for audience participation."

He uses a little plate reverb on the voice, and runs the guitar through an Eventide DDL to get a stereo effect. The mike on the bass amp sounds a little far away, so Hutchinson opts for the one good direct track, which he fattens out a little.

"Things tend to be mushy and sloppy on a live performance tape," says Roger Glover, "so my purpose in the mix is to try to clarify things a bit, and to dip down the really bad mistakes a little. Rock and roll is not supposed to be perfect, and as long as they're not too obnoxious, I can let a lot of things go. It shows we're human."

Hutchinson has remixed a lot of remote recordings, but still, he says, "I'm surprised that this 24-track tape came out as well as it did. Everything seemed to be very much in order, and there were no problems at all that we had any trouble fixing.

"The sound has got to be more punchy than the kind of lush stuff that we put on a record," he continues. "On records we add a lot of top and bottom. A live radio show should be more raucous. Of course, it usually comes across that way anyway. That feeling was inherent in the tracks here, so we just take advantage of it."

According to Paul Zullo, "Once we get the basic mix down, we can pretty much let the tape run. Of course, we make adjustments from song to song, depending on what instruments are being used, but after we've gotten a good basic sound, nothing really changes much."

The five mixes go down smoothly in two sessions, a total of about 13 hours. Zullo then takes the tapes back to Manhattan, where they will be put through final assembly into an hour-long show.

Post-production

Meanwhile, back at D.I.R. Broadcasting's Manhattan office and studios, Bob Kaminsky is putting the finishing touches on an upcoming *Silver Eagle* program, along with D.I.R.'s chief engineer, Tim Mulligan. The show is quite an impressive one, as it features George Jones, Johnny Paycheck, The Marshall Tucker Band, and Linda Ronstadt, recorded at several different locations.

Kaminsky takes a somewhat different approach to the way audience mikes are used in the mix.

"I think most live albums are recorded well, but mixed improperly," he says. "Either there's too little audience or too much. Often, when the mixing engineer brings up the audience at the end of a track, it sounds like the Nurnburg rally. I use four tracks: left and right near the stage, and left and right far. Having set the level of the far mikes early in the mix — right after I've gotten the basic sounds down — I leave them there. When I need more audience, I bring the near mikes up. The stereo image is compromised a little that way, but it preserves the perspective, which I try to make 15th row, center.

"I will use a little artificial ambience sometimes, but never on the whole band. I may put a little warmth or color on the lead vocal, or a DDL on background vocals. Sometimes, of course, it's not possible, but for the most part I use what's already on the tape. That's why recording neatly and accurately is so important."

Although there are a few differences, the *Silver Eagle* is edited much the same way as The Biscuit. One major difference is that Kaminsky, who involves himself very actively in the technical side of production, does the mixes for 75% of the *Silver Eagle* shows himself. . . . *continued overleaf* —

Chief Engineer Clay Hutchinson at Kingdom Sound's Harrison console

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The King Biscuit Flower Hour

"I've done mixes in Florida, Toronto, Nashville, New England, New York; just about everywhere," he says. "I always bring a familiar record or tape with me so that I can hear the room I'm going to be working in. I like to use JBL 4311s, RORs, UREI 813s, and Auratones, and just about any place now has at least a pair of one of those monitors."

D.I.R.'s studio indeed has both JBL and Auratone loudspeakers. The small monitors are used generally at a low level to simulate a real radio, while the 4311s are used to examine mistakes and edits. Larry Kenny, an announcer for WKHK, New York's first country FM station (formerly a non-profit jazz station, WRVR), is in the small announcer's booth that doubles as a closet, reading the copy he and Kaminsky have written. Kenny's voice is recorded flat through an AKG H17 mike, and is equalized on playback to match the flavor of the show.

"We record bridges for every possible combination and order of acts," Kaminsky explains, "and I'll time the various sequences and reassemble them later." A typical show requires about five hours of post-production work in this studio, which is usually accomplished in one day.

The 2-track master is copied and, on occasion, re-equalized at this stage. Most of the music that finds its way on to the final tape is spliced directly from this second-generation tape, but some segues have to be mixed again and then spliced onto the beginnings and ends of numbers.

"Seventy perent of the time we cut down the space between songs by splicing applause to applause," says Kaminsky. "After 300 shows, [engineer] Tim Mulligan usually manages to get it right the first time; he just doesn't miss. If we can't do it that way in a rough cut, then we'll mix in a separate applause tape that we've derived from the original recording."

Two MCI JH-110 stereo recorders are located along the back wall of the production studio, together with a pair of vintage Ampex 300s with brand-new AutoTec electronics. On one of the Ampex machines is a small reel with the program ID — the sound of the horn of the bus that gave the program *Silver Eagle* its name. Also on that reel are a few bars of the "Orange Blossom Special," as played by George Jones' band.

"We use an instrumental tape from the live show as a music bed," Kaminsky explains. "Every act does at least one. If it's not that tune, it's 'Rocky Top' or 'Wildwood Flower.'"

Producers Bob Kaminsky (left) and Paul Zc

The console is a Quad-Eight, with 12-input capability, although only eight modules are wired. Unlike many broadcast production boards, the input modules do not have stereo pots, but rather each channel is controlled separately.

"It's no problem operating two faders at a time," says Mulligan, "and this way we get the flexibility we need if balances have to be changed, or if the two channels from any one source have to be equalized differently."

The only other equipment in the room is a rack of Kenwood and Pioneer cassette decks.

"I can't tell you how happy I was when we got those in," says Zullo. "We use the tapes for legal clearances, for pre-editing and, of course, for our cars. It saves us a tremendous amount of time to be able to just whip out four cassette copies."

With all of the work that D.I.R. is now handling, the company recently found it necessary to build a second production room, based around a TEAC Tascam Model 10 console.

Tape *vs:* Disk Syndication

Up until early last year, the *King Biscuit Flower Hour* was sent out to radio stations on high-speed duplicated tapes.

"When the company first started out," Kaminsky explains, "it seemed the logical way to do things. In the last few years, however, both musicians and audiences have become more aware of sound, and tapes just didn't come out good enough. Now, our show sounds as good, or better, than most live record albums."

"With as many copies going out as we have," offers Zullo, "it makes more sense as well to do it on records, particularly considering the costs of raw tape and shipping."

"Besides," adds Kaminsky, "disk jockeys and program directors respond better to disks. They're used to handling records, and are much more comfortable with them than with tapes."

Joe Brescio, cutting engineer at the Record Plant's Master Cutting Room, is responsible for all of the disk mastering for D.I.R. Brescio used to be a staff engineer at Bell Sound in New York, and worked on several of the early Biscuit shows. He has been cutting them since January, 1980, and he now handles the *Silver Eagles* as well.

"We don't do these masters much differently from the way we do any other album," Brescio says. "Everything else we do is also played on the radio, so the sound doesn't change much. We do tend to be a little conservative on the cutting levels, though, by about 1 or 2 dB. That's because we do no reference acetates, and usually get no second chances. My lacquer goes right out to the metal shop, and D.I.R. doesn't even get to hear it until the disks are on their way to the stations, so if there are any cutting problems, they may not show up until it's too late. We're even more careful if we have to put more than 20 minutes on a side."

The King Biscuit Flower Hour is pressed on three sides of two disks, plating being handled by Mastercraft in New York, and pressing by Donora Manufacturing, in Holtsville, Long Island.

"They use a one-step process," Brescio explains. "The stamper is peeled right off of the master lacquer. It saves a lot of time, and the fidelity is a little better than the usual three-step. They can get away with it because they're only pressing a few hundred copies, so there's no problem with stamper life."

Brescio's mastering suite uses a Neumann VMS-70 lathe with an SX-74 cutter head. He monitors with the same speakers as the Record Plant's stationary and mobile studios: Westlakes, JBL 4311s and Auratones. The speakers in his room are powered by Crowns, but Brescio says that the company is gradually switching over to Brystons.

He also has an ITI stereo parametric equalizer, which he uses, he says, about 50% of the time. "Sometimes the tapes that we get aren't exactly right for air. They may not be bright enough, or there's not enough bottom, or the vocals are buried. That sometimes happens when the band finds itself having to mix in an unfamiliar studio, and they're out on the road and can't wait until they get home. We can fix all of that here," he says proudly.

Towards The Future

In its continuing quest for technological perfection, D.I.R. Broadcasting has ordered from AT&T its own satellite transponder. Such a system will simplify distribution of both live-concert and recorded programs, although it won't change radically the way the company does business for quite some time.

A move to the sky would be a first for an independent radio syndicator, but being the first with a revolutionary idea in radio broadcasting is nothing new to D.I.R. Considering the company's current track record, it's a safe bet that it will be done right. No doubt the makers of the *King Biscuit Flower Hour* will have many more surprises for us, for quite a few years to come. □□□

Photography by: William E. Eastabrook

Green-Crowe Mobile co-owner Ed Greene at the Auditronics Model 750 console

AUDIO REQUIREMENTS FOR REMOTE TV PRODUCTION —

The Greene-Crowe AUDIO/VIDEO RECORDING Mobile

by Winn Schwartau

Today, why would anyone faced with 1981 inflation dollars and a deflated record industry, invest over two million dollars in a remote truck? That was the first question I asked Ed Greene, of Greene Crowe and Co, as we sat in a dressing room behind the Mandrell Sister's Stage 8 at the Sunset-Gower Studios in Hollywood, California.

"We forsaw the requirement for a truck with not only expanded video facilities, but one for which equal emphasis would be placed on high-quality sound to satisfy the production needs of the Eighties." But Ed couldn't hide the grin. "It was a challenge," he says.

Challenge may be an understatement when defining this portable television studio on wheels, which has already completed several successful remote stints, as well as being booked almost a full season in advance. It is a monumental achievement to have

. . . continued overleaf —

Audio/Video Perspectives ***by Martin Polon***

THE DIGITAL DISK CONSUMER MARKETPLACE

The Audio Profession is a business just like any other. It must have quality products to sell to its consumers. Ultimately, these consumers are those who listen to music in their homes. For all of the professional standards found in today's audio recording environment, stereo sound quality is only as good as the records sold over the counter to the home listener.

For better or worse, with excessive stamping cycles, re-used vinyl, and shrink wrapping, the LP record has unwittingly become the weakest link in the cycle of audio recording. production distribution and listening. Despite the presence of half-speed cutting, custom pressings or international pressing with virgin vinyl, etc, the quality of mass market records is marred by distortion, missing channels, untrackable disks, and so on. Worse still, audio media coverage and industry discussions seem to exploit what is wrong with the LP record.

The technology explosion of the Eighties has yielded an alternative in the form of the plastic digital disk. The plastic LP record, like the videodisk, has a number of advantages: ease of manufacturing, inexpensive raw materials, simplicity of packaging, suitability for mass market distribution, and relative ease of handling. The digital disk retains all the features of the LP record, and adds the absolute of repeatable fidelity to the original recording, with virtually no audible noise or distortion.

There are three sytems in primary contention for the digital-disk consumer marketplace. In all cases, a conventional audio signal is delivered to the home stereo via the particular digital audio disk (DAD) player, all digital-to-analog conversion being accomplished internally. None of the presently proposed digital-disk systems are compatible with other DAD units, or with videodisk systems or, for obvious reasons, a conventional record player.

The system that appears to be emerging as a standard for digitized audio is the *Compact Disc* (CD). Measuring 4.7 inches in diameter, the metallized plastic disk with its protective

. . . continued overleaf —

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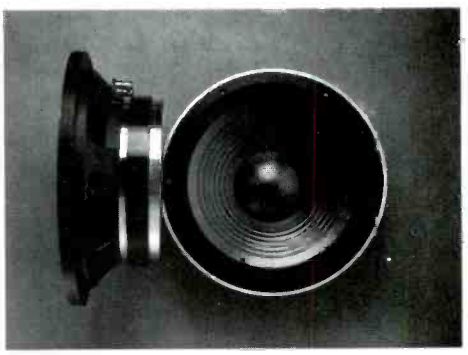

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Audio/Video Perspectives . . .
THE DIGITAL DISK CONSUMER MARKETPLACE

transparent plastic coating is a joint venture of Philips BV, Eindhoven, The Netherlands, and Sony Corporation of Japan.

The *Compact Disc* is manually placed in a solid-state laser player the size of a cigar box. Utilizing a 44.1 kHz sampling rate, the *Compact Disc*'s pulse-code modulation is read by an optical laser beam, and configured to analog audio via 16-bit D-to-A converters.

The CD System, first shown to the world by Philips in 1977, has progressed with a shorter gestation period than any other high-technology playback system, such as VCRs or videodisk players. Sony's involvement has transferred technology gains made with professional PCM audio recording, to the modulation and error correction of the 60-minute per side stereophonic *Compact Disc*. The counter-clockwise rotation of the disk in playback could also provide a secondary format for 30 minutes-per-side, four-channel (quad or surround-sound) audio, with at least 90 dB signal-to-noise ratio. The Philips-Sony *Compact Disc* has some similarities to the Philips-MCA laser videodisk (LVD).

Many Japanese and American manufacturers are reportedly preparing to manufacture audio disk players for the Philips-Sony CD format, including Pioneer, Mitsubishi Electric, Sharp, JVC, Denon, Toshiba, Hitachi, Kenwood, AKAI, Sansui, TEAC, Clarion, Warner Pioneer, Audio-Technica, Fostex, Dynavector, and Marantz.

Another potential system for digital audio use is the mini-disk (MD) from AEG-Telefunken of West Germany. The mini-disk is only 5 inches in diameter, and uses a piezo-electric stylus to play grooved disks, in a system with marked similarities to the RCA capacitive (CED) videodisk. Like the RCA CED, these conventional plastic disks can be stamped by standard record pressing equipment. The five-inch mini-disk provides one-hour playing time per side. A protective caddy is supplied for the disk, the complete package being inserted into the player. The AEG-Telefunken player removes the disk for playback internally, and is similar in operation to the RCA Videodisk caddy system. Also like the RCA system, the AEG-Telefunken disk can carry still-store video information on the third of the digital disk not used for audio. This stationary video capability could provide record and artist information, similar to album notes, for viewing on the home television screen.

The third major system for digital audio does not use a small disk; in fact, it doesn't use a disk at all. The Soundstream unit, proposed by DRC-Soundstream of Wilton, Connecticut, is *radically* different from the other three systems, since it uses a stationary 3- by 5-inch card that has been photographically screened using conventional darkroom techniques. The card, once placed in a small player, is scanned with an optical reader that moves over the photograph-card. The system, developed by one of the "fathers" of digital recording, Dr. Thomas Stockham, would have very low software cost, by using what is basically an optical system as the carrier of the digital information.

The fourth system for digital audio is from Matsushita's 51% owned affiliate, Victor Corporation of Japan (JVC). The audio high

—AUDIO/VIDEO—
RECORDING

AUDIO REQUIREMENTS FOR REMOTE TV PRODUCTION

begun physical construction of the truck only last Fall, and be on the road and recording by this August.

Greene and his co-conspirators, Nick Vanoff and Gene Crowe, have planned for every contingency that might be encountered on a fully-fledged audio/video remote. Many of the systems integrated into this truck represent an industry first for many audio/video operators in the United States.

"I was also being selfish," Ed offers. "In my experience there really was no other remote facility that was capable of handling audio for the types of shows I was doing. I'm basically a record mixer who has drifted over to TV. And conventional video trucks just aren't equipped to handle the complexities of modern-day TV sound."

Ed certainly speaks from experience on that point. His remote days began in college, operating a school radio station, which further nurtured a basic love and respect for high-quality sound. In the early Sixties, when audio was considered a step-child of electronics, the general philosophy of radio and TV broadcasters alike regarding audio was: "Just get it on the air, with little concern for *quality*." Ed took an approach that was diametrically opposite to that philosophy, and felt that the quality of TV sound, was important to the medium. He later owned and operated a 40-input remote truck around Washington D.C. during the Sixties, as well as working in his own studio.

He continued making records through the Seventies, when he relocated to California and was asked occasionally to represent the artists with whom he'd worked when they came to do a TV show.

"Actually, I was acting as just a consultant." Ed recalled, "I wouldn't tell them how to do their job just let the technical director or audio man know what made the performer comfortable, and what he was used to with mikes, monitors, and such."

His trial by fire came a few years ago when working with Frank Sinatra. While in the studio mixing an album for Sinatra, Ed was asked to handle sound for an upcoming TV special, *Old Blue Eyes Is Back. (R-e/p, October 1973, Page 15ff.)* With that project under his belt, more television work came his way, and soon much of his time was spent doing shows rather than albums. His credits include not only Award Shows, but countless Donnie and Marie Osmond shows, HBO and Showtime specials, *Rock Concert*, Disney extravaganzas, and many single-artist specials.

Special Demands of The Audio/Video Marriage

As Ed's television recording experience grew, he began to realize that the nature of TV recording differed from record remote dates. For some shows, a second audio truck would have to be hired, then hooked up to the first truck to handle the numerous microphones and tielines required for a complex shoot. Apparently, several others agreed with him; most notably, producer Nick Vanoff, now principal partner and financial architect of Greene-Crowe and Company, and Gene Crowe, now director of systems engineering. Vanoff and Crowe shared Ed's belief that with the growth of TV, and the successful emergence of audio/video as a unified medium, a facility was needed that paid equal attention and detail to both aspects of the audio/video marriage. Rather than have a jumbled collection of small mixers lashed together for mixing sound, a dedicated recording area with as sophisticated equipment as that found in a studio should be housed within the same facility as the video package.

And so it was that just over a year ago that Gene Crowe began discussions with Gerstenslager Manufacturing of Wooster, Ohio, about their plans. The partners wanted something special from the custom truck firm, and something special was what they got.

Truck Layout

The final truck design is nothing short of awesome. When Gene Crowe drew up the initial designs for the truck, he realized that in order to create the amount of work area required, certain departures from the norm would be necessary.

Imagine a 45 foot long semi sitting in front of a concert hall. Suddenly the right side begins to bulge. It continues expanding, until the whirring of motors stops. The semi has grown another 100 square feet of useable work area inside the truck. When the date is over, the truck shrinks itself and is back on the road. The telescoped area is actually

Detail of Telescoping Trailer Extension

Audio/Video Perspectives . . .
THE DIGITAL DISK CONSUMER MARKETPLACE

density (AHD) system adds a PCM decoder to the JVC VHD (Video High Density) videodisk player, thereby allowing the same unit to play back both video and audio disks. This groovless system uses capacitive tracing and pick-up without direct contact. Audio and video information is stored in micro "pits" inside of grooveless tracks. The disk is 10.2 inches in diameter, and made of standard electroconductive plastic. Normally kept in a plastic protective case, the disk is removed by the player. Since the basic player is a videodisk unit, it offers various play, search and repeat features.

Pressing of the AHD format is done initially with a laser and a glass master, producing the tracks and pits; conventional metal sputtering techniques then convert the master to a pressing mother. Disks themselves are then produced in the standard fashion.

The one-hour per side AHD system can provide up to four channels of audio with a 90 dB dynamic range. If one channel is not used for audio, it can provide still-frame video pictures to accompany the sound portions of the AHD disk.

A fifth system — if one could be considered a full system — would be the use of a Pioneer LaserDisc video unit with an attachment for the CBS CX noise-reduction decoding. Optical Programming Associates has a special Ray Charles concert ready for release, and which was recorded with CX encoding.

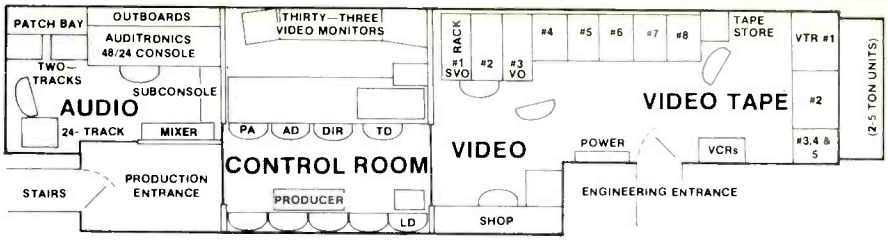
All of the digital disk systems offer high-fidelity response with very low signal degradation. The systems have noise figures around the 90 dB range. They all offer special features such as still photos via video, or video record notes, or search and repeat features. In effect, the systems are noiseless and almost distortion-free. DAD units practically eliminate wow, flutter and any sign of stereo inter-channel crosstalk. The improvement in dynamic range over conventional records may prove to be 50% greater; up to the high 90 dBs.

All present audio digital disk systems have a reciprocal technology in the video disk. DAD systems, like their video cousins, are not compatible in the least, although JVC's system does provide the option of one player being available for audio as well as video playback.

Initially, the high price of players will offset technical advantages over conventional LP records. DAD players are expected to retail in 1983 for between $500 and $800, prices being highest at initial introduction. The disks themselves are expected to be priced in the $10 to $15 range at introduction. But the manufacturing engineering wizardry of Japan is expected to cut the price as sales and production rise. All of the Japanese consumer electronic manufacturers see the digital disk as a rejuvenation of the audio business. For some Japanese companies like Sanyo, Toshiba, and auto manufacturing giant Mitsubishi, it is felt that the digital disk will pave the way for new prominence in home audio.

Crucial to a lowering of price is the combining of all electronics on to several multi-purpose chip sets for the DAD players. The high prices of necessary on-board digital-

. . . continued on page 108 —



AUDIO/VIDEO RECORDING

AUDIO REQUIREMENTS FOR REMOTE TV PRODUCTION

located within the video-production section of the truck. On part of the wall will be five DC10 airplane seats for the lighting director and other production people during the shoot. The rest of the telescoped wall holds a maintenance shop, materials and work spaces in the machine room.

Additional space is a luxury in any truck, but here the environment created around the telescope is unique to remotes. You feel as though you are in a fairly large TV production studio. The normally cramped conditions of a remote truck are completely gone, and there is plenty of room to walk from area to area on board the rolling studio.

The truck has been divided roughly into three discreet operating areas. The largest space is taken up by the racks of video equipment: computer-controlled camera setup, with memory files to return to pre-set conditions, video tape machines, (B- as well as C-format), and video cassette recorders, plus a tape library and maintenance area. In addition, the sophisticated fire-protection system and main power distribution for the truck are housed within this section.

The second area, connected by a glass sliding door for improved visual communication, is where production decisions are made and executed. A wall of over 30 color and monochrome monitors for the cameras, VTR returns and switcher positions hang above the main video switcher — that imposing control panel which handles a large number of incoming video signals, and fades, switches, wipes, or keyes them into the final video picture feed to the VTRs. The constant bustle in this room — directors talking to camera men, lighting talking to color correction, script consultants cueing the switcher, the producer calling the stage manager — requires not only the Patience of Job, but also a sophisticated communication system.

CONSOLE CHOICE FOR TELEVISION AUDIO

The Auditronics Model 750 console selected by Ed Greene for the Greene-Crowe Mobile features 48 input channels equipped with three-band sweep EQ, and routing to 24 track outputs. A total of six auxiliary send busses are provided: two foldbacks, one of which is switch-selectable pre- or post-channel fader, or pre-monitor; and four effects sends configured via internal PCB jumpers as two pairs, pre- and post-channel fader. Each of the 48 channel faders is equipped with a VCA control element, which can be operated under local control, or slaved via DC-control to one of nine sub-master faders.

To improve visual monitoring of console functions during complex television shoots, Ed Greene had specified that metering on the Auditronics console be arranged with the 24 bus VU meters located on the left, and the stereo and mono, plus four auxiliary send meters to the right. In addition, illumination of the main program meters has been increased to make them more prominent in low lighting conditions. Ed also specified switchable line-in and -out selection for the bus meters, to facilitate easier checking of off-tape recording levels.

During a complex shoot, the long-throw Penny & Giles channel fader and rotary monitor pots can be swapped, enabling more precise control of the main stereo or mono mix sent to the video tape machines located in the rear section of the truck, or as required during a live TV date. The Model 750 console has been laid with the nine DC-controlled sub-groups located between 36 input faders to the left, and 12 to the right. A stereo module housing the pair of master stereo program faders and mono rotary controls is situated just above the central sub-master bank, for easier access.

Important additional modifications specified by Ed Greene for the Auditronics console include a redesigned output stage, for which an extra transformer winding has been inserted in the feedback loop to reduce phase shift caused by high-level, low-frequency signals; extra patchpoints in each program output module for inserting outboard compressor-limiters or similar effects, so that bus levels can be monitored *after* rather than before such devices; a variable-trim output level control on each module that features a calibrated (+4 dBm) position for normal applications; an extremely comprehensive patchbay, comprising two sections of six, 6 × 28 fields, with numerous multiple access points to stereo and bus outputs via distribution and buffer amplifiers; a bank of A/B microphone switches mounted above the console, to simplify set changes during a shoot; and a back-up power supply permanently connected in parallel with the main PSU through diode isolators — in the rare event of the main supply failing, the back-up is already on line, thus preventing any disruption in operations.

□□□

The audio room, although extremely compact, is laid out much like any recording studio might be expected to look. However, there are a couple of obvious differences. The patch bay, for example, is *huge*. Not to mention a wall of submixers for extra incoming microphones. A lot of action goes on in this room, and the area has been configured to be operated by two people: the production mixer, and a machine operator.

Here too, good communications is a must. Not only do the mixer and operator have to talk to production and director, but there may be five or more audio assistants (A2's), a PA operator, monitor mixer, boommen and, well, maybe more than that. With everyone trying to tape a complicated show and stay in touch with one another throughout the shoot, communications among everyone must be simple and reliable.

"To help out in this respect, I sort of 'borrowed' an idea from the BBC," Ed acknowledges. "Instead of having to listen to all communications come out of one speaker, several small PL speakers are mounted in the corners of the room. Output from production would be on one, our private PL on another, and so on. That way you can hear what you're mixing, and still keep a handle on what everyone else is doing without getting too distracted.

"I have one additional speaker," Ed continued, pointing right in front of him. "A squalk box. If I lower the level on my PL communications, and they *really* have to get my attention, they can always reach me through this speaker."

The boommen, who handle the long microphone booms or fishpoles, and keep the mikes out of the camera eye, listen to something different. They receive the audio PL in one ear, production PL in another, and their own microphone signal down the middle of their headsets.

The Audio Department

The Greene-Crowe truck's audio systems are nothing short of amazing, and actually surpass the capabilities of many recording studios. One-hundred and ninety-two microphone lines come directly into the truck (although there are provisions for more if needed), and get routed through switchers to either the 48-input custom Auditronics Model 700 console, or to a bank of sub-mixes located in back.

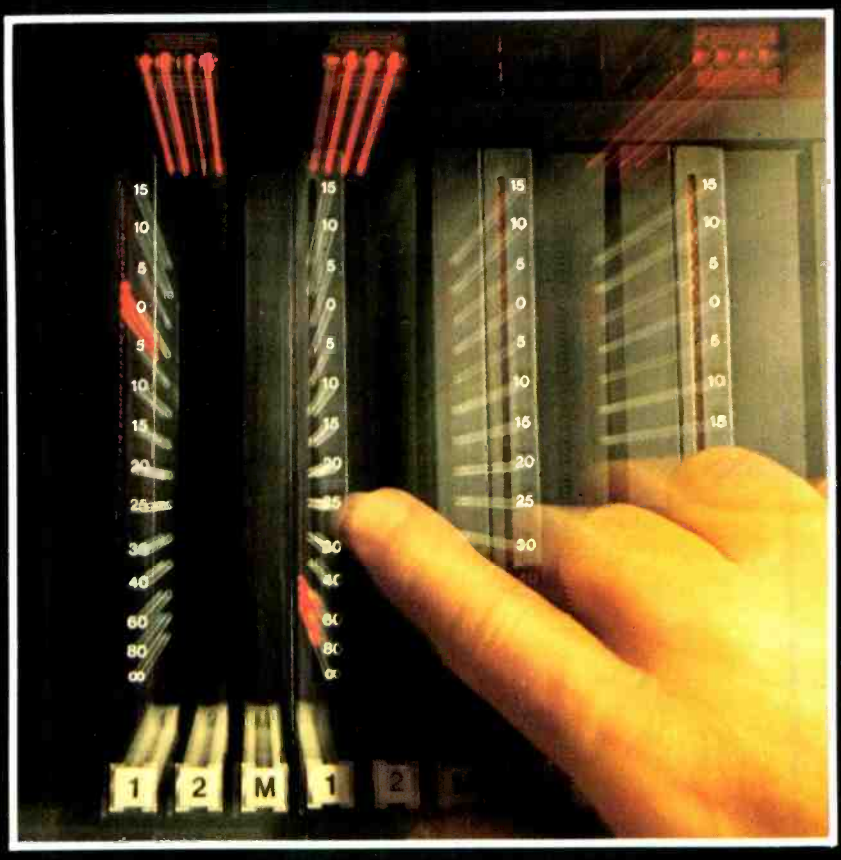
"The Bee Gees once taped a show on 46-track with safeties," Ed recalls, "so

. . . *continued on page 108* —

DIGITAL SPHERE

The Travis Fader
This revolutionary new fader design featuring no moving parts at all is the genius of the industry. A microcomputer connected to each fader creates an uncanny, realistic "feel" that users report increases a sense of direct communication with the music.

Infra-red light bridge technology tracks your finger and sends exact digital level data to the attenutator and to the Datalog computer. An LED cursor alongside each fader gives visual level indication the same way the old knob did, and when the Datalog computer is doing the mix all your moves are faithfully reproduced, exactly. Its quite a sight. Two preset level memories and a fader Solo/Mute are enormously useful features. Track assignments can be typed into the alphanumeric readout above each fader and when your finger enters the field it switches to exact dBm values. After a few moments with the Travis Fader you won't miss the old knob at all.



The Digital Attenuator
The Sphere Digital Attenuator (Goodbye VCA!) represents a significant advance in digital control of analog signal. The Attenuator receives an 8-bit level word from either the Fader or the Datalog computer and switches level changes as fine as .375 dB. There are 230 discrete steps. Attenuator signal-to-noise is better than 100 dB and it contributes virtually no distortion at all. The Attenuator has been under development and testing at Sphere for more than a year and has wide application prospects for video editing suites and automated live shows in addition to recording and broadcast studio consoles. The Sphere Digital Attenuator represents a major advance for our industry.

Retrofit
The Fader, Attenuator and Datalog Automation are all available on new Sphere consoles, but that's not all. Datalog retrofit packages are also available for **any** console now in service. If your present console is VCA then the Attenuator replaces it and the DC fader . . . and getting rid of the active VCA will improve system noise significantly. If your console is mounted with audio faders the package replaces them and converts your old console into the most modern engineering tool. And you will be pleasantly surprised at how reasonable the cost is, especially considering what an advantage your room will have for attracting new business. Engineers and Producers love it. So will you.

Datalog Automation
Sphere Datalog console automation represents the best of both worlds: its sophistication is second to none and, thanks to The Fader and Digital Attenutator it achieves true elegance in its system simplicity. The Datalog system is a series of additive "Levels" beginning with the basic computer and command panel for simple and very cost effecitve automation. Level II gets SMPTE code and dual floppy disk capabilities including butt splice mix editing. Level III represents "the finest money can buy:" extensive inter-mix editing, machine shuttle operations and client invoicing and record keeping.

Beyond this lies **STATUS DATALOG** . . . the ultimate in console logging systems. Every knob, pan and switch on the entire console can be retrieved from memory. Quite simply there is no automation system available that offers so much for your money.

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— continued from page 105 . . .

Audio/Video Perspectives . . .

THE DIGITAL DISK CONSUMER MARKETPLACE

to-analog converters is expected to come down from $200 to $10 as quantities rise. Use of hybrid IC technology with thin-film resistor networks and laser trimming will allow the extensive use of the converters in DAD players. The cost problem is partly a function of the 16-bit units used to provide the 6 dB per bit dynamic range. Large scale intergration of circuits, plus economies in semiconductor lasers and lens optics, will also contribute to lowering the price of the players. It is possible, if the demand justifies the change in parts cost, to consider a digital player in 1985 for under $250.

The irony of digital disk is that the record companies may be responsible for squelching the very boom they so desperately need. The key to mass adoption of digital disk will be a standard, with only one player dominant. Unlike videodisk, that seems a likely possibility, especially with the digital audio group conference of 47 manufacturers (mostly Japanese) leaning towards the Philips-Sony CD format.

However, establishing a standard over the LP record with its tens of millions of players out in the hinterlands, will require large scale availability of software. Most record companies show signs of wanting to wait until digital disk sales become presentable; but that won't come to pass without the large scale presence of software. The price of the software may not migrate downwards as radically, but the per-minute price will be about equal to an LP record, given the longer playing time of the digital disk.

Digital records will come initially from CBS/Sony (with over 100 projected titles), Polygram (a Philips holding), and Nippon/Columbia, with others involved in the manufacturing of hardware expected to join.

The real test of digital disk's staying power and potential value to the professional recording studio will be when the major record companies join the "bit" wagon, and convert from analog to digital. □□□

—AUDIO/VIDEO— RECORDING

AUDIO REQUIREMENTS FOR REMOTE TV PRODUCTION

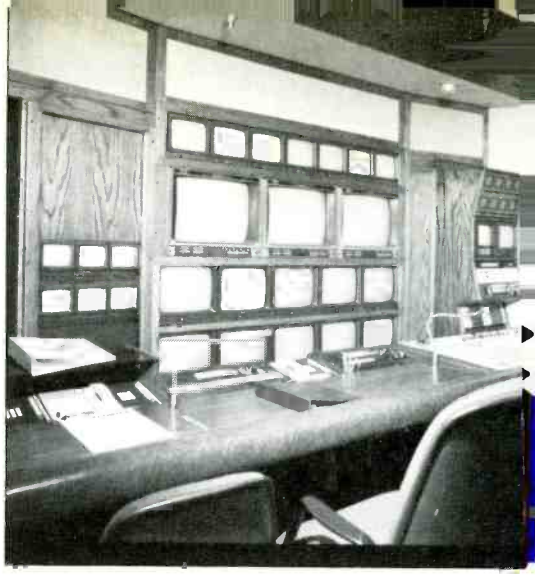
our truck now has the capability to plug in four 24-track machines."

Other than mere size restrictions, equipment selection for the truck is more difficult than it would be for a studio. Being on the road so much, and subjected to more abuse than in a fixed location, long-term reliability is of absolute prime importance. Also, in the field you're subject to more diverse operational requirements than in a studio.

The Auditronics console, which is fitted with TransAmp mike pre-amps, must be able to not only record 24 or more tracks, but also provide quality mono and stereo mixed feeds to the video section. Not to mention the need for possible broadcast feeds, and extras for anyone else who might decide at a moment's notice that they require audio.

"Console manufacturers often lose touch with operating conditions in the battlefield," Ed concedes. "We proposed some changes for our Auditronics board, that are now going into the other production models."

The patch bay is about as custom as you can get. Sitting on a wall adjacent to the console — and, being vertical, completely coffee-proofed — over 1,800 patch points enable re-routing of every conceivable signal path. All 192 mike lines, 96 tracks of tape-machine ins and outs, distribution amp feeds throughout the truck and to the outside world, bus insert patching, and a multitude of time code and sync signals, permeate the bay. Although everything is normalled for "routine" operation, the most



The Video Control Room —

cumbersome re-routing task can be handled easily.

Otari MTR-90 multi-tracks were chosen for their compact size, staggered turn-on of record bias and erase signal, and internal VSO facility. Outboard equipment is just as prevalent as that found in a conventional control room. The one missing link in a facility as complete as this, however, was console automation. Ed feels that, "right now, I don't see that automation is of any practical benefit."

The truck's physical dimensions put the mixing console quite close to the side wall of the audio control room. To overcome this problem, special monitors had to be found. And, as the nature of the problem suggests, a near field audio monitoring system by E.M. Long was installed.

The Shoot

More critical than the number of mikes, the quantity of set changes, or the nature of the hall or music, is the

actual planning that goes into a combined audio/video shoot. Disasters can be common if insufficient planning or pre-production happens before the shoot. Concept meetings for a show may come as much as six months before the taping itself. A quality production company will begin preparations as soon as possible by having pre-production meetings, when the producers, and director, plus the audio, house sound, video, and lighting people, can all get their ideas and concepts for the final show into a cohesive whole. For a complicated shoot, such as an Awards Show, or large multi-orchestral TV special, for which upwards of 200 mikes may be required, there may be a day or so of set up, before bringing on the actors or musicians.

In this case Greene-Crowe might send a cabling crew along a day in advance to lay out the wiring necessary for the dozens of onstage, offstage, down stage, upstage, hand-held, wireless transmitters, receivers, monitors, mikes, speakers, and all the rest. When the truck arrives at the location, the sound crew just plugs in multi-pin connectors, and audio is ready to go.

The back of the truck opens up into a large audio central panel, where all the signal inputs and outputs are located. Mike lines appear in bunches of 48 per connector, with both a video return for monitor, PL for communications, and spare returns for future expansion. All DA feeds and returns for broadcast and house sound are located here as well. In fact, there's even a telephone block, so connections may be made directly into a phone or intercom system.

"This type of show is exactly what the truck is built for!" Ed beamed.

Audio Requirements

The logistics of recording over 200 mikes and many set changes is an exercise in planning and disciplined execution. Mike lines and routing systems must be thoroughly tested, of course, the machines set up and, perhaps most importantly, verification made of good quality SMPTE code on the multi-track safety.

Multi-track safety? As mentioned above, production requirements are somewhat different for TV audio than for a remote or studio record date. Video tape machines at the other end of the truck will receive either a mono or stereo mix of the program material. This mix will generally be done on the long-throw board faders, while other controls will feed a mix to the multi-track. Since the multi-track tape may or may not be used — but usually is — it will be referred to as a "safety"; it's layed down just in case. Increasingly though, production companies are being enlightened to the necessity of high-quality sound. As a result, audio post-production of shows is often more complex than mixing a record, *plus* the important fact that you're mixing to picture.

While the shoot is in progress, a casual observer might notice a couple of immediate differences. First, the board can be color coded. Second, the mixer spends more time looking at a TV monitor, than the banks of equalizers, echo knobs and effects devices.

"After all, you're mixing to match the *picture*," Ed explains. "You have to help create an illusion, so that what you're looking at and listening to can translate to a home TV."

If done correctly, the audio elements can augment a video picture, or be disastrous if they don't. It can be truly unnerving to see a close-up of a steel guitar playing, and hear a saxophone. Which is why accurate scripts are so necessary to a TV sound mixer: he will follow the show and camera calls to anticipate the next move. Ed feels that in this way, and only in this way, can audio/video media communicate a *total* experience.

"That's also why I endeavor to memorize fader positions on the console," Ed continued. "You don't have time to think, 'Move the piano up,' read the input strip, 'piano,' and then move it — by that time the piano lick is over. I always have to *know* where the piano is: right here."

"It's never been a problem for me though, and I'll continue to do it that way. Besides, in a typical shoot hopefully you will be moving only a few elements, and that's where I use the

AUDIO REQUIREMENTS FOR REMOTE TV PRODUCTION

VCAs as masters. I try to put the essential elements of the final mix right in front of me."

Having recorded rock 'n' roll for as many years as it has been around, Ed Greene has noticed a distinct change in attitude among musicians. That change has made the recording of loud music that much easier, even if in an acoustic nightmare.

"We all disliked rock 'n' roll years ago because it was so disorganized," he says. "Today a successful group has to have its act together. Having well-organized road people can be the key to successful television. By having good stage people talk to the roadie and asking him, 'What do you have, and what do you need?' things are pretty straight after that."

Occasionally, when shooting a show like *Rock Concert*, for example, which Ed had been doing for many years now, a group will come in and try to blow everyone away with sheer volume.

"I have a speech for them," Ed offers. "I walk up to the stage and say: 'We all want you to be as comfortable as possible while playing. But this time, the main object is to get a great TV show. So, if you can live with a little less monitor and a little less PA, we'll be in great shape.' It usually works if you *ask* them, instead of telling them."

