

Producer
Richard Burgess

MODERN

RECORDING

& MUSIC

MARCH 1995 VOL. 11 NO. 3 \$2.25



DIRECTORY: Performance Speakers

RECORDING TECHNIQUES:

New Methods
of Recording

REMIXER JOHN


"JELLYBEAN" BENITEZ

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MODERN RECORDING & MUSIC

MARCH 1985
VOL. 11 NO. 3

FEATURES

4 RECORDING TECHNIQUES

by Bruce Bartlett

This month Mr. Bartlett discusses a method of recording that is gathering momentum. How much do you know about storing synthesizer note parameters in computer memory? If your answer is 'not much' flip to page four and allow Bruce to supply all the info.

18 AN INSIDE LOOK AT THE SMALL RECORDING STUDIO

by James Corona

So we heard that you'd like to trade some recording secrets and share your experiences. Well, we at *MR&M* have never been ones to deprive our readers, so we went out there and investigated what's happening in small studios. Come along with us and meet three small studio owners and hear their stories.

26 REMIXER JOHN "JELLYBEAN" BENITEZ: PROFILE

by Bob Grossweiner

John "Jellybean" Benitez is an artist, producer, mixer and a dee-jay. Now he is also part of that select group of mixers who expand and rework 7-inch tracks into 12-inch dance records—he is a remixer. What Jellybean creates are not merely expanded versions of the 7-in. They are totally new records. *MR&M* met with Jellybean in his home studio, Sigma Sound Studio B in New York, and learned a lot about this interesting expansion of recordings.

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by Melinda Newman

Richard Burgess has produced such groups as Spandau Ballet, the New Romantics, was at the board for cuts of Adam Ant's Strip LP, and also did some work for America and New Edition. In 1984 he released his own album and now he's back in the studio with Melba Moore. On top of all this, he helped develop the Simmons Electronic Drumkit. We caught up with Richard and discussed his experiences as producer, artist and, of course, innovator.

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by Frank Serafine

Frank Serafine is one of the music and film industry's foremost and well respected music composer and sound designer. His credits include numerous commercials, such as major films as *Tron*, *Star Trek III*, *Brainstorm*, and *The Day After*, as well as designing the sound effects for Disneyland's Space Mountain ride. In this article Serafine discusses some of the current trends in electronic musical instruments as well as gives us a glimpse as to what the future might hold.

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by Denny Andersen

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Setting the Record Straight

In our capacity as public relations counsel to the Music Performance Trust Funds, we are writing to point out that contrary to the article "Music and the Law, Record Contracts, Part I," by Eric M. Berman, which appeared in your August issue, the Music Performance Trust Funds is an independent organization. It is not, as stated, "the Musicians' Performance Trust Fund."

The MPTF was created in 1948 under agreements between the recording industry and the American Federation of Musicians. MPTF is a public service organization, administered by Martin A. Paulson, Trustee, who was appointed by the Secretary of Labor.

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—Helene Besser

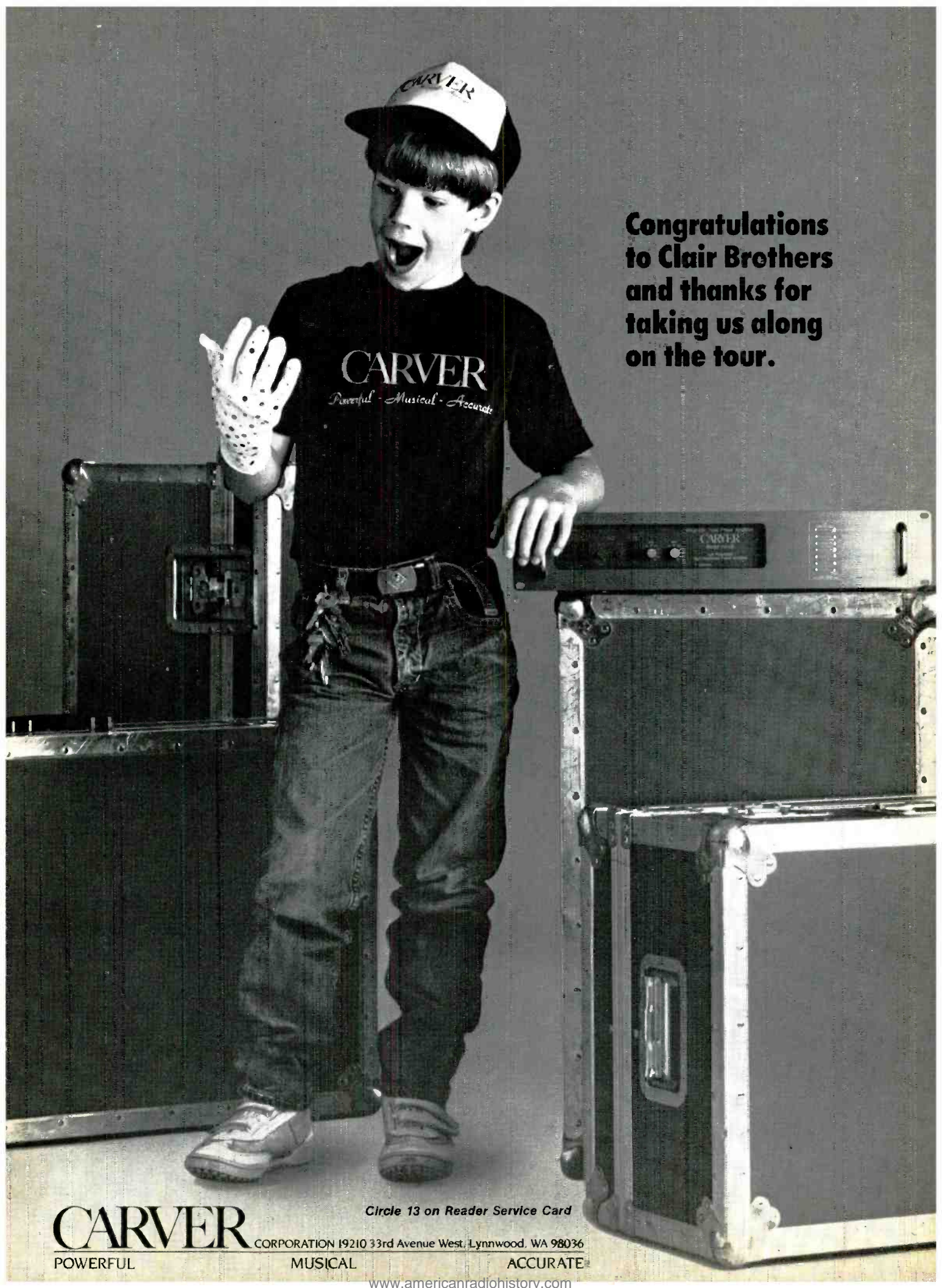
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EDITOR'S CORRECTION

Lionel Richie was inadvertently left out of the photo caption for the All Star Choir photo which appeared on page 29 of the February issue of *MR&M*. Lionel appears between Dionne Warwick and Christopher Cross.



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Recording Techniques

New Methods of Recording



A new way of recording music has been developed: storing synthesizer note parameters in computer memory. This kind of recording is less common than tape recording, but it is an important development that recording engineers and musicians should be aware of.

Many electronic keyboard artists are familiar with this information, but it may be new to some recording engineers.

First a definition. *Computer memory* is a group of integrated-circuit chips, each containing thousands of tiny switches. Information is stored in binary format (1 = switch ON; 0 = switch OFF). Unlike a tape recorder, a computer memory has no mechanical moving parts.

With conventional tape recording, an analog or digital signal representing the output of a musical source is stored on magnetic tape. With computer-memory recording, a synthesizer note is played, and a computer connected to the keyboard stores in memory which note was played, its sound settings, and its duration.

The memory records the *note parameters*, NOT the *audio signal* produced by the synthesizer. During playback, the computer activates the synthesizer (rather than a loudspeaker). The parameters of each note are set and played according to what is stored in memory (see *Figure 1*).

In effect, it's a modern-day player piano. The instrument on which the original performance was played also reproduces the performance, with perfect fidelity.

For example, if you play Middle-C on a synthesizer (256 Hz), the memory does not store a 256-Hz complex signal. Instead, it stores an indication that the "Middle-C" key was pressed. Similarly, during reproduc-

tion, the memory does not play back a 256-Hz signal; rather, it triggers the oscillator that the middle-C key would play. That is how music is recorded and reproduced.

There are two ways of recording note parameters into memory: real time and step time. With real-time recording, you perform your music as you would play it on stage. The computer later plays back your music exactly as recorded. If desired, you can edit the piece.

Step-time recording lets you enter notes one at a time at your own pace. The music plays back at a normal tempo.






Memory Multi-Tracking

Several "tracks" or channels of note parameters can be stored separately. Each track is actually a separate "voice" or instrumental sound. You can overdub, punch in and out, and mix down these tracks just as in multi-track tape recording.

Those of you who have played with a drum machine know how synthesizer overdubbing works. You play, say, a four-bar riff on the hi-hat and kick drum keys. This riff is stored in memory. Then you can play it back while adding a tom-tom fill. That combination is stored. Then you can add a cowbell, and so on. The recording can be mixed by adjusting the faders on the drum machine for each instrument.

Other computer/keyboards (such as the *Synclavier*) use a microphone to pick up a note from a real instrument, then sample the waveform and store the resulting digital data. When you're ready to play back the recording, the keyboard controls the pitch of the reproduced note (see *Figure 2*).

You can record a note from several

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instruments in this manner and store each "instrument" in memory.

Next, you play a sequence of notes and record the sequence into computer memory. This sequence might be drum beats, a bass line, chords, or melody.

After recording a bass line, you can go back to the start of the sequence, play the bass "track," and add a flute part in sync with the bass line. Then you can go back to the top and add drums. It's just like overdubbing with a multi-track tape machine, except there's no tape to rewind and no generation loss.

Types of Synthesizers

Synthesizers used for memory recording can take many forms: a standard synthesizer musical instrument, a synthesizer chip built into a computer, a keyboard that plays digital recordings of real instruments, or a sound-sampling system. Let's explain each of these.

- A standard *synthesizer* contains oscillators, filters, and envelope generators/followers to produce sounds. Built into many synthesizers is a *sequencer*, a computer memory for storing sequences of notes. This memory also can be in a personal computer separate from the synthesizer. The computer adds extra memory to store longer sequences. The synthesizer connects to the computer with a MIDI interface (described later), and a computer program allows the synth notes to be recorded and played back. An example of a computer-controllable synthesizer is the *Sequential Circuits Six-Trak*.

Many synthesizers can store sound parameters (*patches*) or rhythm data on cassette tape. The data can be

loaded back into the instrument to recall rhythms or patches. You can even buy pre-recorded cassettes that contain sounds programmed by professional musicians.

- A *computer synthesizer chip* is an integrated circuit built into a computer that generates and filters sounds according to instructions in a computer program. Currently the *Commodore computer* has the most versatile sound chip of low-cost personal computers. Compared to a regular synthesizer, a computer's sound chip costs much less, but is noisier and provides limited sonic complexity.

Some computers can be retrofitted with *synthesizer circuit cards*. For example, the *Soundchaser MX-5* from *Passport Designs* includes a 16-oscillator digital synthesizer card that plugs into an Apple II+ or IIe. Also included are a keyboard and software that permit 16-track recording. The *AlphaSyntauri* is another such system.

- Some keyboard instruments play *digital recordings* of real instruments stored in memory chips. The sequence of notes played can also be stored in internal memory. Examples of these instruments are the *360 Systems Digital Keyboard*, the *Kurzweil 250*, and the *LinnDrum* machine. It's a strange experience to play a piano keyboard and hear an acoustic guitar or flute sound come out!

- *Sound-sampling instruments* such as the *Synclavier* can sample sounds picked up with a microphone, store these sounds, and play them back via the keyboard. Multiple tracks can be built up, and each track can be edited independently after recording.

Some companies make circuit cards and software that enable certain *Apple* computers to sample and store sounds. Two examples are the *Mainframe DS3* and the *Decillionix DX-1* sound processing system. The software lets the user edit the sounds and control how they are played back. Sampled sounds can be saved on magnetic disk.

Other sampling instruments are the *Fairlight CMI*, *E-mu Emulator*, *PPG Wave*, and *360 Systems Digital Keyboard*. They are becoming important studio tools for recording new instruments and sound effects.

A Computer Synthesizer

Let's return to the personal computer with a synthesizer chip, and explain how the computer records music. First you load and run a special "music" program on the computer. With this program, you can set the tone quality (waveform) and attack-decay-sustain-release envelope for each of several "voices" or "instruments." Each voice is actually a separate oscillator whose parameters can be controlled by computer-program instructions. The *Commodore 64 computer*, for example, includes a sound chip containing three voices; each with four waveforms and a variety of ADSR and filter settings.

A keyboard and software disk, such as the *Melodian* system, can convert the computer into a synthesizer and 3-track recorder. *Sight & Sound Music Software Inc.* makes a piano-style keyboard that fits over the computer keyboard. Their software, such as *The Music Processor*, lets you create, edit, record and play your own musical arrangements.

After typing in the sound param-

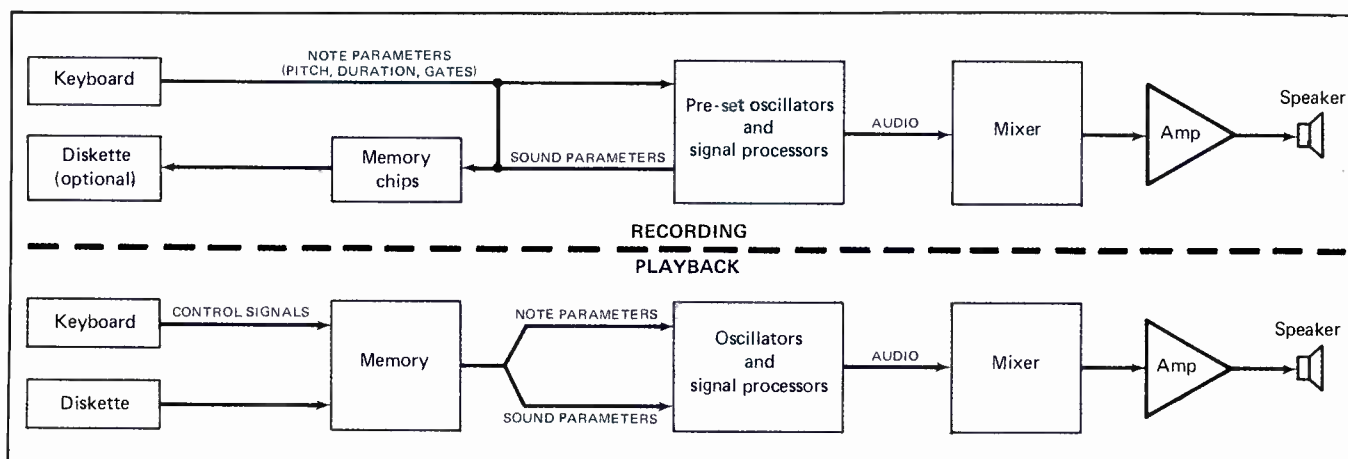


Figure 1. Simplified block diagram showing memory recording and playback of a sequence of synthesizer notes.

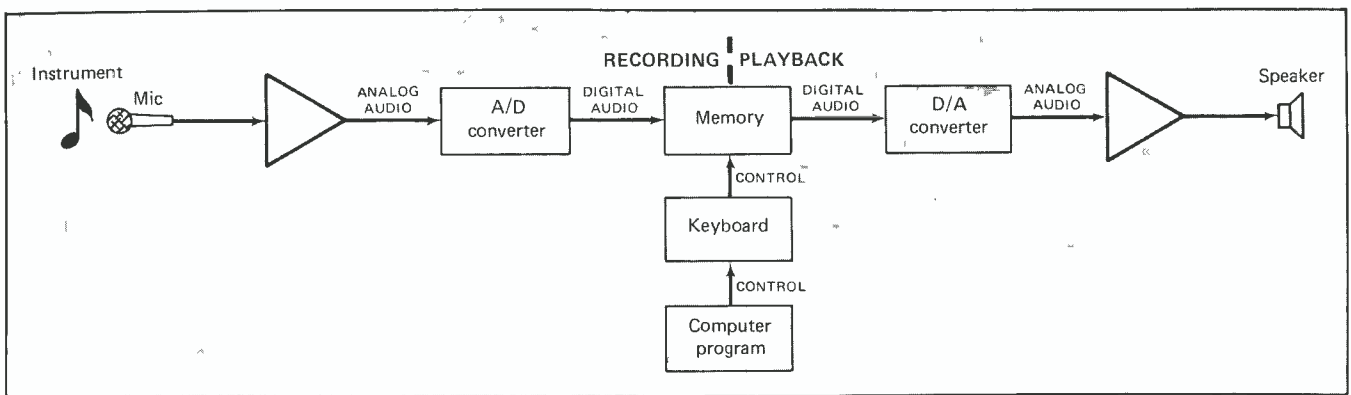


Figure 2. Simplified block diagram showing how a sampling device records and plays back sounds.

eters for each voice, you're ready to record a tune. You play notes on the computer keyboard (or on a separate piano-style keyboard). The keyboard, via the computer program, activates the synthesizer chip to produce music. The computer memory stores which keys are pressed and their durations. During playback, the program reads the note parameters stored in memory, and activates the synth chip accordingly. The resulting music played by the synth chip is the final reproduction.

The computer's audio signal can be recorded on tape, if desired. Or the note data can be stored on magnetic

disk to free up the computer for other tasks. Again, the disk stores note parameters, not audio signals.

Synchronizing Synthesizers

So far we've discussed recording with a single synthesizer, but there are more possibilities. Several synthesizers can be synched together to produce the effect of a band playing. You might have two or three synths and a drum machine synchronized and playing all at once.

Several synths can be linked to a drum machine, which provides the basic pulse that sets the tempo. Or

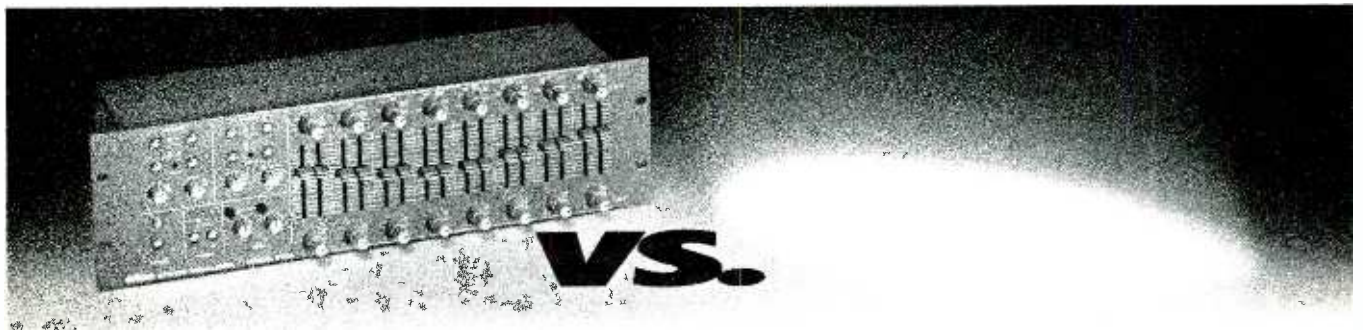
they can be connected to a "click track" machine (such as *Garfield Electronics' Dr. Click*), which generates a timing pulse.

These memory recordings can be played back during live concerts. In this way, synthesizer musicians can play note-perfect performances every time. Or, they can override the sequence and play manually to react to the other musicians' playing.

MIDI

The system used for interconnecting synthesizers is a MIDI interface.

MIDI is a specification for a computer interface that enables



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several different brands of instruments to be connected together. That is, it permits computer-controlled musical instruments to *communicate* with each other through a standard cable.

With the MIDI connection, several synthesizers or drum machines can be controlled from a single MIDI equipped keyboard, guitar, microphone, drum machine, or computer program.

Up to 16 channels of digital data (32 K baud rate) are sent at once through a single MIDI patch cord. Each channel in this patch cord transmits specific information that together can control one or several MIDI instrument(s). When daisy-chained, one MIDI instrument can layer several sounds in one pass on one track, as well as recording that sound's output on separate tracks.

The MIDI cable is standardized with a 5-pin DIN connector, but each manufacturer applies the MIDI spec in a different way. Some MIDI instruments are *not compatible*; for example, they may have different functions controlled by the same channel. Fortunately, many instruments can be reliably interfaced with MIDI. The MIDI control functions

are expected to become standardized over the next year or two.

The International MIDI Association (IMA) publishes a newsletter that includes synth compatibility charts and other useful information. Their address is 8426 Vine Valley Dr., Sun Valley, CA 91352.

Playing Memory Recordings

Suppose you've made a computer-memory demo recording of several instruments linked by a MIDI cable, and you want to play it for a producer in L.A. You don't want to transport all the synthesizers and computers to the producer, set them up, and play the recording. Instead, you'd record the demo conventionally: Plug each synthesizer audio output into a mixer, mix them as desired, and record the result on a 2-track deck to play for the producer. Computer-memory recording replaces the multi-track tape machine, but a 2-track tape deck is still needed for portable playback. If you want to add vocals or non-MIDI instruments to the mix, then you'd need a multitrack tape recorder.

Another New Recording System: The AKAI MG1212

So far we've discussed memory recording. Let's return to standard tape recording and see what's new.

The AKAI MG1212 mixer/recorder takes the "Portastudio" concept several stages further. It is a complete 12-channel mixing console with a built-in 12-track, 1/2-inch cassette recorder.

The device fills the gap between portable studios and permanent studios that use a console and a separate multi-track recorder. The AKAI potentially offers studio-quality production within a single, self-contained package.

It's great for musicians who need more production flexibility than a portable studio allows, but who lack the space or money for a separate console and multi-track open-reel machine. It also should be ideal for multiple-station set-ups in recording-engineering schools.

The MG1212 contains several features that make multi-track recording more convenient and efficient. For example, it is capable of automatic punch in/out between any two points on the desired track. It also can perform automatic mute between any two points on a track to

remove undesired notes or noise, reducing the need to ride the faders.

The mixer section includes three-stage parametric EQ and two independent effects busses on each input. Sound quality is reported to be excellent, thanks to dbx Type 1 noise reduction, a "Lambda Loading Mechanism" that assures outstanding tape-to-head contact, and a stable tape transport.

Other features include a real-time digital tape counter, auto memory, manual memory, search, repeat, and programmable channel/track selector. The AKAI MG1212 sells for around \$7000.

Compusonics Floppy-Disk Digital Audio Recorder

Here's an amazing new product that records music digitally on a magnetic floppy disk. The Compusonics DSP-1000 converts an analog signal to a 16-bit linear digital signal. Before storing the data on disk, it removes signals that are inaudible due to masking, temporal fusion, or other reasons. This procedure greatly reduces the amount of data to be stored on disk. Data reduction is necessary to fit several songs on a "superfloppy" diskette, which will hold 50 megabytes.

The device digitally analyzes the audio signal into 128 frequency bands, then generates three sets of data:

1. A bit stream representing the overall level of the audio signal at 0.01-second intervals.
2. A bit stream indicating which frequency bands contain audio.
3. A bit stream indicating how the amplitude of each band changes over time.

This information, which contains much less data than a regular audio signal, is stored on disk. During playback, the three bit streams activate a bank of 128 synchronized digital oscillators spread across the audible frequency range. The ear hears these oscillator signals as the original music, at least in theory.

The DSP-1000 is expected to be introduced to the consumer market in the first half of 1985, selling around \$1000 to \$1200.

We've described several new ways of recording music. Most of them involve computer memory, computer-controlled oscillators or digital recordings of real instruments. Clearly, the marriage of computers and music is bearing amazing offspring.

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Studio Notebook

The First MR&M Independent Release Contest

After the recent Design-A-Studio Contest, I made a promise to myself never to be so devoid of sanity as to ever again dream up another contest that would eat up months of my time, gallons of my sweat and most probably years off my life. I don't care what the editors of MR&M think, I'll be tied to an ant hill, boiled in oil and forced to watch Doris Day movies until the end of my existence before I'll ever be so foolhardy as to even consider the possibility of another contest for MR&M's readership. Nothing is going to move me from this position. My feelings are etched in stone. So there.

Well, what the hell. I can't think of anything else to write about so let's have another contest. What do you say?

Sometimes it's all too easy to forget that in spite of all of the necessary emphasis that is placed on technology and technique, the final proof of any studio's pudding is the product itself. Skip to the back pages of this magazine (no, no, not now!) and you'll find the obligatory reviews of current record releases from the great and near-great recording companies. While all of this is well and good and both novice and veteran audio engineers can certainly learn from the expertise of the meter jockey's at Columbia, EMI, and Polygram, a bit of recognition for the efforts of the 'little' studio operators of the world is long overdue. Who is to say which is easier; Churning out (yawn), yet another hit in a state of the art, 32 track digital equipped studio facility or trying to coax one last keeper take on the eight track in your basement before your mother-in-law flushes the toilet upstairs and ruins everything?

Readers who write in and wonder how record reviewers can be so harsh in their appraisals of new record releases should remember that the major recording companies and megabuck studios have

every advantage that money can buy on their side. In spite of this, (and personal taste in music aside), even the big boys will occasionally scoop out a product that literally sounds like it belongs on a shovel. I'm a firm believer that the most innovative and imaginative audio recording work being done today is presently being gutted out in basements, garages and back breakfast nooks from L.A. to London, and Paris to Peoria.

So how about a few strokes for the small studio owners of the world? Better yet, how about a contest that lets them strut their best stuff? (I'm glad you asked!) We are now pleased to announce the first Modern Recording & Music Independent Record Release Competition for that very purpose. Any disc release by any small studio and/or independent record company is eligible for entry. What do you win you say? (I'm glad you asked!) All entries will be considered for an upcoming feature article listing the top ten L.P.'s and ten best 45 discs received in the competition. (Sorry, no master tape dubs. Cassettes will be accepted if professionally packaged and obviously meant for commercial release and retail sale.) In addition to the record itself, we'd also like to shine our spotlight on both the artists and the studio that did the job right for them. The object is for all of us to learn from each other, so don't be afraid to include the story behind your recording (including the names of your engineer and producer).