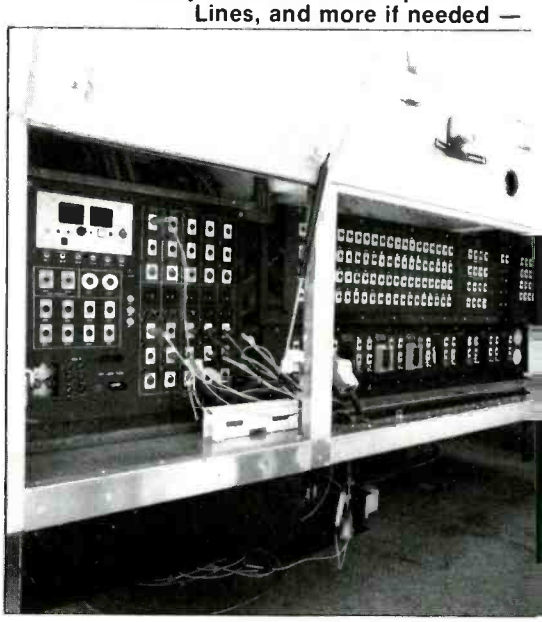
All in all, the process of recording sound for a TV show is not a great deal different from conventional live sessions. Basically, you're laying down tracks for possible later mixdown and overdub, and also sending a finished production mix to the VTRs. The Greene-Crowe truck, however, has so many features in its audio room that a separate foldback mix could also be provided, without taxing the engineer too much.

Problems with Miking

Microphone placement though, can tax an engineer. For a *Rock Concert*, seeing the microphones isn't that bad, so long as they're neatly dressed, and the lead singer doesn't trip over the cables — not too tough an assignment. But on a TV Special, where staging and light comes first, and directors and producers get bent out of shape from seeing a microphone on the TV screen, there are other solutions. Many microphones are handheld on "fish-poles," and carried around to follow an actor during a scene. Booms, too, can be wheeled around a set and used to pick up discreetly the voices or special effects of the action.

In other cases, however, having a microphone follow an actor's motion is just impractical; for example, consider a singer who may be doing a dance number as well. Radio microphones are often the answer to these tricky problems. By using one of the many commercially-available radio mikes, and deftly mounting the transmitter and antenna around the performer's body, an acceptable signal may be had. Often this will result on a large shoot with having an array of radio receivers, which have to be watched by one man, while the taping of the mikes to the performers is done by another. (For a full rundown on the varied application of radio mikes, see *Zen and the Art of Using Wireless Microphones*, by Dale Scott, April 1981 *R-e/p*, page 62 — *Ed.*)

Entry for the 192 Microphone Lines, and more if needed —



Talent: Mixer/Musician

"I guess I'm not aware of any conscious difference in the way I mix for record or TV," Ed says. "But somehow I change technique for the medium." Having years of mixing behind him in both media, Ed observes that "a good seasoned mixer is going to have to accommodate to a wide variety of mediums: TV, record and so on. I think that the accommodation becomes natural after so long.

"I like live work. I especially like live 'live' work, where you don't have a second chance. It's additional pressure on the engineer to have to try to get it all right; bring all the instruments into a proper balance, and go for a straight stereo or mono."

The pressure on an engineer to do it right will also begin to fall back on the musicians, as a trend towards "Doing it Live" in the field, or as an ensemble in the studio, continues to gain momentum. The tendency to mike every instrument in a band — especially the drums — may be receding, as a return to the techniques of the Fifties and Sixties and group miking for more natural sounding records.

"It's nice to use fewer microphones

and have the musicians balance themselves," Ed pointed out. "If you want an orchestra to sound like an orchestra, you have to start out in the hall. A trumpet section has to sound like a trumpet section. It can't be four guys, who all are great players, blowing their brains out, but not sounding as a section. I sincerely hope that other mixers are forcing the musicians to play like an orchestra, rather than isolated elements."

Is It All Worth It?

Every mixer who has listened to his mix on the air has said to himself at one time or another: "That's not my mix. What happened?" And, invariably, the network or local station is blamed. Even when the engineer tries to "mix for air," the sound coming out over the TV speakers can sometimes be different than what's coming off the master tape.

"Broadcasters shouldn't over-process the sound," Ed declares emphatically. There are some stations, he says, where the audio goes through unattended control rooms that have poor consoles and heavy processing on the audio program at all time.

Some of our broadcasting techniques and attitudes seem to be destructive, compared to the BBC in England, for example.

"I sat in a London hotel and watched some local programming," Ed continued. "The picture and sound were extraordinary." Perhaps the attitudes of our broadcasters warrant that our system standards be made the brunt of international technical jokes. NTSC, our standard for color broadcasting, has been disparagingly retitled, "Never Twice the Same Color."

"The weakest link in the entire audio chain happens at the local station," Ed feels. "The amount of signal processing gear that's inserted at the larger stations is unbelievable. When the FCC goes over 'Proof of Performance' checks on a station's equipment, I understand that it never includes the outboard equipment and console — just the transmitter and antenna. There may be equalizers, gates, limiters and such on the line, but they've been omitted from their tests."

In addition, systems are available that can actually prevent the degradation of signals throughout long-distance audio chains. One such system is referred to as VANDA Loop (Video and Audio), operated by the telephone company, which digitizes the audio and video signal. Cable and satellite signals are already all digitized, with very minimal signal loss. Such systems are currently being used by networks; it's now up to the local stations to recognize the need for quality.

Even though long-distance satellite transmission may be fine, and cable quality is improving all the time, some current production techniques that lead

The Video Transmission Section —

up to the final broadcast do not enhance the audio image, with up to 12 generations of analog transfer occurring before transmission.

"But it's worth it," Ed Greene concluded. "I love the challenge of trying to achieve high-quality audio that is properly married to an exciting picture. Our truck is a totally integrated unit that can provide the finest quality audio and video programs. Its state-of-the-art audio and video equipment will let us respond to the challenges of the future, as high-quality programming for television becomes more and more important." □□□

by Robert Carr






The invaluable sources for much of the information in this article regarding strummed acoustic instruments are pictured above. **JOHN ZENDER** *(upper-left)* is an instrument technician, having plied that art for the past eleven years at McCabe's Guitar Shop in Santa Monica, California. (McCabe's has been a popular meeting and showplace for talent such as Arlo Guthrie, Pete Seeger, Kenny Rankin, and John Fahey.) In 1963, he built his first 5-string banjo. John's official title is Administrator of the McCabe's music school, where he teaches guitar, mandolin, and banjo.

In addition to being a renowned international soloist, **LAURINDO ALMEIDA** *(center-top)* was a member of the Los Angeles studio scene as a classical and jazz guitarist for 25 years. (He says he knew it was time to leave when he was asked to hook his guitar up to a wah-wah pedal!) He has continued his solo career, and does regular concert tours and recordings with his group, The LA Four, featuring Bud Shank, Ray Brown, and Jeff Hamilton.

JIMMY STEWART *(upper-right)* is a versatile studio guitarist who has done sessions for producers like Tommy LaPuma, Creed Taylor, Bob James, and Gary McFarlane, and is currently celebrating his 10th year as columnist for *Guitar Player* magazine, Most recently, Jimmy opened his own 16-track recording facility in Los Angeles. He also writes for *R-e/p.*

DANNY WALLIN *(lower-left)* is in charge of the film-scoring division at the Record Plant, Los Angeles. His list of credits as engineer includes the films *Gloria, The Black Hole, Wolfen, A Star Is Born,* and *Altered States.*

VAL GARAY *(lower-right)* is probably best known for his work as engineer with producer Peter Asher's clients, Linda Ronstadt and James Taylor. Val's current energies are focused on his Record One Recording Studio, in Sherman Oaks, California, and producing and engineering the highly successful Kim Carnes.

Recording Acoustic Guitar

All acoustic string instruments are fundamentally the same. Tensioned strings are set in motion, and the bridge across which the strings are stretched transmits those vibrations to a relatively large area called a soundboard. That area is forced into oscillation, and amplified by a resonator to produce sound that hopefully can be called music. From that point on the similarity between acoustic string instruments ends, and the possible permutations of design produce the wonderous array of guitars, mandolins, dulcimers, banjos, and whatever other strummed inventions some creative mind can come up with. (Violins and the rest of the bowed orchestral strings work on the same principle, but their general function in most music, and the method with which they're recorded, are sufficiently unique to warrant a separate treatment in some future issue.)

The strummed instruments can be divided into two catagories: those with arched tops, and those with flat tops. Or you can choose to divide them into those instruments with or without tailpieces. Or ones with steel strings and ones with nylon or gut. How about F-hole versus O-hole; small body versus large body; natural material or man-made; what kind of bracing pattern . . . *stop!*

As can be seen, any kind of classification process gets crazy really fast, so again, generalizations are going to have to be the rule of thumb. I'll stick with just the basic design variations, and how they affect tone generation. For any detailed discussion or analysis of acoustic strummed musical instruments, please refer to the bibliography to be found at the end of this article.

Fundamentals of Acoustic Guitars

Bear in mind that the guitar's fundamental frequencies range from a low of about 90 Hz, to a high of around 1 kHz; taking into account the harmonics

. . . *continued overleaf* —

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Recording Acoustic Guitar

and partials, the upper limit can extend to over 3 kHz.

Once the strings are set in motion, how they sound is governed first by where they terminate — at the bridge or at the tailpiece. Traditionally, a classical guitar has strings that fasten at the pin bridge, and the bridge itself is attached to the top. As the string is played, there is a twisting moment or force applied to the bridge, which tends to rock forward towards the sound hole. The whole top is free to vibrate. The tone is typically increased in the bass and treble, and reduced in the mid-range.

If a tailpiece is employed, the bridge is essentially held in place by string pressure, which primarily is focused downward. Although this may seem the optimum choice in terms of reduced pressure on the bridge and guitar top, the tailpiece limits the number of directions in which the top can vibrate; there is an absence of the forward rocking moment. Tailpiece guitars and mandolins are perfect for jazz, rhythm, and straight-four orchestra comping, because the sound is a very heavy, cutting mid-range, with a roll-off in the treble and bass regions.

Vibrations are conducted next to the soundboard, where they obtain more of their characteristic shape. Different parts of the guitar top vibrate to specific frequencies.

"A flat top guitar has bracing that's fairly carefully thought out," says McCabes's instrument technician John Zender. "So the treble side of the top is stiffer than the bass side. The treble side of the bridge and the area surrounding it is what vibrates when you play high notes. The bass side has less stiff bracing, and the whole top reinforces the lower frequencies."

Braces serve two functions: firstly, to transmit energy across the soundboard to the appropriate areas; and secondly, to provide strength. Six nylon strings collectively pull about 90 pounds of pressure, while a set of medium gauge steel strings on, for example, a Martin 25.375-inch scale guitar is about 200 pounds. The bracing running parallel to the strings offers strength, while braces running perpendicular to the strings distribute energy.

Symmetrical Torres bracing (Figure 1) is a standard for classical guitars. Whether or not the bracing changes from one side to the other for steel string guitars depends on the manufacturer; some Gibsons, for example, have symmetrical bracing. The stiffness of the double-X pattern (Figure 2) increases the treble and reduces the bass. Martin and many other guitar makers have adopted an asymmetrical arrangement (Figure 3). Tuning of the bracing is done by shaving down the thickness; the thinner the supports, the deeper the sound and the louder the guitar.

Gibson's theory for arched top F-holes instruments is to make the wood in the middle of the soundboard thickest, and progressively get thinner down to about ¼-inch from the outside edge, which is the point of minimum thickness. According to Zender, the center plate then vibrates as a unit, and the thin part of the top acts as a speaker compliance. In this system for arched top guitars and mandolins, the top and back are usually shaped the same way, and both vibrate as plates — a type of construction which is a derivative of the violin design.

Taken a step further, the mandolin is dealing with specific resonances.

"The main mandolin to be copied is the Lloyd Lore F-5 made between 1922 and 1924," says John Zender. "Those were tuned so that the cavity resonance was one pitch — an A — and the top and back plate resonances were C# and D, respectively. It made the open A and D notes extremely bright and clear. They didn't seem to be excessively loud in relation to the others, because there was coupling between the cavity and the top and back plates; you could still hear the notes in between. If you graphed all the notes on an oscilloscope with a

Figure 1

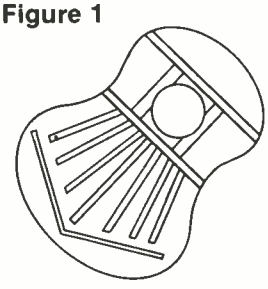


Figure 2

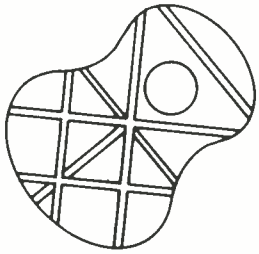
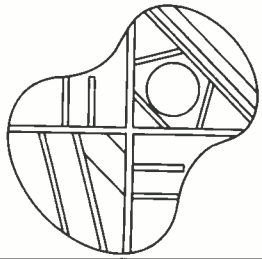
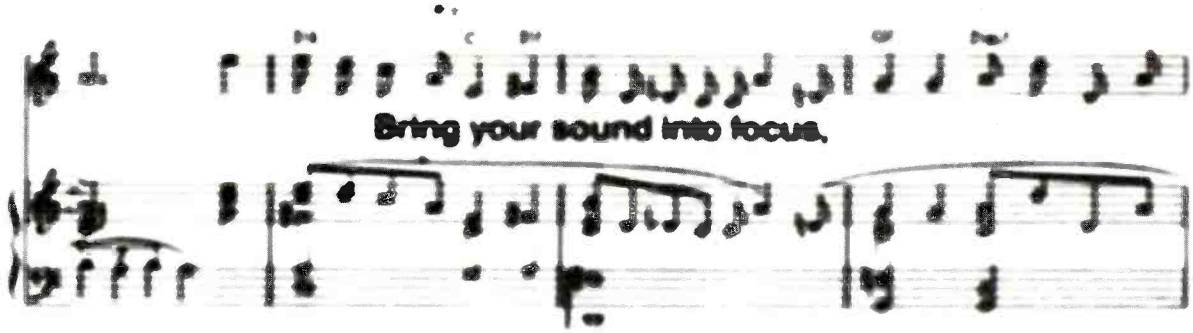
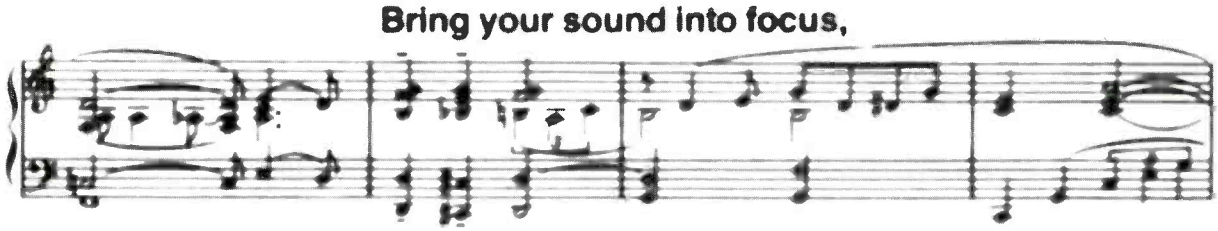
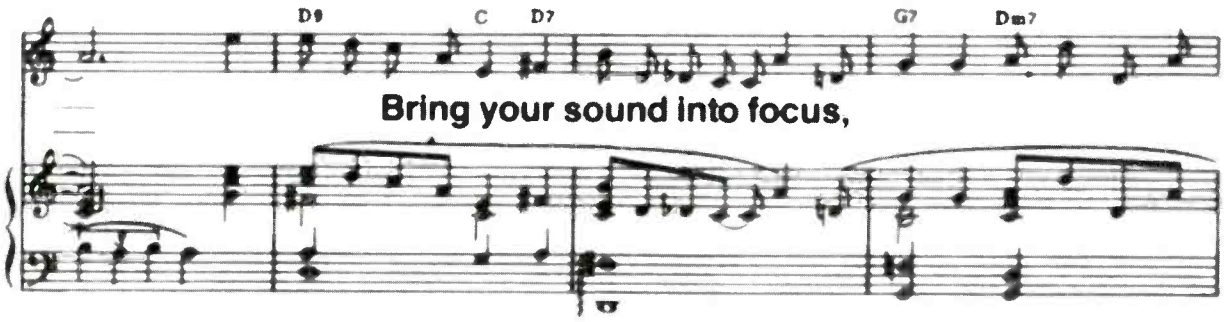


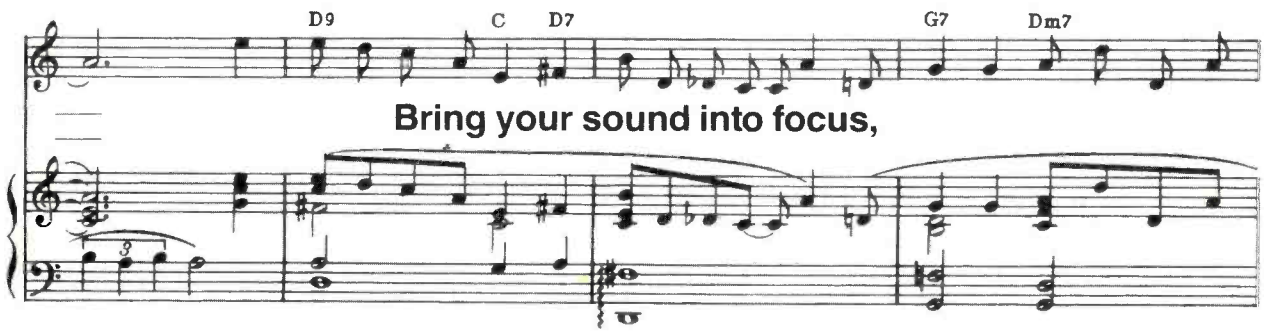
Figure 3











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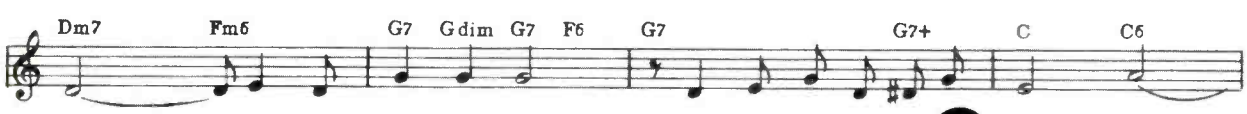

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Recording Acoustic Guitar

transducer, the points of maximum output were the A and D notes. Those are the middle strings, and that's where players and designers wanted it the loudest."

Being an engineer, Lore was proud of the fact that his mandolins could produce harmonics into something like the 8th octave — well above the audible hearing range. Likewise, the Lloyd Lore L-5 guitar also had F-holes, and was designed to create very high harmonics for a penetrating sound (*a la* jazz guitarist Eddie Lang).

In the Thirties and Forties, the guitar supplanted banjo in large ensemble situations. It was made bigger, and therefore louder, with a shift to the more contemporary mid-range emphasis we know today. Round-hole instruments, on the other hand, are skewed much more towards the bass. They don't have the cutting power characteristic of the arch top, F-hole instrument.

A familiar comment about acoustic guitars, and rosewood Martins in particular, kept turning up. Veteran studio musician Jimmy Stewart finds that "The Martin, which I've had set up for finger picking with lighter gauge strings, always gives me too much bass response. In person I want that, but sometimes it's a problem to record."

These guitars were originally used as backup and foundation for loud lead instruments, like banjos and mandolins, in bluegrass and country music. As the distance between audience and performer increased, the bass tended to fall away, and the over-emphasized lower frequencies were required to make the distant balance more even.

Film-sound engineer Danny Wallin has noticed that "there's a bass-proximity effect similar to what you would experience with a microphone. To obtain a good acoustic guitar sound, I like to get away from or outside that field, so I don't have to roll off so much bottom that I start affecting the 'color' of the instrument. I realize I'm going to have to take off a little bottom sometimes, depending on the instrument. If I get back a little bit, I don't have to take out quite so much."

Wallin prefers using Neumann U-87 and M-49 tube condenser mikes almost exclusively, because the transient response is so clean. Any type of coloration that a tube mike produces is all even-order rather than odd-order harmonics from a transistor type. That difference, he feels, translates into a warmer, more musical sound.

"Everybody misuses those [tube] mikes," says Wallin. "If you look at the curve on them, and what happens to them from the sound pressure, you see they only lose a dB at about 6 feet."

Wallin hangs the microphone upside down and about 18 inches in front of the guitar resonator, so that the mike is looking at the guitar right between the helmholtz hole and the bridge, which helps eliminate some of the big, low-frequency bump.

"The positioning is not real critical," he continues, "because the pattern is pretty broad on those mikes. I may roll off a little of the bottom at 50 Hz, and I like a couple dB bump at 1.5 kHz and up the octave at 3 kHz. The Dylan record, 'Knock, Knock, Knocking on Heaven's Door,' was done like that — all spontaneous, live recording — and the guitars are really pretty on the record.

"For the project I'm working on now — *Best Little Whore House in Texas* — we have +4 dB at 1.5 kHz, and +4 dB at 3 kHz. It gives a nice, 'pingy' edge to it. That's a real mild curve. The 18-inch distance gives the sound a chance to develop without getting a lot of low frequency."

Sometimes Wallin will move the mike back even further, depending on the sound he wants for a motion picture. He may put two mikes on the guitar: one 18 inches away, and another six feet back. The phase is kept the same for both microphones. It may be a scene in which he doesn't want as much presence on the instrument, and the two sources can be mixed for the desired effect.

"The guitar is an intimate instrument," Wallin offers. "You can't be miking it eight feet away. The intimacy is something you have to capture; you can't be too far away, or too close. There's an ideal spot where the instrument sounds like what it is. I think you have fewer options with the guitar; it is what it is. You can make it sharper for an effect but, the fact is, the acoustic guitar has a particular sound to it. It's not like an electric guitar where you can distort the sound, and just go crazy with it. For rock records, engineers will usually get it real thin sounding; they'll cut the bottom end, along with a lot of upper boost, for a kind of 'strummy' sound that cuts through all the other instruments. I look upon the acoustic guitar as a particular entity, and I try to be as true to that as I can."

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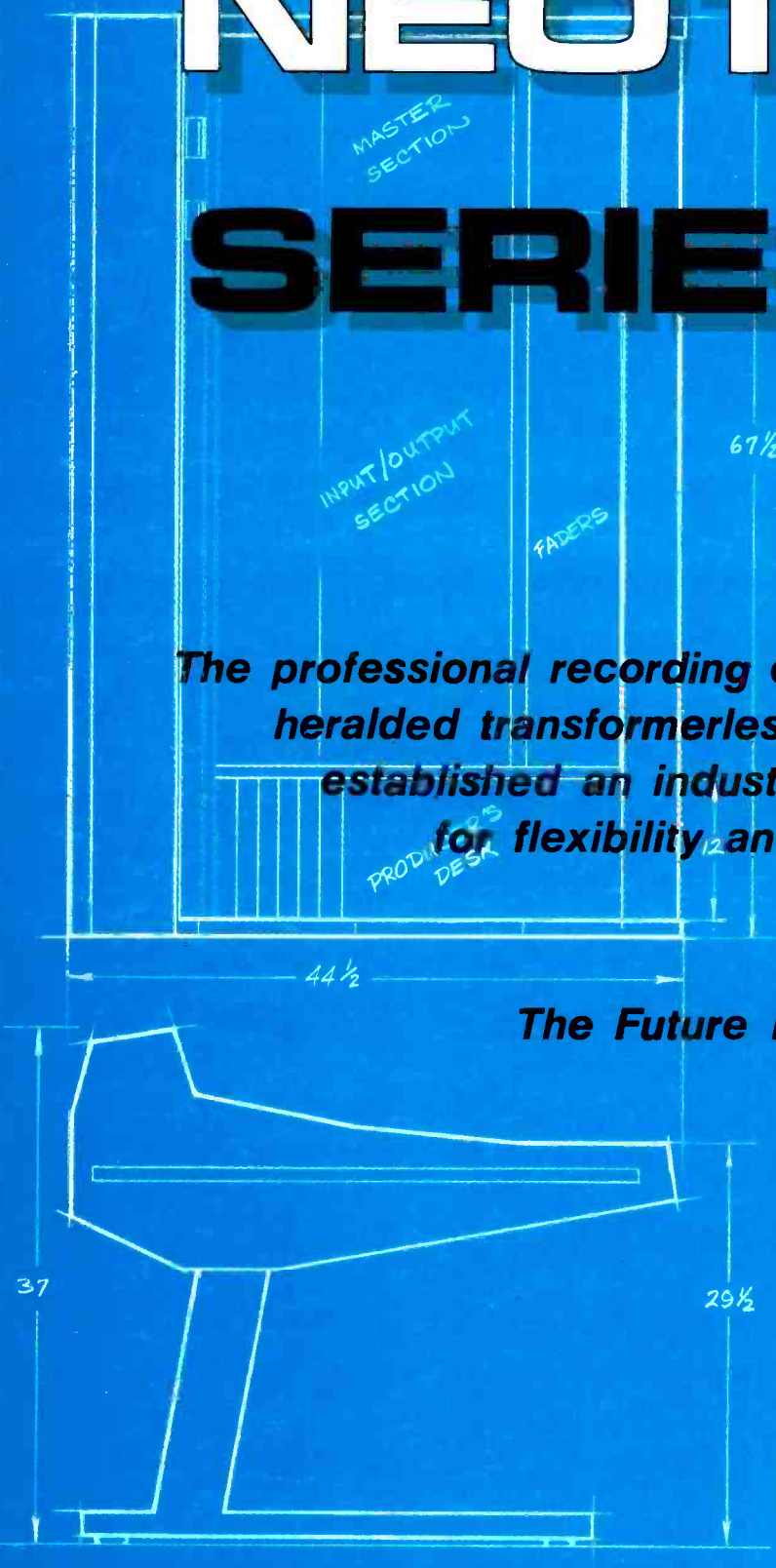

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Recording Acoustic Guitar

The Classical Acoustic Guitar

One breed of guitarist particularly unyielding about an accurate reproduction of their instruments are classical guitarists. Laurindo Almeida is one of a handful of classical/jazz players whose name is practically a household word. As he points out: "Quite a few of the old masters are purists, and will never accept amplification of their guitars. *The* master, Mr. Segovia, is one classical guitarist who can pack large concert halls like The Dorothy Chandler Pavilion in Los Angeles. For anyone sitting too far from the stage, the sound becomes almost inaudible. With 3,000 people breathing at the same time, there is enough room noise to cover up the performance."

After many years of recording sessions and live dates, Almeida was anxious to find a better way to reinforce the sound of his instrument.

"I've been playing through a microphone all my life," he says. "When you have to do that, you must lean into the microphone. You can't move away, or else no one will hear you. It's very restrictive. Then I found out that I could use a microphone inside my guitar, and it was a blessing. Now I can move around, and loosen myself up if I've been sitting for a while, but the sound is still there. The microphone goes where I go."

Almeida has a Sony ECM-50 lavalier microphone mounted in a piece of foam rubber, which, in turn, is positioned just inside and below the O-hole of his classical guitar. An XLR connector has been installed in the tail of the guitar (Figure 4). He doesn't use an amplifier, but plugs the instrument directly into the house PA system wherever he is performing.

Figure 4: Laurindo Almeida's custom guitar with built-in lavalier mike

"I use just a little amplification so I can survive the drums and bass," continues Almeida. "I have only the ECM-50, and that does it for me. It gives me the most accurate representation of a gut or nylon string guitar that I've ever heard. For recording, however, I still prefer external miking."

Using Pick-ups

In general, the idea of employing pick-ups for acoustic guitars does not meet with overwhelming favor among the professionals we interviewed, although a couple of designs seemed to be acceptable if they were used in conjunction with a microphone.

Piezo crystal pickups can be installed under the strings and in the bridge, such as with the Ovation design, or on top or beneath the soundboard or bridge. Magnetic-bar pickups, similar to those on electric guitars, may be clipped into the O-hole. (These work poorly or not at all on classical guitars, because the composition of the strings is nylon or gut.)

According to John Zender: "The entire instrument vibrates. For that reason, a pick-up could be placed just about anywhere on the guitar, and what you get will sound pretty good. Or I should say it's recognizable as guitar music. Probably the best location is inside the guitar, directly under the bridge. As far as picking up some free-air circulation, you tend to get the best response right by one of the sound holes, but slightly off center."

Jimmy Stewart has a comprehensive collection of acoustic guitars — Martin, Guild, Ovation, Takemine, Framus, Aria — as any serious session player should.

"The Ovation is a cold sound," he feels, "but a lot of guys use them. I still can't get used to them. They can be recorded direct from the internal pickups, and blended with a good smooth mike with some highs. If I'm playing a fusion type of line — like a fast, Al DiMeola-style — that blend of the two signals works well in the studio. If we're making a record for the commercial market, we want a sound that's high and tight, because that's what's 'in' now. But we may want to also use a little ambience to give the track some life."

Danny Wallin has a somewhat more traditional approach towards the value of pickups.

"I never really found a good one," he says. "All those contact-type microphones are very artificial sounding. It's not how you hear the instrument; nobody has their ear glued to the guitar body. Bar pickups need a lot of headroom, because there's so much energy produced when you put one inside a helmholtz. There's the real possibility of a mike inside starting to clip if you don't have enough headroom."

Engineer/producer Val Garay isn't happy with the sound of most internal amplification devices either, but he has had some positive experiences. Being such a well-known guitar player-singer, James Taylor is approached by just about everyone who has an idea, and Garay has had the opportunity to try them all.

"A few of the devices are great," he concedes, "like the thin piece of round metal that sticks inside the guitar under the bridge. It's just a simple transducer, but it sounds amazingly real. Unfortunately, none of them are commercially available. The new, 'hot' set-up is the Takemine 6- and 12-string guitar. They have pickups in them that sound about as real as anything I've heard."

Occasionally Val Garay does use a new stereo pickup designed by Frap.

"I use one part on each side of the bridge on the outside," he says. "I stick it to the sloping area with beeswax. I have both sides of the bridge miked, but I don't get stereo so much as a way to equal out the bass and treble strings. I never use something like that just by itself, though. I use an acoustic microphone to give the track more body and clarity of a real guitar. The Frap provides the bulk of the note. That way I don't have to depend on the outside mikes as much, and I can avoid some of the vocal leakage."

Vocal/Guitar Separation

Which brings up an interesting point. How much can be done if an artist prefers to sing and play guitar at the same time. James Taylor is one such artist, and the concern is to isolate the vocal from the guitar mike, and the guitar from the live vocal. If there is ever a need for a punch-in, both tracks would have to be re-recorded to match the leakage. Trying to match guitar sounds two weeks after the initial track is next to impossible.

"I don't care if you write everything down, and photograph it, which we've done," says Garay. "The atmosphere, different set of strings, or anything can change the sound. It's too much to document. With James Taylor I tend to have to sacrifice some of the acoustical purity for the sake of isolation. Even though people think of the guitar as an integral part of his music — which it is in the sense of arrangement and chord structure — they often don't hear it through the bulk of the song. People don't realize that. James has a familiar style of playing — that 'Fire-and-Rain' hammered lick he's famous for. When it pops in and out of a song, the listener subconsciously hears that through the whole tune. In actuality, on many songs it's eaten up by the power of the band.

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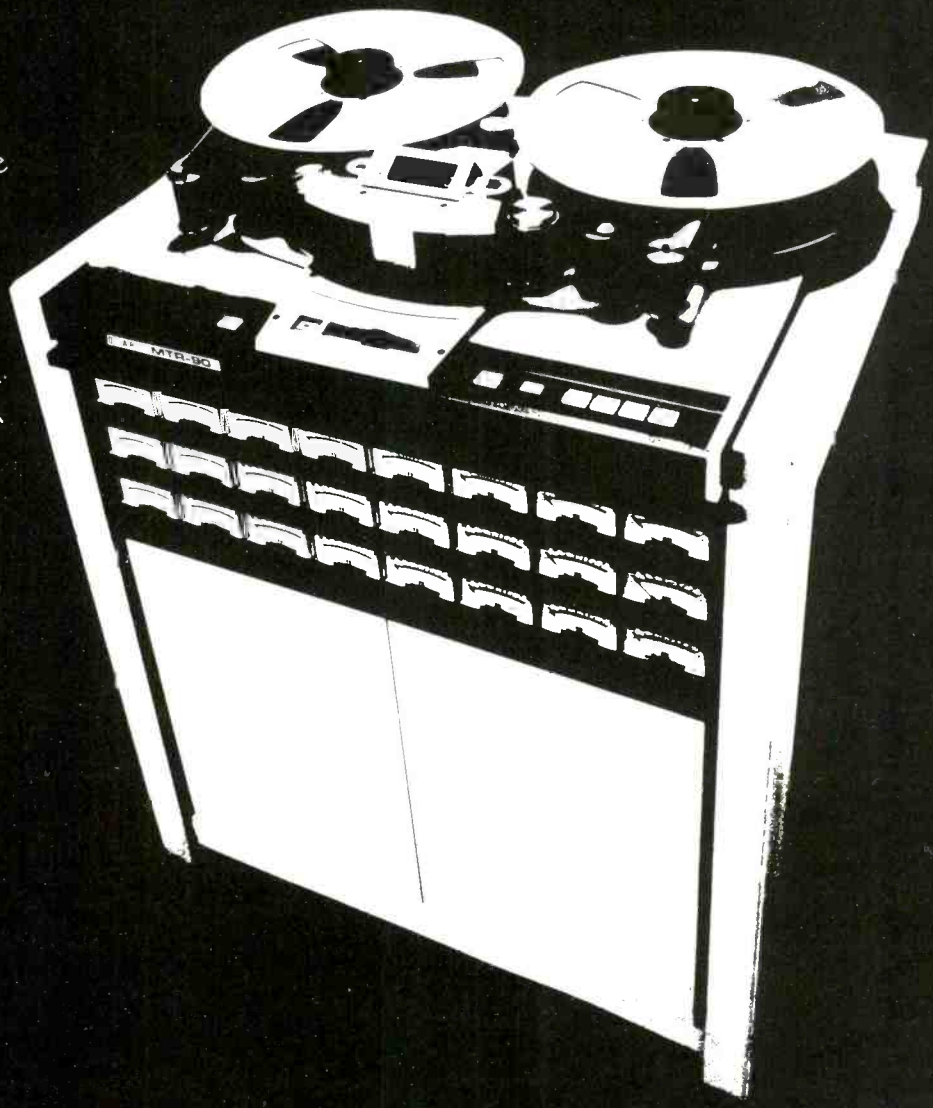

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Recording Acoustic Guitar

"We don't concentrate as hard on an acoustic guitar sound with him from the point of pure, esthetic acoustic sound, as much as we do for the character of his playing versus no leakage. We have to sacrifice."

James Taylor is a finger-picker, so most of his parts are bass lines against picked chords. Over the years, they've found guitars that have the tone to the bass strings without the boom.

"The sound is thinner than you would imagine some fat strummed guitar," continues Garay, "but James never strums it. When it does get thinner in terms of a picked sound, it doesn't get as much thin as it does *clearer*. There is only so much size to a picked sound, and when you start taking bottom end away from it, it only affects the bass strings, and only to a small degree."

For the first album he ever made with Taylor,entitled *JT*, Garay designed a plexiglass shield shaped like a upside-down U, and positioned it over the top and two sides of the guitar mike. The shield was held in place by a shaft connected to a boom stand. The vocal mike was set up above the shield, and the shield extended right up to the guitar body. (There's a picture of the arrangement inside the *JT* album jacket.)

The microphones that Garay used were a Sony ECM-50 clipped to the soundhole, and an AKG C12A far enough from the guitar so the musician has room to play.

"I've tried distant miking," explains Garay. "If you have an acoustic guitar player isolated in a room, the farther away you get the microphone, the more you open up the sound, and the bigger it will seem. A microphone hears what you hear. If I'm talking to you here [4 feet away], you hear my voice in one perspective. If I talk in your ear, it's a totally different perspective. It's the same thing with a mike — it hears what you put in front of it.

"It depends on the kind of effect you're looking for. For a real present, 'in-your-face' kind of sound, you get close to the source. However, since digital technology has advanced so much, an engineer can actually simulate better room sound with a DDL than by mixing in room ambience from a mike. Personally, I've always been a fan of making something sound as real as I can from an acoustic point of view, and then 'bending' it. I prefer working with a big, fat, bent sound, as opposed to something that's just bent."

Mike Technique — Some Tips

Val Garay believes that 50% of the secret to becoming a successful engineer is learning proper miking technique; all the sounds are possible through positioning. If there isn't enough bottom end, for example, the microphone is in the wrong place; the boost shouldn't have to be added with an equalizer. To prove his point, he recorded an entire Linda Ronstadt album, *Prisoner In Disguise*, without once touching the low frequency EQ.

"Peter Asher [Rondstadt's producer] was very tolerant," he remembers. "If we didn't have the right sound, I'd move the microphone until we got it. It took a lot of moving, but it worked. It's such a nebulous technique that every situation takes the same amount of research; there are no short cuts. Ultimately, I always try to record that way anyway, but not to the point where I cannot add 2 dB at 50 Hz. That's where you really have to scratch your head. It really taught me a lot about mike technique."

Realistically, such an approach will work only if the instruments being recorded are in top shape, and already produce almost the sound you want to hear. If a guitar isn't bright or full enough, there's a deficiency that should be corrected — such as replacing old strings — or the instrument should be replaced with another closer the appropriate timbre. For some reason, many engineers don't think in those terms.

Garay relates an experience he had while at a concert being given by his artist Kim Carnes: "When I hooked up with them in Houston, the sound of the snare was unbelievably dull and mushy. I asked the engineer what the matter was, and he told me, 'I don't know! I've got all the top-end added to it that I can!'.

"I walked up on the stage, and the snare sounded dull and mushy. I told the drummer to change the head, and tune the drum. As soon as he did that, the snare sounded great, and cracked where it was supposed to. Now why wouldn't someone take the time to listen to the drum on stage, when they found that it didn't sound good through the P.A.?

"If something sounds weird to me in the control room, the first thing I do is walk out and see what the instrument sounds like in the studio. Who knows what's happening out there? The mike may be bad; the amp could have blown up; it may not be a good guitar, drum, or whatever."

The instrument and musician have to be in tune. Jimmy Stewart has been recording since the late Fifties, and credits his success and longevity to developing and refining a recording sense.

"I have a mini-studio in my house, and that's the way I practice," he explains. "I use earphones, run through a mixer and echo, and record it on a 4-track and cassette. Strings and technique are important to the tone of an instrument. The only way a musician can really know how his instruments sound is to record them. That's how he must develop his sound, and have it down cold. Then it's up to the engineer to capture it and, hopefully, add to it."

Too often, getting those sounds becomes a touchy situation. Good communication and attitude can be the key to defusing a potentially explosive atmosphere before it gets serious. Laurindo Almeida's philosophy is to "always let the engineer do his thing without interference. I know I'd get mad if he told me how to play my guitar. Engineers usually just ask me to play while they find the correct microphone and settings. Then they ask me how I like it, and we go on from there. I know they've worked as hard at learning their business as I have at learning how to play the guitar. It's important to remember and show that respect."

Stewart echoes such thoughts: "There are two things I try to stay away from when I'm recording. I try to avoid asking questions, because that opens up the conversation, and gets us too much away from our work. And I never tell anyone that I'm working with professionally what to do. Playing takes a great deal of concentration. I can't affort to take my creative energy and put it into the engineer's head to do his job. I do need to communicate, however, and I do that with non-threatening statements such as, 'Hey, that sounds good, but can we try this?' Never do I take the attitude, 'I'm telling you *this* works, Jack!' You just don't do that and maintain a positive creative, environment."