In not necessarily any order of importance, all entries will be judged on musicianship, creativity, fidelity of recording, professional appearance of presentation and the gut reaction of the judges to the content of the recording. A professional appearance does not mean how much money was obviously spent on art, layout and printing services for the L.P. jacket or 45 sleeve. We will be making a conscious effort to

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stress innovation over a fat-wallet production budget. Besides, we have all seen hot looking jackets that serve only to masque a recording that sounds like dog barf.

Why not include any promotional materials that you would normally include with the disc when you send it to anyone you want to give a serious listen to your work. We'd like to see any press jackets, artist photos, ad copy, T-shirts (Hey, for my mother!) and promo materials you've used to help further the cause of your music. If you're the studio behind the music, we want to know all about you as well. What equipment was the disc recorded on originally? Who mastered the record? Who did the pressing? Any problems you'd like to avoid next time? Anything you'd do differently? What's next on your studio horizon? How about some photos of your facility? Now's the time for personal horn-tooting, so let's see some extroverts out there!

How long do I have to enter? (Again, I'm glad you asked!) We're setting a September 1st, 1985, cut-off date for receipt of any entries.

Send all records to me c/o Audio Associates, 3200 O St., Suite 2, Lincoln, Nebraska 68503. (Anybody who sends me anything with postage due on it will see his entry again when the postman brings it back to you.) Hopefully the article featuring the winners of the contest will hit the stands in the December '85 issue.

What about E.P. releases you ask? (Jeez, you're full of questions this month!) E.P.'s are A-O.K. They will be included in the 45 category unless enough entries are received to warrant their own top ten rankings.

All judges' decisions will be final. All discs will be judged by a panel of radio programming managers, audio engineers, producers and professional musicians. Any squabbling between the judges will be settled by my mother, whose decision will be final. (Even God is afraid of my mother!!!)

All entries become the property of Modern Recording & Music Magazine. This competition is void where prohibited (somebody please write me and tell me where that is!) and all employees of Modern Recording & Music Magazine and their families are ineligible for entry in the competition.

So that's about it. As with the Design-A-Studio contest, I expect that even those entries that might be nipped out of the top ten ratings could still make the special 'almost-ran' category for particular aspects of excellence. You'll never know unless you enter, right?

So what are you waiting for? Fame, fortune and seeing your name in print are right around the corner. A couple dollars worth of postage could be the ticket to ride for your studio, your record label or your music. Who knows, we all might learn something along the way, too.

As for me, I'll be laying in my supply of No-Doz, ear-drops and warm milk. Okay, okay, so my resolve broke down. I'm only human and I'm willing to pay the price. I think I can handle the ant hill and I'll keep my mouth shut while you bring the oil to a boil. Just don't make me sit through all those Doris Day movies, please? I'd rather share a hot tub with Idi Amin!

See you next time.

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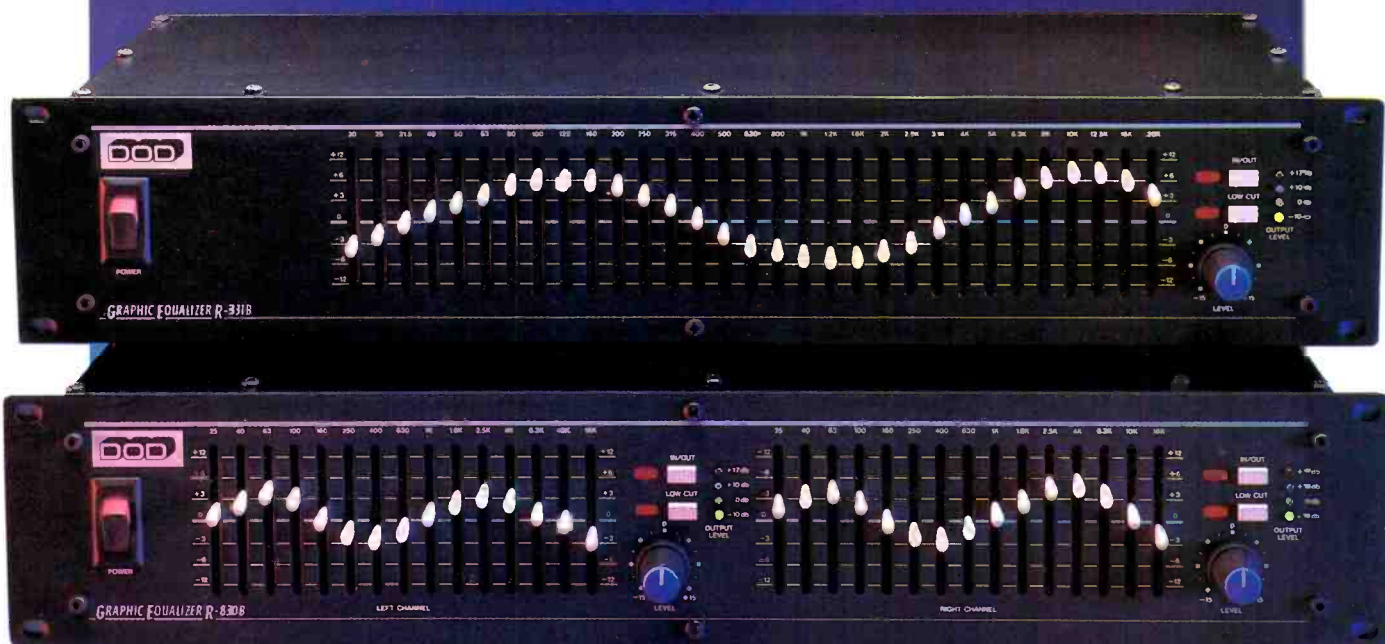
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Musicians Notebook

The E-mu "Emulator II"

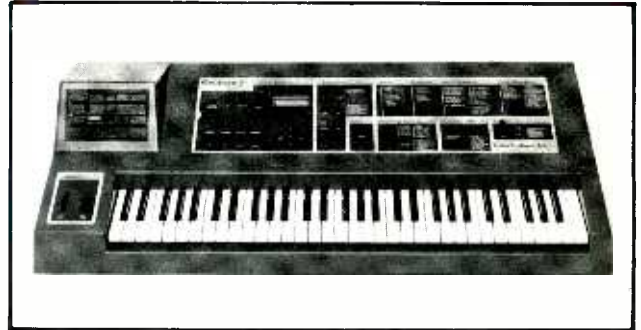
What is it? The Emulator II is a second-generation (and vastly improved) version of the Emulator, a polyphonic sampling keyboard introduced by E-mu in 1981. Rather than synthesizing sounds, the Emulator II digitally records ("samples") real-world sounds into its Memory Bank. If you want the Emulator II to sound like a piano, sample a piano; if you want it to sound like a barking dog, sample a dog.

Sampling in the Emulator II works by examining the signal level 27,500 times a second, and sequentially recording these different levels in computer memory. A total of 17.6 seconds of sound can be sampled; this time can be divided up any way you like (ten 1.76 second samples, eighty-eight 200 ms samples, etc.). Once stored in memory, these samples may be played back (in the proper sequence, of course) to reconstruct the original signal, or they can be modified. For example, playing back the samples in the reverse order from which they were stored plays the sound backwards, playing back the samples at a faster rate than the rate at which they were stored increases pitch, and playing back at a slower rate decreases pitch.

A sampled sound (E-mu calls it a *Voice*), which represents one specific sound, can be assigned to a single keyboard key or transposed over as much as two octaves, then modified with conventional analog synthesizer processors and/or state-of-the-art digital processors (more on both of these later). However, wide-range transposition alters the Voice's timbre, so in many cases Voices are transposed over a limited portion of the keyboard—typically an octave or half-octave. Therefore, in order to have a keyboard full of sound (as required for live performance situations), it is necessary to combine these various Voices into what is called a *Preset*. This involves creating, numbering, and naming a Preset (up to 99 total), then assigning the desired Voices to different ranges of the keyboard. For example, with five Voices you could assign each Voice to cover one octave of the five-octave keyboard. Also, Voices can be assigned to partially or fully *overlap* other Voices, thus producing doubling (layering) effects. This assignment process also leads to advanced split capabilities—record a different sound on *each note* of the keyboard, or split in more conventional ways (i.e. cellos in lower octaves, violins in upper octaves).

This may all sound pretty complicated, and the Emulator II is in fact a very deep and multi-leveled instrument. Luckily, there is a back-lit LCD display which prompts you every step of the way, and makes the Emulator II much more "user-friendly" than you would expect from an instrument of this complexity.

We'll talk some more about Voices and Presets in a bit, but first, let's consider how the Emulator II is organized from a functional standpoint.



The Emulator II's "Modular" Organization. The front panel is graphically divided into *modules*, with each module affecting a certain section of the Emulator II's operation. The modules are:

Master Control. This includes controls that affect the entire keyboard (such as Tune, Volume, and Transpose), a ten-digit calculator-like keypad, the display, and four sliders which set variable parameters. While, like other parameter-controlled synthesizers, you have to call up a parameter before you can modify it, having four sliders makes it possible to alter four parameters at once (such as the attack, decay, sustain, and release functions of an envelope generator). To me, this is a welcome improvement over one-parameter-at-a-time devices.

Disc. The Emulator II used standard 5¼-in. floppy disks to store Voices, Presets, and other information contained in the Bank. Sounds may be stored on disk, read back from disk, catalogued, and more. There are two types of Emulator II disks. Performance disks and Library disks. Performance disks save Bank information (Voices and Presets); since the Performance disk contains a record of the Bank data, playing the disk back into the Bank transfers all the Voice and Preset data back into the Bank. Therefore, you can work a Bank of sounds out at leisure, and save the results of your work on disk. When you go to a gig, simply take the Performance disk with you and load all your hard work from disk into the Emulator II in about 20 seconds.

Library disks record and play back *Voices only* and contain no Preset information. They are useful when building up a library of "raw" sounds. For example, you might want to sample an instrument, but are unclear about what kind of Presets you want to make up from these sampled Voices. Simply save the individual Voices to the Library disk, and then load them into the Bank at a later date when you want to create some Presets. And, if while creating the Preset you process the Voices beyond all recognition, you still have the original Voices preserved on the Library disk.



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- Killer Sound

Why even consider a re-built old 2" machine? At two, three, even four times the price, it won't sound as good as the B-16. And it won't even perform as well as the B-16, configured with some of the options.

For example, the model with independent tape monitoring is really a whole package:

- direct drive capstan motor with phase locked loop speed control
- 7" rack mount unit with 16 independent channels of decode & reproduce (defeat switch)
- remote control unit with individual track select buttons, headphone jack and level control, line out jack and a VU meter for fast alignment

You'd have to pay almost ten times the price of a B-16 to get this kind of dedicated monitoring function. Tape reproduce is entirely separate from the record/sync electronics.

Which makes the compact B-16 perfect for live audio and video remotes. It even handles.

And it's as easy to use as it is to own. You can expect nice user-friendly touches like:

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Sequencer. This module was not implemented as of mid-January. However, I did see it running down at E-mu; basically, it's an eight-track solid state recorder with features such as SMPTE and MIDI control.

Filter. This dynamically changes the timbre of any Voice or group of Voices via lowpass filtering. Features include variable cutoff, variable Q, variable envelope amount (normal or inverted), variable keyboard tracking, and LFO modulation; there is also an associated ADSR envelope generator.

VCA/LFO. This changes the attack/decay/sustain/release characteristics of any Voice or group of Voices by modulating the VCA with its associated ADSR envelope generator. This module also sets most LFO parameters, which include rate, delay, and speed variation. With the latter, you can have anywhere from subtle to drastic changes in LFO rate as you play different keys—I wish every synth had this feature.

Voice Definition. With this powerful module: 1) You may edit a Voice's length; 2) Loop (e.g. infinitely sustain) any portion of the Voice (with several different looping options); 3) Have the Emulator II automatically find the best loop points ("Autoloop"); 4) Adjust the relative mix of various Voices, save Voices to disk, and 5) Perform other Voice-related operations.

This module also sets independent keyboard touch sensitivity for *each* Voice for each of several filter and VCA destinations (VCA level, VCA attack, VCF cutoff, VCF attack, and VCF Q), and programs the mix (audio balance) for the Emulator II's eight output channels (described later).

Preset Definition. This module does all the "housekeeping" for the Emulator II: Name Voices or Presets, erase them, copy them, assign Voices to different places on the keyboard, "catalog" the names of Voices and Presets stored in the Bank, etc. Other Preset Definition functions include MIDI and arpeggiator selection, as well as three keyboard-related special effects (velocity switch, velocity crossfade, and positional crossfade).

Sample. This "recording studio" module records sounds from the outside world into the Bank. Features include adjustable preamp gain, variable threshold setting, and adjustable sample length.

Special. This module mostly contains test routines. However, because of its computer-based nature, the Emulator II can be updated easily and this module will allow access to any new functions.

Real-Time Control. This assigns different destinations (pitch, filter cutoff, VCA attack, level, LFO modulation, etc.) to your choice of the two modulation wheels (located at the left of the keyboard), foot pedal, or three MIDI control channels. In addition, two programmable footswitches give real-time control over sustain, release, *sostenuto*, Preset advance, and sequencer functions.

Finally, the **Enter** module lets you enter data into the Emulator II by pushing a button.

You "activate" a module by pressing its associated pushbutton; the module LED then lights to let you know the module is active. At this point, the display asks you to key in the function you want to implement or parameter you want to modify. The front panel includes a printout of these functions with the numbers you need to key in (a la Poly-61, Six-Trak, etc.), which keep you from having to constantly refer back to the manual. Usually the display will prompt you as to what to do next. For example, if you call up the filter parameters, it will tell you which slider affects which filter parameter, and indicate the parameter value.