Cue Monitoring

The cue system always seems to be another sore spot — the ultimate headache of making records. The problem, of course, is that the process entails reducing something from life size to become part of an ensemble in an inch-and-a-half speaker. Almeida describes his impression of working with headphones as follows: "Playing the guitar with headphones on is the same sensation as playing with a tremendous fever. Let me explain. While playing a series of concerts in New Zealand, my eyes, my nose, ears, mouth, everything became infected with a terrible headcold; my temperature was 103 degrees. When I sat down to play, every note that came out sounded like a double note to me.

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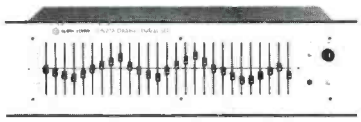

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Recording Acoustic Guitar

Although I knew the pieces — I had been doing the concerts for six months — I still had the funny sensation that, for example, a middle-C sounded like a B-flat, or C-flat. I have exactly the same sensation when using earphones. I have to take one side off to hear myself, and I hear the orchestra or other instruments through the remaining headphone."

Many times the acoustic guitar plays a strummed background part that is meant to add primarily fullness to the track. In those cases, the part being laid down can be difficult to hear. Even if the guitar is playing fills, it has just as great a tendency to be covered up by other electric instruments, or the drums.

"I like to have the instrument panned as it will be in the basic rhythm track," says Jimmy Stewart. "That means if the guitar is going to be soft left, and in the hole near the kick drum, that's the way I'd like to hear it in the 'phones. You can't be totally obsessed with the monitor mix; the studio may not be capable of it. If the studio does have some flexibility, again I suggest things in a non-threatening way: 'Can you pan me to the far left, because I'm having a masking problem with the keyboard who's in the same frequency range.'

"Basically, placing all the instruments in the center is going to cause a lot of masking problems, especially for acoustic guitar. I need a place in the frequency spectrum where I can hear myself. Unfortunately, not every session is ideal. I've done takes with the bass out-of-sync with the drums and my part. Sometimes the pressures of time and money are too great, and even under those conditions you don't want to slip and make somebody else look bad. That's a professionalism that comes from experience."

At Record One Studio, Val Garay has tried just about everything to make artists happy when it comes to monitoring their performance. He put speakers in front of Linda Ronstadt to avoid using headphones. With James Taylor, he fastened bottomless ashtrays to a set of earphone hangers, and attached speakers on the outside of the ashtrays. He finally decided on installing four individual earphone cues in his studio. It breaks down to the lead vocalist in one, the keyboard player — who always need to hear more keyboard — in the second channel, and the rest of the band split between the last pair. So far, the balances have been equitable, and complaints at a minimum.

Other Acoustic Instruments

Before bringing this discussion of acoustic string instruments to a conclusion, some attention must be focused on miking techniques for the less prevalent members of this musical family. Banjos, for instance, scare less experienced engineers by their strange sight and sound.

The banjo body is just a stretched head much like a drum head. Tone production is a little different from that of a guitar, because of the extremely thin membrane that's vibrating. Sound comes off the front and back of the head, and is shaped primarily by two factors: head tension, and whether or not a resonator is used.

As the head is tightened, notes start to ring more, and become brighter sounding. A tympani is a good analogy — the tighter the head, the higher the resonant frequency. The banjo behaves according to the same principle.

The resonator, or wooden back, reflects vibrations back toward the front, in a similar way to the action of a loudspeaker enclosure. The presence of a resonator produces a deeper sound than does its absence. Whether or not it's used is a matter of musical style.

To quote John Zender, "Old, string-band style, which was played from about the 1890's to the Thirties, called for a strumming approach to the music. The banjo wasn't as loud, but the increased pressure from strumming overcame any volume insufficiencies. Earl Scruggs originated the Bluegrass or three-finger picking method around 1945. The back was added so that the individual notes could compete with the loud guitars and bass. The added fullness of the resonator reinforced the penetrating power, and the banjo cut through the rest of the ensemble."

For miking, Val Garay recommends clipping an ECM-50 lavalier on the bridge, with the C12A or a Vega S-10 as the outside microphone. These latter mikes should be placed a few inches from the strings, as with an acoustic guitar. In fact, he would handle mandolin and dulcimer (ECM-50 fastened at the soundhole) in a like manner.

Danny Wallin, too, carries over his acoustic guitar technique to the other strings. For banjo: "The Neumann tube condenser works fine on the sharp transients. As a matter of fact, that particular effect is what I'm looking for when I'm recording it with a big orchestra, and sometimes I boost that treble just to give it a little more edge so it stands out. I don't worry about the bottom end; I just take off enough lows to get rid of room rumble."

The Mixdown Session

Once the parts are captured on tape, the final step is mixing. Placement of the guitar, as does everything else, depends on the concept of the overall piece.

"I don't approach a mix in the normal way," Val Garay offers. "Fortunately, I have an innate sense of balance that I don't really think about. I hear the tracks during the mix, and just know where to put them. It's an intuitive feeling. I feel a pressure when the balance is right, and the odd thing is parts that people would never expect to balance often do.

"Let's say there's a strong guitar part on the left side, and no guitar on the right. Oddly enough, the hi-hat on the right seems to balance it somehow. With the rest of the drums in the center, the feel is right.

"A doubled or stereo rhythm part is another matter. I never put a rhythm part soft left or soft right; they are either in the middle or hard. That's what gives you a real stereo effect. If you locate present, moving parts out on the sides, that's what gives the mix width. Pulling them in just shrinks the mix. For other instruments, there are no rules. Remember: No Guts! No Glory!"

There's one final comment that should be included in any discussion of miking acoustic guitars. If a client comes to you with the intention of recording a guitar or banjo that has poor intonation or fingerboard action, keep one thing in mind that may be of some help to him or her. Seldom are precise adjustments completed at the factory before shipment and sale. Guitar manufacturers have no idea for what purpose their products will be used once they're purchased; variations in desirable string height and weight, style of playing, and musical requirements stretch over too wide a range for the companies to spend the time customizing each item. Fine tuning is left up to the local craftsmen, who can translate a player's needs into the proper refinements, and the result will be the perfect guitar, banjo, or mandolin that's easy to record.

Why should an engineer or studio owner know or care about this? Everything you know about a musician's desires and feelings will make you you that much more valuable to him, and that's the best way to get to the top of his list of favorite places to record.

□□□

Bibliography

Guitar Electronics, by Donald Brosnac, 1980; dB Music Company, P.O. Box 953, Ojai, California 93023

An Introduction to Scientific Guitar Design, Donald Brosnac, 1978; Bold Strummer Ltd, 1 Webb Road, Westport, Connecticut, 06880 (203) 226-8230.

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A Practical Approach To

Electronics Troubleshooting Maintenance

For Less Than Technical Studio Personnel

by Ethan Winer
The Recording Center, Inc.
East Norwalk, Connecticut

Before continuing our discussion of electronic components and troubleshooting, I'd like to suggest another use for the hum-cancelling filter described in the August issue of *R-e/p*. During the normal course of routine preventative maintenance in any studio, it's always a good idea to check not only the frequency response of the entire chain, but also the total harmonic distortion from mike-in to final line-out.

While it can be taken for granted that distortion and frequency response are generally dictated by design, and as such will not "drift" in the usual sense (excepting, of course, tape-recorder adjustments), it's entirely possible for a component to degenerate somewhere in a console, or perhaps in a piece of outboard gear. And it can be difficult to hear one or two percent distortion in a casual listening test. Unfortunately, a conventional distortion analyzer is a relatively expensive piece of test equipment, and would be sitting unused on the shelf for most of the time.

I suppose by now you're wondering what the cheap solution is going to be this time. Well, it's the old imitation notch filter trick again, only this one is even simpler than the device shown in the last issue, since the bandpass filter portion can be eliminated entirely. In fact, you won't need to build *any* circuitry at all if you have either a high-quality digital delay, or an analog phase shifter with known low distortion.

Again, we're not talking about super-critical lab measurements; merely a quick way to verify that nothing is seriously wrong. You can use this method either by ear (great for assisting in recorder bias adjustment), or with a voltmeter for actual THD readings in percent. If you use the phase shifter shown in Figure 1 with a good voltmeter, this should yield resolution below 0.05%.

Traditionally, harmonic distortion is evaluated by applying a pure sinewave at the frequency of interest to the input of the device to be tested. The output is then sent to a notch filter that removes this frequency, and the remaining harmonics, noise, and other nasties generated within the device are measured with a voltmeter, and expressed as a percentage of the total signal. For example, if an amplifier is putting out 10 volts at 1 kHz, and after filtering the 1 kHz tone you measure 0.1 volt of remaining signal, the distortion will be said to be 1%. It's as simple as that, although in this case the tone will be cancelled by phase shifting and recombining in the console, instead of using a notch filter. By the way, if you *do* have a "Little Dipper" or some other filter capable of producing suitably sharp notches, of course you can use that instead, by measuring the signal before and after filtering.

This method will not be practical for testing intermodulation (IM) distortion, but THD and IM generally go hand in hand. If you can achieve better than 0.1% THD, chances are good that the IM

. . . continued overleaf —

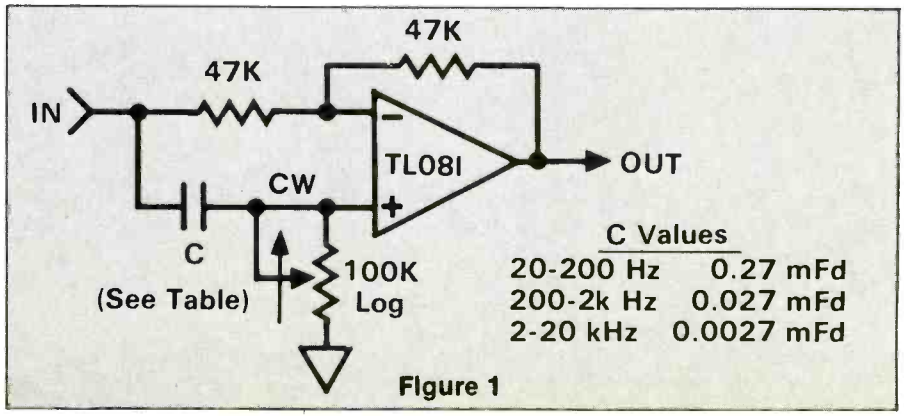
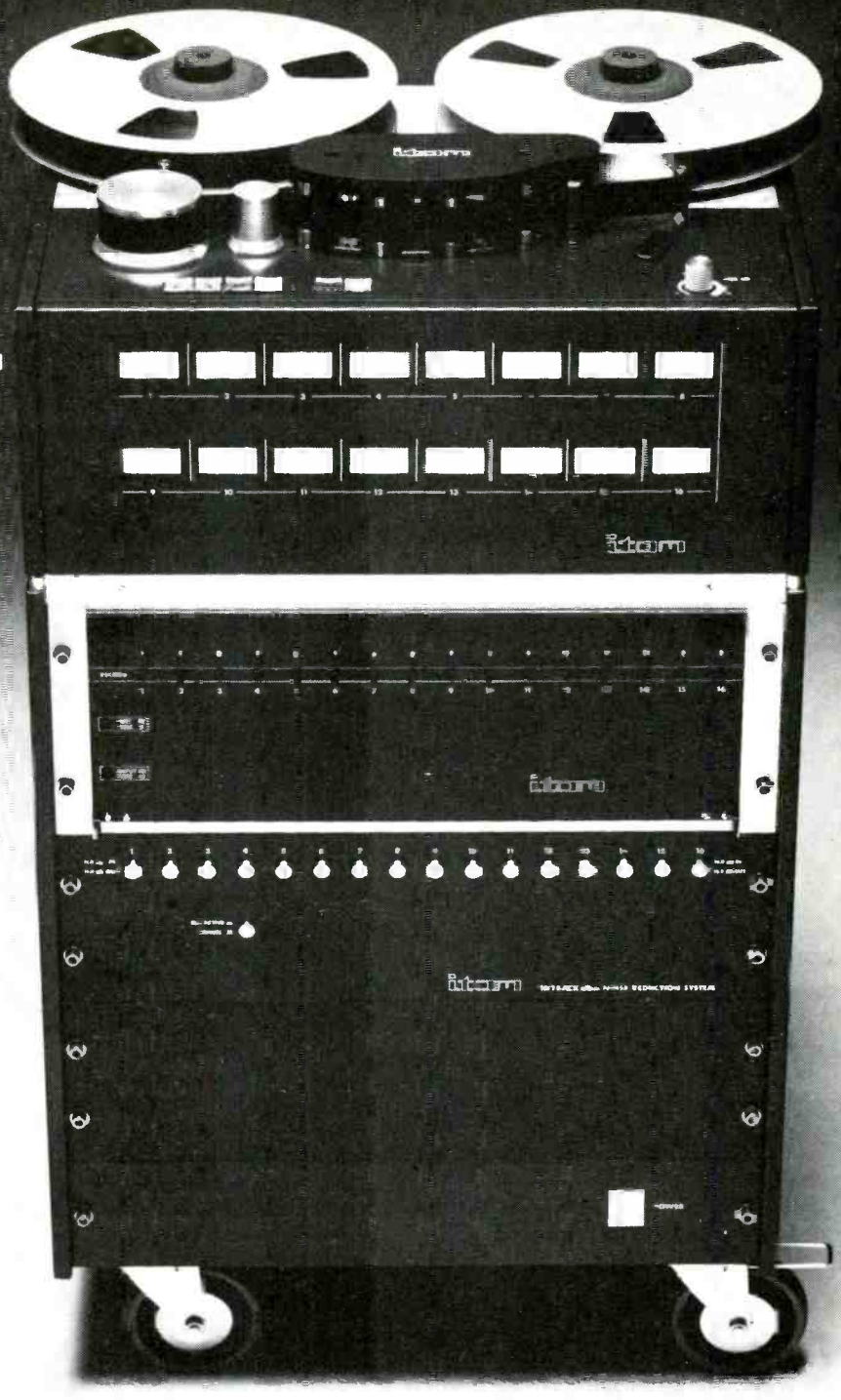


Figure 1

ITAM 1610– The First Professional 16 Track One Inch



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A Practical Approach To Electronics • Troubleshooting • Maintenance For Less Than Technical Studio Personnel

will be acceptable also. Well, enough about that . . . let's continue with our "layman's" guide to electronic components.

TRANSFORMERS

A lot of people have been talking about transformers recently, and the evil things they can do to an audio signal. Certainly, a balanced input or output can be implemented electronically, and it is true that often lower distortion and better frequency response can be achieved in this manner. But there are some cases where a transformer is the *only* safe way to go, and the better ones available really are pretty darn good. Of course, all of this has nothing to do with the facts about how they work.

A transformer is constructed of two or more insulated coils of wire placed in close proximity. For audio, these coils are wound on a single iron core — often one around the other — which enhances the coupling between them. Since we know that a coil of wire wound over iron produces a magnetic field when electricity is applied, it's not too difficult to see how this principle can also operate in reverse. When the iron is magnetized by electricity applied to one coil, a corresponding voltage will appear in the other coil — as long as it is coupled to the same piece of iron. Unfortunately, the input voltage must be constantly changing for the device to work properly, although increasing the amount of iron employed will help extend the low-frequency response. Naturally, this precludes the use of transformers for DC applications, or when really low frequencies are involved.

Probably the most common use for a transformer is to increase or decrease voltages, though don't confuse this with amplification or an increase in actual power. For example, if a transformer is being used to double an audio voltage applied to its input or primary winding, then only half of the original current will be available from the output or secondary. The amount of amps multiplied by volts equals power in watts, and you never get anything for free.

What makes a transformer so attractive for audio applications is that there is absolutely no *electrical* connection between the two windings, thereby eliminating all sorts of grounding and safety problems. Windings don't have to be insulated from each other, however, and a good example of this type of transformer would be the light dimmers most often found in recording studios.

Solid-state dimmers available for the home, while substantially lower in cost, are generally shunned for studio use because of the hum and buzz that they can radiate. Therefore, a variable transformer configured very much like a potentiometer is a more attractive choice. Isolation is not an important requirement here, and the transformer's improved efficiency makes it much more suitable for high-power loads than a variable resistor.

The ratio of the input to output voltage of a transformer is directly proportional to the number of turns in each of the coils. If 10 volts is applied to a primary consisting of 100 turns, a secondary of 200 turns will produce 20 volts, while one of 30 turns would provide 3 volts. The ratio of input to output *impedance*, however, is related to the square of the turns ratio. For example, our transformer with its 2:1 voltage increase will provide a 4:1 impedance increase, since $2^2=4$. And likewise, a 5:1 voltage increase will yield a 25:1 impedance increase. The same applies in reverse, of course, and the 3:1 decrease in voltage provides a 9:1 decrease in impedance.

TRANSISTORS

When we discussed the diode last time around, it was pointed out that when less than +0.6 volts is applied across its silicon junction, the device behaves like an open circuit. And, as the 600 millivolt threshold is approached, the diode's resistance will begin to decrease, drawing more and more current in the process. If you try to apply more than 0.7 volts or so across a diode in the forward direction (anode more positive), you will risk blowing it up.

The closest mechanical analogy I can think of would be that of a dog on a leash tied to a tree. The dog could travel, say, 6 feet from the tree with little interference, although as it approached this distance the leash would begin to pull. Sure, a few more inches is possible due to stretching, though if the dog could make it to 7 feet, the leash would undoubtedly snap.

Internally, a diode consists of a piece of "P" stuff stuck to a piece of "N" stuff with wires coming out of each end, and this behavior is something that just happens, so you might as well accept it. It is important to clarify the characteristics of a diode first, since a transistor comprises two of these PN junctions in a sandwich arrangement.

The elements of a transistor are the base, collector, and emitter, and the two available types are PNP and NPN — similar in all respects except for their opposite polarities. The real beauty of the transistor though, is its ability to provide gain or, more specifically, current control. A small current flowing in the base-emitter junction can control a much larger current — from a battery or power supply — passing through the collector to the emitter.

The amplifying circuit shown in Figure 2 will increase a small input

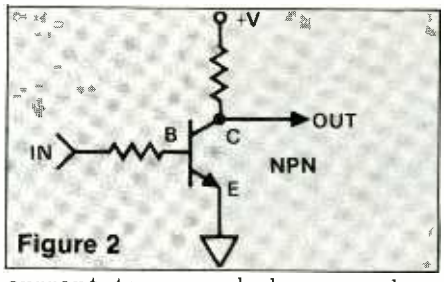

Figure 2

current to a much larger value, depending on the transistor's gain, or "Beta." Resistors need to be inserted where shown to allow the input and output current variations to be converted into corresponding voltage changes. Remember, the voltage from base to emitter will be near 0.6 volts most of the time, even though the current flowing through this junction may be varying widely. This particular circuit inverts the polarity of the input voltage, since the voltage at the output decreases as the input goes up. However, it is the change in output voltage that's important here.

A small amount of energy controlling a much larger amount shouldn't be too abstract an idea: this concept could be equated to controlling hundreds of pounds of water pressure in a pipe by turning a faucet or a valve. Your foot on a gas pedal would be another example, and a cowboy opening the gate to the corral yet another. In Europe, vacuum tubes are called "valves," precisely because of the similarities in operation.

In some applications, an increase in voltage may not always be required, while an increase in available *current* may be. The output of a semi-pro tape deck or console may be entirely adequate in level, but if you need long cabling to reach the patch-bay, or the ability to drive 600-ohm loads, it will be necessary to increase the output current capability. A circuit that posseses a relatively high input impedance, and which can boost the available output current is shown in Figure 3. This

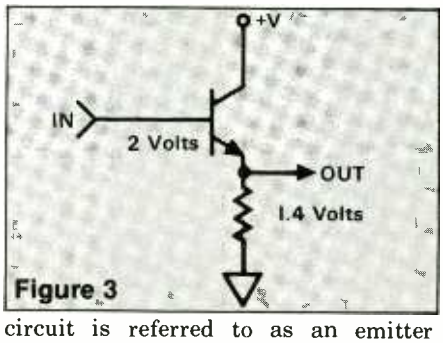

Figure 3

circuit is referred to as an emitter follower, because its output closely follows the input, not counting the fixed 600 mV offset.

FIELD-EFFECT TRANSISTORS

The field-effect transistor, or FET, is a very different device and its operation is

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probably closer to a vacuum tube than to a normal junction transistor. Instead of base, collector, and emitter, we now have a gate, source, and drain. (And, as if *that* wasn't enough, don't forget that tubes have a grid, plate, and cathode!) But in all of these cases, the idea is pretty much the same and, with the FET, the gate is exactly that.

During normal operation an FET's gate is reverse biased, as opposed to forward for a junction transistor. What this means is that the gate will *not* begin to conduct and draw current, since it is going in the other direction. None the less, a voltage applied to the gate will control a current flowing from source to drain, and with virtually no loading on any preceding stage.

Because of this extremely high input impedance, an FET can be very valuable for certain applications, such as an active direct box or in a condenser microphone. One common configuration is shown in Figure 4, and is known

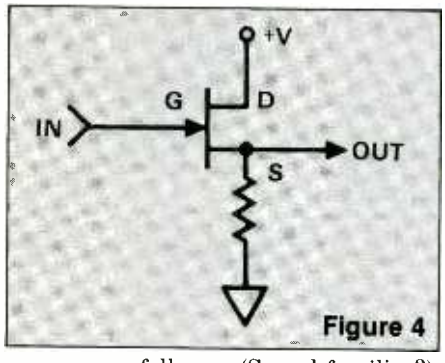

Figure 4

as a source follower. (Sound familiar?) Again, the voltage gain is unity, although the impedance transformation is incredibly large.

Another important use for an FET is as a voltage-variable resistor. Since an FET's drain to source resistance can vary from more than a hundred megohms down to a few dozen ohms for some types, it is often found in limiters as the gain-controlling element; the audio signal, however, must be kept small to minimize distortion.

Some other amplifying junction devices include the silicon-controlled rectifier, or SCR, which is useful as a switch, and the unijunction transistor, which is often found in timing circuits. There are some serious shortcomings when using any single transistor as an amplifier, however, as we are about to discover.

Two of the major problems with a simple one-transistor amplifier are the transistor's inherent non-linearity, and the variation in its gain with temperature. This means that large signals will not be amplified by the same amount as small signals, which causes distortion; and thermal dependancy can make your studio synthesizer drift in pitch as it warms up.

Enter Negative Feedback

Make believe that you're about to cook a frozen dinner — you would go over to the oven and set the thermostat for maybe 400 degrees. The heating coils will begin to glow and remain on until the correct temperature has been reached, at which time they will be turned off. After a few minutes, as the oven begins to cool, the coils again will be activated, thus maintaining a constant temperature. The thermostat is acting here as a stabilizing device and, although its response time is extremely slow, it still represents a classic case of negative feedback in action. Similar mechanical analogies can be found inside the tank of a toilet, and in those gadgets for your car where you don't have to hold down the gas pedal. Without feedback from the speedometer, the car would slow down whenever you went up a hill, and without a cutoff valve, you could never trust your toilet not to overflow.

A transistor can benefit from negative feedback in a similar fashion, since this will enable its input to have some idea of what's happening at the output. This technique works only if the transistor has more inherent gain than it is being asked to furnish in the circuit. (Just like the car must have the reserve power to maintain speed up the hill, whether you use an automatic speed regulator or not.) Even constructive criticism could be considered to be a form of negative feedback — since if enough people were to write in complaining about these ridiculous analogies, I would probably stop using them. But seriously, these are all legitimate examples of negative feedback, even if they may seem a bit farfetched at times.

OP-AMPS

A complete story on the internal workings of an op-amp is far beyond what we're doing here. Fortunately, that deep an understanding is not really necessary in order to have fun building things. As long as you're willing to accept a few facts about its behavior, you can simply treat the op-amp as simply another electronic component.

An op-amp is capable of extremely large amounts of amplification, although in most cases this available gain is reduced to a more manageable amount by the application of negative feedback. By having the op-amp provide more gain than needed, and then "throwing away" the excess, the performance of the entire circuit can be made to be more predictable, as we've seen in previous examples. Another advantage of an operational amplifier is its differential input, which means that signals don't necessarily need to be referred to ground. An op-amp has *two* inputs, and it is the voltage difference between them that is amplified, although it certainly isn't uncommon for one of these inputs to be connected to ground.

As with the transistor and FET, the most basic circuit for an op-amp is a follower, which is shown in Figure 5. To

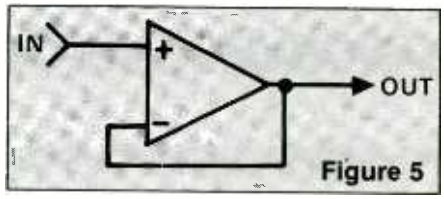

Figure 5

understand its operation, start by assuming that both inputs and the output are sitting at zero volts. If you increase the plus input to, say, 1 volt, the output will begin to go positive in response (notice that the output is also connected to the minus input). If the output tries to go above the 1 volt input, this overvoltage will force the minus input to turn it down. Therefore, negative feedback stabilizes the circuit by making the two inputs equal, or very nearly equal.

An amplifier with a gain of more than unity can be constructed by placing a voltage divider in the feedback path, as shown in Figure 6. If the two resistors

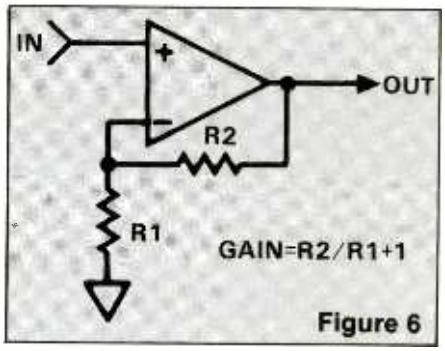

Figure 6

are of equal value, then a 6 dB loss will be incurred back to the minus input, and the output will need to go 6 dB higher in order to maintain stabilization. As R1 gets smaller with regard to R2, the circuit's gain will continue to increase — until, of course, the op-amp runs out of poop. But remember, the actual output voltage is always derived from the power supply, and is merely controlled by the input signal.

Aside from stabilizing gain, negative feedback also has the beneficial effect of reducing distortion and flattening frequency response. Again, this is because the op-amp is able to constantly assess how closely the output resembles the input, and apply a correction if necessary. This also gives an op-amp the ability to ignore large amounts of hum that may be present on its power supply.

The main advantage of the non-inverting amplifier just discussed, aside from maintaining signal polarity, is the very high input impedance achieved —

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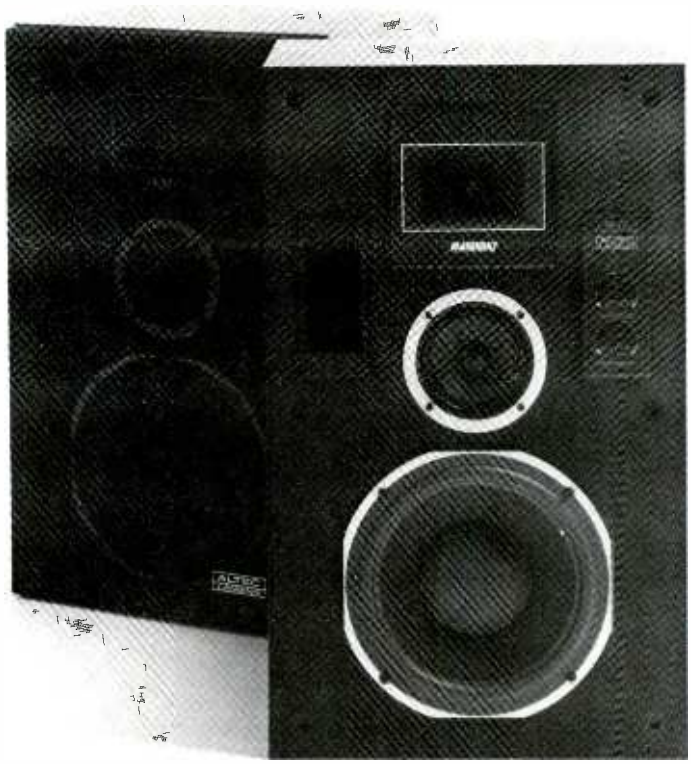

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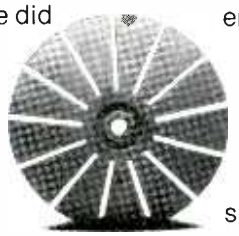

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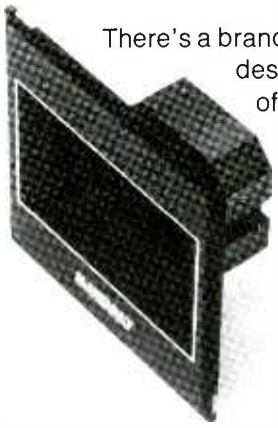

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typically many megohms. Another type of amplifier circuit, called inverting for obvious reasons, is shown in Figure 7, and which has its own unique advantages. The circuit's operation is really the same as the non-inverting amp, since the minus input is still connected to the output through a voltage divider. The only real difference is that the input and ground have been transposed, making things go in the opposite direction. Note that the feedback is still negative, only the direction of the output is inverted.

We have observed that in any linear op-amp circuit, the output will do whatever it has to in order to maintain a minimal difference between its two inputs. This creates an interesting situation when using the inverting circuit shown in Figure 7, since the impedance at the minus input will be very low — closely approaching zero. Therefore, the input impedance of the complete circuit will always be equal to R1 and, for the summing amp in Figure 8, the impedance at each input will be equal to its own resistor.

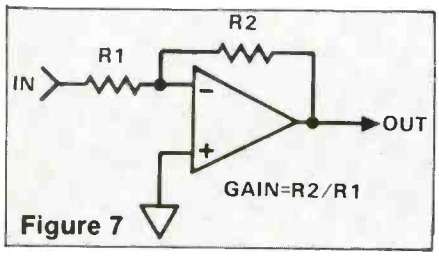


Figure 7

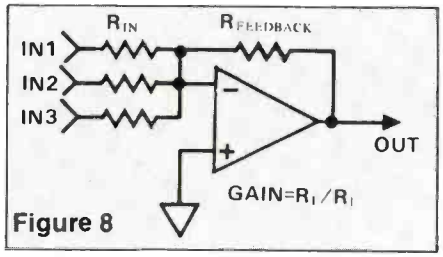


Figure 8

One major advantage of the inverting amplifier is the high degree of isolation between inputs in a multiple-input configuration, because each input resistor appears to be simply grounded. In a mixer, this will ensure that raising the level of the kick drum in the mix won't have any effect on the level of the remaining tracks. Remember, the minus input looks like ground because the plus input is grounded, and this summing junction is often referred to as "virtual ground."

The gain for any input is equal to the feedback resistor divided by the input resistor; the same as in Figure 7. This equality between the plus and minus inputs makes possible a very simple test that will enable you to determine whether an op-amp — inverting or not — is working. Simply measure the voltage at each input, and if the two differ by more than a few millivolts, chances are you've got a dud. Of course, any of the other components could cause the circuit to fail but, in general, resistors and capacitors are less subject to sudden death than their active counterparts.

In all of the op-amp circuits shown so far, linear operation has been achieved through negative feedback. (A linear circuit could be roughly described as one in which the output resembles the input.) There are some cases, however, that use positive feedback, and still others where feedback isn't used at all.

The hookup shown in Figure 9 is called a comparator, and utilizes the full gain potential of the op-amp. The input voltage in this example will be "compared" to ground, and when it is more positive the output will go to full supply voltage, which could light an LED or activate a relay. When the input is more negative, the output will be full negative, extinguishing the light or whatever. Since the open loop gain (no feedback) for most op-amps is around 100 dB at low frequencies, an input difference as small as 0.0015 volt will be sufficient for the output to reach full potential. It is a simple matter to compare the input to any other reference voltage as well, using a voltage divider on the minus input. Swap inputs, and the output will go the other way.

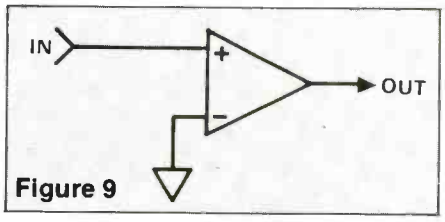
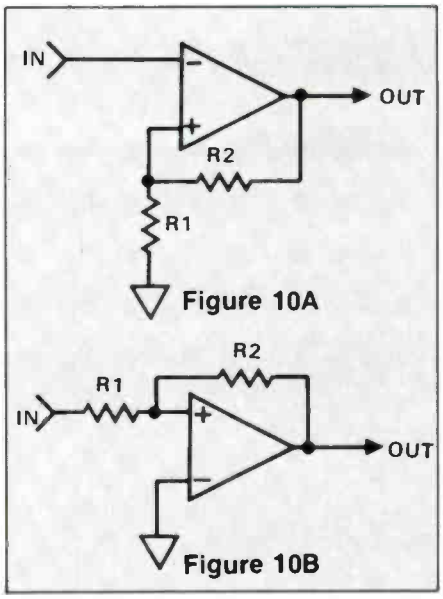


Figure 9

The only problem this circuit may run into is when the input voltage and the reference voltage are very close together. The output may appear to wander around rather than stay firmly up or down, or in some cases it may even oscillate. One common cure for this problem involves a slight amount of positive feedback, and is known as "hysteresis," after a similar, natural phenomenon found in magnetic materials. A common mechanical application of hysteresis can be found by returning once more to the earlier thermostat example.

In all thermostats used for home heating, there is an allowed temperature "window" of a few degrees width. If you set the temperature to, say, 70 degrees, the furnace won't come on until the room dips to 69. Once on, the furnace will continue to run until the temperature reaches 71, and so on. This

prevents the furnace from constantly oscillating on and off as the room temperature hovers near the selected setting. Mechanically, this positive feedback is accomplished with a magnet and a bi-metal spring, though the net result is the same as with the op-amp circuits shown in Figure 10.



Typically, R1 will be much smaller than R2 for comparator stabilizing purposes, and the positive feedback is used to influence the reference level up or down slightly each time the output changes state. It is interesting to note that the input impedance of circuit #10B is equal to R1 *plus* R2 since, in this case, the plus input is not a virtual ground. Other applications of positive feedback are found in oscillators and in active filters, although there is usually some negative feedback in these circuits as well.

* * *

TROUBLESHOOTING

You know, I never have to invent imaginary breakdowns to relate in these pages, since the Recording Center repair files are rich with actual case histories. This issue is no exception.

One particular amusing incident occurred over a defective cue box in the studio. This young lady literally walked in off the street one day with a pair of singles in her hand, wanting to know if I could remove the lead vocal and substitute her own singing in its place. She had never even been in a studio before, and had no idea whether this was possible. After explaining that his could be done — with varying degrees of success — by combining the two channels out of phase, we tried each of the cuts for acceptability. In each case, the lead vocal completely cancelled, but as you might imagine, some reverb still remained. There was also a touch of a funny rasp on vocal peaks that broke through from time to time but, overall, it seemed to be working well enough. Dropping the low end on one channel before combining restored the cancelled bass instruments, and this mix was

then sent through a stereo synthesizer back into the console. (See *R-e/p*, June 1979 issue.) Yet another cute application for out-of-phase mixing!

After taking great pains to assure Nancy that she would be able to hear the record and also hear herself, as well as talk to me, I set her up in the vocal booth. Though she was singing along with the track, she obviously couldn't hear a thing that *I* was saying, which was confirmed by going out into the room. So I gave her a new pair of phones and tried again. When that didn't work, I plugged in yet another pair right in the control room, just to make sure it wasn't the talkback mike that was causing the problem and, of course, it wasn't.

Mind you, this poor kid had no idea of what was going on, though come to think of it, neither did I. I mean, how the heck could she be hearing the music loud and clear, while my voice was being mysteriously cancelled? I moved the whole set-up out to the main studio where the 'phones were working, and finished the session. But I was still going nuts trying to figure it out.

Hours later, it hit me that the problem could only be a broken *ground* wire in the cue box causing the left and right earphones to be connected in series. Instead of getting a normal mono mix as you might imagine, the phones were now connected from hot to hot, responding only to the difference signal. The same thing I was doing to the record was happening to the talkback mike, since it feeds both channels equally. The music, however, didn't cancel due to the stereo synthesizer.

Any technician will tell you that the worst problems to fix are the intermittents, since invariably they disappear the moment you remove the cover screws. Nothing is as frustrating as yanking a piece of heavy gear out of the rack and setting it up on the bench, only to find everything behaving as it should. And, of course, the less frequently the malfunction occurs, the harder it is to find.

About once every three months or so a low but quite audible hum would appear on channels 9 through 16 of our multitrack, and stay exactly until the session was cancelled. As the last musician was going out the door, I would try swapping power supplies in the recorder to see if the hum appeared elsewhere. But the problem always disappeared as soon as I got my meter out, and I still wasn't sure that it was even in the recorder, since power is distributed similarly in my console. I finally did track it down to the MCI recorder, but the voltmeter approach was looking pretty hopeless. I couldn't even fire up the supply on my workbench, because it received its AC input through special connectors from the main transport.

Actually, this one turned out to be pretty easy, thanks to a useful, though painfully obvious, technique. With the power off, simply wiggle every component on the printed-circuit board to be sure they are soldered securely. Tug on every wire as well, since a shiny solder blob could still be hiding a bad connection underneath. Almost immediately, I discovered a transistor with one lead loose, though it certainly looked okay. A close examination revealed that the lead went through the hole, and it was indeed covered with solder, only the solder hadn't adhered properly. A five-power jeweler's loupe can be a great help when inspecting tiny parts, and it doesn't cost too much.

With intermittents in audio components, you may want to tug and wiggle with the power on and the device connected, though you should keep the monitors down. I have a plastic probe I use for this purpose, which is definitely safer than a screwdriver. Listen for crackles and scraping sounds as you tug and tap the parts, and if you hit a loose one, you'll know it.

I was fixing the PA head we use in my band one time, trying to figure out why there was no reverb. Since we didn't have a schematic, about all I could do was to look for loose connections, and maybe check the transistors. As I tugged on a big fat mylar capacitor, one lead suddenly broke off flush at the body and, sure enough, it was connected by a wire to the reverb return control. The manufacturer should have secured it better, since the leads were fairly thin for a cap of that physical size, and obviously couldn't take the strain.

Speaking of checking transistors, there is a handy test you can do with a meter, even if you have no idea how the particular circuit works. Where a linear op-amp always has a zero-volt difference between its plus and minus inputs, a transistor almost always has a 0.6 volt difference between its base and emitter when functioning properly. Even if you have no idea which lead is which, or even if its a PNP or NPN, look for that 0.6 volt difference. While this may not be the last word in troubleshooting techniques, it will enable you to quickly check a lot of transistors without a schematic.

Also, if you spot a 10 ohm, ¼-watt resistor with, say, 50 volts across it, you can be sure it has bit the dust. Check the voltage across any electrolytic caps as well, to be sure the plus terminal is more positive than the minus. If it's not, check the other circuit components and change the capacitor, or at least check it

with an ohmeter.

Most of the relay failures I've seen have been caused by contact problems when handling low-level signals, but it is also possible to encounter mechanical troubles. In earlier tape transport designs, relays were used to perform simple logic functions, such as a latch, so you don't have to hold the record button down continuously, for example. There are four of these relays in my old Ampex four-track, and when the brakes failed to engage, this was where I looked.

A friend with a lot of experience with relays suggested that magnetization could be the problem, since whatever was sticking could only be relieved by tapping the deck plate firmly. So we put a strip of half-inch splicing tape as a spacer over the ends of all the electromagnets, to help enable them to let go. Demagnetizing the whole relay would have been a better solution, but frankly we didn't think of it. It didn't matter anyway, since the sticking still remained.

Similar to a relay is the solenoid, which in this Ampex applies the actual brake pressure; sure enough, the pieces here were magnetized. All that was required was to tighten the darn release spring, though it took me months to figure this out.

It is understandable when a manufacturer uses a relay in certain situations, since an FET — a common solid-state substitute — may not always be adequate. For example, an FET would be great for sel-sync switching of the record and play heads, except for the high-frequency, high-level bias current that would pass through it when recording. Here, the FET's finite "on" resistance can create unacceptable losses, and its non-linearity can cause distortion. There is no excuse, however, for using a relay to do turn-on/turn-off muting, expecially if the relay is used in *series* to interrupt the audio.