Once loaded in the memory Bank, Voices can be sent to the Analog and Digital Processing modules mentioned above. However, it's important to note that *each* Voice in a Preset can be modified independently—you can even go so far as to exempt certain Voices from real-time control (i.e. pitch bend the upper keyboard Voices without pitch bending the lower keyboard Voices). As a result, part of the processing routine is to specify a "Current Voice" which can, with a couple of exceptions, be a single Voice, multiple Voices, or the entire keyboard.

The Output Channels. The Emulator II has eight channels, so you can play up to eight notes/sounds simultaneously. Naturally, there is a separate VCA/VCF/LFO for each channel. Each channel has its own output jack, and there is also a master output which mixes the eight channels together. Individual Voices can also be restricted to particular channels, which is particularly useful with the sequencer when you want to plug each "track" into a mixer independently.

Conclusions. The Emulator II has obviously been designed with the future in mind. There's an RS-422 interface, and additional processing software is being written which uses an Apple MacIntosh in conjunction with the Emulator. All in all, the Emulator II is quite an instrument.

So what don't I like? First of all, it takes about 20 seconds to load Banks from Performance disks. Since these don't necessarily hold lots of different sounds (for example, with a complex sound such as piano there's not much room for other samples), this means that you cannot switch sounds as fast as you can with, say, a programmable synthesizer. Second, the process of sampling and creating truly fine Presets is very time-consuming. The Emulator II's flexibility, while offering staggering creative possibilities, also means that there are a LOT of parameters you can adjust. I'm sure this will discourage some musicians from using anything other than the factory sound disks, but they would be missing out on what makes the Emulator II such a special instrument. I'm no fan of parameter-controlled synthesizers, but at least with the Emulator II you end up with sounds that are well worth the effort.

At \$7995 for the single disk drive version (add \$650 for another drive), the Emulator II is clearly not for the casual player. But I must say I've had more fun with this thing than I have since I got my first polyphonic synthesizer, and that's saying a lot. Sampling is a powerful technique, and the Emulator II is an equally powerful musical instrument.





Taste the Hot One

The Electro-Voice PL78

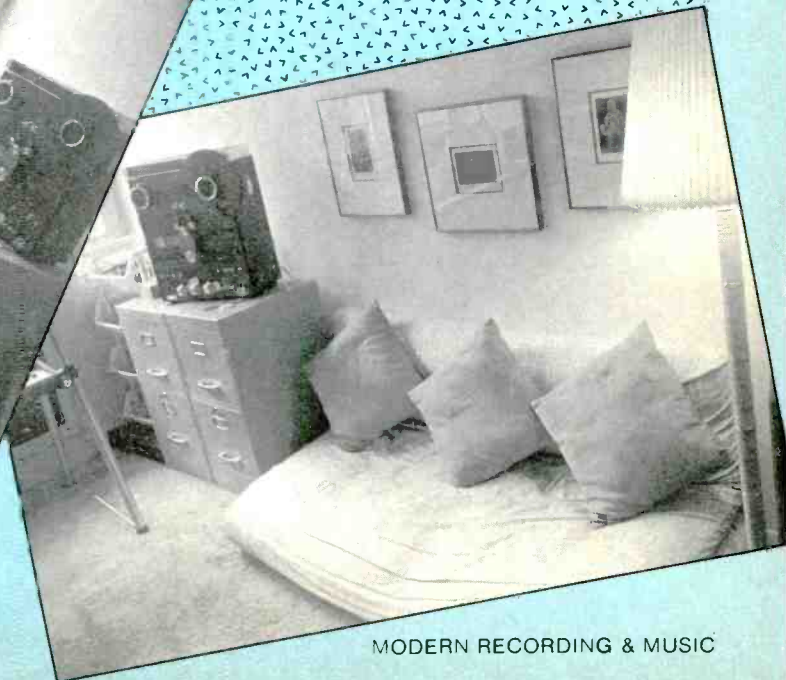
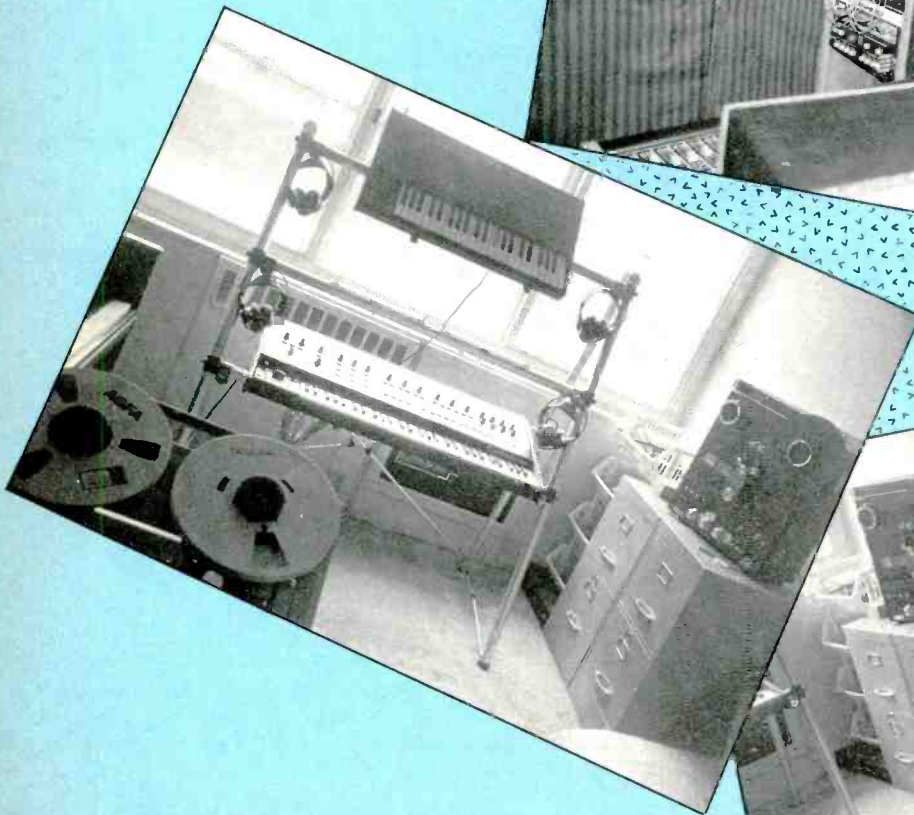
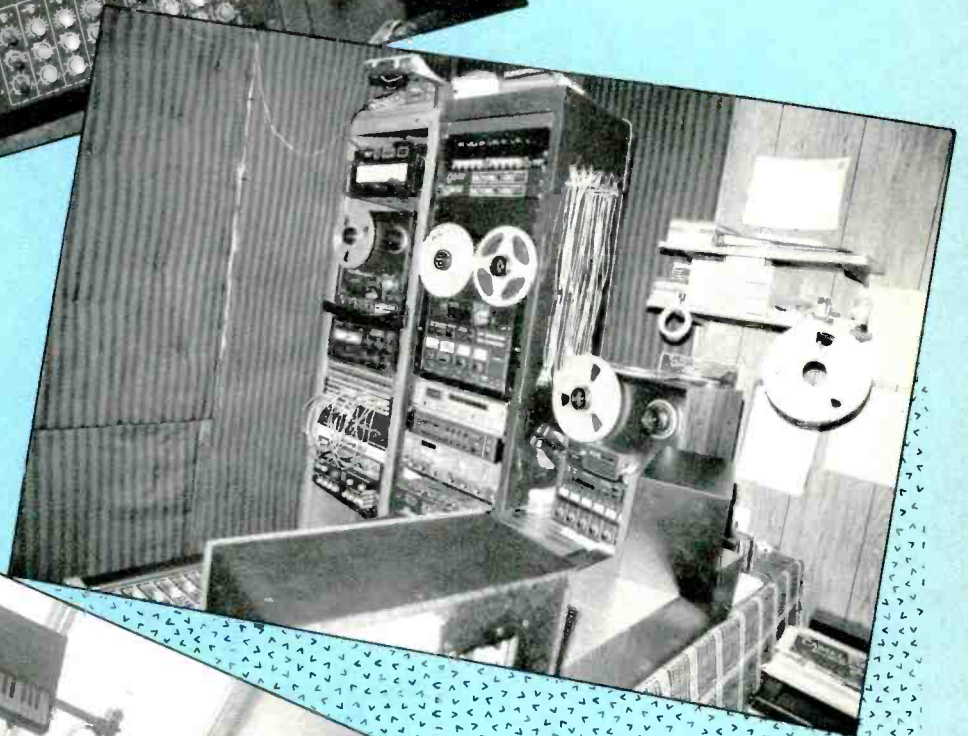
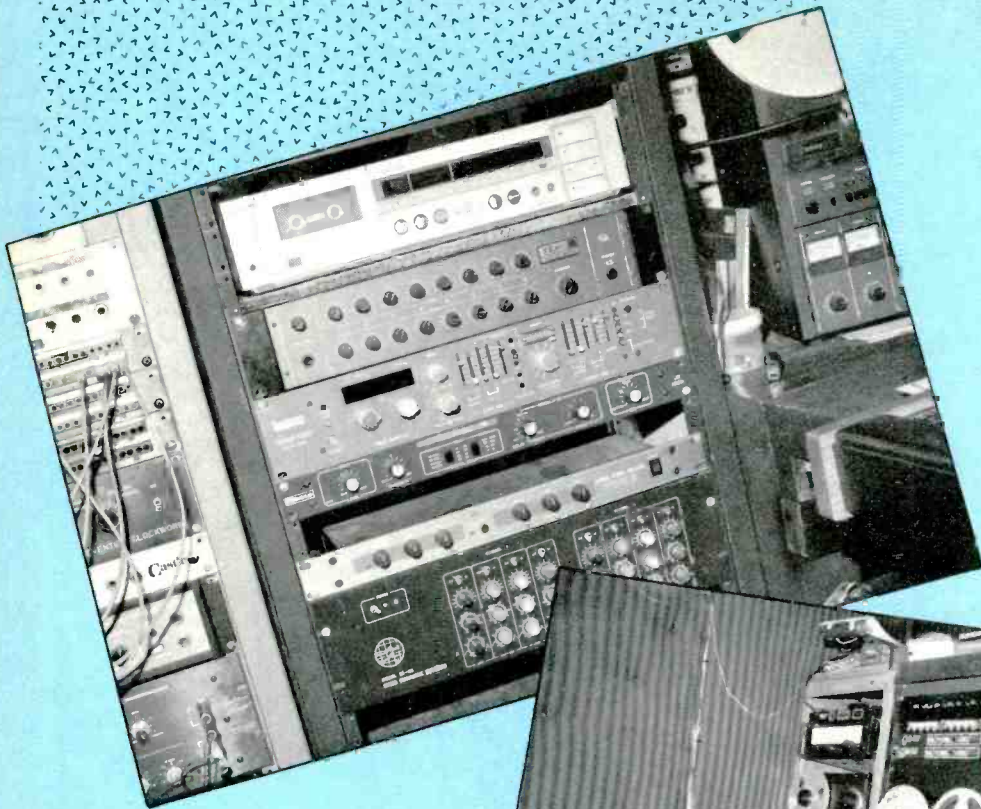
Rock it hard and the PL78 dishes it out . . . with no overload, no distortion. This hot, new performer has wide dynamic range that handles blasting vocals or the most explosive percussion.

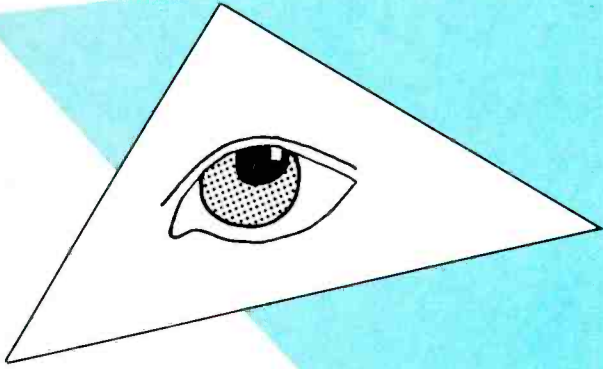
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A Look Into Small Studios

We at *MR&M* have received a decisive reply from you, the personal/home studio owner/operator, in regard to your interest in trading recording secrets and methods as well as sharing your experiences. First off, we would like to thank all of you who contributed your feedback to our recent survey. Although we were delighted with the incredibly positive response, we noted an overwhelming desire for more information on what's happening in other small studios out there. Never to be accused of not being able to take a hint, we went out there to give you an account of three small studios and their owners. So read on for the inside story on small studio techniques, procedures, finances, troubleshooting, and repairs—just to name a few of the topics covered. We're sure you'll recognize many of the same problems and pleasures all small studios owners share today...

Our first stop is "White Cloud Studios" of Uniondale, N.Y. owned by Philip Antonucci and Howard Stein. Stein teaches a private one-on-one studio course and has hired one of his long time students, John J. Lupo as an engineer. All of these gentlemen have other employment. Stein is an audio engineer for the Madison Square Garden Sports Network (sound for sports) and Antonucci is a full-time musician/songwriter. The studio itself was established over 5 years ago, although both owners have been collaborating via home basement studios for many years.