Though I love my Otari MX-5050B, I have had to remove and bypass the muting relay in both of the units I own, because the right channel kept dropping out unexpectedly. I mean, give me a break. If you have to use a relay, at least it should be used to *short* the output, so when the contacts fail, the audio will remain and only the muting feature will be lost.

dbx uses three FETs in parallel to short the output of their Model 160 limiters, which not only seems more reliable to me, but has got to cost them less to boot. Well, enough about relays, I promise — how about switches and pots?

No discussion of do-it-yourself maintenance would be complete without a mention of contact spray. I generally use "Super Trol Aid," which is made by Chemtronics, although I'm sure there are other types that will work just as well. If you have to twiddle with controls to make them work, or if they make a scratchy sound as you turn them, chances are a shot of this spray will help. It is imperative to get the spray *on to* the contacts of switches and the actual element of a potentiometer; simply spraying the shaft from the front will prove futile. As long as you're taking the pot apart to spray it, you should first clean the insides with a Q-tip and alcohol to remove any dust and gunk.

Dirty contacts are not the only cause of scratchy sounding pots, since a leaky capacitor in the circuit will make exactly the same sound. I can't count the times that I have installed a new potentiometer, only to have the noise remain. A capacitor (often electrolytic) is used to block DC from reaching the controls in many circuits, and if it fails turning the knob will modulate that DC level, producing the familiar "dirty-pot" sound. Fortunately, this is an easy problem to spot using a voltmeter on the potentiometer's terminals.

In the next issue, an outboard tape linearizer will be described that you can use to lower the distortion in your recorders, if they are not already so equipped. This is based on pre-distorting the audio in a manner *opposite* to the way tape distorts. Also to be included will be a complete description of test equipment that is used for audio circuits, as well as some methods for using them. □□□

Digital Editing

The Sony System

by Rick Plushner
Professional Digital Audio Division
Sony Corporation of America

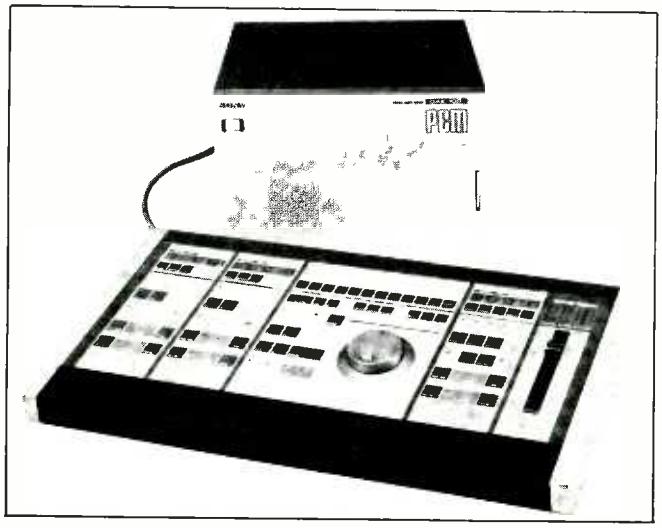
Since digital editing is an aspect of the relatively new digital audio industry, many engineers are unfamiliar with the actual procedures involved. Editing of digital audio tapes is being accomplished today through various techniques, depending on the format chosen. The Sony PCM system has been used successfully on hundreds of album projects, notable recent releases including Stevie Wonder's *Hotter Than July*, Bruce Springsteen's *The River*, and Barbra Streisand's *Guilty*. This article will deal specifically with the Sony PCM system and the DAE-1100 digital audio editor, to provide a step-by-step guide to the editing process.

Already digital audio has had a profound effect on the recording and broadcast industries; as each AES Convention arrives the influence is felt to a greater and greater degree. During this period of transition we are witnessing the development of the digital components that will eventually comprise a totally digital recording chain, from digital microphone to digital master. And, in the near future, we will even have true digital playback in the home.

The advantages of digital recording are already well established throughout the industry. Pulse Code Modulation, the conversion of audio information to digital code, provides a significant increase in dynamic range and signal-to-noise ratio; elimination of wow, flutter, and modulation noise; and reproduction of the stereo image with no phase problems. The master tape is absolutely preserved, suffers no degradation of signal, and can be duplicated an unlimited number of times.

A further advantage of digital recording is the new creativity allowed in the editing process. Editing with the Sony system is a purely electronic operation. Since it is a re-recording process, master tapes are never altered. Original recordings are combined in a sequential fashion, and assembled on a new master. Since digital-to-digital recording produces indentical transfers, there is no change in the qualities of the recorded material. Edits can be made without fear of damaging the original tapes, and the ensuing headache of splicing back in those tiny slivers of tape following an incorrect analog edit. The ability to preview edits is also provided, to ensure critical adjustments can be made until the edit points are virtually undetectable. Electronic editing allows cross-fading of material in addition to butt-editing. Volume levels can also be varied at edit points, a feature not possible to achieve with analog editing.

. . . continued on page 140 —



The Sony DAE-1100 Digital Audio Editor . . .

The Mitsubishi System

by Lou Dollenger
Digital Audio Division
Mitsubishi Electric Sales America, Inc.

The editing of tapes produced on the Mitsubishi two-channel digital audio recorders is accomplished in two different, yet related ways. A choice of both manual and automatic methods is offered that takes full advantage of Electronic Crossfade techniques, a necessary procedure when editing material in the digital domain. The simplest method is razor-blade splicing, a method used successfully on analog recordings for many years. A new and more flexible method uses the XE-1 Electronic Editor, available late this year. Both methods will be discussed in detail, but first a condensed technical primer on the Mitsubishi PCM Format will be helpful in understanding just how flexible and precise these two editing methods are.

Dramatic improvements to audio recording techniques were felt to be possible using digital technology in the early Seventies. Simultaneously, a number of designers the world over began to investigate different ways to apply PCM (Pulse-Code Modulation) techniques to the digitization of audio signals, among them Dr. Kunimaro Tanaka, head of the Mitsubishi Electric PCM Design Group, and winner of the Ohm Award for the X-80 recorder design. Using data garnered from Japan's space efforts, the search for a reliable and practical digital audio format began and was demonstrated in the first prototype of the current X-80 recorder, which was shown to members of Nippon Broadcasting Corporation (NHK) and the Audio Engineering Society in 1974.

The Path to Digital

In its earliest years, analog recording used a number of different formats — among them wire, disk, and tape. With the possible exception of today's costly and limited edition direct-to-disks, many of these signal storage methods were found to be impractical. Analog recording relies on the direct recording of an audio signal in the form of residual magnetic patterns on tape. Inherent drawbacks to this method are tape-related noise, intermodulation distortion, and the non-linearity of the playback signal. PCM recording methods do not record the signal directly, but convert the sampled analog signal to a digital one using 16-bit linear A/D converters.

As has been pointed out before, advantages of PCM recording are therefore: unmeasurably low wow and flutter, ultra-low distortion (less than 0.05%); a dynamic range, signal-to-noise ratio and channel separation of more than 90 dB; undegraded generation when copying; and wide flat

. . . continued overleaf —

. . . Engineer Steve Toby (Fantasy Studios) performing a manual edit on the Mitsubishi X-80 Digital Recorder

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frequency response (10 Hz to 23 kHz with the X-80 and X-80A recorders).

All the devices in the Mitsubishi Electric PCM format use a 50.4 kHz sampling rate — higher than most digital formats — to provide response to 23 kHz. In addition, the 50.4 kHz rate is easily divisible (an 8:7 ratio) down to the proposed C-DAD consumer digital playback and video standards. With a small modification to the X-80 and X-80A recorders, linear frequency response from 10 Hz to 23 kHz is available — well beyond that of any other format and the demonstrated range of human hearing. Therefore a 50.4 kHz sampling frequency and 16-bit linear conversion (necessary for 97.76 dB dynamic range) are two cornerstones of the Mitsubishi Electric PCM format; the fixed-head tape recorder design being the third.

Fixed- Versus Rotary-Head Designs

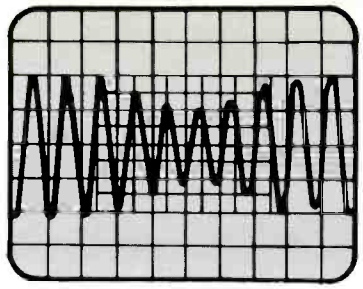
Dr. Tanaka investigated two storage devices that lent themselves to the recording of digital data — rotary-head (helical-scan) videorecorders, and fixed-head (open-reel) tape recorders — and found the latter to have more advantages. The videocassette recorder applications were felt to be better used for consumer PCM recording, and a 14-bit system was developed for that market.

For professional recording it was decided that the fixed-head system offered numerous advantages: the design was well proven over many years of analog recording; and studio engineers were familiar with its design, operation and maintenance. In addition, the open-reel transport was simpler to manufacture than its rotary-head counterpart, and could be sold for much less. Finally, only open-reel tapes could be used with the traditional razor-blade editing method, sparing every single user the expense of an outboard electronic editor, thus speeding the acceptance of digital recording methods. Additional criteria sought in the Mitsubishi design were improved tape and operation economy, and excellent human engineering features.

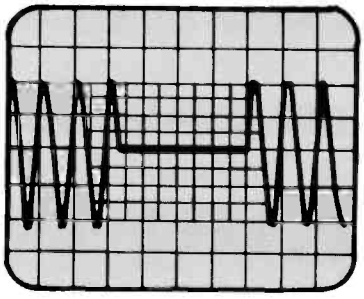
The first generation of Mitsubishi Recorders were designed with this razor-blade splicing in mind but, as we move into the future of digital recording, the full and extraordinary possibilities of automatic electronic editing may be realized. The portable X-80 and console-mounted X-80A digital recorders both offer razor-blade editing capability, and may also be used with the optional XE-1 Electronic Editor. Adding fully automatic electronic editing to digital recording not only increases the tape editor's creative powers, but opens the doors to a new range of technical possibilities.

Electronic Editing

Every edit performed to digital signals must be electronic. Figure 1 shows the abrupt discontinuity of the editpoint waveform where no electronic crossfade is used. Analog recording methods use a series of oblique tape cuts to accomplish this fade, but this is not possible with the PCM coded signal, and an electronically-performed crossfade is necessary. The simplest way to edit digital tapes is with the electronic crossfade circuitry internal to the X-80 and X-80A recorders. The method is identical to the analog editing procedure with two important additions: the use of editing gloves; and the butt splice.



Waveform at Splice (With Cross-Fade)



Waveform at Splice (Without Cross-Fade)

Figure 1: Waveform showing superiority of cross-fade at splice.

Each tape track contains more than 23 kilobits of data per inch; the contamination of this data by dirt and hand oils tends to cause the error-correction circuitry to interpolate data, more often than duplicate it. Cotton editing gloves ensure that the recorded data is kept in its most pristine form (refer to page 134). A glance at the LEDs will immediately tell the editor just how effective he is being in this area.

Secondly, only a vertical butt splice may be used, and a small gap in the splice accommodates the detection of the edit by the crossfade circuitry. This method of manual electronic editing is the simplest and least expensive, and may only be performed on the X-80 and X-80A recorders — allowing even those studios on a modest budget to consider entering the digital era.

Although the edit seems to correspond to a physical cut in analog tapes, it is actually *electronic*. The ideal editpoint is located by monitoring the analog cue track, and scrubbing or rocking the tape across the head, and then marking the exact editpoint with a new flourescent marker. (Grease pencils tend to cause undue tape contamination and headwear.) Location of the edit

MITSUBISHI DIGITAL RECORDERS

The two-channel X-80 recorder is a two-section stacking portable unit, while the X-80A is housed in a console that allows slightly improved transport access and the addition of two monitor loudspeakers. Both units use a new high-density magnetic tape, which is available from Ampex Corporation as #466 and from 3M as #265, and offer a one-hour record time on ¼-inch tape at a speed of 15 inches per second. There are 10 tracks across the tape width: one SMPTE code track, six PCM data tracks, two parity tracks, and one analog mono cue track. The two parity tracks offer a unique error-correction scheme, whereby both the data and the parity tracks are correctable. The correction is also two-dimensional, allowing for a very high margin of error. LEDs on the edit circuit board provide self-diagnosis, and in the record or play modes give a real-time indication of both the level of error-correction being performed, and the condition of the tape.

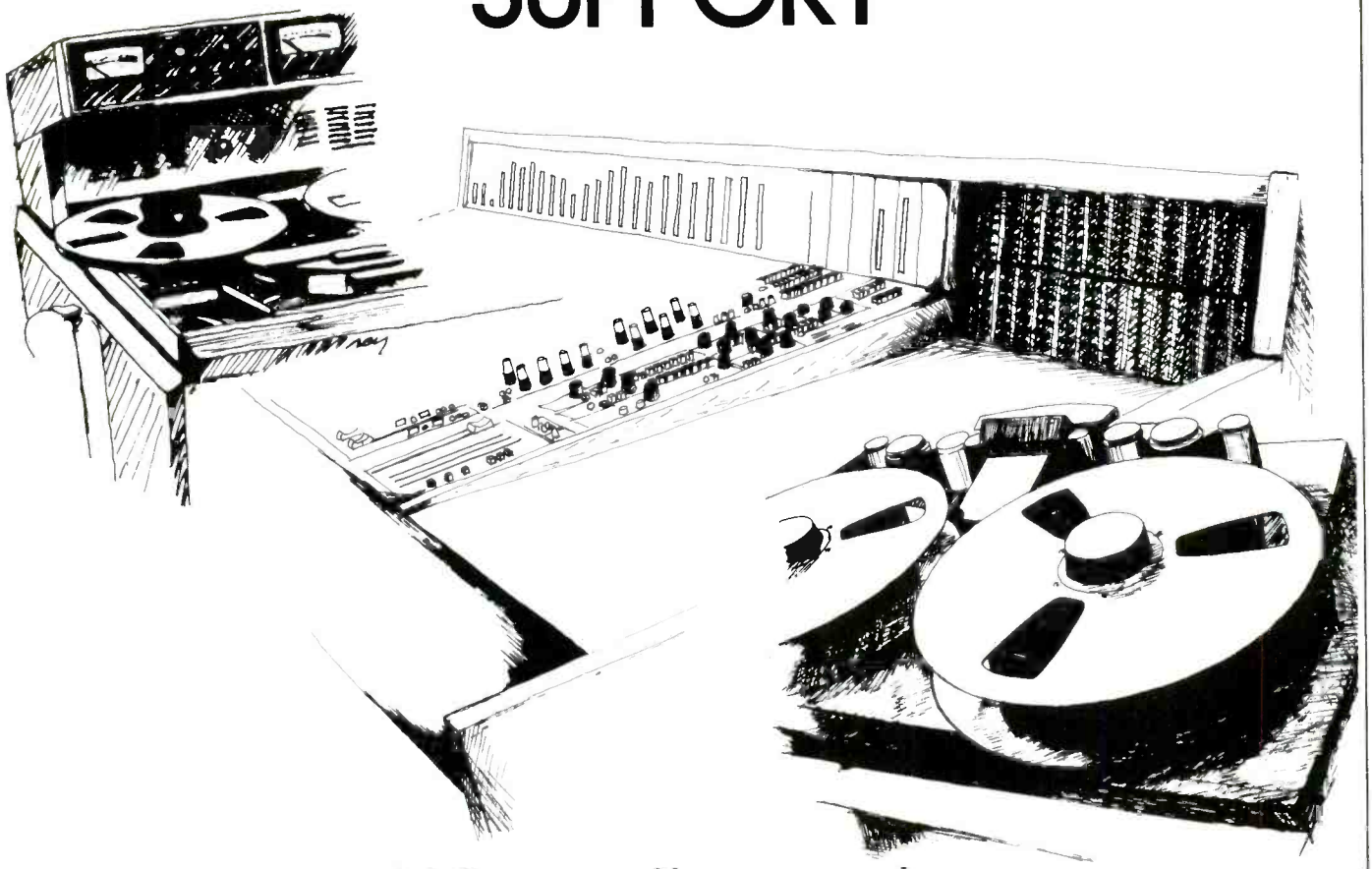
Error Correction

Powerful error-correctability is necessary to combat tape dropouts. Four cascading levels of correction are performed automatically on the Mitsubishi system. Since the data is first interleaved over many tracks — and therefore available from many different places on the tape simultaneously — a recovery method that exactly duplicates the "lost" data allows one or two tracks of error to be corrected completely. This is the first level. Should errors arise on between three and five tracks (or seven if they fall on certain tracks), a method of concealment called "Interpolation" is used: surrounding error-free data is detected, and an average voltage inserted over the error. The third level of correction is used where errors are massive — usually when tape is seriously damaged — and here a mute is performed if errors simultaneously exceed five tracks.

Standard virgin tape rarely yields more than one single track error per minute, so both typical and atypical dropout problems are effectively handled. Computer simulation studies have shown that with Mitsubishi PCM format recorders, the need to interpolate data should arise about once every year, and that audible misoperation should occur about once every 10,000 years of continuous use — what we like to call a "manageable" level!

The X-800 32-channel PCM recorder uses a similar configuration of error-correction on one-inch tape at a speed of 30 IPS. Here there are 44 tracks: 32 PCM data tracks, eight shared-parity tracks, two analog cue tracks, one SMPTE code track, and one auxiliary digital channel that can be used for the storage of computer-mixing data, among other things. A punch-in head used in combination with a sophisticated autolocator unit allows automatic or manual overdubbing, and when used with the XE-1 and X-80, both manual and automatic editing.

SUPPORT



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point may be done manually or, when used with a unique feature of the transport, by using the servomotors, which are activated when the idler arms are touched (thus minimizing the chance of data damage).

Once the edit points are marked, the tape is removed from the path, placed on the splice block (Figure 3), and vertical cuts made. The trailing portion is then joined with the other using a new thin splice tape (for optimum tape/head contact), and trimmed. The tape is again monitored, but on the digital output for edit accuracy. Should the edit need to be modified for any reason, the splicing tape may be removed and trimmed as necessary.

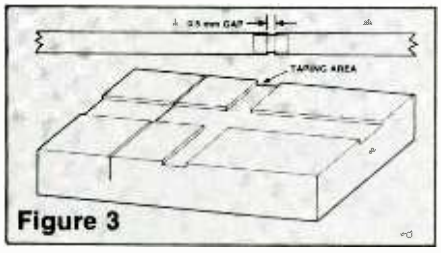

Figure 3

When the circuitry detects an interruption of the sync signal caused by cutting the tape, a 2.5 millisecond electronic crossfade is applied while the data is in the buffer data memory. Normally the loss of sync-phase would require additional lockup time, but here a special "Dummy-Pulse Selection Method" selects the ideal sync-phase relationship from the many available ones, and the edit occurs smoothly. Very recently a dramatic improvement was made to the analog track's output, allowing an increase from 34 to 70 dB signal-to-noise ratio.

Automatic Editing

For those studios feeling that fully automatic electronic editing is necessary today, Mitsubishi has designed the XE-1 Electronic Editor (Figure 4). This unit offers freely selectable crossfade duration between 5 and 100 milliseconds. The editor performs an edit automatically by using an internal SMPTE generator-reader, and the recorder's code tracks. In addition, a host of new and flexible features are available to the creative editor. The XE-1 may be used to control two, three, or four X-80 Series recorders for editing functions (Figure 5), or two recorders for live four-channel sync recording. Full autolocation facilities also enable the editing of tapes produced on the X-800 multitrack recorder.

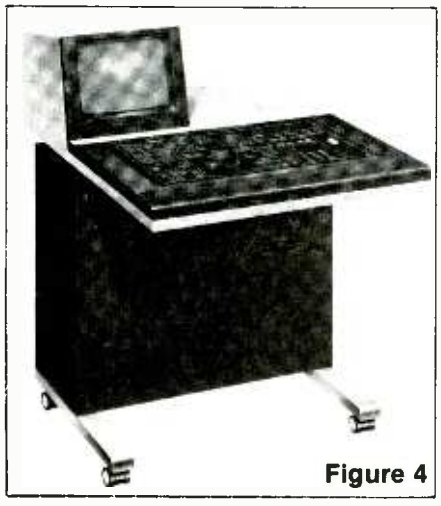
Figure 4

The XE-1 unit is housed in a desk, but the processing section may be rack-mounted, and the keypad and CRT display relocated to a more convenient area. The CRT monitor displays up to five separate event addresses, and an internal NiCd backup battery stores these, and up to 20 take times, for six months. Output connectors are provided to allow visual monitoring of the editpoint waveform on any oscilloscope having an external trigger feature — a helpful addition to sound monitoring.

This combination is designed to fully exploit the XE-1's editing precision of 833 microseconds (equivalent to 10% of tape thickness), and again offers an operation closely tied to standard practices. In circumstances where an edit may be improved by resetting the recording level, a digital fader is provided to alter these levels from +6 dB, to minus infinity.

When working with the XE-1, material is monitored from the analog tracks at the actual read (playback) head, unlike the small bit digital window memory of some rotary-head systems. This is again very precise, and an exact indication of the actual signal. On playback, edit points are selected and a crossfade duration chosen. (The point may be modified by a minimum step-shift key that alters sub-SMPTE codes.) In the rehearsal mode, an area from five seconds before the editpoint to anywhere after may be previewed, and again changed as necessary.

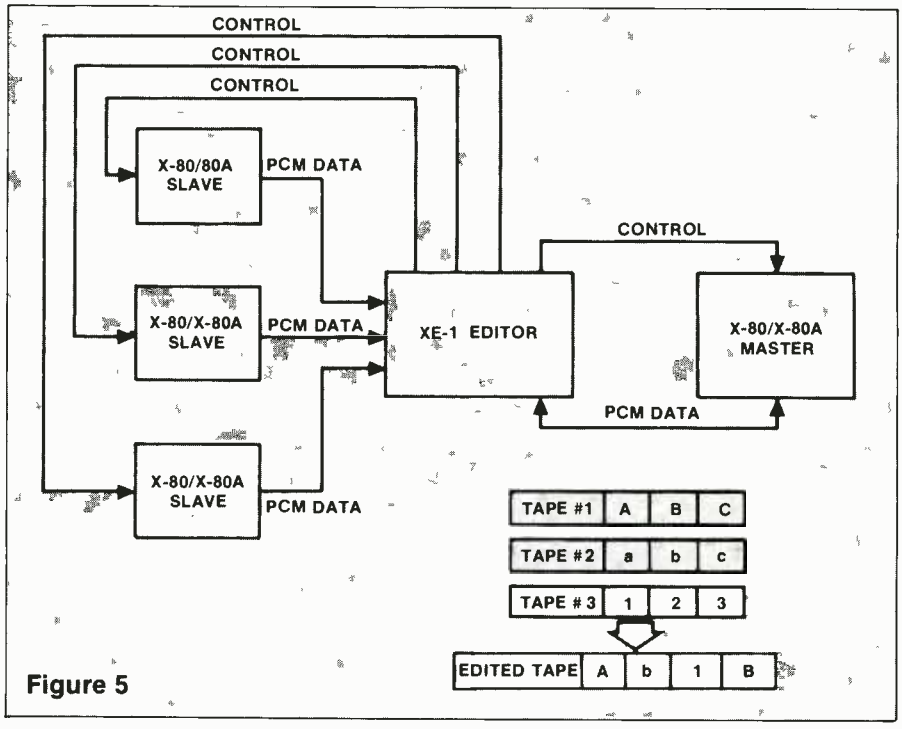

Figure 5

Once the proper editpoints, levels, and crossfade durations are known, the XE-1 is commanded to perform the edit and does this function automatically. In addition, there is only a one-second start time to lockup, unlike the 5 to 10 seconds required on videocassette recorders. Whether digital edits are performed automatically or manually should be left to the user; only on the Mitsubishi system is there such a choice.

Multitrack Editing

Manual splicing of the one-inch tapes produced by the X-800 multi-track recorder is not yet reliable, although methods are currently being explored to offer this choice here as well. A physical phenomenon of curling is encounted on the 0.88 mil base tape to a much greater extent on one-inch tapes than on the quarter-inch — which reduces the optimum tape/head contact required for physical editing. Also, the alignment of 44 tracks by hand may require a machined splice to be effective. We doubt that users will want to tamper with this data in its original unmixed form, as safety copies require another recorder.

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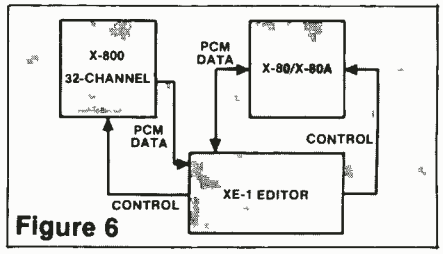


Figure 6

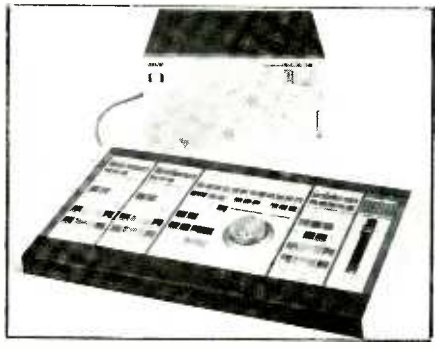
Digital Editing
The Mitsubishi System

Editing is accomplished by using the automatic punch-in and punch-out abilities of the X-800, one XE-1 editor, and one or two X-80 Series recorders (Figure 6). This ping-pong editing method allows very precise edits, and again the choice of performing these edits manually or automatically.

One can see that the Mitsubishi PCM format digital editing systems offer many advantages over other analog and digital methods. The format was chosen from the beginning to move easily into the recording and broadcast studio, and mesh well with existing standards and practices. The Mitsubishi PCM format was recently adopted by AEG-Telefunken for European installations, and soon will become essential to the making of high-quality PCM recordings — especially in the light of recent C-DAI) developments. The Philips Compact digital audio disk will assure that consumer playback of actual digital signals will appear next year. This formidable combination of manual and electronic editing is an important and essential commitment to the future of professional audio recording. □□□

— *continued from page 134 . . .*

Digital Editing
The Sony System



DAE-1100 Digital Audio Editor

The DAE-1100 is used in conjunction with either two or three BVU-200B broadcast standard U-Matic VTRs, since the digitally-processed material is recorded on videotape. The editing or assembling of digital audio tapes with the Sony system is very similar to the process of video editing.

Designed for use with Sony's professional PCM-1610, PCM-1600, and PCM-100 audio processors, the DAE-1100 provides fully electronic control of the tape-to-tape editing process (Figure 1 above). The editor's main microprocessor unit is rack-mounted, and operated with a remote-control keyboard that can be installed anywhere to accommodate functional studio requirements.

The editor has numerous features to make editing accurate, as well as convenient. The remote-control panel incorporates a large search dial for selecting edit points with an ease surpassing that of analog editing. Editing techniques already familiar to engineers have been translated to the electronic medium, making the transition to digital editing a simple one.

Location of edit points is achieved with SMPTE time code recorded on the original tapes. The DAE-1100 has SMPTE readers for the recorder — on which the edited and sequenced master is assembled — and the player(s) from which the master is created. A code generator is also incorporated in the editor for the initial laying down of time code prior to an editing session.

Once an edit point is selected, rehearsal editing is possible. If changes are desired, the edit point can be shifted in millisecond increments up to one minute in either direction. Lighted buttons flash in sequence on the editor's keyboard, and the editing operation is conducted by simply following the ordered sequence.

The DAE-1100 maintains an edit accuracy of 90 microseconds, which is far more precise than can be achieved with a conventional razor blade. It also features advanced cross-fading adjustments, with selectable fade times that permit the elimination of signal level differences between source programs at the edit points. In addition, the editor features a level control for each of the source programs, to adjust the source level within a +6 dB to minus-infinity range. These controls can also be used to produce fade-in and fade-out effects.

The Editing Procedure: A Step-by-Step Guide

The finished and edited master tape will be assembled from previously recorded digital audio tapes. The equipment necessary for the operation includes the PCM processor, editor, and videotape recorders (Figure 2). One of the VTRs is designated the "recorder" machine, and either one or two VTRs the "player" machines. The procedure is the same with either one or two players, the operation being somewhat speedier with two.

Digitally-encoded audio information, stored on ¾-inch videocassettes, is placed in the player machine. A blank cassette is placed in the recorder machine, and will receive the edited and sequenced material. Both tapes have been previously striped with standard SMPTE time code, either drop-frame or full-frame, according to individual requirements.

While the recorded material is monitored, and an edit point reached, the desired material is being transferred to the recording machine. The engineer goes slightly past the edit "out" point, and is then ready to make an edit.

The recorder machine is then played back, starting where the edit point

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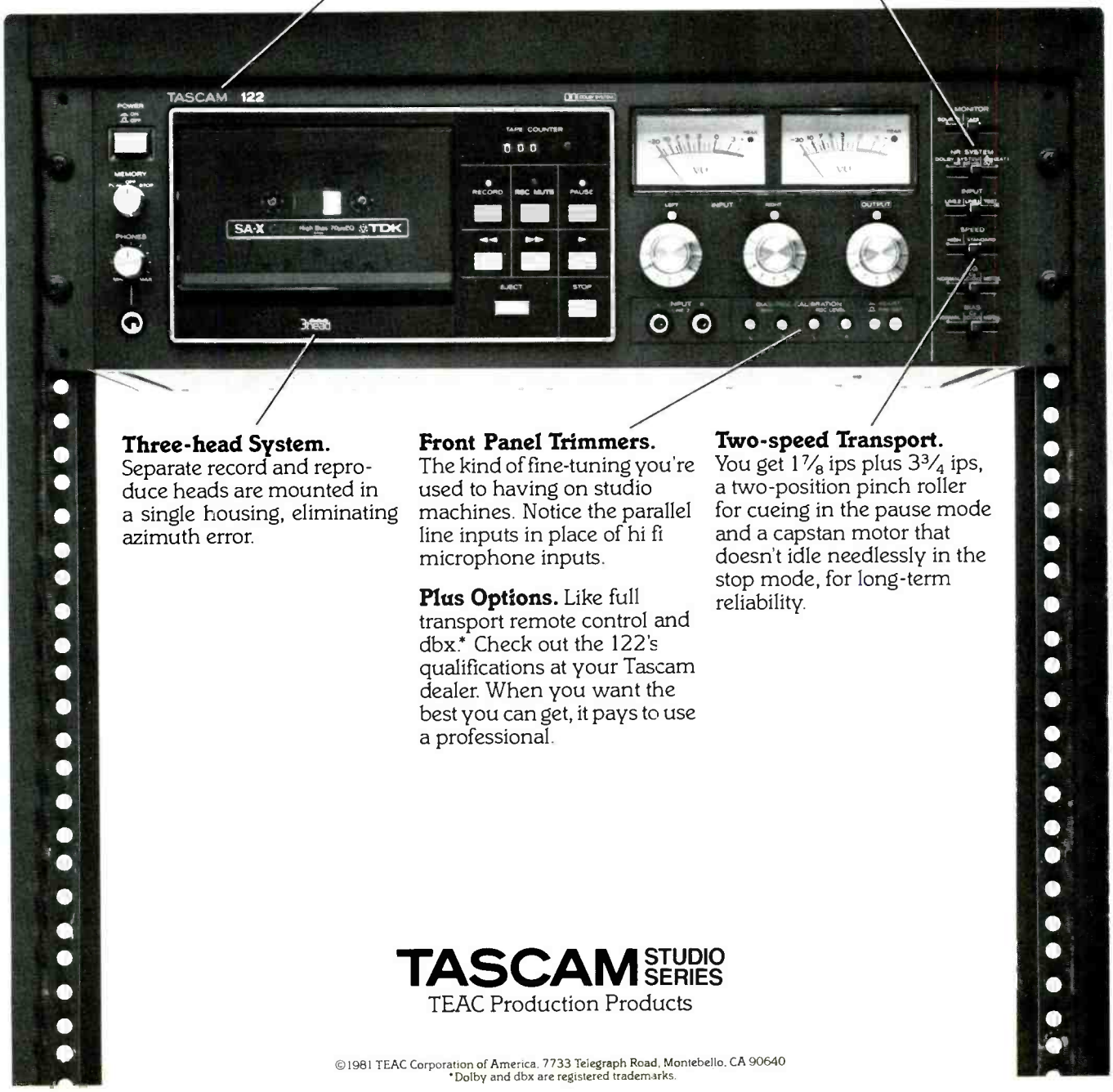


Three-head System. Separate record and reproduce heads are mounted in a single housing, eliminating azimuth error.

Front Panel Trimmers. The kind of fine-tuning you're used to having on studio machines. Notice the parallel line inputs in place of hi fi microphone inputs.

Plus Options. Like full transport remote control and dbx.* Check out the 122's qualifications at your Tascam dealer. When you want the best you can get, it pays to use a professional.

Two-speed Transport. You get $1\frac{7}{8}$ ips plus $3\frac{3}{4}$ ips, a two-position pinch roller for cueing in the pause mode and a capstan motor that doesn't idle needlessly in the stop mode, for long-term reliability.

TASCAM STUDIO SERIES
TEAC Production Products

For additional information circle #91

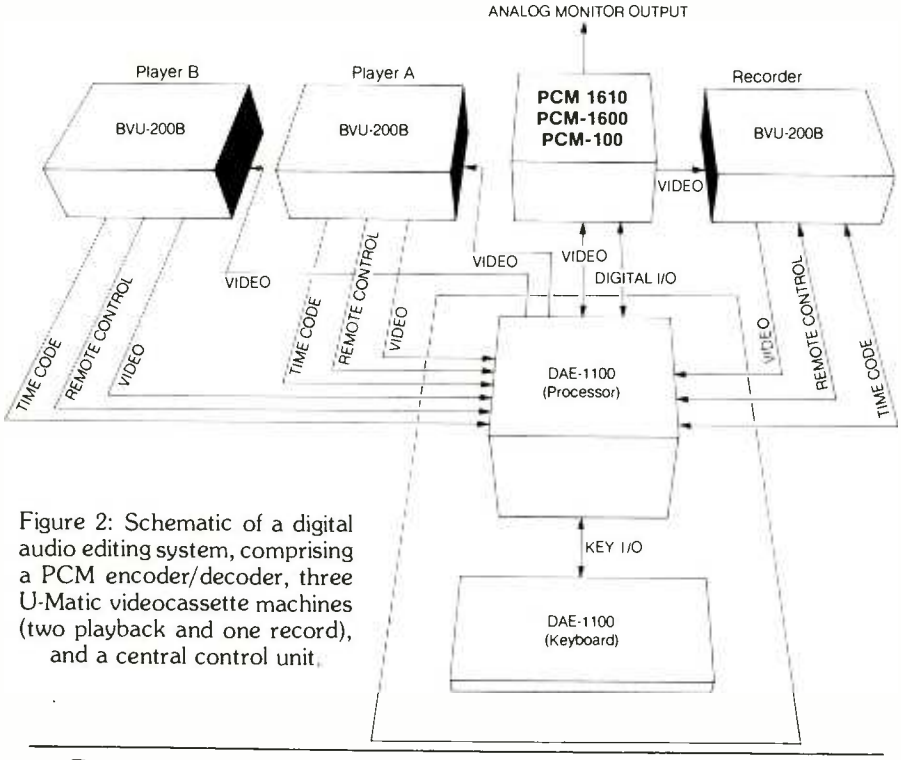


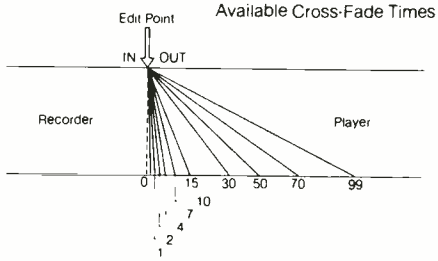
Figure 2: Schematic of a digital audio editing system, comprising a PCM encoder/decoder, three U-Matic videocassette machines (two playback and one record), and a central control unit.

Digital Editing
The Sony System

comes up. When the edit point is heard, the engineer pushes the "out-point" button, which is flashing on the keyboard. At the moment that this button is pushed, the editor transfers into digital memory six seconds of music — three seconds on either side of the edit point. The recorder machine, which was playing automatically, goes to the appropriate point on tape in readiness for the performance of the actual edit.

There is now a six-second "window" of music stored in digital memory, in which the exact edit point has to be found. This six-second segment is played back from digital memory (not off the tape itself) either at full- or half-speed, or by manually turning the search dial in a fashion parallel to the "rocking of the reels" on an analog tape recorder. With the same familiar technique, the edit point is determined from the digital memory. When the point is found, the "out-point" button is pushed again, and the exact location placed into the editor's memory. The next step is to determine the "in" point of the subsequent sequence of information from the player side. The procedure is the same as previously described for finding the "out" point of the first sequence.

When these steps have been performed it's time to preview the edit. Before initiating the preview, the engineer selects from 10 different digital cross-fade times, ranging from 1 to 99 milliseconds. Any and all of these



crossfades can be previewed as many times as desired before committing to the edit. A 15-millisecond crossfade time is approximately equal to the standard 45-degree splice used for analog tape editing.

As an additional feature, in the preview mode the volume level can be digitally adjusted from the player to the recorder. Levels can be matched, boosted by as much as 6 dB, or the editor used as a digital attenuator for gradual fade out. All of these adjustments are made in the preview mode, before actually committing to the recorded edit.

If, during the preview of an edit, it is found that the in or out points need to be shifted in either direction, this can easily be accomplished by the use of the editor keyboard's time-shift mode. "In" or "out" points can be shifted independently from as little as one millisecond to as much as one minute in either direction. After such fine tuning, the edit points can also be previewed. After the exact edit points have been selected in the preview mode, an auto-edit button is pushed and the machines automatically roll back to the pre-selected point. A selection of a 5, 10, or 30 second pre-roll can be made to the edit spot, facilitating very rapid editing, or the ability to listen to the edit in a larger musical context.

After an edit is performed, the

recorder is allowed to continue recording information from the player side until the next edit out-point is reached. This process is then repeated and, continuing in this fashion, a completed and sequenced album is produced on the recorder side.

The editor also offers the ability to write a user bit code on the tape, which can be used for logging the date of the recording, or any information for various reference purposes. The user bit code can be retrieved by simply pressing a button on the appropriate section of the editor keyboard.

The SMPTE time code written on to all tapes in combination with the selected in and out points provides a complete editing log of the session. In digital audio editing, as with video editing, a log of edit points is a necessary and valuable tool. The editing process begins with listening to the tapes and logging the SMPTE time code numbers that correspond directly to the desired edit locations. When an editing session takes place, a list of all edit points is available that can be found with the automatic location devices built into the DAE-1100. When an album is edited and sequenced, the accompanying list of edit points can be filed for easy reference at a later date, should any changes be desired for further uses of the recorded material.

The Edited Digital Master

The edited and sequenced master digital tape is now ready to be mastered to analog disk, or transferred in the future to the compact digital disk for home digital playback. The analog disk that's produced from the master tape with a PCM-1610 or -1600 processor is of extremely high quality. The specifications are similar to those achieved with direct-to-disk mastering in terms of the final analog lacquer characteristics.

The digital master tape is taken to the disk mastering facility along with the PCM processor and two BVU-200B VTRs. At this point, the disk-mastering engineer sets up the EQ for the analog disk. When the EQ is determined, a digitally equalized master is prepared for the production of the analog disk. A digital-to-digital dub is made through the equalization console at the disk-mastering facility. Because it is digitally encoded, the digitally equalized master will not change from day to day or year to year. Every new set of lacquers cut from this tape will be absolutely identical to the original record release.