Stein was a full-time electrician for several years and wired up the studio for efficiency and convenience. He even installed a mic input bay directly over the patch bay for a variety of useful applications, (Phil sometimes records himself singing from the control room).

To go through every piece of equipment that these guys own would take quite a bit of space, and, while we would like to, we just can't fit all of it in.

Firstly, their console, the Carvin MX1688 requires the attention of anyone interested in having the most versatility for the least amount of dollars. Carvin has constructed a modular console with individual circuit boards for each channel and each master strip along with quiet ITT Schadow switches. The tape machines in use at White Cloud are the Tascam 80-8 and, for mastering, the Tascam 25-2 with Ampex tape being used on both machines. Monitors in the control room consist of Altec 604s, and the near-field monitors are the Yamaha NS10s.

Now for some of the outboard gear: To start, Lexicon's Prime Time and DeltaLab's Effectron headline the delay units along with MicMix's Plate Reverb. The MXR Pitch Transposer with four presets, (which the guys really like to work with) along with Eventide and Castle phasers are in the rack with Ashly Audio's parametric equalizer and compression unit. *White Cloud* would also like to add that they have used the Aphex Aural Exciter and have received noticeable results. Headphones presently in use in the studio are Beyer DT 100s. The microphones being used include Sennheiser's MD421U, Shure Bros.' SM-57, SM-58 and SM-7, Neumann's U87 and others.

Musical instruments available in the studio are: Gretsch drums, a Korg Poly 6, Marshall amps, an Ampeg B-



Control room at White Cloud.

15, Pignose amps, a Hammond organ, a Rockman amp/processor (by Tom Scholtz), MXR's drum machine, and a baby grand piano.

Some years ago, Stein and Antonucci started in their respective basements, then with money made from gigs and other jobs, they gradually invested in equipment without taking out loans or going flat broke. Eventually they decided to combine their equipment and relocate in a place where they could eventually build up into a financially functioning studio. That

they did. The studio today is comfortable and conducive to good recordings. The actual area in space distribution is spread out with emphasis on giving the musician plenty of room. An isolation booth is also available and often used for vocals, guitars or special effects.

After doing recordings for more than five years, they have established what they call a "pre-production" meeting. These roughly one hour meetings are afforded to the client for no charge and are keyed into the



(l. to r.) Howard, John and Phil.

effective use of the studio within the given budget. The topics covered in the meeting will include: equipment preparation (squeak-free drums, short-free guitar pick-ups); proper tuning techniques; serious work attitudes; good physical health (no smoking or coffee—it's bad for the throat!); well rehearsed music; a general explanation of studio procedure (rhythm tracks, overdubs, etc...); and the session objectives (number of dollars vs. the number of selections to be recorded). Production services, (for a small charge) are also offered to all clients.

White Cloud has tried advertising many times in different forms. Thus they have determined that money is better spent on equipment rather than on advertising. Satisfied clients bring return gigs, and word-of-mouth advertising from existing clients can fill their schedule adequately.

One point which was especially stressed was that of educating musicians and producers. From their experience, with the industry (record companies, A&R people...), a 24-track, state-of-the-art demo recording is not required. The key to presenting a demo is offering an idea for the record company to mold for their standards and ideas, and, to give some work to their staff arrangers and producers.

We all know that this point is not always acceptable to the writer/musician, but the question of priority is between *creative principle* or *recording contract*. Another facet of the musician/producer education meeting is the pre-planning of bouncing tracks and other conservation (time and money) techniques. Education for free is more rare than free studio time and those who take heed to all of the information available usually end up with admirable recordings in a brief amount of studio time (that means *less MONEY!*)

White Cloud has a very diverse clientele and do the utmost to fulfill the needs of all. From puppet shows, religious programs, and ethnic bands to childrens music, pop tunes, jingles and, of course, the heavy duty rock-n-roll groups. Some artists and producers who have worked in this studio include: L.I. All-Stars (Billy Joel's band); Gene McDaniels (producer of Roberta Flack's "That's the Time"); AntKnox songwriting; and Trend Set Productions doing ads for various NYC nightclubs, Ben's Kosher Deli, Leathers Only and New Merritt

Lighting. This studio has even accommodated a full high-school band and the Nassau Community College Jazz Ensemble.

Future expansion plans are on the drawing board for Howard and Phil at *White Cloud Studios*. They include a 16-track tape machine with the SMPTE lock-up plus more outboard gear with improvements and updates on existing equipment.

Now to move on to the second studio, *Adsounds*, Rich Martin's 8-track personal/musician studio that's been in business for two years

in Manhattan. Martin is involved in some nationally broadcast campaigns and also works in the major studios of NYC. He doesn't have a studio which is open for booking sessions, but rather a personal studio which meets professional standards and is the arena for creating quite a few state-of-the-art jingles.

Some of the equipment in the studio starting with the console is the Soundcraft 200 Series 24x4 which is a neatly packaged board that needs no explanation at all. The Tascam 48 8-track tape recorder has had the

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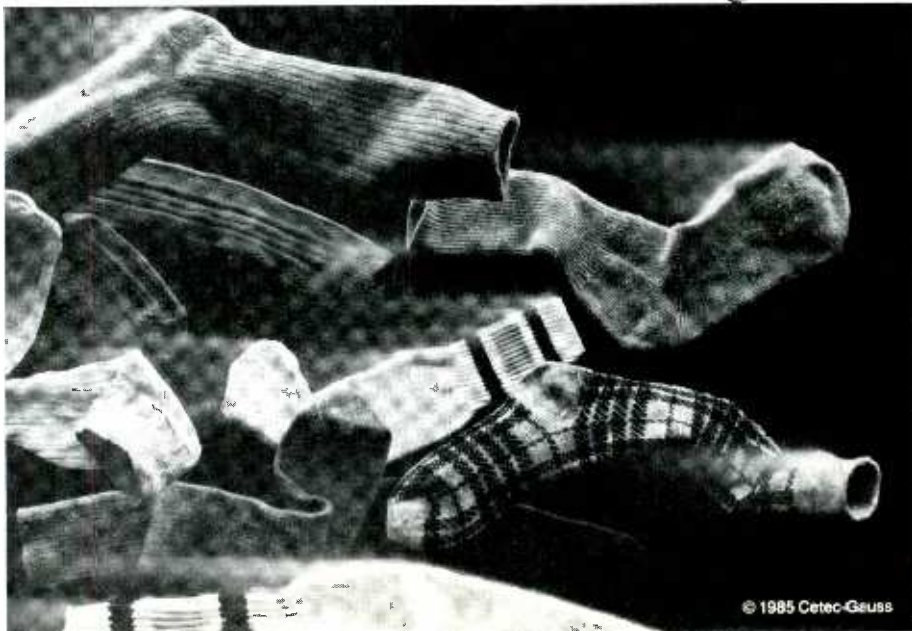
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bias set to accommodate Agfa tape and performs just wonderfully with it. For mixdown, the machine is a Technics RS 1520 half-track, also using Agfa tape. The monitors are the Tannoy SRM 10Bs along with Auratone comparison monitors. These Tannoy near-field monitors have an acoustically satisfying sound when sitting at the console and give a great end-to-end frequency response even at the low levels that they normally operate at. Surrounding the monitors, in an area of about 4-ft. by 4-ft., is Sonex acoustic foam (distributed by Alpha Audio). The noise reduction system for both the 8-track and 1/2-track machines is by LT Sound (he believes this system to rival or better *dbx* and if you could hear the lack of tape noise you might agree).

Now for the outboard gear. The amplifier system consists of Hafler and NAD amps which drive the speakers and headphones with the utmost of cleanliness. Martin and his engineer Greg Curry explained that the equalization of the monitors is something that can't be taken lightly and shopped quite a bit before deciding on 2 White 1/6 octave room equalizers (they spent 2 1/2 hours with an analyzer and the EQs after installing them). Another piece of equipment by LT Sound is the CLX 2 stereo compressor/limiter/expander, (see NOV 83 *MR&M* Lab Report).

Adsounds has an excellent selection of delay units. The MXR 01-a digital reverb is their primary unit while they still use the DeltaLab Super Time Line delay and the Biamp MR140 spring reverb. In addition to the delay units, Rich has



Studio area with a combination of reflective and absorptive surfaces.



Adsound's mixdown position. 8-track is stored neatly underneath and the LinnDrum is kept on sliding shelf.



Monitors form a 1 meter equilateral triangle with the engineer's head. Equipment rolls into a convenient position for recording.

an Aphex Aural Exciter (type B) along with the Ashly Audio parametric equalizer. Although there aren't many microphones, the AKG C414 is used in almost every application possible.

Synthesizers which *Adsounds* have available are the Yamaha DX7, Oberheim OB8 and Korg Mono/Poly. Rich also has a Linndrum as well as an upright piano. Plus he added that any instrument or piece of equipment can be rented if necessary.

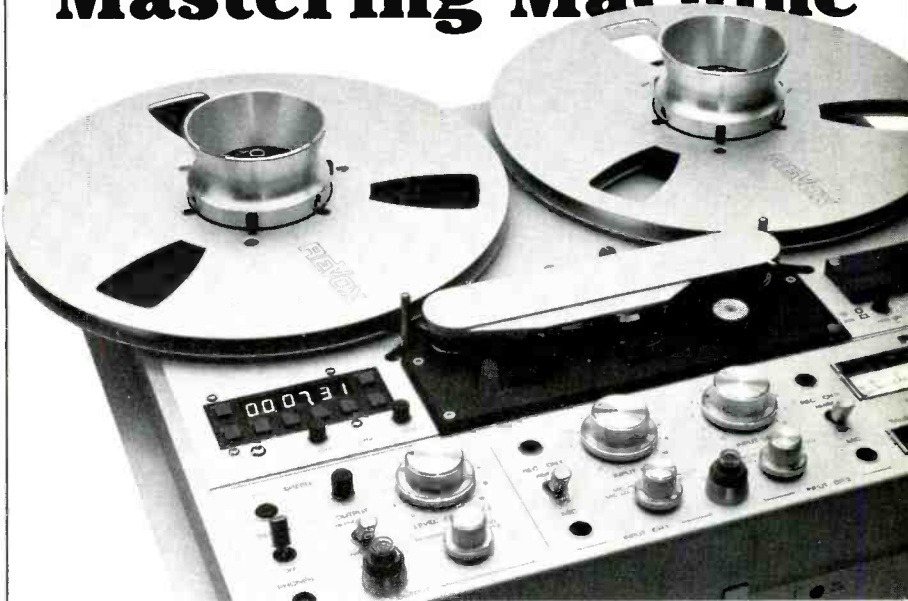
As mentioned before, Martin has been involved in some prominent broadcast campaigns across the nation but most of his business comes from smaller advertisers who have limited budgets. Martin decided to build a personal studio which meets professional criteria, and his motivation was to record advertising music demos for clients at his convenience, spend time experimenting with unusual recording techniques or producing friends' projects, and get some hot performances on tape because the people are really relaxed. The atmosphere is literally homey.

Another key point to having a broadcast standard personal studio is, except for a few situations, that results achievable are nearly indistinguishable from the technical quality of similar advertising music recorded in 24-track studios.

The following 7 tips are printed courtesy of *Adsounds* and their consulting engineer, Greg Curry. #1 Set up a monitor system which is accurate at the mixdown engineer's position. Be prepared to spend some money. Also, set up and use a second set of small monitors to test the TV/Car speaker mix. #2) Build a logical and flexible patchbay. #3) Fight noise on all fronts. Buy a good noise reduction unit for both the 8-track and 2-track decks. Eliminate ground loops. Use expanders/noise gates. Align decks and NR units and keep them aligned. #4) Splurge where it counts. Buy the best reverb (least noise/most clarity) you can afford, at least one superior multi-purpose microphone (like an AKG C414) and a good drum machine. Set-up a clean, comfortable cue system for the singers and performers. #5) Shop for an equipment supplier who'll give good advice, service and prices. After several months of looking, *Adsounds* found National Sound Engineering (4318 Shady Drive, (Lilburn Atlanta, GA. 30247 ATTN: Tom Hayward). #6) Dedicate yourself to discovering and master-

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ing the recording/mixing techniques and vocal/instrument arranging skills that work best in the 8-track format. This is a tall order, but is the bottom line in many ways. #7) Hire a qualified engineer for assistance with all the above!

Future expansion for *Adsounds* is not on the blackboard yet, but Rich mentioned a few things that he keeps in the back of his mind. For example, if a digital 8-track were to come out and be cost effective. Other than that, he feels if he can't do something at

home, it'll have to be done in a 24-track studio. Outboard gear, well he thinks that maybe he'd try different digital reverbs or other mics but no big purchases. Martin, being a keyboardist, did say that the dream of having a Fairlight or Synclavier is always present.

Brendan O'Keefe Productions, located on Manhattan's upper east side, was developed as a keyboardist's studio (as you will note in the equipment inventory) and has flourished into a fully operational 8-track

studio. Classically trained at Mannes College, he has been in the music field for several years in different capacities. O'Keefe is presently teaching approximately thirty students, as well as performing, writing, engineering and producing at his facility.

The console is the Tapco C-12 Series II (12 x 4). O'Keefe's 8-track tape machine is the Tascam 80-8 and his ½ track is the Tascam 32. Both machines are operated with Ampex 456, ½-in. and ¼-in. tape. The monitors are JBL 4401 speakers with a rated frequency response of 70 Hz to 18 kHz ±3 dB. The headphones used at this facility are AKG's K-240 circum-aural type. The noise reduction system that's being used with the 80-8 tape recorder is the DX-8 by dbx. The lineup for outboard gear is as follows: DeltaLab's ADM-2048 and the Ibanez DM 1000 digital delays along with the Furman R2 reverb unit. The compression unit is the dbx 119. The studio also has an Aphex Aural Exciter (type B) and a Fostex 3010 patch bay. Most instruments (with the exception of acoustic drums and vocals, etc....) are directly connected to the patch bay or console but when a mic is needed, he'll use a Shure Bros. SM-57.

The instrument and associated equipment list is fairly extensive and gives all clients a nice variety of tools to work with. Yamaha's DX-7 (quickly becoming an industry standard), Oberheim's OBX-a and OB-1 along with Octave-plateau's Voyetra Eight are the keyboard synths available and are used with Oberheim's Xpander and DSX sequencer. The studio also has a contingent of electronic and acoustic drums including: Simmons SDS-8, Oberheim's DX and DMX drum machines, Remo Roto-Toms and a full Ludwig drumkit complete with Zildian cymbals. A Baldwin piano and a Hondo II electric guitar are on the studio



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premises as well. In the very near future (by the time you read this) the Octave-plateau Electronics 64-track sequencing software program will be available to be used with all MIDI equipment or an IBM personal computer (see *MR&M* JAN. 85 software directory).

This particular establishment developed from a TEAC Model 3440 4-track tape machine and a collection of synthesizers. After doing some recording projects and some influencing from associates, O'Keefe began to steadily accumulate the

necessary equipment to fulfill his recording needs and shortly after realized he had the foundation of a recording studio. His personal attitude towards buying equipment is to buy in bulk and haggle the price down (the salespeople tend to help multiple-purchase customers). The capital for the equipment came from sessions, gigs and students.

Teaching has been a part of this unique studio since its conception. O'Keefe's classes have primarily consisted of standard piano lessons but he also has students playing

synths to familiarize as well as adapt their ears to the different sounds. One thing noted was that although most students don't usually get to sit down and play a harpsichord, with two flicks of a switch (the power and patch number), a synthesizer can sound just like a harpsichord though not quite the same feel on the keys. A relating point is the effect of hearing a harpsichord plucking sound while executing say a baroque piece. The student can then develop a "feel" for the particular style whatever it may be (without ever actually playing the instrument). Composition is another branch-off from having a studio for teaching. Sequencers and tape machines, as well as a solid music theory background, are excellent tools for analyzing composition and O'Keefe commented that even his youngest students are composing and practicing longer (a teacher's dream!)

Brendan O'Keefe Productions has an impressive list of clientele in music as well as film and video. In the area of film/video the studio has handled such projects as: "Out of Step" an ABC film, "How to be a Perfect Kid" a PBS film, sound effects for a dramatic play named "Cloud Nine," plus slide presentations for both the Red Cross and Jet Magazine. In the music category, artists such as: Will Lee (solid bass player of David Letterman's Late Night Band), Michael O'Keefe (actor/singer appeared in the movies *Caddyshack* and *The Great Santini*), Alan Murphy (*Village People*), Rick Martinez (*Blood, Sweat and Tears*) and Bobby Stewart (SOS Records single "Copyright on Love"). Demos have been sent from Brendan O'Keefe Productions and accepted by the following companies: ABC, Arista, Sid Bernstein, CBS, Island, MCA and RCA. One project that was unique to all of these was music/sound effects for an Alvin Ailey Modern Dance (modern ballet) video.

Formerly with the jazz fusion group, Nite Sprite, O'Keefe's future plans include: getting his studio completely MIDI and SMPTE functioning, pursuing more jingle production and purchasing a number of items like a 16-track Fostex tape machine, a digital sampling keyboard, more microphones, outboard gear, software programs and a Rockman amp/processor.

Modern Recording & Music would like to thank these studios for their cooperation and wish them success.



Brendan O'Keefe at work on the Yamaha DX7.

Remixing with Jellybean

bob grossweiner



photo by Chuck Pulin

John "Jellybean" Benitez and David Byrne remixing "Slippery People" at Sigma Sound Studios in New York.

Remixers, a breed of mixers who expand and rework album tracks and singles into 12-inch dance records, began to demand more attention as street music made an impact on commercial music. Remixing came about when dee-jays experimented with various segues and gimmicks, like scratching records. Then some went into the studio and came up with totally new records, not just expanded sections via tape loops. John "Jellybean" Benitez is such a person.

Jellybean, a 27 year-old native of New York, considers himself an artist, producer, mixer, and dee-jay, but not an engineer. "My priority is to be a producer," he explains, "but my first love is being a club dee-jay. I'm still learning to produce. I went from dee-jaying to mixing to producing. I never got into engineering, but I hope to do so one day. I feel that if I was engineering and worrying a lot about the technical aspect, I wouldn't be able to concentrate that much on the creative aspects. It would make me think of things other than being creative."

Jellybean has gotten the opportunity to produce other artists simply because of his reputation. Those who he had already remixed for liked his work enough to let him produce a track or two for them. Now Jellybean has produced entire albums for some new artists like B-Movie and Maria Vidal.

And to make Jellybean's artistic palette even more complex, he has released his first album *Wotupski!?!?* even though he doesn't play any instruments, write, or sing lead vocals. However, he was able to recruit Marcus Miller, David Sanborn, Madonna, Dan Hartman, and Nile Rodgers as stellar sessionists for his album

The 12-inch dance market is incredibly unique, and according to Jellybean, "The record labels can see the potential of an artist reaching a youth market and being able to sell a few 12-inches that won't interfere with album sales because the market they're going for are not the people who normally buy that artist's record."

Modern Recording & Music spoke with Jellybean Benitez at his home studio, Sigma Sound Studio B in New York...

Modern Recording & Music: What exactly is remixing?

John "Jellybean" Benitez: It's the same as a mix, but the record has already been mixed or released. They want me to take a new approach to a record that is already finished and look at it from a different perspective. When I do a 12-inch mix, I make it more accessible to the dance floor. A 7-in. mix is a lot different than a 12-in. mix, and it's called a remix because that's what is being done. But a remix should actually be a 7-in. record used again as a 7-in. record. Since this is the first time it's being used as a 12-in. record, it should be considered another mix.

MR&M: Okay. But are all remixes intended for the dance floor?

Jellybean: No. Sometimes my 12-in. (dance) remix becomes the 7-in. as well...

MR&M: That's if it hasn't been released yet as a 12-in....

Jellybean: Yes... I see it as a trend that is starting to develop where the record companies market the 7-in. and 12-in. at the same time or within a week or two instead of releasing the 12-in. a month after the 7-in. is a hit. I also did a 7-in. remix of a ballad for Paul McCartney, which was used as a B-side of a single.

MR&M: Who hires you to do a remix?

Jellybean: Sometimes the artist, sometimes the A&R department of a record company, sometimes the manager, or sometimes the producer of the record.

MR&M: What do they generally ask you to do?

I feel that if I was engineering and worrying a lot about the technical aspect, I wouldn't be able to concentrate that much on the creative aspects. It would make me think of things other than being creative."

Jellybean: To make a dance mix of a record they feel has potential for the dance market, basically using it as a marketing tool to get more exposure for a record that is already happening. Then they hope to eventually sell some 12-in. records.

MR&M: How much advance notice do you normally get to work on a project?

Jellybean: About a week. Sometimes only a few days depending upon if the record is already released.

MR&M: What do they give you?

Jellybean: A master tape or a safety of the master of the mix, rough mixes if there are any available, and a cassette or album of the record to listen to if it is available. I use the multi-tracks and work from the 24-track or 48-track tape.

MR&M: What kind of mapping out do you do before remixing?

Jellybean: I listen to the record. I compare it to other records to see what's missing. I see what's happening in the clubs and the kind of reaction these records are getting on the dance floor. Then I compare what's missing with what's needed to be brought out in the mix to make it more competitive in the market place.

MR&M: How long does it take you to actually remix a record?

Jellybean: If it's a 24-track master, it takes about eight to twelve hours depending on how the tracks were cut. If they were cut badly, it takes longer to doctor them up. If they were cut really well, it might take less time. Some producers put two or three things on a track, and I use automation to bring up things—one EQ on a track might not work for all the instrumentations on the track or all the things I set up. So I have to bring up the different instruments on all the faders and that takes time because it takes more passes with the

automation and more EQ you have to set up. A 48-track master usually takes two days. I come in one day and do all the EQ's and mutes—turning off the instruments I don't want—and finish the mix the next day.

MR&M: Do you ever add instruments in your remixes?

Jellybean: Yes. On the Paul McCartney-Michael Jackson song *Say-Say-Say*, I added percussion because it needed to move a little more to make it assessible for the dance floor. The 7-in. was fine, but without any added percussion it wouldn't have charted as a dance record. There weren't enough interesting things happening on the record to keep the dancers interested. I needed to add percussion to add some rhythm—there were enough rhythmic things happening with synthesizers and guitars but not in the frequencies I needed so I used percussion (a la Ralph MacDonald).

MR&M: Were either McCartney or Jackson in the studio with you?

Jellybean: No.

MR&M: Did they like the resulting remix?

Jellybean: Paul McCartney said I could do whatever it took to make it danceable, which is what I did. When I met Paul in London a few months later, he said he liked it a lot.

MR&M: Have you ever removed things from a track?

Jellybean: I don't erase tracks, but I might not use them in the mix. I might replace things, like a guitar part. It's more adding than taking things out—I might open them for space though.

In Pat Benatar's *Love Is a Battlefield*, I took the emphasis off the tomtom effect that was used upfront in the mix. I took it out, and in certain parts, I took the drums out and just let the synthesizers and the guitars play the chords in certain sections.

There was so much coming at you all the time that on the dance floor you needed to give your ear a break and an opportunity to let the dancers get into the song. There were too many things going on which became anticlimactic. A lot of things—tom-toms and guitars—come in and out instead of playing all the way through.

MR&M: What did Pat Benatar think about the finished 12-in.?

Jellybean: She liked it. I put some reverse echo in the beginning of the song and played her vocal backwards as well as forward when she speaks in the beginning of the song. She found it interesting. I put a lot more echo in her voice than she is normally used to. She was one of the artists who understood what was happening and let me have the freedom to do a 12-in. She knew the mix I was doing was for the clubs and not radio unless it got a lot of R&B play, which she probably wouldn't have gotten.

MR&M: Do you take rough mixes of your remixes to clubs to try them out on dancers before finishing your remix?

Jellybean: Sometimes. I look for the movement of the dancers to see

Jellybean: Usually not. If they want to come by I tell them when it's convenient. As long as they understand why I'm there, which is not to make an extended version of their 7-in. record sound-wise, then it's fine.

MR&M: Do artists ever offer suggestions?

Jellybean: Yeah, but it's up to me to listen. And if I did half the time, the record wouldn't wind up sounding the way I want it to sound.

MR&M: Do they ever get to the point where you have to ask them to leave the studio?

Jellybean: Yes, but I don't want to say who! (laughter)

MR&M: Do they mind that you overdub on their records?

Jellybean: When I first started, artists wouldn't let me do overdubs. But as my reputation preceded me, they didn't have any qualms. They can always reject the mix if they don't like it.

MR&M: When you take a three-minute record and extend it to five or six minutes, what do you do?

Jellybean: I extend certain sections and highlight different instruments and change the balances so you

not use them in the 7-in. version but they're on tape for the 12-in. version.

MR&M: Why do you use *Sigma Sound Studio B*?

Jellybean: A lot of mixers use it, but I have a perpetual hold on it—Monday through Friday from ten in the morning to six in the evening. I like the way *Sigma Sound* sounds and the way the records sound on my speakers at home. At home, it's very close to what I hear in the studio. The engineers at *Sigma* are really knowledgeable about 12-in. records, about the people who mix 12-in. records, and the type of mixing. I work with the chief engineer Michael Hutchinson so if other people want to work with him, they have to use him at night or on the weekends.

MR&M: Who else is in the studio with you besides the engineer?

Jellybean: The assistant engineer and the tape operator.

MR&M: Do you use any special outboard equipment in the studio?

Jellybean: I probably don't use anything out of the ordinary. It's more of the placement of the instruments in the stereo mix. I mix very much from seven to five o'clock and keep things spread out and layered. I use a lot of reverb and echo, which you need for the big sound systems these 12-in. records are played on in the clubs.

MR&M: As one of the premier remixers, do you feel you have a trademark remixing sound?

Jellybean: I'm more percussion oriented. Percussion really works well on the dance floor. And I emphasize rhythm because I'm Latin.

MR&M: What equipment do you use at *Sigma*?

Jellybean: I use EMT 250, AMS, RMS, MXR Flanger, Valley People, Kepex, Lexicon's 224X and PCM 42, MCI board, and full automation.

MR&M: Why do you like to work from 10:00 am to 6:00 pm?

Jellybean: Because I used to mix and DJ at night and found it was hard to do both.

MR&M: How did you get into remixing?