With conventional analog master tapes, the EQ is determined for disk mastering and the lacquers cut. At a later date it may be necessary to cut additional lacquers for continued production of the record. Disk-mastering engineers realize that the EQ of an analog master tape is subject to change as time goes by — transient response weakens and bass response softens — and that various equalization

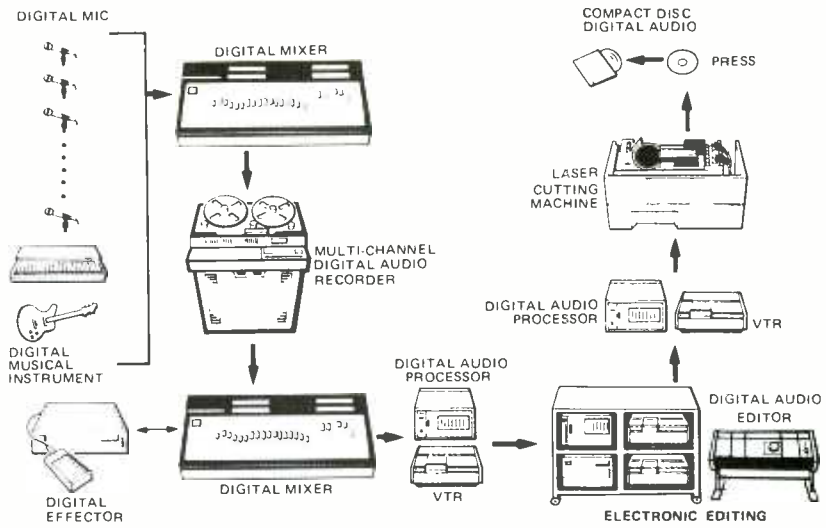


Figure 3: The all-digital recording system of the future will enable a signal, once digitized at the microphone or signal source, to remain in the digital domain through to the final pressing of the final Compact Digital Audio Disk.

levels have to be re-adjusted to approximate the sound of the original release. This is often done without the advantage of having the producer or the artist in attendance. Drawbacks are obvious.

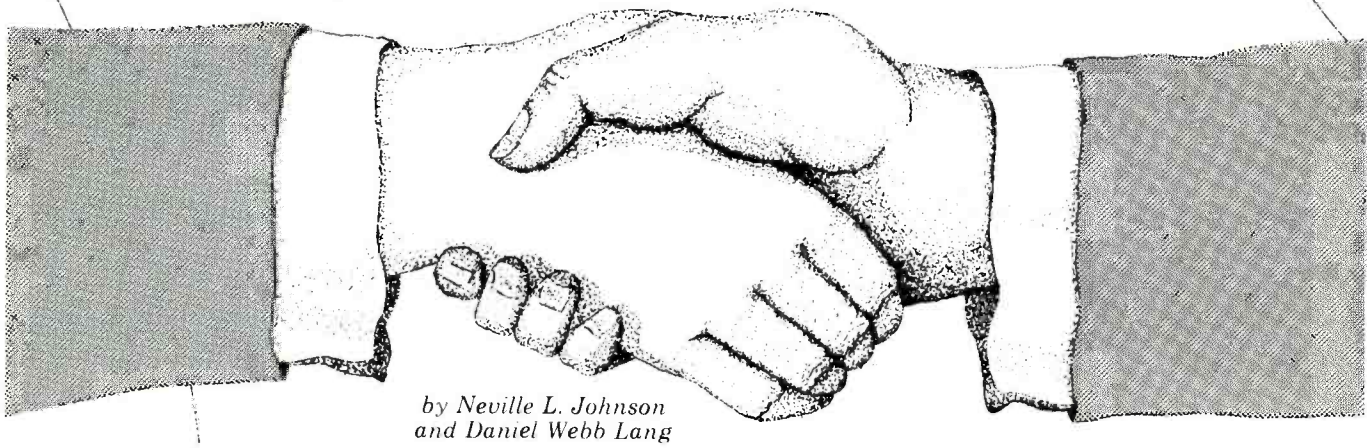
With a digitally-equalized master, lacquers will always be identical, regardless of whether they are prepared a day later, a year later, or 10 years after the original cutting session. Identical analog disks made from the digital master will always be assured.

As for the future, production of a compact digital disk from the master tape will be a direct digital-to-digital transfer, with no signal alteration whatsoever. audio information encoded on the compact disk will be identical to that found on the original master (Figure 3). There will be no transcoding, and the compact disk will be capable of 16-bit digital reproduction that is identical to the master tape in every respect. And, of course, as the years go by, every compact disk produced will remain identical to the original release.

□□□

Beyond The Studio Glass —

Successfully Negotiating The Record Producer's Agreement



by Neville L. Johnson and Daniel Webb Lang

EDITORIAL NOTE

The readers' attention is drawn to the fact that this article is concerned with a "prototype" record producer's agreement. It is recommended that a record producer engaged to produce a recording should seek the advice of counsel before embarking upon the project.

A TYPICAL RECORD PRODUCER'S CONTRACT

The accompanying sidebar to this article constitutes a "prototype" record producer's contract, which contains provisions typically found in record producer's contracts of major record companies such as Capitol, Warner Brothers, Atlantic, MCA, Motown, A&M and CBS. You should familiarize yourself with the general language of the prototype contract, because agreements like this are the foundation of the relationship between the record producer and his employer, and the starting point from which negotiations commence in all protypical situations discussed in this article.

The basic areas — which subsequently will be discussed at length — covered in the prototype record producer's contract are:

. . . continued overleaf —

— the authors —

Daniel Webb Lang practices with the Century City (Los Angeles) law firm of Wyman, Bautzer, Rothman, Kuchel & Silbert. **Neville L. Johnson** practices law in Los Angeles, California. They are co-authors of the definitive work on California law applicable to talent agents, personal managers and the entertainment unions.

PROTOTYPE RECORD PRODUCER CONTRACT

Agreement made this ___day of _____, 19___between *(Name of Producer)* ("you") and *(Name of Record Company)*.

1. PRODUCING ENGAGEMENT

A. You will render your exclusive services as a producer of Master Recordings of performances by _____ ("Artist"). Said engagement will terminate automatically upon any termination of the agreement between us and the Artist (or any other party), pursuant to which such recordings are to be made.

B. You will produce Master Recordings sufficient to constitute one (1) Album or the equivalent. If you produce additional recordings by the Artist, such further services will be deemed performed pursuant to this agreement.

C. We may designate other producers for recording sessions with the Artist, and you shall have no rights hereunder with respect to the Master Recordings produced at such recording sessions.

2. RECORDING PROCEDURE

A. You will follow the procedure set forth below:

1. Prior to the commencement of recording in each instance you shall obtain our approval of each of the following, in order, before proceeding further: (a) selection of material, including the number of Compositions, to be recorded; (b) specification of accompaniment, arrangement and copying services; (c) selection of dates of recording and studios where recording is to take place, including the cost of recording therein — the scheduling and booking of all studio time will be done by us; and (d) a proposed budget on our then current Recording Authorization budget form (which you will fill out and submit to us at least 14 days before the planned commencement of recording).

2. You shall notify the appropriate local of the AF of M in advance of each recording session.

3. You shall timely supply us with all of the information we need in order to comply with any obligations we may have, including any payments in connection with the making of, and to prepare to release phonograph records derived from, such Master Recordings.

4. You shall submit to us fully edited Master Recordings, satisfactory for our manufacture and sale of phonograph records, and Deliver to us all original and duplicate Master Recordings of the material recorded, together with all necessary licenses and appropriate permissions.

B. Nothing in this agreement shall obligate us to continue or permit the continuation of any recording session or project, even if previously approved hereunder, if we reasonably anticipate that the Recording Costs will exceed those specified in the approved budget, or that the Master Recordings being produced will not be satisfactory.

3. RECORDING COSTS

We will pay all Recording costs specifically approved by us for the Master Recordings, which such costs shall constitute Advances against the royalties payable with respect to the services of the Artist. Any Recording Costs in excess of the amount approved by us will be your sole responsibility, and will be promptly paid by you (or reimbursed by you if paid by us).

4. GRANT OF RIGHTS

All Master Recordings produced shall be produced by you on our behalf, and all records and reproductions made therefrom together with the performances embodied therein, and all rights thereto shall, from inception of their creation, be entirely our property in perpetuity, throughout the world, free of any claim whatsoever by you or by any persons deriving rights from you

. . . continued overleaf —

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For additional information circle #95

A. The record producer's engagement

The record producer agrees that he will produce a number of recordings of an artist which will contain a certain number of minutes of recorded music.

Record companies, independent production companies, distributed labels and artists are the usual parties engaging the services of the record producer. (Unless otherwise noted, our use of the term the "record company" will include the "major" record companies as well as an independent production company, a distributed label, or an artist that might employ a record producer.)

B. Recording procedure

The record producer agrees that he will perform certain tasks in producing the artist, and that such tasks will be performed in a certain sequence. The tasks and the sequence in the prototype record producer's contract are: selection of material, recording dates, studios, musicians, vocalists, copyists and arrangers; preparation of a budget for the project; supervision of the sessions; preparation of union reports; and delivery of recordings.

C. Recording costs

All items which will be recording costs, such as costs of tape, studios, musicians and musical equipment, are listed. All other costs "customarily" thought of as recording costs in the industry are also included.

The record producer agrees that he will prepare and submit a recording budget to the record company for approval. The record producer agrees that if actual recording costs exceed the approved budget, the record company may deduct the "excess recording costs" from advances or royalties payable to the record producer, or require the record producer to repay the excess. (The negotiation of the record producer's responsibility for excess recording costs is discussed in section B.2. under the "Services Required of Record Producers" heading later in this article.)

D. Grant of rights

The record producer acknowledges that the record company owns the "results and proceeds of the record producer's services," i.e. the recordings produced by the record producer and all of the sounds on such recordings. The record producer acknowledges, in addition, that the record company owns the exclusive copyright in such recordings as the record producer's "employee for hire." The practical effect of this acknowledgment is to prevent any "recapture" of the copyright which could be available under U.S. copyright law to the record producer 35 years after the release of the record, or 40 years after its recording, whichever occurs first.

The record producer agrees that the record company has the right to use the name, likeness and biography of the record producer to sell and advertise records manufactured from the recordings produced by the producer, and for other business purposes.

E. Advances

The record producer agrees to the amount of the "advance" or "flat fee" payment, if any, that will be paid to the record producer for the services he will render in producing recordings.

F. Royalties

The record producer agrees to the royalty rates that will be payable to him for sales of the artist's records manufactured from recordings produced by him, and the manner in which such royalties will be defined, computed and paid.

G. Royalty accountings

The record producer agrees to terms on which the record company will account to him for royalties.

H. Mechanical licenses

The record producer agrees to obtain mechanical, i.e., publishing, licenses for the compositions to be produced by him. The licenses usually provide that the record company will not have to pay more than 2¾ cents per composition, 5 cents for all the compositions on a single, and 27½ cents for all the compositions on an album. If those amounts are exceeded, the record company may deduct the amount of such excess from the royalties (phonograph and mechanical), or advances against such royalties, payable to the record producer.

I. Other provisions

The record producer agrees in other provisions of the record producers's contract that the record company may:

1) hold the producer financially responsible if the record company is sued because materials furnished or selected by the record producer for the recordings infringe on the rights of others;

2) seek injunctive relief should the record producer breach any provisions of the record producer contract;

3) require the record producer to pay for, and protect the record company from, any breaches of the record producer's contract;

4) suspend the term of the record

PROTOTYPE RECORD PRODUCER CONTRACT

including, all rights of copyright and the right to renew such copyright (it being agreed that for this purpose you are deemed our employee-for-hire). We shall have the right to use the Master Recordings throughout the world or any part thereof in any manner we see fit, including, without limitation:

A. The right to manufacture, advertise, sell, lease, license or otherwise use or dispose of the Master Recordings and records (in any speed, size or format whatsoever) embodying any of the performances Delivered to us hereunder, in any or all fields of use upon such terms and conditions as we may approve or to refrain therefrom;

B. The sole and exclusive right in perpetuity in and to all performances recorded hereunder, all Master Recordings, records or other reproductions of the performances embodied in the Master Recordings, and the right to use the same in any manner and by any method now or hereafter known;

C. The sole and exclusive right to publicly perform the records and to permit the public performance thereof by means of radio and television broadcast or otherwise;

D. The right to release derivatives of any one or more of the Master Recordings on any medium or device now or hereafter known, under any name, trademark or label;

E. The exclusive and perpetual ownership of all duplicates of the Master Recordings, tapes and other physical devices embodying performances made at recording sessions hereunder and records manufactured therefrom, and the right to use and control the same and the performances embodied therein.

5. NAME AND LIKENESS

We shall have the worldwide right in perpetuity to use and to permit others to use your name (both legal and professional), likeness, other identification and biographical material in connection with the Master Recordings hereunder, the records derived therefrom and our record business and products. We shall give you appropriate production credit on album cover liner notes of records embodying solely Master Recordings hereunder.

6. ROYALTIES

Conditioned upon your full and faithful performance of this contract, you shall be paid in respect of the sale or other exploitation by us or our licensees of records embodying the Master Recordings recorded hereunder, the following royalties:

A. In respect of records sold in the United States, in the form of disks and pre-recorded tapes (including reel-to-reel tapes, cartridges and cassettes) or other recorded devices (other than disks), we shall pay you a royalty at the rate of 3% of the suggested retail list price ("srlp") from time to time of such records; and in respect of records sold by our licensees in the United States in the form of pre-recorded tapes or other recorded devices (other than disks), we shall pay you a royalty at the rate of half (½) of the aforementioned royalty rate based upon the srlp from time to time of such records.

B. In respect of records sold outside of the United States, we shall pay you a royalty at the rate of 1½% of the srlp (or the price of records generally regarded as the equivalent thereof) from time to time of such records in the country of manufacture, sale, import, or export, as we shall be paid.

C. Notwithstanding any of the foregoing, the royalty rate, as calculated in accordance with the foregoing provisions, in respect of the sale of records:

1. Sold through any direct mail or mail order distribution method (including record club distribution), shall be half (½) of the otherwise applicable royalty rate;

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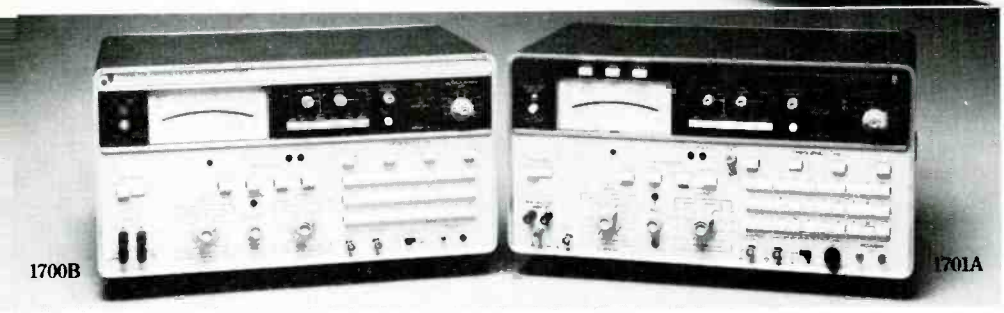

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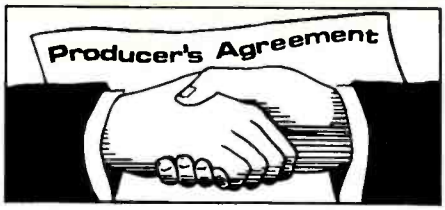


producer contract because of an act of God, sickness or other incapacity of, or breach by, the record producer;

5) substitute other record producers for the record producer on the project at any time;

6) use other record producers to change or alter the recordings produced by the record producer;

7) re-mix, re-edit or re-sequence the recordings produced by the record producer; and

8) combine the music in recordings produced by the record producer with the music in recordings produced by other record producers.

THE PRODUCER'S ENGAGEMENT

A. Engagement of the record producer's services

The person(s) who or entity which employs the record producer may be significant to the record producer. Suppose a record producer is hired by an artist to produce an artist's album. The artist agrees, in a written contract, that the record producer will receive a production credit on the label and liner of the album. Will the record producer receive the production credit as agreed? Maybe. It is the record company which must agree in a contract to print the credit on the label and liner of the album. It is not bound by the written contract between the record producer and the artist to print the credit. The moral: get the record company or third party who must perform the obligation to agree to do so in writing.

B. Scope of the engagement

1. Producers, co-producers, associate producers, executive producers and staff producers

The record producer may be engaged as the sole producer of an artist; as a co-producer, jointly producing an artist; as an associate producer, assisting another producer; as an executive producer, "deal-making" and reviewing the work of another record producer; or as a staff producer, producing artists as an employee of a record company.

2. Exclusivity of services

The record producer may agree to render his services "exclusively" while producing the project, or agree that during the "term of the agreement" the record producer's services will be "exclusive."

An "exclusive" engagement will preclude the record producer from producing two or more records at the same time. If two projects are scheduled at or near the same time, it is preferable that the record company which first contracts with the record producer agree to a priority or "first-call" on the record producer's services.

PROTOTYPE RECORD PRODUCER CONTRACT

2. On a mid-priced record line shall be three-quarters (¾), and on a low-priced record line shall be half (½), of the otherwise applicable royalty rate;

3. Sold for use as premiums or in connection with any other product or service shall be half (½) of the otherwise applicable royalty rate, and based upon the price received by us for such records sold by us or upon the price utilized by our licensees;

4. Sold to the United States Government, and sold to educational institutions or libraries, shall be half (½) of the otherwise applicable royalty rate.

D. Notwithstanding the foregoing, the royalty rate in respect of Master Recordings licensed by us for record use and for all other types of use (other than record use) on a flat-fee basis, and licensed by us for use on records sold through the mail and/or through retail stores in conjunction with special radio or television advertisements (including K-Tel type records) shall be an amount equal to 10% of the net flat fee or royalty, as the case may be, received by us in respect of each such use.

E. Notwithstanding any of the foregoing, no royalties shall be payable on records furnished as free or bonus records to participants in any record club or other direct mail distribution method; distributed for promotional purposes to radio stations, television stations or networks, record reviewers or other customary recipients of promotional records; distributed as "promotional sampler" records; sold as scrap or "cut-outs" and furnished on a so-called "no-charge" basis or sold at less than 50% of their regular wholesale price.

F. Notwithstanding any of the foregoing, royalties in respect of records sold at a discount (except for records sold at less than 50% of their regular wholesale price, for which no royalties are payable hereunder) shall be reduced in the same proportion as the regular wholesale price of such records is reduced on such sales.

G. Notwithstanding any of the foregoing:

1. For purposes of computing royalties there shall be deducted from the srlp (or other applicable price, if any, upon which royalties are calculated) of records hereunder an amount equal to:

(a) any excise, sales, value added, or comparable or similar taxes; and

(b) 10% thereof for 45 rpm single records packaged in color or other special printed sleeves, and for long-playing or extended-play records in disk form packaged in our standard "singlefold" album jackets without any special elements (such as, but not limited to, inserts or attachments); 12½% thereof for all other long playing or extended play records in disk form; and 20% thereof for reel-to-reel tapes, cartridges, cassettes or other recorded devices (other than disks).

2. Royalties shall be computed and paid upon 90% of net sales for which payment has been received; provided, that if any licensee distributing records hereunder through mail order distribution (including record clubs) shall compute and pay royalties to us in respect of such records on less than 90% of net sales, your royalties hereunder with respect to such records shall be computed and paid on the same percentage of sales.

H. Notwithstanding any of the foregoing:

1. The royalty payable to you hereunder with respect to any record embodying Master Recordings hereunder together with other master recordings shall be prorated as the number of selections contained on the Master Recordings hereunder which are embodied on such record bears to the total number of selections embodied on such record; and

2. In the event any of the Master Recordings are produced by you, jointly or separately, with any other producer, or if any other producer shall perform additional services with respect to any of the Master Recordings produced hereunder, then the royalty payable to you hereunder with respect to such Master Recordings shall be reduced by the royalty payable by us to such other producer; and

3. No royalties shall be payable to you hereunder unless and until all Recording Costs for the Master Recordings shall have been recouped by us pursuant to our recording contract with the Artist at the "net" Artist's royalty rate, i.e. the royalty rate payable to Artist under our recording contract with Artist less the royalty rate payable to you hereunder. Upon such recoupment by us of said Recording Costs, we shall credit to your royalty account for payment, at the next regular accounting date hereunder, all royalties earned by you hereunder retroactively to the first record sold.

7. ROYALTY ACCOUNTINGS

A. We will compute royalties payable to you hereunder as of June 30th and December 31st for each preceding 6-month period during which records as to which royalties are payable hereunder are sold, and will render a statement and pay such royalties, less any unrecouped Advances or charges under this agreement or under any other agreement between you and us or any of our affiliates, prior to each succeeding September 30th and March 31st, respectively.

B. Royalties for records sold for distribution outside of the USA ("foreign sales") shall be computed in the national currency in which we are paid, and shall be paid to you at the same rate of exchange at which we are paid. For accounting purposes, foreign sales shall be deemed to occur in the same semi-annual accounting periods in which our licensees account to us therefor. If we are unable to receive payment for such sales in USA dollars in the USA, royalties therefor shall not be credited to your account during the continuance of such inability. We will, however, at your request and if we are able to do so, deposit such royalties to your credit in such foreign currency in a foreign depository, at your expense.

C. At any time within six months after any royalty statement is due you hereunder you shall have the right to give us written notice of your intention to examine our books and records with respect to such statement. Such examination shall be commenced within 30 days after the date of such notice, at your sole cost and expense, by any certified public accountant or attorney designated by you, provided he is not then engaged in an outstanding examination of our books and records. Such examination shall be made during our usual business hours at the place where we maintain the books and records which relate to you, and which are necessary to verify the accuracy of the statements(s) specified in your notice to us.

. . . continued overleaf —

C. Product requirements

1. Number of recordings

The record producer may agree to produce recordings "as requested" or "sufficient to constitute one album or the equivalent." If the record producer agrees to produce an album, a minimum and maximum number of recordings, usually no less than eight or more than 10, and a minimum and maximum number of minutes of music, usually no less than 30 or more than 40, is usually required. These limits define the record producer's producing obligation, and should be requested if not included in the record producer's contract.

2. Additional recordings

The record producer may agree to produce additional recordings of an artist for a project at the record company's request.

If the record producer produces recordings of an artist for a subsequent project, however, the record company may consider such recordings to be additional recordings for the first project, rather than recordings produced for the subsequent project. This prevents negotiation of the amount of the royalty to be paid for the record producer's services on the subsequent project. Additional recordings should be defined therefore as the recordings of the artist being produced for a particular project. The obligation of the record producer to record any additional recordings for a project should terminate not later than six months after the date the record producer commenced his services on the project. A time limit on the record producer's obligation to record additional recordings also minimizes interference with other commitments.

3. Additional records

(a) Record company option

The record producer may agree that the record company can option the services of the record producer for another project at a later date, and for an agreed to royalty.

The record producer should avoid granting an option, because it gives the record company the right to obtain the services of the record producer before the success of an earlier record produced by the record producer or the future success of the record producer can be taken into account in the negotiation process.

If the record producer is willing or must grant an option to the record company, however, the advance (if any) and royalty which would be payable if the option is exercised should be more than the advance and royalty payable for the project of the artist the record producer is currently producing for the record company.

The record producer may be hindered in scheduling other professional engagements if he grants the record company an option, unless safeguards on the exercise of the option are negotiated by the record producer. Thus, the option should be exercisable

only within a specific period of time following the completion of and only for the project immediately following the project of the artist produced by the record producer. Sufficient advance notice of the commencement date should be given so that the record producer may schedule his other professional commitments. The option recordings should be recordable only if the commencement date of recording follows the date of exercise of the option within a specific period of time.

(b) Record producer option

The record producer may also wish to option the right to produce the next record of an artist. The option for an additional record gives the record producer the opportunity to capitalize upon the success of a project, or an artist whose star is rising.

A record company will want to avoid granting the record producer an option because it restricts the record company's freedom of choice. The record company will be obligated to use the record producer for an artist's next record, even if it does not wish the record producer to produce that artist's record. Moreover, the advance, if any, and royalty payable for the option recordings will not take into account the failure of a prior record produced by the record producer, or the subsequent "track record" of the record producer.

If the record company is willing or must grant an option to the record producer to produce the next record of an artist, the advance, if any, and royalty which would be payable if the option is exercised, should be no less than the advance and royalty payable for the project of the artist the record producer is currently producing for the record company.

A record company may condition the record producer's right to exercise any option it may grant to produce the next record of an artist on the sales success of the record of that artist produced by the record producer. The sales figure selected should be a reasonable estimate of the sales potential of the record, given the sales success of that artist's prior records. The record producer may negotiate for a higher advance and royalty for the option recordings, as long as the amounts are reasonable for the sales success level which triggers the record producer's right to exercise his option.

The record producer may be hindered in the scheduling of his other professional engagements if the record company grants him an option unless safeguards, similar to those discussed in the section of record company options, are negotiated. Thus, another

. . . *continued overleaf* —

D. Your sole right to inspect our books and records shall be as set forth above, and we shall have no obligation to produce such books and records more than once with respect to each statement rendered to you, or any records that do not specifically show sales or gratis distributions of phonograph records as to which royalties are payable hereunder.

E. Unless notice shall have been given to us as provided in paragraph 7C hereof, each royalty statement rendered to you shall be final, conclusive and binding on you and shall constitute an account stated. You shall be foreclosed from maintaining any action, claim or proceeding against us with respect to any statement or accounting due hereunder unless such action, claim or proceeding is commenced against us in a court of competent jurisdiction within one year after the due date of such statement or accounting.

8. MECHANICAL LICENSES

A. The mechanical licenses for the Compositions produced pursuant to this agreement shall be in the general form utilized by the Harry Fox Agency, Inc., or otherwise acceptable to us. Compositions which are written or composed, in whole or in part, by you or by any person, firm or corporation associated or affiliated with you ("Controlled Composition") shall be licensed to us at the rates below, and such licenses shall provide that royalties shall only be payable with respect to records on which royalties are payable pursuant to paragraph 6 hereof:

1. $0.0275 per Controlled Composition;

2. Notwithstanding subparagraph 1, the maximum copyright royalty rate which we will be required to pay in respect of an Album produced hereunder, regardless of the number of Compositions contained thereon, shall be $0.2750. Without limiting our rights, if the aggregate copyright royalty rate for said Album shall exceed $0.2750, such excess may be deducted from any and all sums due you hereunder including royalties payable for Controlled Compositions.

3. Notwithstanding subparagraph 1, the royalty rate with respect to records derived from Master Recordings sold in the United States through record clubs or similar sales plans or devices by our licensees or which have a srlp which is at least 80% or less per Album than the srlp used for top line records released by us or our licensees shall be three-quarters (¾) of said rate, and arranged versions of public domain compositions which are claimed by you shall be licensed at half (½) of said rate.

4. Accountings for such royalties shall be rendered quarter-annually, within 45 days after the end of each calendar quarter.

5. Any assignment made of the ownership of copyright in, or right to license the use of any Controlled Compositions shall be made subject to the provisions hereof.

9. WARRANTIES; REPRESENTATIONS; RESTRICTIONS; INDEMNITIES

You hereby warrant, represent, and agree that:

A. You are under no disability, restriction, or prohibition with respect to your right to grant the rights granted by you to us hereunder, and to produce each and every selection produced hereunder. No selection produced by you hereunder is or shall be subject to any restrictions of any other agreement to which you are or have been party or by which you are otherwise bound.

B. During the term of this contract you shall become and remain a member in good standing of any appropriate labor union(s) with which we may at any time have an agreement lawfully requiring such union membership.

C. No Controlled Compositions nor any other selections, materials, ideas, or other properties furnished or selected by you and contained in or used in connection with the Master Recordings or the packaging or advertising for records hereunder will violate or infringe upon any common law or statutory right of any person.

D. No contract or agreement of any kind is presently in existence which would interfere in any manner with the performance of this agreement by you.

E. You will not:

(i) using the endeavors of Artist produce any selection recorded hereunder for the purpose of making records for anyone other than us for five consecutive years after the date of this agreement or the delivery of a recording to us, but in no event more than six consecutive years after the date of this agreement; and

(ii) using the endeavors of any other artist produce any selection recorded hereunder for the purpose of making records for anyone other than us: (a) for 18 months after the date of recording hereunder; or (b) for 1 year after the release of a recording by us, whichever is earlier.

F. You hereby indemnify us from all damages, liabilities, costs, losses and expenses (including legal costs and attorneys' fees) ("damages") arising out of or connected with any claim, demand, or action by a third party which is inconsistent with any of the warranties, representations, or covenants made by you in this contract. You agree to reimburse us, on demand, for any payment made by us at any time with respect to any damages to which the foregoing indemnity applies. Pending the determination of any claim, we shall have the right to withhold payment of any monies due you hereunder in an amount reasonably related to the amount of such claim, and our estimated attorneys' fee in connection therewith.

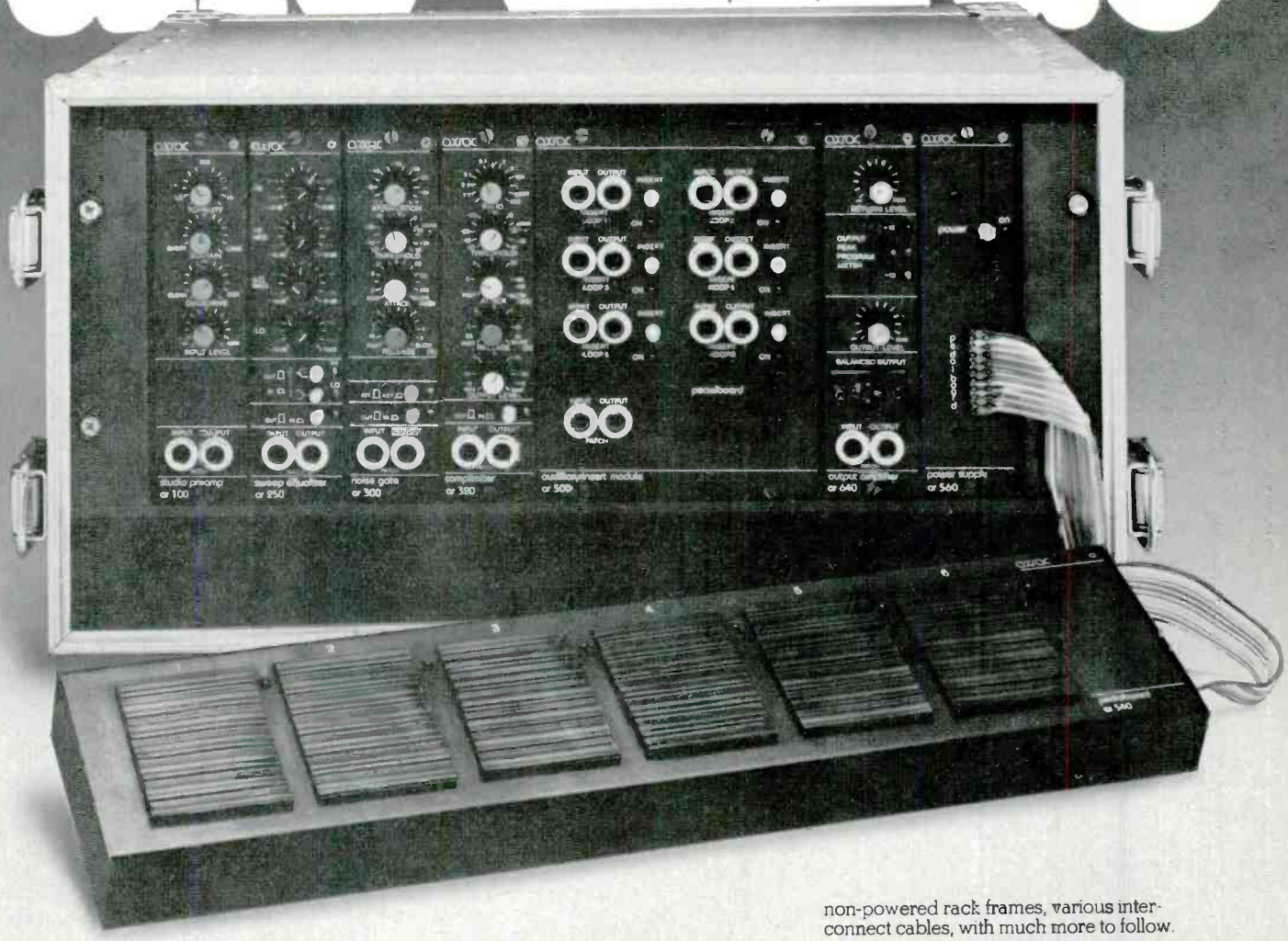
G. Your services hereunder are of a special, unique and intellectual character which gives them peculiar value. In the event of a breach by you hereof, we will be caused irreparable injury. In such event, we shall be entitled to injunctive relief and/or damages, in addition to our other rights or remedies.

10. SUSPENSION: TERMINATION

A. We shall have the right, at our election, to suspend the running of the term of this contract and our obligations hereunder upon written notice to you if for any reason whatsoever your ability to perform as a producer shall become impaired ("incapacity"), or if you shall refuse, neglect, or be unable to comply with any of your obligations hereunder ("default"), or if as a result of an act of "force majeure," we are hampered in the recording, manufacture, distribution, or sale of phonograph records, or our normal business operations become commercially impractical. Such suspension shall be for the duration of any such event or contingency, and the term hereof shall be automatically extended by such number of days as equal the total number of days of any such suspension.

. . . *continued overleaf* —

the axrac®



The most versatile, practical, and affordable professional signal processing system ever devised.

Whether your "axe" is the guitar, bass, keyboards, sound reinforcement system, or the recording studio, the axrac's versatility finally makes it possible to design the custom effects rack/pedalboard system you've always wanted. And the axrac's low cost makes your dream system truly obtainable.

Self Contained

Unlike other signal processing systems or components, axrac modules may be powered by two 9 volt batteries or battery eliminator (as with the optional Module Case with foot switch), or by the ±15 VDC power supply of the axrac powered rack frame.

Interface Flexibility

Be it stage, studio, or sound reinforcement, all axrac modules operate at line or instrument level, and are switchable to match any need situation. Each axrac module features RCA-type phono jacks on the rear panel normalled to ¼" phone jacks on the front panel, thus creating a normalling patch bay as the axrac is expanded.

Custom Effects Rack - Pedalboard System

With the optional Pedalboard Module, up to six functions in the rack may be remote controlled. Added to the normal ± 15VDC power supply of the powered rack frame is a +9VDC source that, coupled with the Auxiliary Insert Module, enables the powering and interface of external effects "toys" in series or parallel.

Modules

The axrac system includes a full range of modules: a very special instrument preamp featuring the extraordinary tubecube® circuit, equalizers, a dynamic processor combining noise gate, compressor-limiter, and de-sser functions, a time delay processor combining flanging, chorus, ADT, and other effects, an auto panner a stereo synthesizer, an auxiliary insert unit, a patch bay, a high resolution LED bargraph meter, an output amplifier, pedalboards, powered and non-powered rack frames, various interconnect cables, with much more to follow.

Affordable

When compared to a rack of individual signal processors, the entire rack system costs far less than the price of any equivalent system. Although axrac modules cost somewhat more than most "toy" effects boxes, their performance and flexibility easily justify the slight added expense.

The Sound

The bottom line, the reason for buying any signal processor . . . THE SOUND. At Audio Envelope Systems, we know the sounds you seek. As musicians, recording engineers, sound men, electronic design engineers, and serious audio tweaks, we too have tried for "that" sound, only to be disappointed by typically poor performance. As a result, all AES products are built with one primary purpose: to deliver the sound, easily and reliably, through innovative, revolutionary components. To that end we dedicate ourselves and our company. In concept and execution, that philosophy is exemplified by the axrac . . .

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B. In the event of your incapacity or default, we shall have the right, without limiting our other rights or remedies, to terminate this contract upon written notice to you, and shall thereby be relieved of any and all obligations hereunder.

11. DEFINITIONS

As used in this contract, *"record"* or *"phonograph record"* shall mean any device, known or unknown, on or by which sound may be recorded for later transmission to listeners, whether embodying sound alone, or sound synchronized with or accompanied by visual images, including disks or tapes of any speed or size; *"Master Recording"* shall mean any original recording of sound, whether embodying sound alone or sound synchronized with or accompanied by visual images, which may be used in the recording, production, and/or manufacture of records, together with any derivatives thereof (other than records); *"selection"* shall mean a single musical composition, medley, poem, story, or similar work; *"Advance"* shall mean the amount recoupable by us from royalties to be paid to you or on your behalf pursuant to this or any other agreement between you and us or any of our affiliates; *"Recording Costs"* shall mean all union scale payments required to be made to the Artist, as well as all payments made by us to you (including Advances), and any other individuals rendering services in connection with the recording of the Master Recordings, made by us pursuant to any applicable law or regulation or any applicable collective bargaining agreement between us and any union or guild (including payroll taxes and payments to union pension and welfare funds), all amounts paid or incurred by us for studio or hall rentals, tape, engineering, editing, instrument rental and cartage, mastering, transportation, accommodations, immigration clearances, so-called "per diems," together with any and all other amounts paid or incurred by us for the recording of the Master Recordings; *"Delivery to us"* shall mean delivery for mastering to a studio designated or approved by us, of fully mixed, leadered, sequenced and equalized 15 IPS master tapes in proper form for the production of the parts necessary to manufacture records therefrom, and delivery to us of all consents, approvals, information, credits and other material required by us to release records embodying such Master Recordings and to manufacture album covers or other packaging therefor; *"Album"* shall mean one or more 12-inch 33-1/3 rpm records, embodying not less than eight nor more than 12 Master Recordings, and not less than 35 nor more than 45 minutes of music; *"mid-priced record line"* and *"low-priced record line"* shall mean a record line or label the records of which bear a srlp in the country in question, respectively, in excess of 66-2/3% and less than 80%, and 66-2/3% or less of the srlp in such country of top-line records on which recordings of the majority of our artists are initially released in such country; *"net royalty"* shall mean the gross royalty received by us in respect of record sales, less an amount equal to any monies required to be paid by us to the AF of M SPTF or MPTF, or any similar fund, to the copyright proprietors of the musical compositions embodied in such records; and *"net sales"* shall mean gross sales less returns and credits of any nature.

12. ADVANCES

A. Conditioned upon your full and faithful performance of this contract, we shall pay to you, as an advance recoupable by us from any and all royalties payable by us to you hereunder, the sum of $15,000, payable half (½) upon the commencement of recording, and half (½) after your delivery to us, of the Master Recordings.

B. If you produce additional Master Recordings hereunder, the amount of the Advance under subparagraph 12A will be $1,500.00 per recording (but not more than $15,000.00 in connection with any Album), and it will be payable within 30 days after the Delivery to us of all the Master Recordings to be produced in connection with the Album or other recording project concerned.

13. ASSIGNMENT

We shall have the right, at our election, to assign any of our right hereunder, in whole or in part, to any person, firm, or corporation. You shall not have the right to assign any or your rights hereunder.

14. NOTICES

All notices to be given, and all statements and payments to be sent, to you an all notices to be given to us hereunder, shall be addressed to you and to us at the addresses set forth on page 1 hereof. All notices shall be in writing.

15. MISCELLANEOUS

A. This contract sets forth the entire understanding of the parties relating to the subject matter hereof. No waiver or default hereunder shall affect your or our respective rights thereafter. If any provision of this contract shall be held void, no other provision shall be affected as a result thereof.

B. We shall not be deemed to be in breach of any of our obligations hereunder unless and until you shall have given us specific written notice by certified or registered mail, return receipt requested, of the nature of such breach and we shall have failed to cure such breach within 30 days after our receipt of such written notice.

C. Nothing herein contained shall constitute a partnership or a joint venture between you and us.

D. The provisions of any applicable collective bargaining agreement between us and any labor organization which are required by the terms of such agreement to be included in this contract shall be deemed incorporated herein as if such provisions were expressly set forth in this contract.

E. The prevailing party shall be entitled to recover from the other its attorneys' fees and costs in connection with any action, suit, or proceeding in this contract.