Jellybean: I've been DJ-ing in New York for eight years and playing at all the big clubs. I was in contact with lots of producers, artists, managers and record company people who used to come by the clubs. When the disco thing started, they thought it was interesting to try a record out in front of a live audience if it was going to be a dance record. I would make comments, and they



When I first started, artists wouldn't let me do overdubs. But as my reputation preceded me, they didn't have any qualms. They can always reject the mix if they don't like it.



what they like and what they don't like, how easy it is for the DJ to move in and out of the song, how long it takes to get to the break, and how easy it is to mix out of it.

MR&M: Is the audience aware that you're experimenting with unfinished records?

Jellybean: At the clubs I go to, the audience expects to hear new things. I wouldn't take a record to a club where the DJ wasn't into hearing new records. The audience is not aware that it's a rough mix, but is aware that it's a new record they never heard before.

MR&M: When you do a remix, is the artist normally in the studio?

don't realize it's the same thing. I also use tape loops.

It's really difficult to take a record designed as a pop record and make it a dance record. It's a lot easier to make a dance record a pop record because when you're doing the production you go into it with a different overview. When I do my own records, I don't want them to be dance records. They might be six minutes long, whereas producers who do pop records make them three to four minutes long. It also has to be edited and extended—thinking about how long the intro is, where the breaks fall. The musicians play the parts in my arrangements, and I may

would ask me what I thought about the reaction from the dancers. Sometimes the record was fine but sometimes the record would be too long or have no break or the intro was hard to mix into or mix out of. Basically, that's why 12-in. records were necessary.

I got more interested in studios because I wanted to see what was making the sounds on the records. Sometimes I felt records were really close but were missing something—maybe a bass being a little louder or some other effect coming in at a certain spot. Then I asked artists and producers if I could come by when they were in the studio. Most of them said “sure.” Then I started to pick up the jargon and say, “Oh, that's what that sound is.” I don't play an instrument or write songs. I learned what the sounds of synthesizers and guitars were. I learned about overdubs and EQ-ing. I asked a lot of questions.

MR&M: When did you start doing your own remixing?

Jellybean: My first record was “Dance a Freestyle Rhythm” by Mantees in 1977. Then disco died. I started to DJ at the Funhouse in New York. I then worked with producer Arthur Baker on “Planet Rock” by

Afrika Bambaataa and the Soul Sonic Force and “Walking on Sunshine” by Rocker's Revenge. We worked together, we mixed together, we exchanged ideas, and he tried some of them.

MR&M: What are your favorite remixes that you have done?

Jellybean: “Yah Mo Be There” by James Ingram and Michael MacDonald, which was released in Europe but never in America. I always liked the song, and although it made people happy in the clubs when

I played it, they couldn't dance to it the way I felt they could be dancing to it. I expanded certain sections of the three and a half-minute song.

MR&M: Why was it never released in the States?


Jellybean: Because by the time I made the record, it was already over here on the radio so it was basically a remix for Europe.

MR&M: What do you consider your most famous remixes?

Jellybean: Probably Paul McCartney and Michael Jackson's “Say,




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You really have to understand the psyche of a DJ in order to make good 12-in. records. You have to understand what they need to play a record and what the audience needs to be able to dance to it, really get off on it, and want to buy it after hearing maybe 30 or 40 records that night at the club.

Say, Say," Pat Benatar's "Love Is a Battlefield," Billy Joel's "Tell Her About It," Irene Cara's "Flashdance ...What a Feeling," Michael Sembello's "Maniac," and Denise Williams' "Let's Hear It For the Boys."

MR&M: How did you get into record production?

Jellybean: I did some production for an independent label. I was mixing, and I wanted to learn about production because if I was doing remixes, and they weren't structuring things right for dance records, I wanted to get in and do it right especially if they were making dance records. Richard Chandler, Lottie Golden and I produced a group called Warp 9 for Prism Records. They had a top ten dance record and a top 30 R&B song.

Then I did "Holiday" by Madonna, which was on her first album. Reggie Lucas finished the album, and they thought that "Burning Up" and "Lucky Star" also needed to be remixed. I did a lot of overdubs, and they wound up using these on the album. They asked me to co-produce a song, "Ain't No Big Deal," which didn't end up being on the album due to the fact that securing certain rights from the writer of the song could not be accomplished. Then they needed another song for the album, and I had a demo of "Holiday." They liked it so. I had a week to get it arranged, cut the tracks, and mix it. It was the first single from the album, and it was the first record that broke her in the pop market.

I then worked with Hot Streak, who were the writers of "Holiday," and their song is featured in the film *Breakin'*. It was a pop hit in Italy and Germany and a top five dance record in America. I also produced B-movie in England, my own album, and Maria Vidal, who was formerly with Desmond, Child & Rouge. I also will be co-producing a song with Quincy Jones for his album. When he first contacted me, I thought he wanted me to just remix a song for him.

MR&M: Which do you prefer: remixing or producing?

Jellybean: I don't want to stop remixing because that's basically how I got into production, and I can be real experimental with a 12-in. record. I can try a lot of things that if you tried on a 7-in. record, a record company wouldn't know what to do with it and radio just wouldn't play it. So 12-in. remixing is a good way to experiment and to try a lot of effects.

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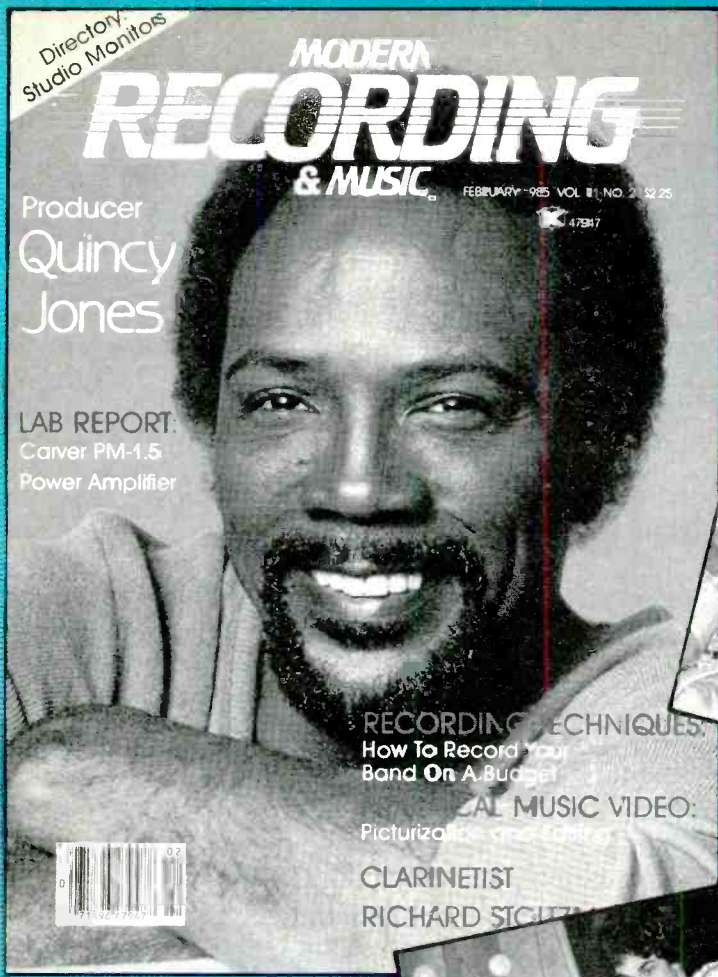
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Remixing is more adventurous. Producing is good too because I can mold the whole thing.

MR&M: You said that you don't play any instruments or write...

Jellybean: ...I hum things out. I tap things out...

MR&M: Doesn't that hinder you in production and even in overdubbing when you're remixing?

Jellybean: No. Not as long as the musicians I use understand that I don't play, but that I can hum it or signal what I want, like if it's too long or too short.

MR&M: You recently released an album *Watsupski!!!* and previous to that an EP, which contained five versions of the song, "The Mexican." What was your contribution to your own album?

Jellybean: I produced, arranged and programmed some of the drum machines. In this case, the *production* is the artist since there is no artist. It's my ideas that dictate how I want people to play things and try things. The musicians I used were the ones I use to overdub songs when remixing, plus some other sessionists. The artist in this case was the production—the

bringing together of different concepts. All the songs are danceable.

I had an EP out with five different versions of "The Mexican" on the 12-in. record. There was a dance mix, an a cappella version, a Funhouse mix, a bonus beats version, and a short version. Being a DJ, I know what DJ's like to fool around with. It takes a really long time to do five versions. The only way it could be done when I produced the album, I could have a whole bunch of different versions. It's real hard to take someone else's production and do that many mixes of the same song. Basically, it's the same mix with different effects, structuring and levels. I knew the record was more of a club record than a radio record, and I took it all the way club. If it gets to radio, great!

I did five versions of "The Mexican" because I wanted the DJ's to be really experimental and not just put a record on in a club and go to another record. This way, they can put on the instrumental version, then the a cappella version over other songs, the bonus beats, the long version, and the edited 5½ minute version, which is really long compared to a normal 7-in. record. It's designed to be a hip-

hop street dance record—the synthesizers sound like harpsichords—and I used a female rock vocalist. Most people use an R&B vocalist. And I used a power chord guitarist.

MR&M: What does the album title *Watsupski!!!* mean?

Jellybean: It's street slang for what's up or what's new.

MR&M: It seems that all the famous remixers are located in New York—like Arthur Baker, John Luongo, Francois Kervorkian, and yourself. Why?

Jellybean: New York is the 12-record market place. It's the hot bed of remixers. We have a feeling of whether it's going to work or not going to work. We might be able to open the market to people who might never have bought a Billy Joel record. The dance market can work for many artists.

You really have to understand the psyche of a DJ in order to make good 12-in. records. You have to understand what they need to play a record and what the audience needs to be able to dance to it, really get off on it, and want to buy it after hearing maybe 30 or 40 records that night at the club.

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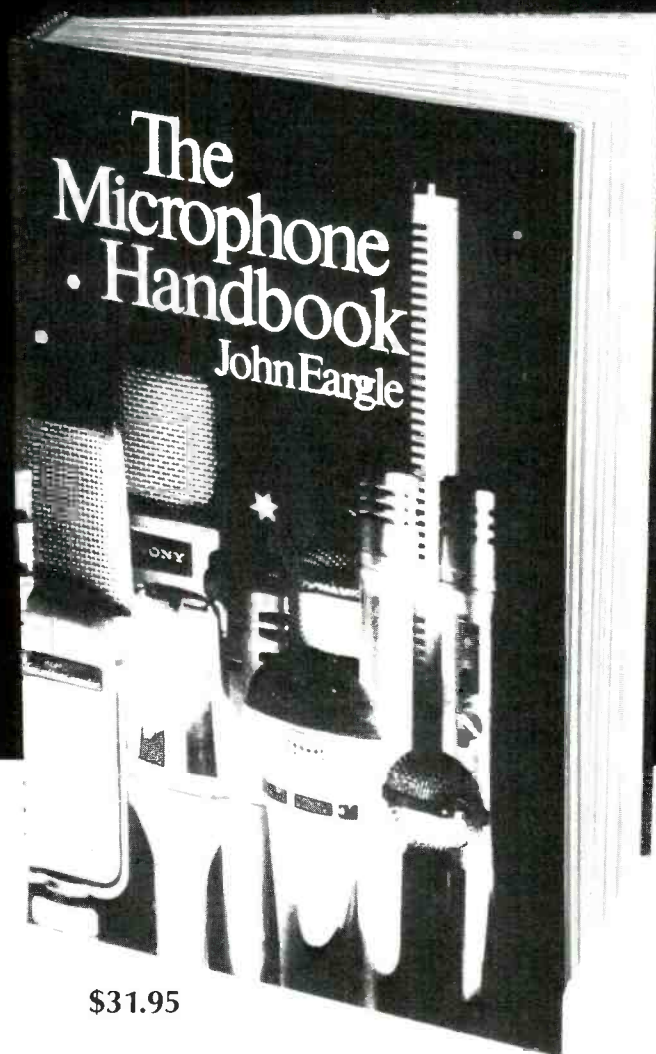
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**Richard Burgess in a
London studio.**

Richard Burgess:

An Innovative Angle

When it comes to music, Richard James Burgess is a jack of all trades—and a master of many. The New Zealand native is equally adept on either side of the studio glass. As drummer for the Seventies' British funk-jazz band Landscape, Burgess first received production experience working the console for his own group. Since then he's produced a myriad of artists, including Spandau Ballet. Burgess produced the New Romantic's first two LP's, *Journey to Glory* and *Diamond*, both of which subsequently turned gold. He was also at the board for cuts on Adam Ant's *Strip* album, and did some work for America and New Edition. Burgess' latest project is Melba Moore's new album to be released this spring. But his musical prowess doesn't end with vinyl.

Although delighted with Landscape's studio sound, Burgess was constantly displeased with the live reproduction. On stage, all the instruments, except the drums, plugged into amplifiers. When the drum mics were pushed up, the result was a muddied sound. Burgess and the boys in the band joked about DI'ing (Direct In) the drums. When the laughing stopped, he thought about it a little more and approached Dave Simmons about collaborating on a project. The result was the

Simmons SDS Electronic Drumkit. It became all the rage in drumming circles and is now a staple on live tours. It's also cropped up on albums by Spandau Ballet, Wang Chung, The Specials and Japan, among others.

Burgess' own solo album, released in 1984, symbolizes a return to the more traditional sounds. The eponymously-titled EP contains six songs, all with a distinctly late Sixties American pop flavor. It isn't so much that he's turning his back on the sound he helped to create; he just needed a new challenge.