F. This contract shall be governed by the laws of the State of

G. This contract shall not become effective until signed by you and countersigned by a duly authorized officer of our company.

IN WITNESS WHEREOF, the parties hereto have hereunto set their hands the day and year first above written.

RECORD COMPANY
By
Agreed to and Accepted:
(PRODUCER)

record of the artist for whom the option is granted should not be recordable prior to the date on which the record producer's right to produce the option record will arise. The record producer should have reasonable advance notice of the commencement date of the sessions for the option recordings, so that he can re-schedule his other professional commitments, if necessary, in order to exercise the option. The recording sessions should commence within a specific period of time following the record producer's exercise of the option. If the recording sessions do not commence within such time, the record producer should be paid his advance and a royalty, even if he is unable to produce the project because of another commitment.

If the specified sales criteria are met, and the record producer cannot or does not decide to produce the follow up record of an artist, he should nonetheless receive an "override" royalty. We think "one or two points" of the suggested retail list price of the records sold on the follow-up record of the artist would be fair in most cases. This override should be mandatory in any situation where the sales criteria are met, but the record company or artist does not wish to retain the services of the record producer.

4. Rendition of other services

The record producer may be a musician, arranger, vocalist, engineer, session leader or writer, as well as a record producer. Such additional services, if rendered, should be compensated for in addition to the royalties and advances to be paid to the record producer for his services as a record producer.

5. Termination of record producer if artist or project terminated

The record producer must be wary of situations where either the artist's recording contract, or the project being produced by the record producer, is terminated by the record company. In such cases, the record producer may not be paid an advance or royalties.

The record producer's contract should provide that the record producer should be paid the entire advance, if any, specified unless the termination of the artist's recording contract or the project is due to the fault of the record producer. Moreover, if the project is terminated and thereafter reinstated, the record producer should have the right to produce the artist, and should be paid another advance.

SERVICES REQUIRED OF A RECORD PRODUCER

A. Selection of compositions, dates, studio, musicians, accompaniment, arrangements, copying services, and supervision of sessions

The record producer's contract will typically reserve to the record company the right to select any or all the "creative elements" mentioned in the heading. It is important that the record

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producer negotiate a right to participate in the selection process of the creative elements, because the right combination of creative elements is essential to the creation of good recordings.

The record company will usually agree that the creative elements will be subject to the mutual approval of the record company, artist, and the record producer, or, at a minimum, that the record producer will be involved in their selection. In other words, the record company may agree that the record producer and the artist will select the creative elements subject to the approval of the record company, or that the record company will select the creative elements subject to the approval of the record producer and the artist.

B. Preparation of the budget

1. Significance of the recording budget

The recording budget is the projection of the aggregate cost of making an artist's record. Therefore, the record producer must take great care to prepare a budget which accurately reflects his needs in the studio. The record producer should prepare a budget even when the record producer's contract does not specifically provide that a budget be prepared and approved by the record company as to amount.

While the record producer will be constrained by the maximum amounts allowed by the record company for the production of recordings for a project under an artist's recording contract, preparing a budget will enable him to determine whether or not the record he envisions for an artist can be produced for the amount of money which the record company has allocated for the project. Indeed, a key ingredient in the success of any project is the record producer's understanding of the financial constraints under which the project is operating. Furthermore, the creative process can be boosted by the record producer's planning of the project. Unfortunately, it is not uncommon to see the finished recordings suffer due to inadequate overdubbing or sweetening, or mixes being rushed because basic tracks took too long to complete.

2. Over-budget responsibility

The responsibility of the record producer for excess recording costs underscores the importance of preparing a budget in advance of recording. Of course, no person, be he a record producer or palm reader, can predict with absolute certainty that a budget will cover all the costs of recording a particular artist. This is particularly true in the case of a new artist when the producer's, artist's or record company's concept of an artist's "sound" is not finalized, and may require a change of direction during the course of recording. Thus, most record companies will agree that that record producer is responsible only for excess recording costs over 110% of the approved budget.

The record producer may negotiate with the record company to agree that he bear no responsibility for excess recording costs, but most record companies refuse to make such a concession. Moreover, some record companies, when they believe a record producer is responsible for the excess costs, withhold any remaining payments to the record producer, whether or not the record producer's contract authorizes the withholding.

The record company may recognize that the record producer is not the only person involved in the project responsible for budget over-runs. An artist or the record company itself may bear some responsibility. Thus, some record companies will agree to make a good faith evaluation of the reasons for the excess, and apportion the excess recording costs between the responsible parties.

Excess recording costs should be calculated only for the recording project as a whole, and not on a master-by-master basis. Thus, if there are 10 recordings to be produced, and if the record producer exceeds 1/10th of the budget with respect to a particular recording, he should not be held to have exceeded the budget if the overall cost of recording all 10 recordings is within the approved amount.

One of the most significant areas of over-budget recording costs is multiple-scale payments to musicians. "Double-scale," and "triple-scale" payments may be appropriate, but must be carefully monitored.

If there is more than one record producer initially involved in a project, the record producer's contract should make provision for apportionment of excess recording costs. An apportionment provision should always be considered, even in instances where the recordings are initially produced by one producer only, because the record company frequently reserves the right to use other record producers on the recordings or the project, who may be responsible for the excess recording costs.

If a record producer is headed toward an overbudget situation, he should stop recording and talk it over with the record company. The fact that the record producer advises the record company of the potential for excess recording costs, however, will not insulate him from responsibility for the excess if he exceeds the existing approved budget, even in situations where the record company authorizes the excess recording costs.

The record company executives responsible for the record producer's employment are accountable to their superiors for expenditures supposedly under their control. Inevitably, such executives are likely to hire record producers who are financially circumspect in the recording studio.

3. Union reports/late fees

The American Federation of Musicians ("AF of M") and the Amerian Federation of Television and Radio Artists ("AFTRA") each require that certain forms must be filed for every recording session. These forms must be filed within a certain number of hours after each recording session. It is the responsibility of the record producer to file these forms on behalf of the record company. If, for any reason, the record producer fails to file such forms or any other payroll forms on time, and a penalty is assessed, the record company will require the record producer to reimburse the record company for such penalty, or deduct the amount from any royalties or advances against royalties payable to the record producer pursuant to the record producer's contract.

4. Recording Costs

Paragraph 11 of the prototype record producer's contract sets forth a definition of recording costs. Usually, royalties are not payable to a record producer until "recording costs" are "recouped" by the artist. Thus, the record producer must determine what costs, if any, should not be included as recording costs recoupable against the artist, but instead should be borne solely by the record company. Here are some costs we like to exclude from the definition of recording costs in a record producer's contract:

(a) Mastering costs

Mastering is the first metal part from which records are ultimately pressed, and therefore is a cost of manufacturing records rather than producing recordings. Some record companies refuse to delete "mastering" from the definition of recording costs. The record producer may then request that mastering costs be limited to "remastering" costs if the recordings produced by him are not technically satisfactory.

Some record companies will agree that mastering is not a recording cost, but only if the mastering is performed by the record company's engineers at its usual mastering facility.

(b) "Per record" royalties

That is those payments made to the AF of M Music Performance Trust Fund and Special Payments Fund, and AFTRA Contingent Scale. All record companies have agreements with unions and guilds which require that payments be made to such unions and guilds based on a percentage of the aggregate sales of records. The AF of M's Music Performance Trust Fund and Special Payments Fund, and AFTRA's contingent scale payments to background singers, are the most significant of the "per record royalties." These payments are more in the nature of overhead costs than recording costs,

because they result from the sale of records and not from the production of recordings. The AF of M's Music Performance Trust Fund, for example, was created in 1948 pursuant to agreements with the record companies to counteract the decrease in the number of live music performances stemming from the widespread use of phonograph records.

(c) Advances to the record producer

If an advance paid to the record producer is recouped against the record producer's royalties, it should not be also also recouped as a recording cost against the artist's royalties. If an advance is recouped twice, it diminishes the royalties payable to the record producer, and postpones the time at which such royalties will become payable. (See the next installment of this article for a full discussion of recoupment of record producer advances.)

C. The delivery requirement

1. Tape standards

The record producer will be required to deliver fully mixed, leadered, sequenced, and equalized 15 IPS master tapes ready for mastering (unless the record producer is mastering). Such tapes must be in "proper form" for the production of the parts necessary to manufacture phonograph records, and must be "technically satisfactory," "commercially satisfactory," or "satisfactory" to the record company.

"Technically satisfactory" means that the tapes be produced and recorded in accordance with the then current technical standards of the record industry, or the particular record company involved. A master tape is not "technically satisfactory," for example, if there is audible distortion or noise, or if a bass drum track is not accurately synchronized with the other musical tracks. "Commercially satisfactory" and "satisfactory" means that the record company thinks that if records are manufactured from the tapes, such records will sell.

Tape standards are an important item of negotiation. If the required standard is other than "technical," the record producer may be subjected to the arbitrary tastes of the record company's A&R (Artists and Repertoire) department, regardless of the technical quality of the tapes. If, for example, the A&R department does not think that the tapes contain songs that will sell records, the record producer has failed to "deliver" commercially satisfactory tapes, and therefore has not fulfilled his obligations under the record producer's contract. This means that the record producer may not be entitled to any compensation or credit for his services, since he "failed" to perform at a level of satisfaction acceptable to the record company.

Applying the standards of "commercial satisfaction" to the record producer is unfair for two reasons. First, the interests which the record company seeks to protect with such standards are that the record produced will, in some way, reflect popular musical taste, and be a serious attempt to produce a record of the highest artistic and professional quality.

Popular taste is not entirely within the record producer's control. The record producer does not, for example, have complete control over the musical compositions to be recorded. Often, he is limited to musical compositions which are written by an artist. Moreover, the record producer does not have complete control over the instrumentation, arrangement, or musicians to be utilized on a project. Artists are often self-contained musical units who have their own views about how their recordings should sound. A record producer may help execute an artist's "sound" in the studio, but not necessarily create it.

The record company can argue that the record producer frequently supplies the arrangements, instrumentation and musicians for the recordings, and that, accordingly, the record producer, as the "director" of the entire "recording picture," must bear the responsibility for the sound of a record.

In truth, a recording is a joint artistic venture between the record company, an artist, and the record producer. Often, the record company has final approval of the compositions and all other creative elements. It also determines how much monies will be spent on the recordings. An artist, too, plays a significant role in the recording of his performances.

Second, the commerciality of a tape is a largely subjective determination once it is determined that a tape is technically acceptable. If a record producer produces a record that constitutes a musical break with the artist's past work, the tape may nevertheless be a *bona fide* artistic and professional effort, regardless of whether or not it is commercial. General principles of contract law and the laws of the marketplace are adequate to protect the record company in such circumstances. If the record producer produces a tape of totally unmarketable sounds, such as chickens clucking, the requirement of good faith, inherent to *all* contractual relationships, would not be met and the record company, without resort to standards of acceptance, could reject the tape as failing to meet the requirements of the record producer's contract. Moreover, a record producer who cannot deliver "good" records will not long be gainfully employed.

However, it is not uncommon for top record producers, with several "Platinum" records, to be sent back into the recording studio to modify their work. Even seasoned professionals benefit from an objective evaluation of their endeavors.

2. Other materials required

In addition to delivering recordings, the record producer is required to deliver "consents, approvals, credit information and other material necessary for the record company to release the phonograph records." "Consents and approvals" generally must be obtained for musicians and vocalists who are parties to exclusive recording contracts, and who are requested by the record producer or the artist being produced by the record producer to perform at the sessions. "Credits" must be supplied for session persons, engineers, other producers, record companies who permit their exclusive recording artists to perform on the recordings, authors, publishing companies and performing rights societies.

Often, the record producer delivers recordings to the record company unaware that there are other materials that must be accumulated and delivered before he will be deemed to have fulfilled his obligations under the record producer's contract. Whether or not it is appropriate to require the record producer to obtain these materials will vary with the situation. The artist may have greater access to such materials than the record producer, and it may be more appropriate for the artist to be responsible for supplying the materials to the record company. In addition, the record company obtains the materials itself. The gathering of the pertinent information and materials for the credits is usually accomplished by the collective efforts of the record producer, artist and record company.

3. Re-recording

As mentioned, a record producer's contract will require the record producer to re-record any recording until a tape is delivered which meets technically satisfactory, commercially satisfactory or satisfactory standards. If the record producer is required to re-record a recording on a tape rejected by the record company as unsatisfactory, the timing of the record company's request that he fulfill such requirement may conflict with his other professional commitments. The record producer's contract should therefore provide that any requested re-recording will be subject to the record producer's other professional commitments, unless such request is made within a certain number of days following the delivery of the tapes (as opposed to all the other materials that may be required under the record producer's contract) to the record company. Moreover, it should also provide that any *per diem* expenses or other monies allocated to the record producer for his living and traveling expenses during the initial period of recording will be paid to him on the same terms that applied during the initial period of recording.

The next installment of this article, to be published in a forthcoming issue of *R-e/p*, will be concerned with the ways in which a record producer can ensure that he is fully compensated for his services on a recording project.

New Products

MELKUIST UNVEILS ADVANCED GT800 AUTOMATION SYSTEM

Mixing Consoles having up to 64 elements — faders and other level controls — capable of producing and accepting voltage replicas of control functions can be used with the GT800 System, thus providing a simple and effective means of memorizing the settings and movements of the controls, and reproducing these in synchronism with the time signature.

When power is first applied, the system "signs on" at the video monitor with a message to indicate that no selection has been made. Disks are then inserted into the drives, and their directories automatically read into the control box memory.

The tape is loaded on to the multitrack and lined up at the head of the piece to be mixed. The processor is then put "on-line." If the tape does not already contain timecode, the presence of code at the jackbay can be confirmed by a listening test, then patched to a spare track's input and recorded throughout the piece to be mixed.

As soon as the system is active, control movements can be written into the store. The methods of making the mix are virtually identical to those used in manual mixing, since each entire mix is stored.

The standard GT800 is designed to work with the faders in a totally "transparent" fashion. Functions available to the operator are: *Isolate*, where the fader controls the audio but no information is stored; *Write*, where the fader controls the audio and all movements are stored; *Read*, where the processor controls the audio and the fader is disabled; and *Update*, where the fader can be used to locally offset the read levels for adding final "live" expression to the mixdown.

The usual system of D.C. grouping is also provided, which allows any number of VCA's to be controlled by one of the separate group faders in all the various modes (read, write, etc). In restricted space applications, the special channel group fader can be specified where any channel can become the Group Master shown on its group selector by switching a master-slave. VCA bypass can also be achieved during basic tracking.

In addition, the Enable function is available as a footswitch, which can be very convenient to operate if a number of faders has to be manipulated over a short passage. As a particular cue approaches, the foot-switch is pressed once and the faders brought up over null. On their way up, the faders collect their Writes and the change is inserted. At the top of the movement, Enable is pressed again so that the faders will drop back into Read as the levels match on the way down.

For convenience, the spooling of tape on the master machine is made to de-select all the current or pending Write functions, so that levels inappropriate to the start of a pass are not carried over from its predecessor.

The multitrack tape may be spooled to any point during a mix, and dropped in on at that point. When the tape is started again, the computer will assemble the data up to a point about two seconds ahead of the drop-in point, and then release the system at this point. As soon as the tape is stopped or spooled, the system will compile the new data created during the last pass into a new mix in an available store.

MELKUIST, LTD.
35A GUILFORD STREET
LUTON LU1 2NQ
ENGLAND
0582-416028
or, in the U.S. —
STUDIO MAINTENANCE SERVICE, INC.
12458 MAGNOLIA BLVD.
NORTH HOLLYWOOD, CA 91607
(213) 877-3311

For additional information circle #102

CROWN ANNOUNCES NEW PZM MIKE POWER SUPPLY

The in-line microphone power supply unit will provide new convenience and flexibility to users of the PZMicrophone, according to R. David McLaughlin, Product Line Manager for Crown International. The PXT is a small nickel-plated metal tube (¾-inch diameter by 4-inches) with male and female XLR connections, and contains electronic circuitry to provide power needed by the mike to raise the level of the capsule output. The unit requires a phantom supply from the mixer.

"The PXT," McLaughlin added, "can

"What's Your Budget"

Knowing your budget is your first step. At Westbrook Audio, Inc. we design and equip full audio facilities within your budget requirements. In a sea of audio confusion, consult with a company second to none in complete services. Large facility or small, you get the most for your money at Westbrook Audio.

Pictured: Star Track Recording Studio, Tulsa, Oklahoma.

westbrook audio inc.

11836 Judd Court Suite 336 Dallas, Texas 75243 (214) 699-1203

For additional information circle #103

For additional information circle #104

New Products

provide a 'handle' on PZM™ mikes for mounting to mike stands." The PXT will be available as the power supply furnished with the purchase of a PZMicrophone, or as an additional accessory.

CROWN INTERNATIONAL, INC.
1718 W. MISHAWAKA ROAD
ELKHART, IN 46517
(219) 294-5571

For additional information circle #105

NEW DRUM BAG AND STAND DAMPER FROM ALPHA ACOUSTICS

Designed to fit over the front and rear skins of a kick drum, the Drum Bag features a zippered cover for the front skin to enable a mike to be positioned anywhere within the drum, while the rear cover is provided with a cut-out for the beater.

Both covers are fabricated from the same quilted, sound-absorbent material used in the well-known Piano Bag, and come complete with elasticated edges and eyelets for attaching to the outside of a kick drum. The present units, which retail for $175.00, accommodate a 22-inch drum; other sizes will be available in the near future.

The Stand Damper fits all professional music stands, and is held in place with elastic straps. Retailing for $15.00 each, discounts are offered for quantity orders: $162.00 per dozen, and $300.00 for two dozen.

ALPHA ACOUSTICS, LTD.
P.O. BOX 7520
BURBANK, CA 91505
(213) 760-1139

For additional information circle #106

NEW MODULAR SIGNAL PROCESSING SYSTEM FROM AUDIO ENVELOPE SYSTEMS

The axrac® system mounts into any standard 19-inch equipment rack, and offers a full complement of modules. All modules, being switchable to optimize impedences and levels, operate at line- or instrument-level to match any situation, be it stage, studio or sound reinforcement.

The basic axrac ar-9PF nine-position powered rack frame provides mounting for the equivalent of eight single-width modules, plus powering for up to two racks of modules, or 17 single modules.

Modular components included in the first phase of the axrac system are: a preamp; sweep equalizer; graphic equalizer;

dynamic processor combining noise gate, compressing, limiting, and de-essing functions in a single unit; a high-resolution LED bargraph meter; an auto panner; a stereo synthesizer; an auxiliary insert unit to interface and power external effects, a patch bay; an output amplifier; an electronic crossover; and a full-range analog time processor, featuring phasing, flanging, reverb, echo and chorus, as well as ADT and other effects.

Professional user prices for the axrac modules start at $150.00.

Audio Envelope Systems will be exhibiting and demonstrating production units of the axrac system at the upcoming AES Show in New York.

AUDIO ENVELOPE SYSTEMS, INC.
414 S. MILL AVENUE #108
TEMPE, AZ 85281
(602) 829-0301

For additional information circle #107

STUDER INTRODUCES A80VU TWO-TRACK IN HALF-INCH FORMAT

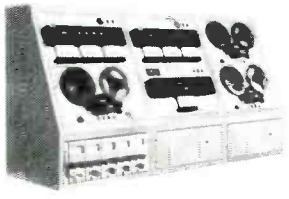
Previously, only the A80RC version had been offered by Studer in this format. By employing the wider tape format, and thus increasing track width, the Studer A80VU ½-inch is said to significantly improve signal-to-noise ratio. At an operating level of 510 nWb/m, the weighted SNR of this new machine measures better than -75 dB. Also, the ½-inch heads, designed and manufactured by Studer, are said to deliver excellent low-frequency response.

In addition, the A80VU ½-inch two-track incorporates Studer's new transformerless line output amplifiers. This new plug-in card employs a Triac-protected, DC-coupled output stage utilizing four power transistors. It may be driven into varying loads (long cable runs, etc.) with no signal degradation. Frequency response for the amp card is 14 Hz to 50 kHz (+0/-1 dB), and THD measures less than 0.01% at 1 kHz with +24 dBm output.

Suggested list price for the Studer

The Telex 300 duplicating system. Versatile, expandable, dependable.

You can bank on it!



A Building Block System: A modest capital investment gets you started whether in cassette-to-cassette, reel-to-cassette, reel-to-reel, in two or four channels. Start with a basic unit and later add modules to suit your growing requirement.

Modular Electronics: Individual plug-in modular electronics permit fast easy service and minimum downtime. Since the system is made in the U.S.A., parts and service are readily available, through a coast-to-coast dealer network.

Now Long Life Heads at No Extra Cost: Cassette slaves with new long life heads last 10 times longer than conventional heads, reducing downtime and replacement cost.

Telex also has available desk top cassette copiers.

TELEX®

TELEX COMMUNICATIONS, INC.

9600 Aldrich Ave. So., Minneapolis, MN 55420 U.S.A.
Europe: 22, rue de la Légion-d'Honneur, 93200 St. Denis, France

Telex Communication Inc. AV Department.
9600 Aldrich Ave. So., Minneapolis, MN 55420
Please send me more information.

Name _____
Title _____
Organization _____
Address _____
City _____ State _____ Zip _____
Telephone _____
Best time to contact _____

For additional information circle #108

New Products

A80VU ½-inch two-track recorder is $10,500.

STUDER REVOX AMERICA, INC.
1425 ELMHILL PIKE
NASHVILLE, TN 37210
(615) 254-5651

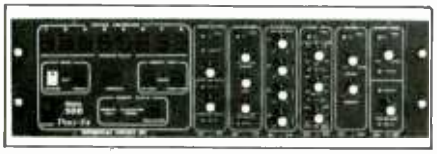
For additional information circle #109

NEW RANGE OF EFFECTS UNITS FROM SEQUENTIAL CIRCUITS

The Model 500, Pro-FX is described as the first integrated signal-processing (effects) system that offers the convenience of a modular rackmount design, with the flexibility and control of full programmability. Engineers and studio musicians can now consolidate all their effects and mixing into one package, and have instant control over sound changes.

The main frame includes a system controller and space for six effects modules. The controller also provides power and program control for up to three additional expansion chassis for a total of 30 effects modules.

All control settings on each 500 Series module may be stored and recalled (up to 64 programs), allowing immediate access to all combinations of effects. For remote control, an optional footswitch permits instant switching to any of the 64 programs, and includes a display of the current program.



The first 500 Series modules available will include a Model 510 phase shifter, 512 distortion/sustainer, 514 mixer, 516 parametric equalizer, and 518 reverb.

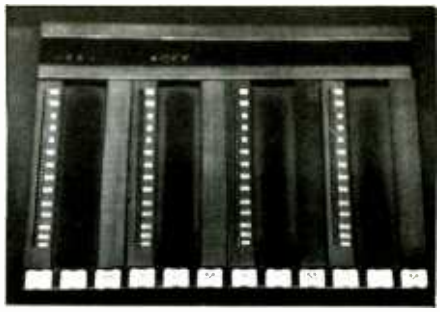
SEQUENTIAL CIRCUITS, INC.
3051 NORTH FIRST STREET
SAN JOSE, CA 95134
(408) 946-5240

For additional information circle #111

SPHERE UNVEILS TRAVIS FADER AND DIGITAL ATTENUATOR

These two elements form the basis for Sphere Electronics' Datalog Automation System, which places the analog signal wholly under digital control. The company claims that this new development accomplishes the best of both worlds: the actual audio signal never gets converted to digital, thereby retaining the "warmth" (and harmonics) that the latest generation of analog tape machines are capable of reproducing.

The Travis Fader is basically a digital encoding device that features no moving parts at all. Infra-red light bridge technology feeds a 6500 Series microcomputer that can receive and process information from four fader units. Level changes are accomplished by placing a digit (finger tip) anywhere in the shallow fader trough, and moving it up or down. A



row of LEDs next to the fader tracks "level" and is analogous to "knob position."

The Sphere Digital Attenuator is a resistive ladder, CMOS switching device that controls the analog signal with 224 discrete, perfectly repeatable digital steps. No distortion or noise is said to be introduced by this essentially passive circuitry. The attenuator is designed to either replace current VCAs or plug directly into the audio signal, thereby making SMPTE time code automation available for consoles in service today on a field-installed, retrofit basis.

Sphere Datalog Automation is described as being as sophisticated as any on the market today and more; it is also described as one of the simplest. The combination of digital fader and attenuator eliminates all problems associated with interfacing and manipulating analog VCAs.

The Travis Fader, Attenuator and Datalog Automation will all be on display at the forthcoming New York AES Show; booth T 30-31.

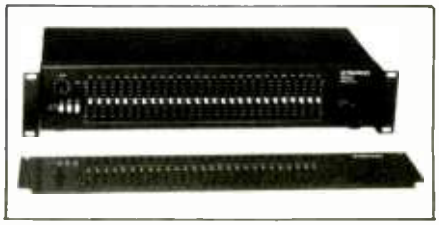
SPHERE ELECTRONICS, INC.
20201-A PRAIRIE STREET
CHATSWORTH, CA 91311
(213) 349-4747

For additional information circle #112

E-V/TAPCO INTRODUCES TWO NEW EQUALIZERS

The 2210 is a dual-channel octave-band graphic equalizer that has been designed for economy without sacrificing quality, performance or ease of operation, according to Jim Loppnow, E-V/TAPCO's market development manager. "Each channel offers the user a full 12 dB of boost or cut in separate frequency bands. In addition, all the sliders are center detented at the 0 dB or flat position. Each channel has its own output gain control, a feature usually associated with equalizers costing much more."

"The 2230 is TAPCO's first third-octave equalizer and is loaded with user-related benefits," continued Loppnow. It offers 27 bands of equalization from 40 Hz to 16 kHz, with 12 dB of boost or cut on standard ISO center frequencies. "This new unit also has true combining filter action which not only increases the accuracy of the equalization, but, because it reduces interaction between individual EQ filters,



MAXI Q...a new breed... a real tiger

***Extraordinary 7 octave sweep on each band * Infinite cut = notch filter/cutoff filter * "Q" adjusts shelving slope 4 to 28dB/octave, and peaking bandwidth from .3 to 3 octaves * Exclusive TUNE MODE for precise aural tuning * 13 point clip monitor...input gain control * Non-interactive feedforward filters * * Superior noise, distortion, slew rate ***

What do you want from a peripheral equalizer?

Smooth clean modification of frequency response.....of course, that's basic. Often times, though, you turn to outboard EQ because you really want to do a number on the sound....**make it roar.** That's what MAXI Q is all about..... **it has teeth.**

At first, MAXI Q might look a bit like other equalizers, but look closer. Consider its enormous 7 octave frequency range on each of three bands...the ultimate overlap. Great for swept phasing effects, or for bringing all three sections together to fix trouble.

Notice MAXI Q is continuously variable to infinity cut (typically 35dB) in all modes. Notch out or cut off unwanted parts of the spectrum.

Unlike other parametrics, MAXI Q gives you adjustable Q not only in the peaking mode (.3 to 3 octaves) but also in the shelving modes, where the slope is variable from 4 to 28dB/octave. At the steeper slopes, we designed in some pretty radical frequency/phase relationships for the times when you want "**bite**" in no uncertain terms.

Even the basic geometry is unique. Most parametrics use the parallel filter approach. Inexpensive, yes, but hindered by interaction and error when the bands are tuned to similar frequencies. We chose a more elaborate series approach, using non-reciprocal feedforward filters. The result...no interaction, more EQ available (42dB) and a more selective rejection of undesired frequencies.

Our exclusive TUNE MODE is a boon to setting up. It allows you to hear only what is being added to, or subtracted from, the program, without hearing the program itself.

Add to this, a 13 point overload detection system, an input gain control for level optimization, .01% distortion, 90dB SN, a 13V/us slew rate, balanced inputs and selective bypass of each band.

When you plug MAXI Q into your **VALLEY PEOPLE** processing package you'll know you've got a real tiger on your hands. If you're not already into the **VALLEY PEOPLE 800 series** processing equipment, you owe it to yourself to check it out. MAXI Q now joins our very successful **KEPEX II** keyable expander/gate and the renowned **GAIN BRAIN II** limiter/compressor/ducker thus forming **the** processing group preferred by the most critical professionals.

VALLEY PEOPLE, INC.
P.O. Box 40306
2820 Erica Place
Nashville, Tenn. 37204
615-383-4737
TELEX 558610 VAL PEOPLE NAS
a merger of **Allison Research & Valley Audio**

For additional information circle #113

New Products

also increases the effective amount of control available." Switchable high and low-pass filters are also built into the 2230.

Both of these new units have recessed controls, and come equipped with plexiglass security covers to protect against accidental changes in the control settings.

Suggested prices of the 2210 and 2230 are $319.00 and $429.00 respectively. Each unit may be rack mounted in a standard EIA-sized rack.

E-V TAPCO
3810 148TH AVENUE N.E.
REDMONT, WA 98052
(206) 883-3510

For additional information circle #114

NEW THREE-WAY STUDIO MONITOR FROM ALTEC

The Model 9813 Studio Monitor is designed for all applications requiring precise frequency response, low distortion and exceptional dynamic range. The three-way monitor incorporates various fruits of Altec research and development, such as the Mantaray® constant directivity horn, Tangerine® radial phase plug, and LTZ (lead-zirconate-titanate) UHF driver. The monitor also employs the Altec automatic Power Control System, which absorbs overloads without turning off the speaker.

With a power rating of 40 watts (continuous pink noise, 20 Hz to 20 kHz)

and frequency response of 60 Hz to 20 kHz within 2.5 dB, the Altec 9813 is said to deliver natural, detailed sound from a space-conserving package (25½ by 15½ by 13½ inches). The system enclosure is crafted of tropical Endriana wood, harvested from special South Pacific island reserves, another Altec first.

ALTEC CORPORATION
1515 S. MANCHESTER
ANAHEIM, CA 92803
(213) 774-2900

For additional information circle #116

SOUND WORKSHOP UNVEILS DISKMIX AUTOMATION SYSTEM

Commenting on the new development, Michael Tapes, Sound Workshop president, stated: "Many studios are faced with the problem of replacing their present consoles due to the lack of storage capabilities inherent in their automation systems. And they are in a quandary because in better economic times, producers were able to work in studios with disk-based systems. Now that money is tight, these producers are turning to smaller rooms with lower rate cards. Though these producers and artists may be happy with the sound and the rates, they are still frustrated with the limitations of tape-based systems.

"So studios are faced with trying to fulfill these creative demands by brute force, or by investing in a new console designed to accomodate mass mix data storage on disk."

"What we saw as the answer to this problem is an add-on system that would interface with any of the major tape-based automation systems. Since we had already developed the system that later became MCI JH-50 Automation — the most widely-used worldwide — we felt right at home introducing the next big step in 'less-than-mega-buck' automation."

The DISKMIX system consists of a rack-mount cabinet housing a proprietary dual-processor computer system, along with dual floppy disk drives. A separate intelligent terminal controls the system.

Interface is provided for a color TV monitor. "The best part of the DISCMIX concept," continued Tapes, "is that the present automation system remains intact and operates with no changes. And interface to the present console system is simple, fast and requires no alterations to the regular automation."

Facilities will be provided for the multiple storage of mixes, off-line merging and editing of individual mixes and the storage of session and console documentation.

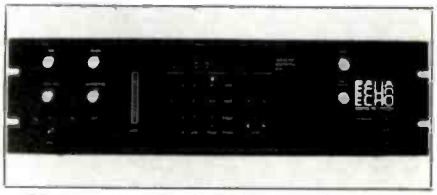
The new DISCMIX system can be seen at the upcoming AES Show in New York.

SOUND WORKSHOP, INC.
1324 MOTOR PARKWAY
HAUPPAUGE, NY 11788
(516) 582-6210

For additional information circle #117

NEW ECHO/DIGITAL EFFECTS UNIT FROM IMAGINEARING AUDIO

The Echo/Digital Recorder is computer-controlled, key-operated, and said to open a new world of capabilities in the studio and on-stage. With the EDR an engineer can select Echo or Reverse Echo (in times from 1.1 milliseconds to 16.777 seconds), Echo Hold, Echo Reverse Hold, Record (up to 16.777 seconds), Playback continuous forward or reverse (without tape), record live Sound-on-sound or Multi-track; all from the EDR keypad or from a remote control.



The optional REM/1 remote keypad control provides keypad control from a remote location up to 100 feet from the unit. With this unique feature the Echo/Digital recorder can be controlled from the stage and/or from the sound mixer during live performances.

IMAGINEARING AUDIO
5558 S.E. INTERNATIONAL WAY
MILWAUKIE, OR 97222
(503) 653-5927

For additional information circle #118

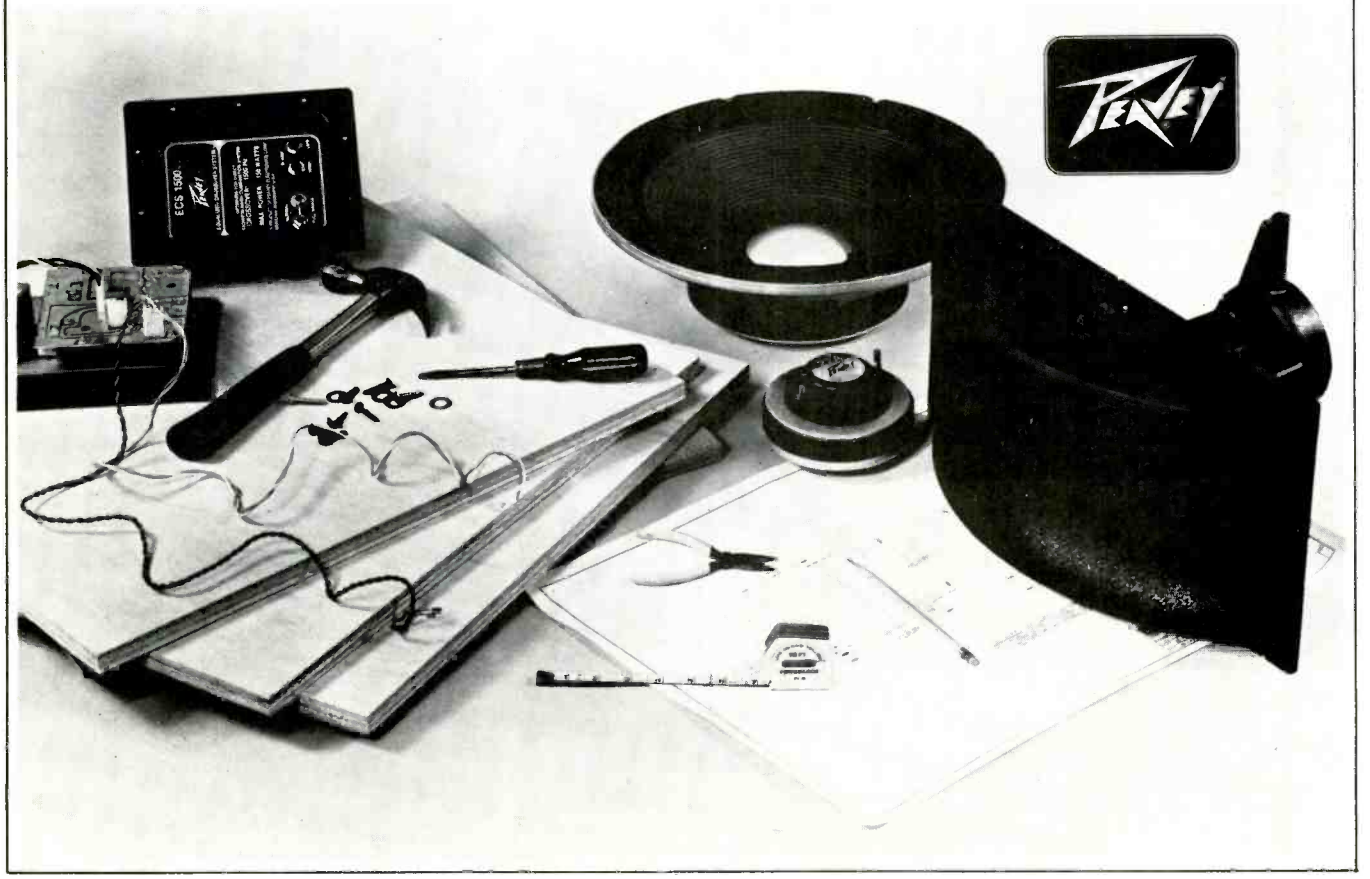
CREATE AN ORIGINAL

A custom designed sound system allows a degree of freedom and a level of performance that is sometimes not possible with a conventional system design. The advantage lies in the ability to match a system to its architectural environment, in terms of mechanical, acoustical, and aesthetic performance.

Peavey now offers a complete line of System Designed Components™ to enable the serious musical craftsman to custom design and build his own sound system enclosures.

Our ECS Series™ of equalized crossover systems, CH Series™ constant directivity horns, 22A™ compression drivers, and Black Widow® Super Structure™ cone type transducers represent state-of-the-art technology, and when mounted in optimally designed enclosures will provide smooth, extended frequency response and extremely high power handling with high system efficiency and reliability.

For all details, write today for a free brochure on our advanced line of System Designed Components™ to Peavey Electronics Corporation, Department P-5, 711 A Street, Meridian, Mississippi 39301.



For additional information circle #119

New Products

RENKUS-HEINZ INTRODUCES TWO CONCERT-SOUND SPEAKER SYSTEMS

The SMS 1582 Stage Monitor and the FRS 1582 Full Range Speaker System both feature the SSH 820 exponential horn, new SSD 3301 2-inch throat high-frequency compression driver, and a 15-inch low-frequency speaker. The systems are compact, carpeted and built to withstand rugged road use. They can be used in passive or bi-amp mode.

RENKUS-HEINZ, INC.
17851AB SKY PARK CIRCLE
IRVINE, CA 92714
(714) 540-3154

For additional information circle #120

ACOUSTILOG ANNOUNCES SPEAKER PROTECTION DEVICE

The POP-110 stereo speaker protector is claimed to solve the problems with previous protectors, namely slow reaction time, signal degradation, and unreliable threshold stability.

The new unit uses a proprietary peak threshold sensing circuit and unique circuitry, with no active components in the signal path until a potentially destructive transient comes along. Then, the POP-110 quickly mutes the send to the monitor amp and resets within 1 second. If the overload continues, the process repeats.

The POP-110, which has a professional user price of $295.00, can be seen at the upcoming New York AES Convention.

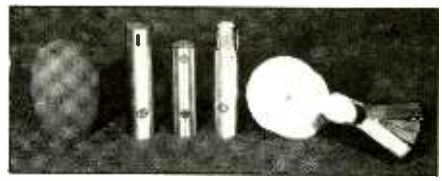
ACOUSTILOG, INC.
19 MERCER STREET
NEW YORK, NY 10013
(212) 925-1365

For additional information circle #122

WRIGHT UNVEILS SR-1 AND TSR-2 CONDENSER MIKES

The SR-1 has a conventional transformer coupled output stage, while the TSR-2 has a solid-state output stage. Both microphones have a 100-ohm output impedance, and the solid-state version 12 dB more gain. A switchable 6/12 dB pad and plug-in battery supply are available as accessory items.

Both microphones are supplied with a windscreen and a unique foam rubber shock mount and holder.



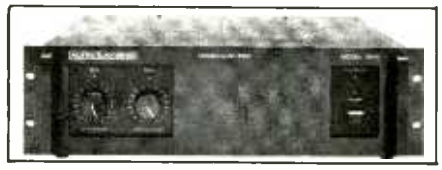
Professional net user price of the SR-1 is $440.00, and the TSR-2 is $600.00.

WRIGHT MICROPHONES
2093 FAULKNER ROAD N.E.
ATLANTA, GA 30324
(404) 321-3886

For additional information circle #123

ALTEC INTRODUCES ADVANCED POWER AMP

The Model 1270 Stereo power amplifier harnesses 800+ watts of "super amp" brute strength to state-of-the-art computer protection circuitry. Two channels may be operated independently or in bridged configuration with less than 0.05% THD, while delivering more than 250 watts into 8-ohm loads, or more than 400 watts per channel into 4 ohms.



The Model 1270 is designed to protect itself and the acoustic elements it drives. Each channel is provided with an error computer that monitors and compares input and output signals, detecting output anomalies such as excessive voltage or current levels, excessive slew rate, etc. Amplifier output is continuously monitored to guard against excessive current drain. An instantaneous VI limiter restricts output to 400 VA for a 45° phase shift.

Protection against excessive operating temperature is offered through logic circuitry that automatically overrides low-speed fan operation, locking fan to high-speed mode until temperature is reduced.

A time delay relay operation protects the load being driven from transients during startup and shutdown. The load is similarly protected from amplifier failure, such as DC voltage at the out-put.

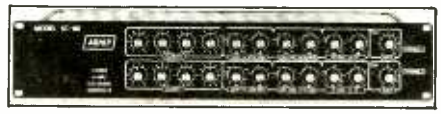
ALTEC CORPORATION
1515 S MANCHESTER
ANAHEIM, CA 92803
(714) 774-2900

For additional information circle #124

SC-88 FOUR-WAY CROSSOVER FROM ASHLY

The newly introduced stereo four-way electronic crossover features inputs and outputs that can be used balanced or unbalanced; peak overload warning lights; continuously variable crossover frequency; and high-current output stages to drive long cable runs.

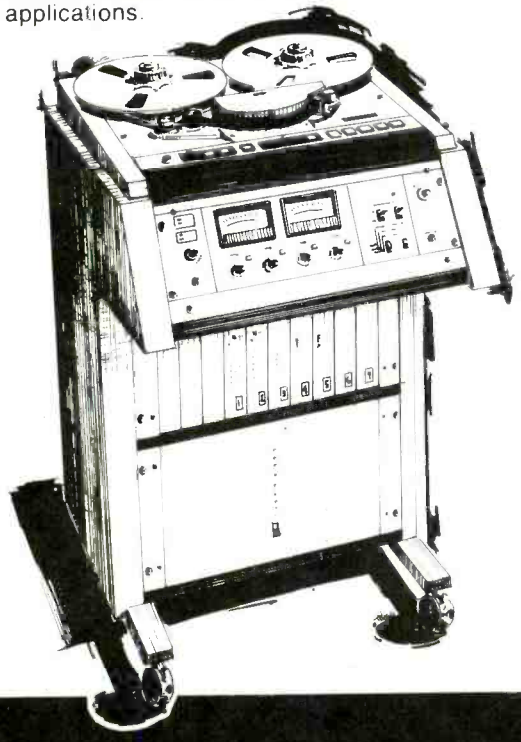
A unique feature is the "roll-off" control, which acts as a band of equalization centered at the crossover point. This allows adjustment for flattest frequency

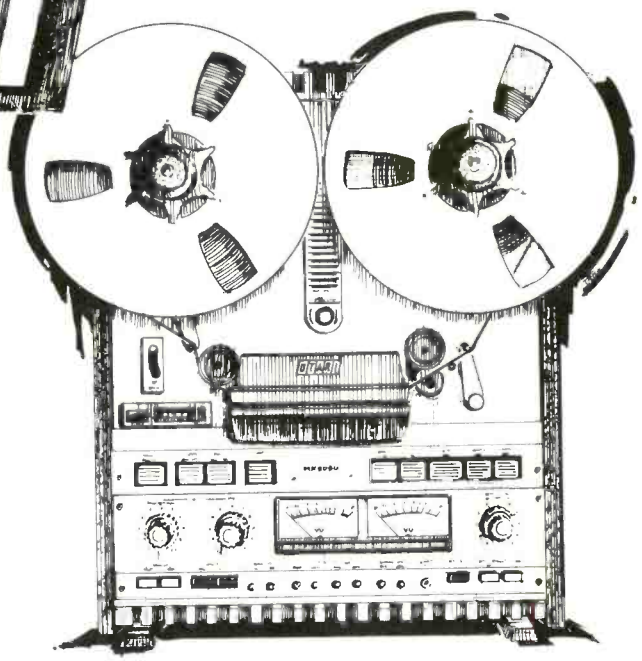


OTARI

MTR-10 Series
Professional Two and Four Channel Production/Mastering Recorders

Offered in two professional formats, ¼" two-channel and ½" four-channel, Otari's MTR-10 Series have been engineered to offer the professional the most advanced features and performance from state-of-the-art electronics and mechanical design. The MTR-10 Series yield a new level of performance for audio and video post-production applications.





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For additional information circle #125

New Products

response in the crossover region. Distortion is less than 0.05%, and noise less than -90 dBV at unity gain.

All Ashly crossovers are housed in a rugged steel 19-inch rack mount enclosure, and are constructed using a plug-in ribbon cable interconnect system to provide excellent reliability and ease of servicing.

ASHLY AUDIO, INC.
100 FERNWOOD AVENUE
ROCHESTER, NY 14621
(716) 544-5191

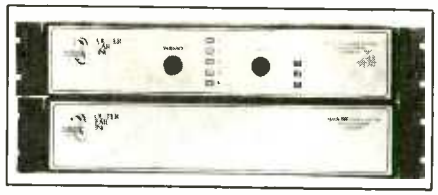
For additional information circle #126

IMAGE RECOVERY SYSTEM UNVEILED BY OUTER EAR INC.

Outer Ear's Image Recovery system is a stereo signal processor designed for use in disk mastering. It is said to "open-up" and spread the stereo image, creating greater width and depth perception. The Master Series subjectively increases high frequency response.

Specifications:

- Input: Switchable, balanced/unbalanced from 600 Ohms to 20 K Ohms
- Output: Active balanced, less than 100 Ohms
- Headroom: 26 dBm balanced, 20 dBm, unweighted
- Signal to Noise: Less than 90 dBm, unweighted
- Distortion: Less than 0.01% (harmonic or intermodulation)
- Frequency Response: DC — 100 kHz, flat within 0.05 dBm
- Unit Dimensions: 3-3/16 inches by 19 inches by 14½ inches
- Weight: 30 pounds.

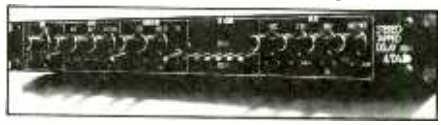


OUTER EAR INC.
P.O. BOX 1566
HOLLYWOOD, CA 90028
(213) 462-8940

For additional information circle #127

STEREO TAPPED DELAY UNIT UNVEILED BY A/DA

The STD-1 is a voltage-controlled analog delay with six taps, which can each be assigned to one of two output channels. Each delay tap is non-harmonically related to the other taps, and when combined is said to simulate natural random doubling and a myraid of chorus effects — without the need for six separate delay lines. The extensive control section for the delay time includes capabilities for mixing fixed delay, slow sweeps, and a higher frequency sweep modulation, to generate a wide variety of special effects.



The regeneration circuit allows for selection of feedback from one of three taps, with variable gain and high-cut to simulate a wide range of acoustic "liveness" and ambiences. All of these features working independently and in conjunction, enable such effects as high flanging, low flanging, chorusing, voice doubling, multi-voice choruses, echo, reverberation, and machine gun reverb — all at full bandwidth and in stereo.

The STD-1 has a delay range of 1.3 to 55 milliseconds, with regeneration decay time up to 20 seconds. The unit occupies one standard rack space, and features an 8-step LED headroom indicator.

A/DA
2316 FOURTH STREET
BERKELEY, CA 94710
(415) 548-1311

For additional information circle #129

K-CHECK CABLE TESTER FROM NEUTRIK

The unit consists of a test finger, battery compartment (containing a 5.6V mercury battery), an LED-display and a female XLR-type connector. Each red LED is keyed to a corresponding contact in the female connector. Connection between the test finger and any contact in the female connector will cause the appropriate red LED to light. Connection between the test finger and the shell (housing) of the female connector (or any connector plugged into it) will cause the green (ground) LED to light. If connection is made to two or more contacts in the female connector, LEDs will light for *each* contact involved.

If a cable does not have a male XLR-type connector, the accessory test lead can be used to make contact between one of the female connector's contacts and the contacts on the cable. This test lead also enables the K-Check to be used as a general-purpose continuity tester. For cables with female XLR-type or ¼-inch phone plugs on both ends, adapters (NAM-8 and NAM-9 respectively) are available for faster testing.

NEUTRIK PRODUCTS
77 SELLECK STREET
STAMFORD, CT 06902
(203) 348-2121

For additional information circle #130

TWO NEW PORTABLE MICRPHONE MIXERS FROM SHURE BROTHERS

Designed primarily for use in studios and remote broadcast setups as a single, complete, compact console, or as an add-on mixer for expanding existing facilities, the M267 provides a wide frequency response, and low noise and distortion. Each of the Unit's four balanced microphone inputs has its own volume control, low-cut filter switch, and line/mic switch. Active gain controls eliminate the need for input attenuators, and each input is wired to provide simplex power for condenser microphones.

. . . *continued overleaf* —

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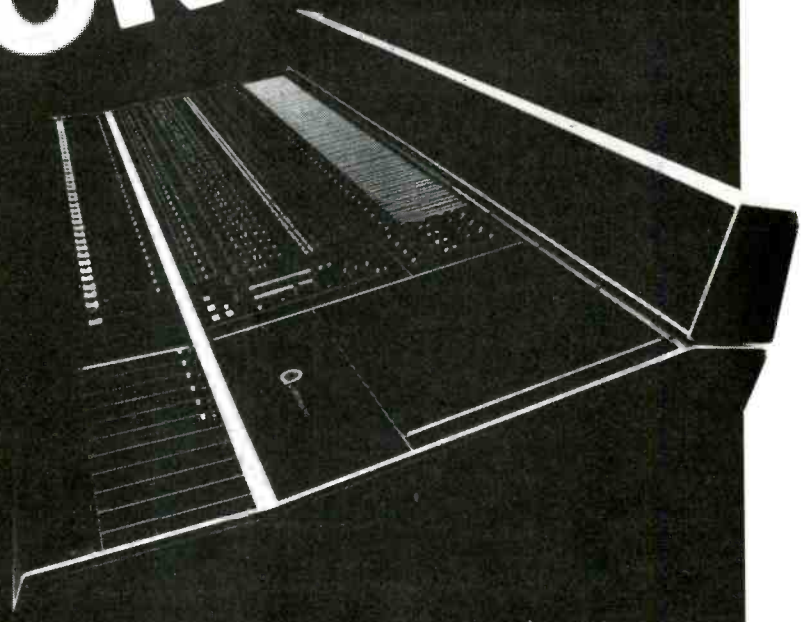
Have you heard our NEW
700 CONSOLE



If you haven't heard it, you're in for an exciting ear-experience!

The Auditronics Engineering Staff has developed a new output circuit which is **exclusively ours*.** Now standard on all 700 Model Consoles, this new circuit gives you transformerless specifications and operation **WITH A TRANSFORMER! Now you can have the quality and transparency of a transformerless circuit** with the total isolation and decoupling of a transformer!

Now, no more distortion and phase shift at the low frequencies, no more problems because your console **cannot** completely decouple from its outboard equipment.

* Patent Applied For

The audible difference is very noticeable in the low frequencies a cleaner, tighter, "beefier" sound, creating unbelievable definition on drums and the percussive instruments.

SPECIFICATIONS ARE (% distortion THD):

20 Hz — .02
30 Hz — .007
50 Hz — .005
100 Hz to 20 KHz — .0045
IM Distortion — .008%

All measurements at +24 dBm output - 600 ohms.

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(901) 362-1350 Telex: 53-3356

New Products

Similar in design to the M267, the M268 mixer is designed for general-purpose use primarily with sound reinforcement, tape recording and audio-visual systems.

Both the M267 and M268 are small, rugged, lightweight units, designed for compact installation or convenient portability. An optional rack mounting is available for both models.

Suggested professional user price of the M267 is $395.00; the M268 is $250.00.

SHURE BROTHERS INC.
222 HARTREY AVENUE
EVANSTON, IL 60204

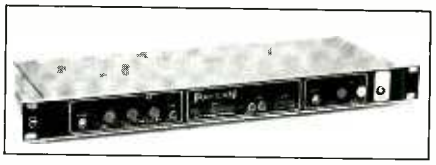
For additional information circle #132

AUDIO & DESIGN LAUNCHES PANSCAN EFFECTS UNIT

Utilising either a stereo (two-channel) or mono input and, a stereo (two-channel) output, the Panscan will pan the audio image at varying speeds from a very slow soft shift effect to an ultra fast "stereo vibrato" effect. Audio & Design have developed a pan control circuit that cures the 6 dB loss as the two channels pan across the center — a serious problem with some of the other pan effects units on the market.

In AUTO mode the Panscan pans continously; in the TRIGGER mode panning can be triggered either manually by the front-panel pushbutton, or by the unique ADR "beat count" circuitry. This senses and counts the beat transients direct from either the input signal, or from a secondary key signal from an external source. The count is displayed by a 10-element bar graph.

At any time during a pan the audio image may be held by an "image freeze" switch. When released, the pan will continue in its original pattern.

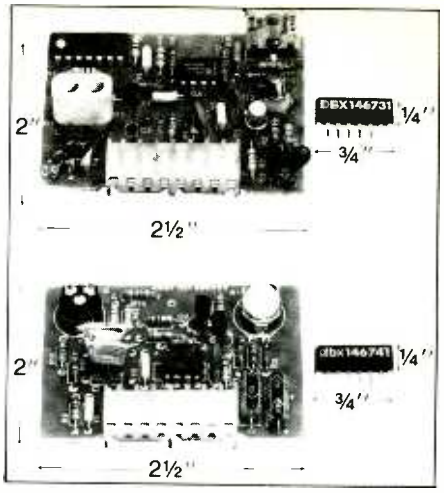


Additional controls include a variable "image width" and "image center offset."

The new unit can be seen at the forthcoming New York AES Show.

AUDIO & DESIGN
RECORDING, INC.
P.O. BOX 786
BREMERTON, WA 98310
(206) 275-5009

For additional information circle #133



dbx NOISE REDUCTION DECODE CHIPS ANNOUNCED

Two 0.1-inch thick chips which measure 0.75- by 0.2-inch have been introduced to replace the discrete circuitry for the voltage-controlled amplifier (top photo) and RMS detector, which comprise the system. Each of the wired units measures 2½- by 2- by 0.9-inch.

According to dbx executive vice president, Zaki Abdun-Nabi, the availability of the integrated circuit will profoundly affect the company's recently instituted licensing program which represents a growth area for dbx. "The extraordinary noise reduction capability combined with disk decode capability, at a lower licensing cost than Dolby, has already attracted a number of Japanese

New Products

cassette deck manufacturers," he said.

"The development now of an integrated circuit which not only provides improved performance at reduced cost, but also decodes dbx disks, is a great advantage. Up to the present time," explained Mr. Abdun-Nabi, "dbx licensees have been working with discrete circuitry. The new chips will cut present licensee manufacturing costs. The reduced cost is also expected to attract other manufacturers."

dbx, INC.
71 CHAPEL STREET
NEWTON, MA 02195
(619) 964-3210

For additional information circle #136

JBL MODEL 2421 HIGH FREQUENCY COMPRESSION DRIVER

The new one-inch throat high-frequency compression driver, designed with the benefit of laser holography, features a diaphragm that incorporates JBL's patented three-dimensional diamond-surround technology, first featured in the 2441 driver.

Offering exceptionally high power capacity, wide dynamic range and flat response, the 2421 is said to be ideal for sound reinforcement systems and custom studio monitors. For maximum flexibility in system design, the unit is offered in two impedance ratings: the 2421A at 8 ohms, and the 2421B at 16 ohms. Both drivers

have a power capacity of 60 W continuous program at 800 Hz, 12 dB per octave slope, and 100 W continuous program at 1.6 kHz or higher, 18 dB per octave slope.

Sensitivity is a quoted 110 dB 1 W, 1 meter, and frequency range 800 Hz to 20 kHz. The Model 242 measures 5¾-inches in diameter, 3⅞-inches deep, and weighs 11 pounds.

JAMES B. LANSING SOUND, INC.
8500 BALBOA BLVD.
NORTHRIDGE, CA 91329
(213) 893-8411

For additional information circle #137

TANNOY ANNOUNCES M2000 BUCKINGHAM MONITOR

The massively constructed, ported cabinet houses a three-way speaker system: high- and mid-frequencies are handled by a dual concentric unit, for enhanced stereo imagery, while two 12-inch drivers are said to produce outstanding bass performance.

Hot voice coil technology, critical design parameters, and only the finest quality components enable the Buckingham Monitor to handle peak power inputs of up to 1000W, which is capable of producing peak SPL at 1 metre of 124 dB.

The Buckingham Monitor can be operated as either a passive or active (bi-amped) system. When used passively the in-built crossover switches provide individual control over four frequency bands from 150 Hz to 20 kHz, offering flexible response adjustment.

For optimum performance the unit can be quickly converted to bi-amped operation, thanks to an easy-change connection panel that has been designed for use in either the active or passive mode.

The Tannoy XO5000 external crossover is available for bi-amping, offering additional features of time delay compensation and parametric equalisation.

TANNOY PRODUCTS LIMITED
P.O. BOX 220
SLOUGH SL2 3XA
ENGLAND
02813-86493
or in the U.S.,
BGW SYSTEMS, INC.
13130 S YUCON AVENUE
HAWTHORNE, CA 90250
(213) 973-8090

For additional information circle #138

FOSTEX ANNOUNCES MODEL 3050 DIGITAL DELAY

Delay or echo time is selectable in 10 steps from 0.13 to 270 milliseconds. Modulation width can be adjusted to a maximum ratio of 1:4, providing excellent flanging/chorus effects and double tracking.

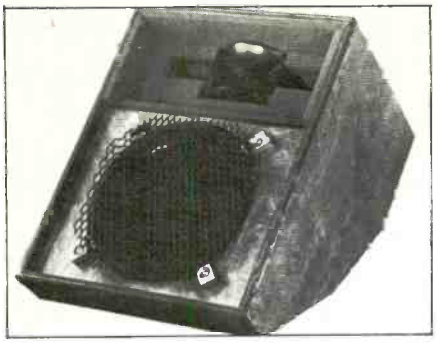
Modulation can be externally controlled by feeding a control signal into the "external" jack.

The 3050 has separate output level controls for both "dry" signal (unaffected sound) and the effect, so they can be adjusted for the optimum output blend. LED indicators on the Fostex 3050 indicate signal present, normal and limit.

Suggested retail price: $450.00.

FOSTEX CORP. OF AMERICA
15431 BLACKBURN AVENUE
NORWALK, CA 90650
(213) 921-1112

For additional information circle #139



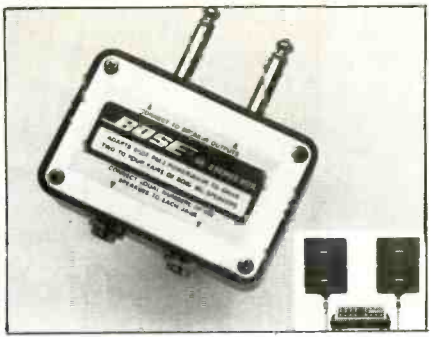
MODULAR SOUND SYSTEMS TA-12 COMPACT FLOOR MONITOR

Highly intelligible reproduction is said to make the TA-12 well suited for many applications ranging from rock and roll to speech or acoustical instrument reinforcement. The system utilizes an E-12 Bag End™ 12-inch loudspeaker, and an Electro-Voice ST350B tweeter in a specially designed crossover network, with solid-state tweeter protection.

Units are available in two versions: the TA-12A utility enclosure with a black finish (professional user price: $395); or the TA-12B Bag End™ enclosure featuring dark brown oiled Finland Birch plywood ($495).

MODULAR SOUND SYSTEMS, INC.
P.O. BOX 488
BARRINGTON, IL 60010
(312) 382-4550

For additional information circle #141



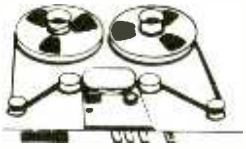
BOSE ENHANCES CAPABILITY OF MODEL PM-2 POWERMIXER

The Model SB-2 Series Box is a simple, low-cost way for PM-2 Powermixer users to obtain the extra projection and bass response of stacked pairs of Bose 802 Loudspeakers. The unit plugs directly into the output jacks of the PM-2, and alllows impedance-corrected connection of two to four pairs of 802 speakers without the need for any additional amplifier power.

Suggested retail price: $38.00.

BOSE CORPORATION
100 THE MOUNTAIN ROAD
FRAMINGHAM, MA 01701
(617) 879-7330

For additional information circle #142



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STUDIO UPDATE

Northeast:

☐ **PRESENCE STUDIOS** (West Haven, Ct.) has upgraded to 16-track with an XEDIT 16R recorder with dbx. Monitors are JBL 4311's, Cizek Model II's with MG-27 sub-woofers, and Auratones, powered by Crown D 150 and Hafler DH-200 amps. Outboard effects include Ecoplate reverb, Lexicon Prime Time DDL, dbx compressors and noise-gates, a Sound Workshop 262 and EXR Exciter. **Jon Russell** is the owner/chief engineer, and **Bill Murphy** the staff producer/engineer. *17 Enfield St., West Haven, CT 06516. (203) 397-8682.*

☐ **VALLEY RECORDERS** (Red Hook, N.Y.) has opened a new 16-track facility featuring an APSI 26/24 console and an Ampex MM-1100 multitrack. **William C. Brafford** supervised the control room modifications; **James Barker** is studio manager. *12 Saint John Street, Red Hook, NY 12571. (914) 758-5167.*

☐ **SORCERER SOUND** (NYC) has added three more Kepex II's, two Gain Brain II's, two Pultec Equalizers, a clavinet, a Mesa Boogie amp, and a Prophet V synthesizer to its list of hardware. *19 Mercer St., New York, NY 10013. (212) 925-1365.*

— *NORTHEAST ACTIVITY* —

SIGMA SOUND STUDIOS (Philadelphia, Pa.) **Gamble and Huff** have finished albums for **Teddy Pendergrass** and **Patti LaBelle,** Sigma's president **Joe Tarsia** engineering. **The Jones Girls** are recording with producer **Dexter Wansel** and engineer **Peter Humphreys.** Producers **McFadden** and **Whitehead** have finished **Melba Moor's** EMI release with engineer **Dirk Devlin,** and **Instant Funk** completed a single produced by **Bunny Sigler** and engineered by **Arthur Stoppe.** *212 North Twelfth St., Philadelphia, PA 19107. (215) 561-3660.* ■ **BLUE ROCK RECORDING STUDIO** (NYC) finds **Rupert Holmes** producing his new album with **Bill Stein** engineering. **Garland Jeffreys** is recording a live LP, produced by **Dick Wingate** and **Bob Clearmountain,** assisted by **Michael Ewasko. The Swollen Monkeys** are doing an album with producer **Hal Wilner** and engineer **Vince McGarrie,** while **Helen Keane** is producing **Joni Shirra** with **Dave Matthews** arranging. *New York, NY.* ■ **KAJEM RECORDING STUDIOS** (Gladwyne, Pa.) is doing overdubs on **The Pedestrians'** album, co-produced by the band with engineers **Joe Alexander** and **Dave Connor.** Vocal overdubs are proceeding for **Janis McClain's** second album, with **Milton Tenant** producing and **Mitch Goldfarb** engineering. *1400 Mill Creek Rd., Gladwyne, PA 19035. (215) 649-3813.* ■ At **TROD NOSSEL RECORDING STUDIOS** (Wallingford, Ct.) **Plan 9** are recording an EP for Bomp; **Margaret Thatcher and The Supply Side** is cutting a self-produced EP; and **The Shwiffs,** have been mixing an album. *10 George St., Wallingford, CT 06492. (203) 265-0010.* ■ **UNIQUE RECORDING STUDIO** (NYC) has seen producer **Tommy Cappello** and **Richie Havens** recording Cappello's composition, "A Part Of You," for a film. Also **J. Silver** has completed their single with **Bobby Nathan** engineering. *701 Seventh Ave., New York, NY 10036. (212) 398-0574.* ■ **RBY RECORDING STUDIO** (Southbury, Ct.) reports **Whatever Music** finishing an EP. Also, a film score for *Get Out Alive,* produced by The Hartford Fire Insurance Company, has been completed by composer/arranger **Bill Horwitz.** *RD 1 Main St., Southbury, CT 06488. (203) 264-3666.* ■ At **BAYSIDE SOUND STUDIOS** (Bayside, N.Y.) producer **Jimmy Miller** completed **The Hero's** first single; producer/writer **Elliot Chiprut** is working on new projects; and **Johnny Thunders** producing a single by **The Knots.** All the sessions were engineered by studio manager **David Eng.** *Box 129, Bayside, NY 11361. (212) 225-4292.* ■ **AURA SONIC REMOTE RECORDING** (Flushing, N.Y.) mixed the live performance tapes for an EP by **Marilyn and the Movie Stars** at The Sound Works. Remote is also producing/engineering two other EP's for Square Mode Records: one by **The Remote Men;** and a disk with five songs by various artists. *140-02 Poplar Ave., Flushing, NY 11355. (212) 886-6500.* ■ **THE RECORDING CENTER** (Norwalk, Ct.) in conjunction with Rob Carlson Creative Services, has produced a jingle for the state of Rhode Island. *Norwalk, CT. (203) 853-3433.* ■ At

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STUDIO UPDATE

SORCERER SOUND (NYC) **Steve D'Acquisito** has booked all the full moons for the upcoming year for his music projects with **Albert Basslin** and **Christian Genest**. **Tony Digradi** has been mixing his Gramavision album, *Lunar Eclipse*, with **Alec Head** engineering, and **Joe "King" Carasco and the Crowns** in from Texas remixing their latest with **Tony Ferguson** producing. *19 Mercer St., New York, NY 10013. (212) 925-1365.* ■ **BERNARD FOX RECORDING** (NYC) supplied remote facilities for **Earthling's** appearances at The Underground and Peppermint Lounge; **Bernard Fox** engineered for the Japanese band. Other remotes included dates by **Richie Havens** at The Savoy for producer **David Platner**. Mixing for videodisk release will begin this fall at the Fox Studios. *928 Broadway, New York, NY 10010. (212) 228-4740.* ■ At **GREENE STREET RECORDING** (NYC) **Rhyze** is completing an LP for 20th Century with producers **Paul Kyser** and **Raymond Esponosi**, and engineer **Roddy Hue** assisted by **Frank Scilingo**. Also in the studio, **Baird Hersey** is producing the new act **FX** for Bent; engineering by **Jim Jordon, Joe Arnold** and **Amy Mitrani**. *112 Greene St., NYC, NY 10012. (212) 226-4278.* ■ At **SIGMA SOUND STUDIOS** (NYC) **Jimmy Simpson** and engineer **John Potoker** remixed **Miles Davis'** recordings of "Shout" and "Man with a Horn" for CBS, while **John Loungo** and engineer **Jay Mark** are overdubing/mixing the single "Zulu," by **The Quick**. Also in is **Revelation**, doing two songs for Handshake, with producers **Dunn Pearson** and **Bruce Gray**; engineers **Michael Hutchinson** and **Jim Dougherty**. *1697 Broadway, N.Y., NY 10019. (212) 582-5055.*

Southeast:

☐ **CRITERIA RECORDING STUDIOS** (Miami, Fl.) has installed a new MCI JH-532LM transformerless console with JH-50 automation in Studio C. *1755 NE 149th St., Miami, FL 33181. (305) 947-5611.*

☐ **MORRISOUND RECORDING** (Tampa, Fl.) has opened a new 24-track studio, featuring a Sound Workshop Series 30 console with VCA sub-grouping, interfaced with an Otari MTR-90 24-track recorder and UREI monitors. Instruments include a Yamaha grand piano, Hammond organ, Fender Rhodes, and Wurlitzer electric piano. A mobile unit is also offered, equipped with an Otari 8-track machine fed by a 24-in/8-out console. The studio is owned and operated by **Tom, Laurel**, and **Tim Morris**. *5120 North Florida Ave., Tampa, FL 33603. (813) 238-0226.*

— *SOUTHEAST ACTIVITY* —

OMEGA RECORDING STUDIOS (Washington, D.C.), in conjunction with the JVC Cutting Center of Los Angeles, has completed the first in-studio digital recording in the nation's capitol, using a JVC DAS Series 90 System. Omega president **Bob Yesbeck** engineered the album for **Tim Eyermann and the East Coast Offering**. **Larry Boden** of the JVC Cutting Center handled digital editing and mastering. *10518 Connecticut Av., Kensington, MD 20795. (301) 946-4686.* ■ At **REFLECTION SOUND STUDIOS** (Charlotte, N.C.) **Ted Daryll** is producing **Rick Bowles** for Polygram, with engineering by **Ron Carran** and **Steve Haigler**, while **Eric Aucoin** is producing the **PTL Family Album** for PTL Records, **Bob Whyley** engineering. **Mark Williams** completed mixes for **Sugarcreek's** live LP on Beaver, and producer **Loonis McGlohon** is doing tracks with **Eileen Farrell** engineered by **David Floyd**. *1018 Central Ave., Charlotte, NC 28204. (704) 377-4596.* ■ **BEE JAY RECORDING STUDIOS** (Orlando, Fl.) is recording **Doc Holliday's** A&M album engineered by staffer **Andy de Ganahl** assisted by **Dana Cornock**, and produced by **Tom Allom**. **Carolina** finished three tunes for CBS, produced by band member **Jon Phelps**. *5000 Eggleston Ave., Orlando, FL 32810. (305) 293-1781.* ■ At **CRITERIA RECORDING STUDIOS** (Miami, Fl.) **Fire Flight** is recording an LP with **Carl Beaver** producing, and **Bruce Hensal** engineering. Also,

STUDIO UPDATE

Rigg is doing an album for Full Moon/Warner; **Andy Johns** and **Marty Cohen** producing. *1755 NE 149th St., Miami, FL 33181. (305) 947-5611.* ■ **TRIIAD RECORDING STUDIOS** (Ft. Lauderdale, Fl.) is recording an album by **Truc of America**, a rock comedy show band; engineering by **Michael Laskow, Vincent Oliveri,** and **Robert Corti**. Also, singer/songwiter **Marc Levy** is adding strings to new material, and **The Crystal Caine Band** is finishing vocal work on their LP. *5075 NE Thirteenth Ave., Ft. Lauderdale, FL 33334. (305) 771-1431.* ■ At **ALPHA RECORDING STUDIOS** (Richmond, Va.) **Single Bullet Theory** are recording for Mad Dog Productions. *Richmond, VA.* ■ **STRAWBERRY JAMM** (West Columbia, S.C.) reports **Johnny Hilton, Rob Crosby,** and **Steve White** wrapping production on "Paper Mill Blues." Also, Prescoop Productions' **John Presley** and **Ricky Cooper** completed mixdown of a music bed of their compositions for live accompaniment on the *Job Man Caravan. 3964 Apian Way, West Columbia, SC 29169. (803) 356-4540.*

South Central:

☐ **MUSIC CITY MUSIC HALL** (Nashville) took delivery of a new Studer A-80VU MK III 24-track recorder and a Studer A-80VU half-inch, two-track unit. Both machines feature transformerless amplifiers. *25 Music Square East, Nashville, TN 37203. (615) 244-1060.*

☐ **SHOE PRODUCTIONS** (Memphis, Tn.) has updated its Studio B with a new Otari MTR-90 24-track recorder and an M-24 Dolby rack. *485 North Hollywood, P.O. Box 12025, Memphis, TN 38112. (901) 458-4496.*

☐ **DEL SOL RECORDING STUDIO** (Alice, Tex.) is a new 16-track recording facility featuring a TEAC Tascam 85-16 multitrack interfaced with a Tascam 16-/8-out Model 15 console. Monitors are by JBL powered by Crown amps, while signal processing gear includes units by UREI, Delta Lab, and Orban. Studio design and installation were handled by **ASI Pro Audio** of San Antonio, Texas. *1401 South Reynolds, Alice, TX 78332. (512) 664-0224.*

☐ **WOODLAND SOUND STUDIOS** (Nashville) has aquired a Studer half-inch two-track recorder for mixdown. The studio's mastering department installed half-inch, two-track machines recently, and mastered the latest recordings by **Jimmy Buffett, Tammy Wynette,** and **Ronnie Milsap**. *Nashville, TN.*

— *SOUTHCENTRAL ACTIVITY* —

REELSOUND RECORDING COMPANY (Manchaca, Texas) has completed location dates of two concerts with **Ted Nugent; Dancer McCullough** was producing with **Malcom H. Harper, Jr.** engineering. The mobile unit was also present for live work produced by **Al Kooper, Chet Hanson,** and **Joe Ely** for Free Flow Productions at The Tornado Jam; **Bob Edwards** engineered. *P.O. Box 280, Manchaca, TX 78652. (512) 472-3325.* ■ At **MUSCLE SHOALS SOUND STUDIOS** (Sheffield, Alabama) **Glenn Frey** is working on a solo album with engineer **Steve Melton** assisted by **Mary Beth McLemore,** while **Barry Beckett** is wrapping up **Delbert McClinton's** album for MSS/Capitol with **Greg Hamm** and McLemore at the board, assisted by **Peter Greene**. Also, **Jimmy Johnson** and Beckett are overdubbing/mixing **Levon Helm's** MSS/Capitol project. *1000 Alabama Avenue, P.O. Box 915, Sheffield, AL 35660. (205) 381-2060.* ■ **SHOE PRODUCTIONS** (Memphis, Tennessee) has completed **Debra DeJean's** debut album on Handshake, co-produced and engineered by **Carl Marsh** and Bo **Bohannon,** as well as a project by **The Minglewood Band** for RCA Canada, produced by **Donald "Duck"**. Also, **Kilo,** is working on an album with **Andy Black** engineering the self-produced project. *485 North Hollywood, P.O. Box 12025, Memphis, TN 38112. (901) 458-4496.* ■ **SOUND EMPORIUM STUDIOS** (Nashville) has seen **Nancy Brooks** laying down tracks to songs co-produced by drummer

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STUDIO UPDATE

Clyde Brooks and **Ralph Childs** of Ambient Productions; **Howard Steele** engineering. **Larry Butler** and engineer **Billy Sherrill** recorded **Diane Pfeifer** for an upcoming EMI/Capitol project. Also, **The Joe English Band** has been laying tracks with producer English and **John Rosasco**; **David Henson** mixed the sessions. *3312 Long Boulevard, Nashville, TN 37203. (615) 269-5289.* ■ At **MUSIC CITY MUSIC HALL** (Nashville) **Jim Stafford, Rex Allen,** and **Sue Powell** are cutting tracks for the syndicated TV series *Nashville on the Road,* with **Jerry Whitehurst** producing and **Bill Harris** engineering, while **R.C. Bannon** and **Louise Mandrell** are finishing up their first album for RCA with producer **Tom Collins**. Also, **Loretta Lynn** is cutting a new MCA album with producer **Owen Bradley** and engineer **Bill Vandevort**. *25 Music Square East, Nashville, TN 37203. (515) 244-1060.* ■ **DIGITAL SERVICES/RECORDING** (Houston, Texas) reports handling the first digitally-recorded pop/rock album made in Texas. Live dates by **Dr. Rockit and the Sisters of Mercy** were recorded at Rockefeller's in that city. The live mix on the Sony PCM—1610 digital processor was handled by **John Moran**, assisted by **Chuck Fitzpatrick**. *1001 River Oaks Bank Tower, 2001 Kirby Drive, Houston, TX 77019. (713) 520-0201.*

Midwest:

☐ **T.J. SOUND PRODUCTIONS** (Warren, Michigan) has opened a new 8-track studio with equipment including a TEAC Tascam 80-8 recorder, Tascam M-35 console, dbx noise reduction and compression, UREI equalizer, and mikes by Shure, Sennheiser, and Audio Technica. *27040 Ryan Road, Warren, MI 48092.*

☐ **UNIVERSAL RECORDING CORPORATION** (Chicago, Illinois) reports that September 30 marks the 20th anniversary of studio president **Murray Allen's** affiliation with the company. The operation currently features a SMPTE interlocked video sweetening room and full video productionn capability in Studio A, as well as a 3M 32-track digital mastering system interfaced with a Neve NECAM mixing console. *46 East Walton Street, Chicago, IL 60611. (312) 642-6465.*

☐ **FIRE IN THE LAKES** (Minneapolis, Minnesota) has relocated to a new 8-track studio which will feature a Neotek Series I console feeding an Otari MX-7800 one-inch recorder. Other hardware will include an Otari MX-5050B, Altec and JBL monitors, mikes by AKG, Shure, Electro-Voice, and Beyer, and a full complement of ancillary equipment. Completion is scheduled for the first of the coming year. *2301 East Hennepin Avenue, Minneapolis, MN 55413. (612) 331-4650.*

— *MIDWEST ACTIVITY* —

CHICAGO RECORDING (Chicago, Illinois) is finishing up sessions for soul singer **Barbara Acklin** for her Chi-Sound single produced by **Gene Chandler** and **Willie Henderson,** engineered by **Phil Bonanno**. Also using the facility was the Christian hard-rock group, **The Ressurection Band,** recording for Light Records, while **Nathan-Coates** tracked their album *Heartbeat*, with **Andy Watermann** producing/engineering. *528 North Michigan, Chicago, IL 60611. (312) 822-9333.* ■ **UNIVERSITY RECORDING** (Columbus, Ohio) is recording **The Rich Kids, John Lyon, The Motorboats Venture, The Bombadairers, Mad Max, Axis,** and **Melvin McGary**. All the dates engineered by **David Sheward,** with **Tom Howard** assisting. *1896 North High Street, Columbus, OH 43210. (614) 291-7800.* ■ **THE RECORDING CONNECTION** (Beachwood, Ohio) is recordin tracks for **Carol Hensel's** *Dancersize* album, with producers **Roger Hatfield** and **Joey Porello,** and **Dale Peters** engineering. **Jonah Koslen** is recording for an album project, and **Scott Read** finished his latest album with producer **Arnie Rosenberg**. The Connection's Roadmaster II 24-track mobile will be handl ng **Billy Squire's** appearance at the Santa Monica Civic for *The Source*. The truck will then go to The Blossom Music Center to record the **Michael Stanley Band** and **Donnie Iris,** and a live broadcast Halloween concert with **The Moody Blues,** also for *The Source*. *23330 Commerce Park Road, Beachwood, OH 44122. (216) 464-4141.*

— *MOUNTAIN ACTIVITY* —

BONNEVILLE PRODUCTIONS (Salt Lake City, Utah) Music Studio "C" has been booking by **Brian Chatter** for his album with producer **Shel Talmy,** while **Phil Davis** is producing the next release by **Sonja Eddings,** engineered by **Jeff Ostler. Mike Mclean completed producing a new project with Judd Maher** for Bonneville Records, while mixing was completed for the score of the TV special, *Mr. Kruger's Christmas. Salt Lake City, Utah.* ■ **COMMERCIAL SOUND STUDIO** (Las Vegas, Nevada) finds **Diana Ross** producing her album with engineer **Scott Spain**. The studio is also recording **The Fifth Dimension** with **Tony Camillo** producing for Venture Productions, **Barney Perkins** engineering. **Paul Anka** has done pre-recorded tracks for his world tour, **Bob Lentini** engineering. *2010 East Charleston Boulevard, Las Vegas, NV 89104 (702) 384-1212.*

STUDIO UPDATE

Southern California:

☐ **CONWAY RECORDING STUDIO** (Hollywood) aquired a 24-track Studer A-80-MK III, and a pair of A-80 half-inch, two-track machines. Other additions include EMT 250 reverb and 24 channels of Dolby in a TTM mainframe. *655 North Saint Andrews Place, Hollywood, CA 90004. (213) 463-2175.*

☐ **HERITAGE STUDIOS**(Los Angeles) has updated by adding an AMEK 2000 Series 2500 36-in/24-out automated console. The board features four-band parametric EQ on each input channel, as announced by studio manager, **Murry Wecht**. *1209 North Western Avenue, Los Angeles, CA 90029. (213) 466-3244.*

☐ **INTERNATIONAL AUTOMATED MEDIA** (Irivine) named **Paul Freeman**, who previously owned Overland Studios, to a production and engineering position. Current activities include in-studio work with vocalists, **Lisa Mareno** and gospel artist, **Jayn Porter**. *17422 Murphy Ave, Irvine, CA 92714. (714) 751-2015.*

☐ **GARDEN RAKE STUDIO** (San Fernando Valley), owned by producer **Jay Graydon**, has been completed, and features an MCI console with automation, linked to an MCI JH-114 24-track machine. Designed by **Gary Starr** and constructed by **Rudi Breuer**, it features a live echo chamber. Outboard hardware comprises units by Yamaha, Lexicon, Eventide, dbx and UREI.

— *SOUTHERN CALIFORNIA ACTIVITY* —

WESTLAKE AUDIO (Los Angeles) reports **Dave Mason** is doing overdubs and mixes for a video and radio program, **Neil Marshall** producing and **Michael Braustein** engineering assisted by Ed **Cherney**, while **Madeline Kane** is doing overdubs and mixes with producer **Georgio Moroder** and engineer **Brian Reeves**. Recording is **James Ingram**, doing a solo album for Warners, with producer **Quincy Jones** and engineer **Bruce Swedien**; and **Randy Goodrum**, doing tracks with **Elliott Shiner** producing/engineering. *7265 Santa Monica Boulevard, Los Angeles, CA 90046. (213) 851-9800.* ■ **THE PASHA MUSIC HOUSE** (Hollywood) reports **The Plimsouls** are recording tracks with producer **Jeffry Rich**, while **Carmine Appice** and **Larry Brown** are co-producing **Rod Stewart** sessions. Brown is engineer with producer **Spencer Proffer** editing single selections from **Billy Thorpe's** Pasha Records LP, *Stimulation*, while **Randy Bishop** is producing tracks for his first Pasha release, *Dangerous*, with engineer **Duane Baron**. *5615 Melrose Avenue, Hollywood, CA 90038. (213) 466-3507.* ■ **RUSK SOUND STUDIOS** (Hollywood) is recording/mixing a project for Atlantic artist **Stevie Woods** produced by **Jack White**, engineered by **Juergen Koppers** and **David Clark**. ■ At **GROUP IV RECORDING** (Hollywood) **Norman Granz** is producing a **Count Basie** album for Pablo using 3M's Digital System, engineering by **Dennis Sands**. Other activity includes **Basil Poledouris** soundtrack scoring for the film *Fire on the Mountain*, with Sands engineering. Also, **Paul Aronoff** and **Greg Orloff** are mixing for George Englund's film *My Strange Uncle. 1541 North Wilcox, Hollywood, CA 90028. (213) 466-6444.* ■ **ARTISAN SOUND RECORDERS** (Hollywood) finds **Greg Fulginiti** mastering for Electra's **Eddie Rabbitt** with **David Malloy** producing; for **Steve Martin** and Warner's with **Bill McEuen** producing; and for **Sarah Vaughn** and **Count Basie**, and **Milt Jackson** with producer **Eric Miller** for Pablo. Singles were cut for **Pat Benatar** and **Rick Springfield** with producer **Keith Olsen**, and **REO Speedwagon** with producer **Kevin Beamish**. *1600 North Wilcox Avenue, Hollywood, CA 90028. (213) 843-8096.* ■ **MAMA JO'S RECORDING STUDIO** (North Hollywood) is recording **Richie Furay's** LP with **David Diggs** co-producing with the artist; **Jack Puig** is engineering, **Gene Meros assisting**. Puig is also mixing **Amy Grant's** live LP

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STUDIO UPDATE

produced by **Brown Bannister** with **Michael Blanton**. *8321 Lankershim Boulevard, North Hollywood, CA 91605. (213) 982-0305.* ■ **SKYLIGHT EXCHANGE** (Granada Hills, California) reports producer **Steven Richardson** has signed to produce the score for David Fortney's film, *Maya;* recording sessions will take place at Skylight. Also, singer/song writer **Grey Singing Horse** is finishing tracks for his LP. In addition, **Tuppelo** is recording/mixing four tunes with producer **Bill Marin**. *P.O. Box 3173, Granada Hills, CA 91344. (213) 363-8151.* ■ **KENDON RECORDERS** (Burbank) finds producer **Leon Sylvers** supervising overdubs and mixing **The Sylvers** for Solar, with engineer **Jim Shifflett** in Studio 2; **Steve Hodge** is mixing in Studio 1. Also in is **Johnny "Guitar" Watson** and producer **Michael Zager** to record tracks for A&M with staffers **Mallory Earl** and **Bob Winard** in Studio D. Producer **McKinley Jackson** has mixed **The Jones Girls** for Philadelphia International, with **Barney Perkins** and **Mack Sackett** handling engineering. *619 South Glenwood Place, Burbank, CA 91506.* ■ **REALIFE PRODUCTIONS** (Agoura) finds producer **Bill Cumo** tracking for **Rue Morgan,** while Screen Gems artist **Jack Conrad** is working on a single with engineer **Bruce Jackson** engineering. **The Wheels,** is also using Realife under Jackson's guidance. *P.O. Box 356, Agoura, Ca 91301. (213) 889-1318.* ■ **SOUNDCASTLE RECORDING** (Los Angeles) **Kasim Sulton** is doing overdubs for a solo album on EMI America; **Bruce Fairbairn** producing with engineers **Joe Chiccarelli** and **Mitch Gibson. Poco** is finishing their latest LP for MCA, with **John Mills** at the console and **David Marquette** assisting. **Weather Report** is also in, overdubing/mixing for a CBS album, with **Joe Zawinul** producing and **Brian Risner** engineering. *2840 Rowena Avenue, Los Angeles, CA 90039. (213) 665-5201.* ■ **SALTY DOG RECORDING** (Van Nuys) reports **The Crusaders,** in doing overdubs with **Joe Cocker,** engineered by **Galen Senogles. Bill Motley** is producing the second **Boys Town Gang** album with **David Coe** engineering. Also in is **Bill Champlin** doing overdubs for his project with **Gerry Lentz** engineering, and M.I.I. Inc. producing **Hero's** album sessions. *14511 Delano, Van Nuys, CA 91411. (213) 994-9973.* ■ **DIRK DALTON RECORDERS** (Santa Monica) is recording **Jimmy Photoglo's** 20th Century LP, *Fool In Love With You,* with producer **Brian Neary** and engineer **Dirk Dalton. Barry Manilow** is producing his next album with Dalton engineering. Also booking time is **David Shire** for Columbia Pictures. *3015 Ocean Park Boulevard, Santa Monica, CA 90405. (213) 450-2288.* ■ **MYSTIC SOUND SERVICES** (Hollywood) finds **The Sheiks of Shake** in doing a 45, while **Ysef Rahmen** is producing sessions with **Bill Streitfield,** and **Beverly Gardner** is working on a gospel project. **Wasted Youth** finished their LP in the studio, as did **Los Bahos Group**. *6277 Selma Av., Hollywood, CA. (213) 464-9667.*

Northern California:

☐ **FANTASY RECORDS STUDIOS** (Berkeley) has aquired two Mitsubishi PCM digital audio recorders. An X-80 fixed-head recorder will remain at Fantasy's mastering facility, while a portable X-80 recorder will be available for additional in-house mastering and rentals. A DDL-1 delay system completes the Mitsubishi mastering package. According to studio manager **Roy Segal,** "Digital is the perfect way to highlight the benefits of recording at our studios. *Berkeley, CA.*

☐ **TRANSPARENT RECORDINGS** (San Francisco) announces the aquisition of a Studer Model 169 mixing console for use primarily in live on-location recording. *883 Golden gate Avenue, San Francisco, CA 94102. (415) 563-6164.*

☐ **ANGEL VOICE RECORDING** (San Jose) has opened its new recording facility. The studio offers 1,520 square feet of recording area with a 17-foot ceiling, a 48 square foot control room, and a client lounge. The booth features a new 32-track Sphere console feeding an Ampex MM-1200 24-track recorder and an Ampex ATR-100 mastering machine. Interior acoustic design was handled by **Dennis Rice.** Company president **T.A. Price** also announced the appointment of **Vince Sanchez** to the position of chief engineer. *2500 Senter Road, San Jose, CA 95111. (408) 292-7930.*

STUDIO UPDATE

☐ **2032 PRODUCTIONS** (San Francisco), a keyboard oriented 16-track studio, has aquired a Linn LM-1 digital drum machine, which is also available for outside rental. A Sound Workshop Series 30 console is interfaced with such signal processing gear as an Eventide H949 Harmonizer, and a Lexicon Model 93 DDL. *2032 Scott Street, San Francisco, CA 94115. (415) 929-8085.*

— *NORTHERN CALIFORNIA ACTIVITY* —

☐ **FANTASY RECORDS STUDIOS** (Berkeley) received their first Ampex Golden Reel Award for its part in the production of **Journey's** gold album, *Captured;* specifically the studio single, "Party's Over." Journey's new album *Escape*, was recorded entirely at Fantasy. *Berkeley, CA.* ■ At **HARBOUR SOUND** (Sausalito) **Con Funk Shun** recorded overdubs for a Polygram/Mercury project, engineered by **Nancy Evans** and **Dana Chappelle. Brian Linsley** is producing his own demo with Chappelle at the board, while **The Silvertones** and producer **Eric Jacobson** are cutting a demo project with engineer **Paul Stubblebine**. *301 Harbor Drive, Sausalito, CA 94965.* ■ **THE AUTOMATT** (San Francisco) finds **Gene Sarazan** in Studio A recording with **Jim Gordon** and **Allen Pasqua; Billy Cross** producing, **Ken Kessie** and **Wayne Lewis** engineering. In Studio B. **Con Funk Shun** is producing their album for Mercury, with engineer **Leslie Ann Jones** assisted by **Dave Frazer**, while down the hall in Studio C, **Nicolas, Glover, and Wray** are laying down tracks with producer **Terry Garthwaite**. *827 Folsom Street, San Francisco, CA 94107. (415) 777-2930.* ■ At **BAY SOUND REPRODUCTION** (Oakland) **Super Strings** are doing piano and string overdubs for their demo tape, with violinist **Joe Weed** producing and **Glen Oey** and **Gene Mick** at the board. *Five Yorkshire Drive, Oakland, Ca 94618. (415) 655-4885.* ■ **HEAVENLY RECORDING STUDIOS** (Sacramento) had Doobie Brother **Cornelius Bumpus** mixing tracks for his solo album with engineer **Larry Lauzon**, while **Ebony Express** is recording with producer **Ike Paggett**. In addition, **Ray Pyle** is engineering a album by **The Pontiax**. *1020 35th Avenue, Sacramento, CA 95822. (916) 428-5888.* ■ **ANGEL VOICE RECORDING** (San Jose) has been recording **Pablo Telles,** author of *Suavecito*, as he completes pre-production on a new LP with **Vince Sanchez** engineering. **Pat Kelly** has also been doing overdubs for his album on Rock Candy, while **Sadaka** has completed mixing an LP for **Teresa** with producer **Umlah Saday**. *2500 Center Road, San Jose, CA 95111. (408) 292-7930.* ■ **DIFFERENT FUR RECORDING** (San Francisco) is recording tracks for **Explosives**, produced by **Stu Cook**, formerly of Creedence, with engineering handled by **Stacy Baird** assisted by **Howard Johnston**. Another former CCR member, **Doug Clifford,** has been in the studio recording a project. **The Tubes** also have been recording a track for their Capitol Records video presentation. *3470 Nineteenth Street, San Francisco, CA 94110. (415) 864-1967.* ■ At **RUSSIAN HILL RECORDING** (San Francisco) **Pamela Rose and The Eights** recorded four singles, produced by **Richard Greene** with **Neil Schwartz** and **Sam Lehmer** engineering; **Chrome Dinette** recorded five tunes for a new demo project, with Schwartz engineering; **Gary Brooker**, formerly of **Procol Harum** and currently a member of **The Eric Clapton Band**, recorded a solo album for Polygram, with engineers **Jack Leahy** and **Sam Lehmer**; and **Jon Hendricks and Family** are recording an album for Muse with Greene at the board, **Marnie Moore** assisting. *1520 Pacific Avenue, San Francisco, CA 94109. (415) 474-4520.* ■ **PEARL'S PLACE** (Fremont) recorded their first album tracks at the medium security prison, Duel Vocational Institution, in Tracy. **Prisoner** recorded eight songs working on eight-track in a makeshift control room. **Dave Humrick** engineered, with **Joey Horten** assisting. *4163 Doane Street, Fremont, CA 94538. (415) 651-7187.* ■ At **FANE PRODUCTIONS STUDIO** (Santa Cruz) **The Garcia Brothers** wrapped up their latest album for Bulls Eye, with producer/engineer **Tom Anderson; The Secretes** finished their single for Secrete Sound Productions with **Pete Carlson** engineering; **The People** are recording overdubs for a new ULC Records LP engineered by **Fane Opperman**; and **Earl Nightingale** is booking time for his syndicated radio show *Our Changing World*, Carlson engineering. *115-B Harvey West Bl., Santa Cruz, CA 95060. (408) 425-0152.*

STUDIO UPDATE

— *NORTHWEST ACTIVITY* —

SEA-WEST RECORIDNG STUDIOS (Honolulu, Hawaii) reports that mainland rock group **TKO** is completing their second album with **Rick Keefer** producing and mixing, while **Danny Mirror** from Holland is doing an LP of Elvis Presley medlies with the original **Jordanaires** for CBS/Holland. Also in the studio, **Sonya** is cutting an album for RCA. On the personnel front, **Kit Ebersback** has joined the staff as an in-house arranger and recording engineer. *P.O. Box 30186, Honolulu, HI 96820. (808) 293-1800.*

Canada:

☐ **EVOLUTION 2000 SOUND STUDIO** (Brampton, Ontario) announces the expansion of its facilities with the addition of a Soundcraft Series 3B 24/24 mixing console, an MCI transformerless JH-110B two-track mastering machine, and additional processing equipment. The studio has also updated its mobile unit, and now offers 24-track location recording. **Eugene Schneider** is the studio president. *334 Rutherford Road South, Unit 14, Brampton, Ontario, L6W 3P5. (416) 453-4626.*

☐ **MUSHROOM STUDIOS** (Vancouver) announces the appointment of **Lindsay Kidd** to the position of chief engineer. Kidd began his career in 1971 as an assistant engineer with Decca Records in London, England, and by 1974 was a staff engineer at Morgan Studios, working with such artists as Rod Stewart, Black Sabbath, Queen and Jethro Tull. In 1978, he moved to Montreal as chief engineer at Listen Audio, recording dates with Toulouse, Walter Rossi, and Michael Pagliaro. Turning free-lance, Kidd worked at numerous studios in eastern Canada, and taught recording at The Trebas Institute of Recording Arts before joining Mushroom. *1234 West Sixth Avenue, Vancouver, V6H 1A5. (604) 734-1217.*

☐ **THE WAXWORKS RECORDING STUDIO** (Saint Jacobs, Ontario) has completed renovations with the addition of an automated MCI JH-600 series console interfaced with a new Stephens 24-track recorder with QII Autolocator. *P.O. Box 299, Albert Street, Saint Jacobs, Ontario, N0B 2N0. (519) 664-3311.*

— *CANADA ACTIVITY* —

PHASE I STUDIO (Toronto) reports **Chilliwack** is in producing tracks with **Long John Baldry**. *Toronto, Canada.* ■ **THE WAXWORKS RECORDING STUDIO** (Saint Jacobs, Ontario) recently played host to **Ronnie Hawkins** in tracking some tunes, and to **Rick Curtis** working on an album for Freedom Records. Other dates include sessions for **Major Hooples Boarding House** for Axe Records, and for the new band **Glider**. *P.O. Box 299, Albert Street, Saint Jacobs, Ontario, N0B 2N0. (519) 664-3311.* ■ **MUSHROOM STUDIOS** (Vancouver) finds **Long John Baldry** in to record his upcoming Capitol LP produced by the Vancouver-based team of **Bill Henderson** and **Brian MacLeod**. The sessions are being engineered by **Rolf Hennemann. Loverboy** is also utilizing the facility for their next album. *1234 West Sixth Avenue, Vancouver, Canada, V6H 1A5. (604) 734-1217.*

Great Britain:

☐ **EELPIE 1** (London, England) is the name of **Pete Townshend's** new audio/video complex at the Boathouse in Twickenham. The control room features a 40-input Solid State Logic Master Studio System, complete with a Primary Studio Computer, which handles all title, track, cue, and mix listings, and Total Recall, which allows the set-up of every control on each input/output module to be memorized

and recalled. Sound monitors include UREI 815s and Auratones. Video monitors are interfaced with the Primary Computer, Total Recall Computer, the studio's visual monitoring facilities, and the video-tape recording operation. The facility also features an overdub room and a conservatory with a window into the control booth. The studio itself can be converted from sound-only to video-tape recording by simply pulling back a wall of acoustic screens. A shutter at the back of the control room can be opened to provide a view of the River Thames. Townshend is currently working on his next solo LP. *Twickenham, London, England.*

Eelpie Studio. *London*

☐ **BATTERY STUDIOS** (London, England) has opened a newly-constructed studio with the control room centered around a Solid State Logic Master Studio System interfaced with a Studer A-80 MK-III multitrack recorder, and two A-80R two-tracks. A Studer A-68 amp powers the UREI 813 monitors included in a design by acoustics consultant **Keith Slaughter**. The new AC/DC album is already slated for mixdown in the new facility. *Willesden, London, England.*

AUDIO/VIDEO UPDATE

Eastern Activity:

☐ **E.J.STEWART, INC.** (Primos, Pennsylvania) celebrated the upgrading of their mobile units with the taping of a concert by **Kool and the Gang** using four cameras and three VTRs at Six Flaggs Great Adventure Amusement Park, in Jackson, New Jersey. Editing for this concert program as well as other events taped at Great Adventure was completed in Stewart's facility using a CMX 340X, Sony one-inch VTRs, a Grass Valley 1600-7K switcher, and the Grass Valley Mark II digital video effects system. *525 Mildred Avenue, Primos, PA 19018. (215) 626-6500.*

☐ **SCENE THREE** (Nashville) has just completed three projects for RCA recording artists **Sylvia, Razzy Bailey,** and **Alabama.** Executive producer for RCA, **Jerry Flowers,** will use the projects for promotion of each artist, as well as for promotion of their current albums. The first two pieces were shot on one-inch video in the studio, with both Sylvia and Bailey performing three cuts from their latest albums, one being an interpretive visual production of the song. Director/cinematographer **Marc Bell** and producer **Kitty Moon** were instrumental in development of the concepts. Editing for the pieces was completed by **Terry Climer** in Scene Three's post-production facility, which includes a CMX 340X editing system, a two-channel Squeezoom, and Neve audio console. The 30-second spot produced for Alabama will be used in promotion of their latest album, and allowed Climer to use the Squeezoom to accentuate the balance between the performers in concert and their recordings. *1813 Eighth Avenue South, Nashville, TN 37203. (615) 385-2820.*

☐ **DEMO-VOX SOUND STUDIO** (Brooklyn, New York) has recently expanded to include video production and broadcast placement for its clients. The company has created a new division, **D-V-X International,** and, with the purchase of ¾-inch and ½-inch video recorders and editors, expects to focus on both commercials and industrial shooting. Demo-Vox president **Frank Grassi** will act as creative director of the video division, and just completed directing a three-camera "live-on-tape" studio shoot to promote Lomar Productions' album, *G.I. Sweethearts,* a salute to the female vocal groups of yesteryear. *1038 Bay Ridge Avenue, Brooklyn, NY 11219. (212) 680-7234.*

☐ **NATIONAL VIDEO AND RECORDING STUDIOS** (New York City) has completed post-production on three, one-hour

programs in the series, *The Song Writer*, produced by **Sonny Fox Productions** for CBS Cable. The programs spotlight Broadway composers discussing and performing songs from their hit shows. Special effect for the opening segments were created with National's Grass Valley Mark II Digital Video Effects unit. Senior mixer **Dick Mack** utilized National's unique Vidi Mag System, a sprocket-driven video tape process developed to facilitate high-speed audio editing and mixing. The system is similar to the double system handling techniques used for over 50 years in motion picture post-production. The three programs are entitled *An Evening With . . .*, and are devoted to the music of Burton Lane *(Finian's Rainbow)*, Sheldon Harnick *(Fiddler On The Roof)*, and Charles Strouse *(Annie)*. **Sonny Fox** produced, while **Roger Englander** was senior producer for CBS Cable. *New York, NY.*

☐ **ALPHA AUDIO RECORDING CORPORATION** (Richmond, Virginia) has expanded its four-studio, multitrack facilities to include video lock-up. The new system consists of multiple SMPTE time code based synchronizers controlled by a computer to sync video cassette recorders to 24-track machines, as well as to separate audio source machines. This will allow sond effects, music, and sync-sound elements to be resolved and time-justified. The computer-assisted operation and multiple synchronized machines make frame-accurate audio editing and insertion quick and easy. Sync-sound can be resolved using this system, eliminating the need for magnetic film stock transfers. Video elements can be viewed in real-time, slow-motion, or frame-by-frame on a 19-inch Sony Trinitron monitor with superimposed time code display. Several post-production jobs have already been completed, including King's Dominion *What's New '81*. and a 12-minute animated film. *2049 West Broad Street, Richmond, Virginia 23220. (804) 358-3852.*

***Alpha** engineer Bobby Tulloh, Martin Agency producer Betsy Barnum*

☐ **ELECTRONIC ARTS INTERMIX** (New York City) will be distributing for consumer purchase a number of experimental video works, including *Ontogenesis* by Janice Tanake, the winner in the Experimental category of The National Video Festival, held at the Kennedy Center in Washington, D.C. Tanaka's work has been described as a video poem with intense sound and visual imagery, which combine "a stunning montage meditation on the nature of contemporary American experience." The piece is in the tradition of Nam June Paik, and was described by critic Gene Youngblood as being "of the highest calibre, displaying a visual brilliance and poetic resonance characteristic of a master's work." Along with the 5½-minute *Ontogenesis*, the new EAI catalog will include *Duality Duplicity* (1980, 6 minutes), *Manpower* (1980, 6½ minutes), *Beaver Valley* (1980, 6½ minutes), and *Mute* (1981, 2½ minutes). *84 Fifth Avenue, New York, NY 10011. (212) 989-2316.*

☐ When **BULLET RECORDING** (Nashville) opens for business this fall, according to its owners, it will be the first U.S. facility to offer simultaneous 46-track state-of-the-art audio and three-camera, one-inch video recording under one roof. The primary audio/video facility, Studio A, was designed by **George Augspurger** and architect **Jack Edwards**, and measures 46- by 40-foot with a 26-foot ceiling. Its audio control booth is centered around two Studer A-800 24-track recorders, and a Solid State Logic Master Studio System console equipped with full plasma metering and Total recall computer. An Audio Kinetics Q-Lock SMPTE timecode unit keeps everything in sync, while audio mastering is handled by Studer A-80 decks in both half- and quarter-inch formats. Twin live echo chambers are located beneath the floor, with other reverb going from EMT 251 and Lexicon 224 digital units to an EMT 240 gold foil unit. Outboards are by AMS, UREI, Aphex, Eventide, Marshall, RCA, and Roland, while audio monitoring is handled by UREI Time-Aligned 815 units. The video production

suite, located on a balcony over the audio booth and overlooking the studio, is equipped with a triple re-entry switcher, three Sony BVH 1100A VTRs, and a ¾-inch off-line editing suite. For basic TV audio, a 12-input mixer feeds a stereo signal to the VTRs. In the studio, over 175 kilowatts of lighting is available for use with the three Sony BVP-330A Plumbicon cameras. An elaborate track installation offers an 86-foot cyc system featuring a white sharkstooth, a blue chromakey, and a velour blackout, all of which disappear when not needed. Immediately adjacent to this room is Studio B, equipped with a Harrison automated 28-in/24-out console, and Studer 24- and 2-track recorders. Bullet's Studio C, located across town, is a basic 24-track facility with such upstairs amenities as a full kitchen and a hot tub. **Randy Holland** is Bullet's president, while **Piers Plaskitt,** formerly with Apple and Trident studios in London, and Celebrations Studios in New York, is the studio manager. Technical operations at the $1.5 million dollar complex will be handled by chief engineer, **Scott Hendricks,** formerly a staff engineer at Glaser Sound Studio in Nashville. *49 Music Square West, Nashville, TN 37203. (615) 327-4621.*

Central Activity:

☐ **RICHARD KIDD PRODUCTIONS** (Dallas, Texas) announces the formation of **RKP Entertainment** to produce and distribute new and original programming for cable television. According to **Theresa Bach,** director of program development, RKP has already completed two 60-minute music specials, *Delbert McClinton,* and *Clarence Gatemouth Brown,* each featuring live performances by these artists combined with personal interviews. RKP's staff is presently developing several program series with production slated to begin in January of 1982 utilizing their in-house studio facilities. *2800 Routh, Suite 212, Dallas, TX 75201. (214) 748-5744.*

☐ **UNIVERSAL RECORDING COMPANY** (Chicago, Illinois) played host to **On Track Productions** and 1,800 music fans for the video taping of a documentary on the Windy City's local rock scene. The 75-minute piece is targeted for national cable television sale, and featured, in alphabetical order, **Bohemia, Garrison, The Marquis, Phil 'n' the Blanks,** and **Screamin' Rachael and Remote.** Previously taped material, including interview segments and local club appearances, will be edited in with the sequences captured at Universal. On Track Productions, Inc. is an independent television company owned by partners **Brian Boyer, Tom Pabich,** and **David Webb.** The production utilized Universal's video equipped facility, recently unveiled by studio owner **Murray Allen.** *46 East Walton Street, Chicago, IL 60611. (312) 642-6465.*

☐ **OMEGA AUDIO** (Dallas, Texas) was on hand with its remote unit to provide 24-track recording with SMPTE time code for the television shoot of **Mickey Gilley's** first annual picnic, featuring **Shelly West** and **David Frizzel, Ernest Tubb, Faron Young,** and **Johnny Lee.** Engineering for Omega were **Paul Christensen** and **Russel Hearn,** while video was supplied by **Clearwater Video** of Dallas. Other television activity include the video taping of **Delbert McClinton** at Star Fest in Dallas. Omega also supplied facilities to mix the show to picture with their BTX interlock system. Christensen and Hearn were again behind the board with video handled by **Video Production Services** of Kansas City. *2805 Clover Valley Drive, Garland (Dallas), TX 75043. (214) 226-7179.*

Western Activity:

☐ **HOUSTON RECORDING** (Sonoma, California) has moved its 24-track remote recording truck to the San Francisco Bay Area of Northern California. Specializing in multitrack recording for video, the unit features an MCI JH-636 automated console equipped with 72

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STUDIO UPDATE

mike inputs, 3M tape machines, JBL monitors, and closed circuit video monitoring. In addition, in conjunction with **Audio Video Resources** of San Francisco, the company now offers 32-track digital recording for remote work. *2355 Sobre Vista Road, Sonoma, CA 95476. (707) 996-8881.*

☐ **COMPACT VIDEO** (Burbank, California) announces the introduction of the first commercially-available High Definition Television. According to company president **Robert E. Seidenglanz,** "We have developed the first operational system for High Definition Television, which more than doubles the apparent resolution of the usual television image." The HDT process is called ImageVision™, and employs 655 scan lines per frame rather than the ordinary 525. Another advantage of the process is a transcoding stage that enables shooting of video at 24 frames-per-second, the speed of projected motion pictures. This will enable movies to be shot electronically, and then transferred to film for release with much higher quality than ever before. A new post-production facility has also been opened by the corporation in New York, offering video, sound, and satellite services. The operation will be headed by the company's service group vice-president, **Emory M. Cohen,** who named **Robert Watt** as manager of the entire East Coast operation. The facility will also offerImageVision to East Coast clients. *2813 West Alameda Avenue, Burbank, CA 91505. (213) 843-3232.*

IAM, Irvine

☐ **INTERNATIONAL AUTOMATED MEDIA** (Irvine, California) announces the addition of full video post-production services following the addition of video production capability to the audio studio. According to the company's founder and president, **Jerry Shirar,** the new facility is under the supervision of **Jim Rose,** and features ¾-inch on-line and/or off-line editing capability. Rose is the founder of **Post Production Services,** a company recently relocated from Ventura to IAM's Irvine headquarters. Rose began his career in 1958, and has been involved in the post-production of many video shows, including **Sonny and Cher, Tony Orlando and Dawn,** and **The Lawrence Welk Show,** and served from 1979 to 1980 as the post-production supervisor of one of the largest video houses in Hollywood. *17422 Murphy Avenue, Irvine, CA 92714. (714) 751-2015.*

CFI Video, Hollywood

☐ **CFI VIDEO** *(Hollywood) has completed installation of a fully computerized one-inch, on-line editing suite, according to vice-president* **Tom Bruehl**. The facility offers five one-inch Sony BVH-1100 A Type C VTRs with high-speed search, freeze frame, and slow motion in forward and reverse; a 7-channel Quantum Audio Labs stereo mixer; a Quantel DPE-5000 special effects system driven by a CFI Video custom-designed software; a CDL-480 switcher featuring multiple rotary wipe patterns, and downstream keyer; a Mach I editing system with full "look-ahead" custom software, 1000-edit capability, and floppy-disk storage; and Ampex ATR-104 slaved audio recorder with double system editing capability; a two channel compositor; four black and white and two color cameras for insert, graphics, and Chromakey; a ¾-inch JVC 6600 VTR with remote control and joy stick. Custom computer control has been added for the first three units. Edit I complements CFI's two operational two-inch editing suites and its ¾-inch off-line editing bay. The company also recently added a Rank Cintel telecine system to go with its Fernseh telecine unit. *959 Seward Street, Hollywood CA 90038. (213) 462-3161.*

STUDIO UPDATE

☐ **REALIFE PRODUCTIONS** (Agoura, California) is described as a new full service audio/video facility featuring 16-track audio recording and a complete multicamera ½- and ¾-inch video operation. The audio studio is equipped with TEAC Tascam 16- and two-track recorders, a 24-channel Biamp console and dbx noise reduction. Outboards include MICMIX Master-Room XL-305 reverb and Lexicon Prime Time digital delay, dbx compressors and limiters, an EXR Exciter, and dbx 900 Series noise gates. Mikes are by Neumann, AKG, Shure, Crown PMZ, and Sennheiser, while the instrument list offers a Kawai grand piano, a Hammond B-3 organ with two Leslies, and Les Paul, Stratocastor, and Sting Ray Bass guitars. The video room offers Panasonic ¾-inch on-line editing, Panasonic and JVC color monitors, JVC S-100U color video cameras, and Panasonic ½- and ¾-inch tape VTRs. Studio owners **Bruce Jackson** and **Dusty Ebsen** are both currently in shooting for *Rockfile*, a future release of Theta Cable, which will combine major recording artists **Pat Benetar, The Tubes,** and **Vickie Carnes.** *P.O. Box 356, Agoura, CA 91301. (213) 889-1318.*

☐ **CHRONICLE PRODUCTIONS** (San Francisco, California) announces the availability of full audio sweetening, dialogue replacement, and live music scoring with time code interlocked video. "Since its inception, Chronicle Productions has been committed to the highest quality of picture and sound production," said **Ken Hobbs**, director of sales and marketing. "The expansion of these services through an arrangement with **Fantasy Studios** is the next logical step in fulfilling that commitment." "Our arrangement with Fantasy allows us to provide personal production coordination of our clients' work through all phases of sweetening," said CP's director of production **Stephen Smith.** Sixteen- and 24-track studios with Dolby and extensive sound effects will be offered. In addition, a producer can be supplied with a stereo mix for use in other than the broadcast medium. *1001 Van Ness Avenue, San Francisco, CA 94109. (415) 561-8663.*

☐ **ALCON VIDEO/FILM PRODUCTIONS** (San Francisco, California) has opened its new production and post-production facility equipped with ¾-inch on-line editing, complemented by one-inch mastering. Partners in the venture are **Richard Poggioli, Jayne Morris, Jim Cassedy, Ken Fay,** and **Steve Gamble.** Film production is also offered. *San Francisco, CA.*

☐ **CHATON RECORDINGS** (Scottsdale, Arizona) has taken delivery of a 25-foot Beach-craft motorhome packed with audio gear ready for synchronization with video. Long range planning by the studio points towards stereo television, as the truck is equipped with a BTX Shadow synchronizer and a BTX Model 5400 reader/writer, allowing for interlock with collaborating television units. Other equipment includes a 250-foot neopreme cable for truck to auditorium lines, a Soundcraft Series 800 console interfaced with an Otari MTR-90 multitrack machine, three video monitors, and radio links with the location audio and video crews. The truck is also available for standard audio location recording. *5625 Nauni Valley Drive, Scottsdale, AZ 85253. (602) 991-2802.*

Overseas Activity:

☐ **THE SOUTH AFRICAN BROADCASTING CORPORATION** (South Africa) will soon be taking delivery of 11 Audio-Kinetics Q-LOCK 3.10 SMPTE/EBU time-code synchronizers. Each three-machine system will offer complete transport control of a video master and two audio slave machines. The built-in time code generator can be locked to incoming video or external time code for accurate time code regeneration.

☐ **LONDON WEEKEND TELEVISION** (London, England) recently purchased from Audio-Kinetics a new Q-LOCK 3.10 synchronizer, bringing the total number of systems in use at the company's facility to five.

news

STUDER AND OTARI MACHINES NOW BIASED FOR SCOTCH 226 TAPE

When no other type is requested, all Studer B67, A-80 and A-800 Series machines and Otari MTR-10 recorders are now optimum biased for Scotch 226 audio tape and packed with a reel of the tape, reports Henry Ovadia, OEM Market Development Manager, 3M's Magnetic Audio/Video Products Division. Scotch 226 tape, when used at 15 IPS, is said to deliver 3 dB greater maximum output in the low-frequency spectrum, and 2 dB better maximum output in the high-frequency spectrum than Scotch 206/207 tapes. In addition, Scotch 226 has improved print-through and output properties. The tape offers 2 dB better signal-to-print properties than existing high output/low noise mastering tapes.

MITSUBISHI DIGITAL AUDIO RECORDERS NOW AVAILABLE ON DIRECT RENTAL BASIS

Lou Dollenger, PCM sales manager headquartered in Lincolnwood, Illinois, said the X-80 recorder presently is the least expensive of any digital recorder and the most practical because of its razor blade editing capability. With the recent announcement of Mitsubishi's agreement with AEG Telefunken, West Germany, digital mastering of Mitsubishi PCM tapes is now possible in Japan and Europe, as well as the United States.

Rates for the rentals are: $1,000 a week, with a two-week minimum, plus air freight and digital tape costs; tape is available from Ampex and 3-M, Dollenger pointed out. He advised three-to four-week advance notice to rent the equipment.

SOUNDWORKSHOP APPOINTS WESTLAKE AUDIO AS DEALER FOR L.A. AND S. CALIFORNIA

Negotiations between the two companies were finalized in Los Angeles during September by Glenn Phoenix, president of Westlake Audio, and Emil Handke, sales manager for Sound Workshop.

MARTIN AUDIO VIDEO APPOINTED NORTHEAST DEALER FOR HARRISON SYSTEMS

Commenting on the appointment, Martin general manager Courtney Spencer said, "Harrison has clearly become a major factor in the console market over the last several years, while Martin has established itself as one of the two or three largest professional dealers in the country. The addition of Harrison gives us a very credible world class console to top our range of products, and in return Martin gives Harrison an outlet in the northeast with substantial technical, financial, and marketing resources."

The MR-3 is the newest of the products in the Harrison line. Recognising that most studio owners like to see a piece of capital equipment "in the flesh" before committing to buy, Martin has just completed installation of a full-size MR-3 console in their demonstration studio. Says Spencer, "In our demo room, our customers are offered an unusual opportunity to not only see the console, but actually *use* it in a relaxed environment. Our MR-3 is part of a functioning control room, complete with Otari MTR-90 multitrack, UREI Time Aligned™ monitors and a wide selection of reverb and signal processing equipment. We encourage our customers to bring their own multitrack tapes and take some time to hear what the board can do."

VIDEO CASSETTE RECORDER SALES SOAR TO RECORD LEVEL

Total U.S. market sales to retailers of home video cassette recorders increased sharply in September, 1981, over the same month a year ago, according to the Marketing Services Department of the Electronic Industries Association's Consumer Electronics Group.

Home sales to retailers in September were 153,680 units, an increase of 63.9 percent over sales of 93,747 in the same month last year. Sales in the first nine months of 1981 climbed to 883,729 units, up 81.4 percent for the same period of 1980.

In contrast, sales of color television receiver retailers in September amounted to 1,260,244 units, off 0.8 percent from 1,270,003 units sold in the identical month a year ago, while monochrome television sales in September, amounted to 538,998 units, a decline of 32.7 percent sold in the ninth month last year.

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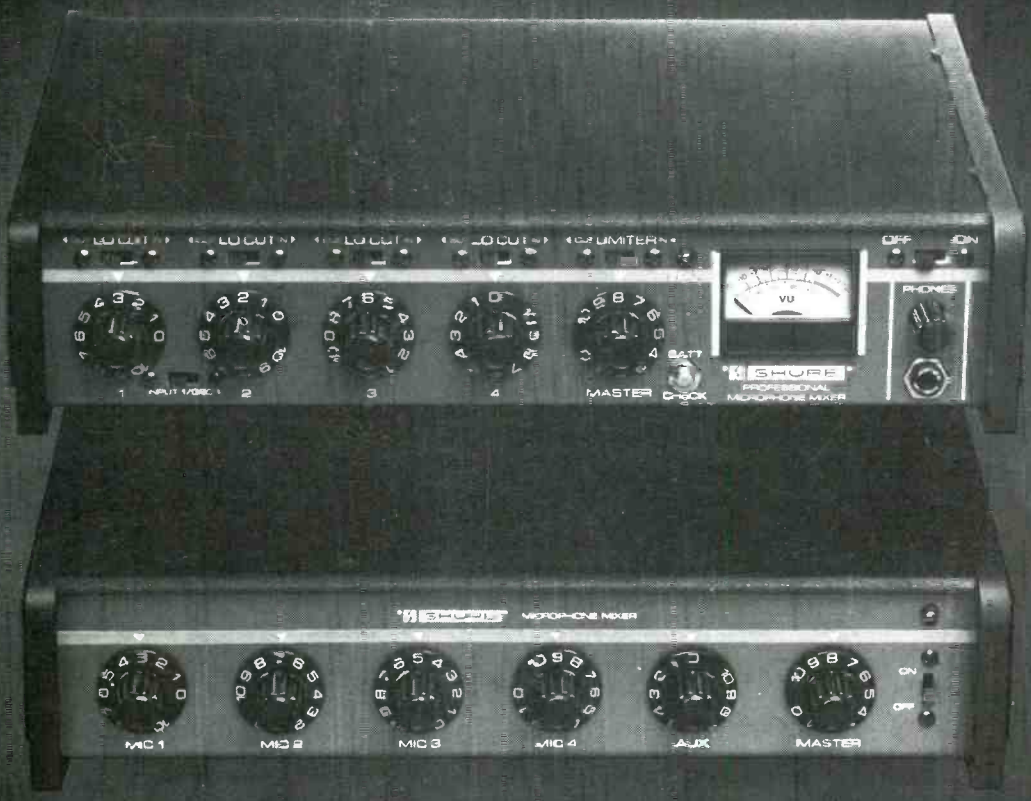

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