That's the key to Burgess' success—a desire to always top his personal best. That means responding to musical conquests from all directions before boredom, or even worse, complacency sets in.

Modern Recording & Music spoke with Burgess about his talents as a producer and inventor, as well as an artist.

Modern Recording & Music: What does the album with Melba Moore sound like?

Richard Burgess: Well, it's supposed to be a step away from where she's been before. One of the reasons I was brought on was to bring a sort of international pop flavor to her sound without losing her R&B qualities. At the same time, I know they definitely want to cross over into the pop market. We're using quite a lot of new technology.

MR&M: Have you ever produced a band and didn't use a lot of modern equipment, synthesis, etc.?

RB: Strangely enough, this band that I originally became associated with everyone thought of as a techno-band, Spandau Ballet, used very little synthesizer work on both the albums I produced. It was more in the mixing that those records became techno-sounding because I used a lot of digital reverb and lot of outboard equipment at a time when there wasn't that much of that going on. And it got labeled "synth pop." But, for example, Van Halen uses as much synthetics as we did on the first two Spandau Ballet albums.

MR&M: You said you're not fussy about the type board you record on. What about the equipment you use? Do you have any preferences?

RB: I've used everything, but generally speaking, I find if I want something with a really aggressive guitar sound, I'll use Marshall amps. I tend to use tube mics for vocals

(generally Neumanns), but it varies largely from singer to singer. Other than that, I use a variety of stuff. I like to DI a lot because you can get a lot of variety from that. But with my mics I usually experiment. I won't just say 'I'll use the 414.' I usually get four or five lined up and listen to them all and then I'll rearrange things around the room and see what combination works best.

MR&M: Well, that ruins my next question—if you have any specific set-up that you favor each time.

RB: Every time is different. Except if I'm doing the drums and I'm not recording the whole band, I'll try to stick the drums in the middle of the room or somewhere where they really speak clearly. I think drums need a lot of air around them to sound right; that's something I noticed from working as a drummer. When they stick you in a little booth, the drums don't sound right when you're sitting on top of them, so there's no way they can sound right through the microphone. If you really want a drum to speak clearly, then you have to leave some space in front of it. If you put a baffle a foot in front of the bass drum, then you get a choked bass drum sound.

MR&M: That sounds logical enough...


RB: It's something people have been talking a lot about lately that I've instinctively known since I was 16. There is this thing called *acoustic compression*. If you put something that moves a lot of air in a small room, then the air has nowhere to go; the result is that it ends up choking the original source (standing waves). I don't know if this is scientific bullshit, but it makes sense to me.

MR&M: Part of *Strip* (Adam Ant) was produced by Phil Collins, and Keith Diamond did several cuts on Melba's album. How difficult is it for you to work on albums with more than one producer?


RB: It's a modern trend! It was that way on the America album I helped produce as well as the one by the New Edition. Working with other producers really does put pressure on you, but the competition is friendly. When there are three other producers on an album, you're very aware of the fact that your tracks have to be strong. Since you're only doing a few tracks, you can really concentrate on them. When you're doing 10 tracks, you need a lot of stamina.

MR&M: What advantages are there for the artist?

RB: For one thing, the artist isn't locked into one producer who might



The hardest part is to really clinch the record. It's relatively easy to know what you're trying to achieve and to get things on tape the way you want them; but to actually take it that last .1 percent of the distance, to get it to be a hit, that's the most difficult thing. That's where you really can run into problems timewise and budgetwise because you could finish 99.9 percent of the record and then spend the budget again just trying to take it that last little way.





(l. to r.) Nile Rodgers, J. J. Jackson and Richard Burgess at a recent party at the Limelight, NYC, celebrating the Capitol release of "Richard James Burgess," the debut mini-LP by Burgess.

not quite deliver that single that he requires. From the producer's point of view, he's not locked into an album for months.

MR&M: What's the most difficult part of producing for you?

RB: The hardest part is to really clinch the record. It's relatively easy to know what you're trying to achieve and to get things on tape the way you want them; but to actually take it that last .1 percent of the distance, to get it to be a hit, that's the most difficult thing. That's where you really can run into problems timewise and budgetwise because you could finish 99.9 percent of the record and then spend the budget again just trying to take it that last little way.

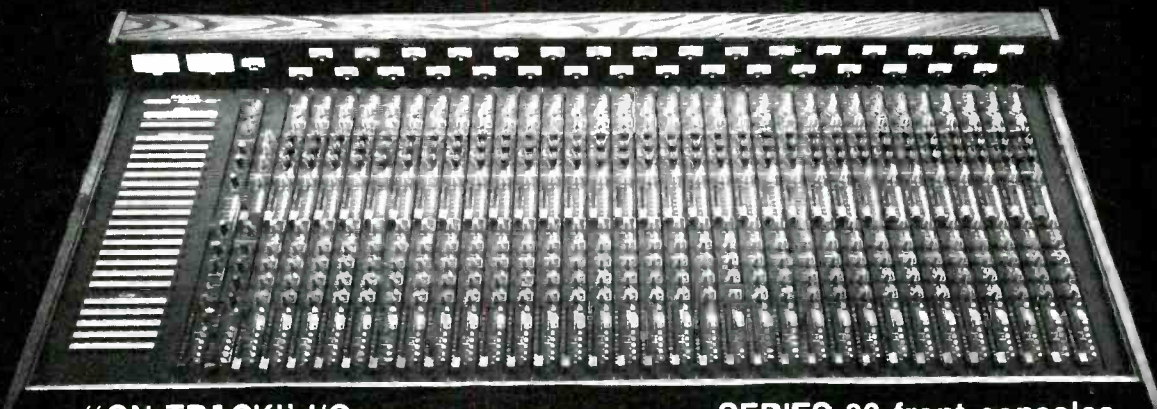
MR&M: And yet, when you finished *Strip* six days ahead of schedule, you said "That's quite usual for me as I plan everything like a military operation." How can you put a timetable on something like that?

RB: All I know is that it takes me a certain amount of time to make a record. Built into that are certain margins for error. I know that I'm going to have a certain amount of breakdowns over the period of an album and there is going to be a

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When there are three other producers on an album, you're very aware of the fact that your tracks have to be strong. Since you're only doing a few tracks, you can really concentrate on them. When you're doing 10 tracks, you need a lot of stamina.

certain amount of stuff that I'm going to record and will have to re-record. I also have a lot of systems that I've developed over the years.

MR&M: What kind of systems?

RB: One of them is with charts. Now from my experience as a drummer, my best take is within the first four, is usually within the first two. After that you'd have to go about 80 takes further to get a better one and by then I'd be in a zombie-fied state. But there were a number of times I'd be in a session and the producer would take ten takes because he just couldn't believe that you could get a good take on the first few. Then he'd only listen to the last three and he'd end up taking an inferior take for lack of any kind of system. I have charts that I make up and as the take is going on, I make notes. These aren't subjective notes; they're objective, like a mistake in the eighth bar or something like that. When we've done ten takes, I look through the list and can see immediately which ones have the most mistakes on them and the least. I'll listen to the three with the least amount on them and base that subjectively. I find that saves a lot of time, but I haven't met a lot of others who use that type system.

MR&M: What other shortcuts are there?

RB: I see a lot of time wasted in the studio; a lot of rock and roll lifestyle going on. For me, the studio is a place to work. If I want to have fun, I'll stop work and go out. That's really why I can usually deliver under time.

MR&M: Do you meet any resistance from artists on your technique?

RB: No. They're usually really happy to see it. There's nothing that drives an artist crazier than a producer wasting his time. I don't expect artists to walk into the studio

at six in the evening and be going through vocals five minutes later. I expect them to come in and we'll sit down and maybe have a cup of coffee, have a laugh, talk, whatever... I'm not a fascist. It's just that I'm stricter with myself. I wouldn't keep them hanging on because I want to watch tennis. But I'd let them keep me hanging on because they're the boss.

MR&M: How difficult was it for you to play drums on an album that you produce other than one for Landscape. You played on *Strip*.

RB: I didn't find it too difficult, although I thought I might. I didn't even know I was going to play drums on that album: I thought there was a band. I ended up playing synthesizers as well, which is kind of funny, because I'm really not a good keyboard player at all. But that's the way they wanted it.

MR&M: With your background as a drummer, do you always lay down the rhythm tracks first?

RB: Actually, I put them down last. For most things I tend to put down a rough, drum machine guide track of how I want it. I'll either replace it later with a new drum machine track, refining the program, (I often re-define the program four or five times as the recording goes on), or I'll replace it with real drums. An advantage of doing this is by not recording the drums initially, you wind up with more tracks for vocals and other stuff because you can record the guide drums on just two tracks. After being a studio drummer, I know you'd spend the whole day getting the drum sound and then when all the instruments are down, the drums sound really muddy and horrible. You have to do it over again or you have to brighten it up. By putting it on last, you have every-

thing else to judge it against. If you put them down first, you usually don't have enough top end on them because you don't have anything to judge them against.

MR&M: That must be really aggravating for the drummer.

RB: It's just another frustration. I'd get sent up for studio work and if I was lucky, I'd get a chart. If I was very lucky, I'd get a chord chart of the song. And if it was the best day of the last five years, I might get a guide vocal to work against. I fail to see how you can put down an intelligent, musical sound check without knowing what the song is. I don't ask my musicians to play anything until there's something down. At least I'll start them off with a guide of everything—something to work with.

MR&M: You recorded *Strip* at Polar Studios and your work with Moore was done at New York's Unique Studios. What do you look for when picking a studio?

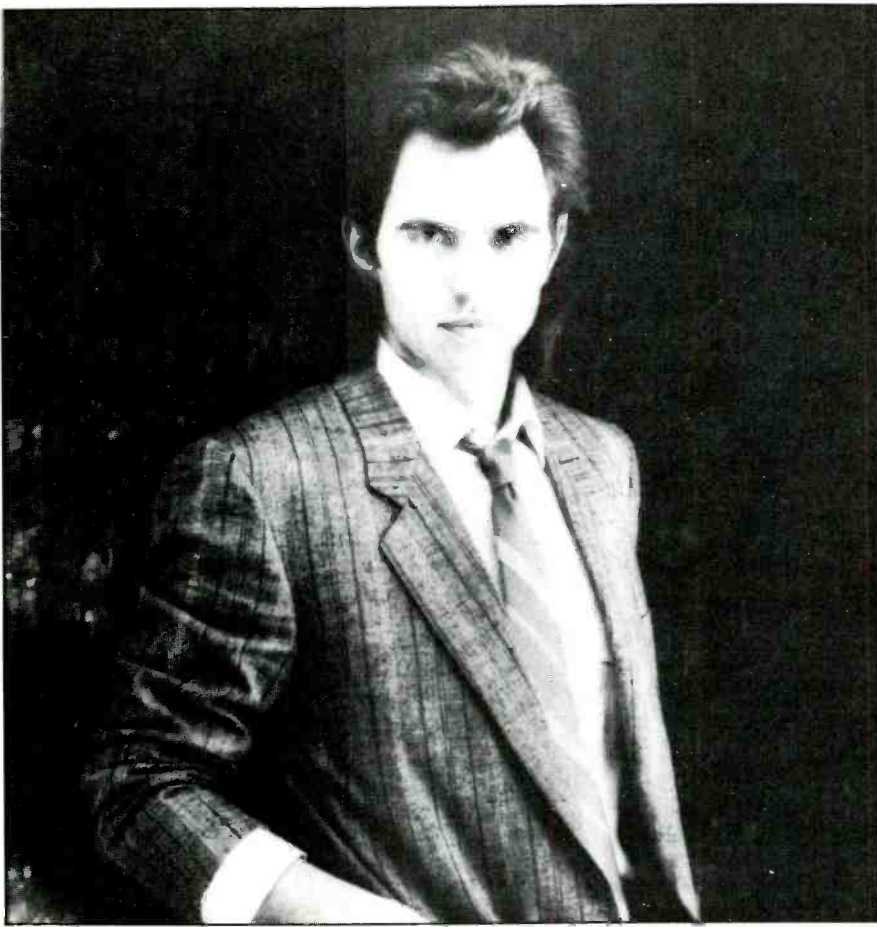
RB: I've used most of the studios in London, N.Y. and L.A., as well as Air Studios which I like a lot. Mainly I look for good maintenance. If there's good maintenance, it's a good studio. Beyond that, I look for some love and care. There are some places that are just sort of cold rooms and there's no feeling of warmth and that anybody really cares. Everything is clean and it works, but you don't get the feeling that anybody cares about the place.

MR&M: How does producing a Melba Moore differ from working with, say, an Adam Ant?

RB: Essentially, there's no difference at all. It's all music to me. I grew up in New Zealand where radio wasn't formatted. I'd hear Otis Redding, Frank Sinatra and Jimi Hendrix all on the same station. I grew up liking everything, but my preferences have always been R&B and pop. I really don't see any huge distinction from one thing to another as long as it has a good melody. I deliberately try to work across the musical spectrum because I'd hate to get bagged into one particular area.

MR&M: Totally switching track here...how exactly did the Simmons drumkit come about?

RB: I'd been frustrated for some time by being out live with Landscape. The only mics we had on stage were for the drums, everything else was DI into the PA. We'd push the drum mics up and suddenly it didn't sound good because the bass would be going through the drum mics and everything else would just waffle



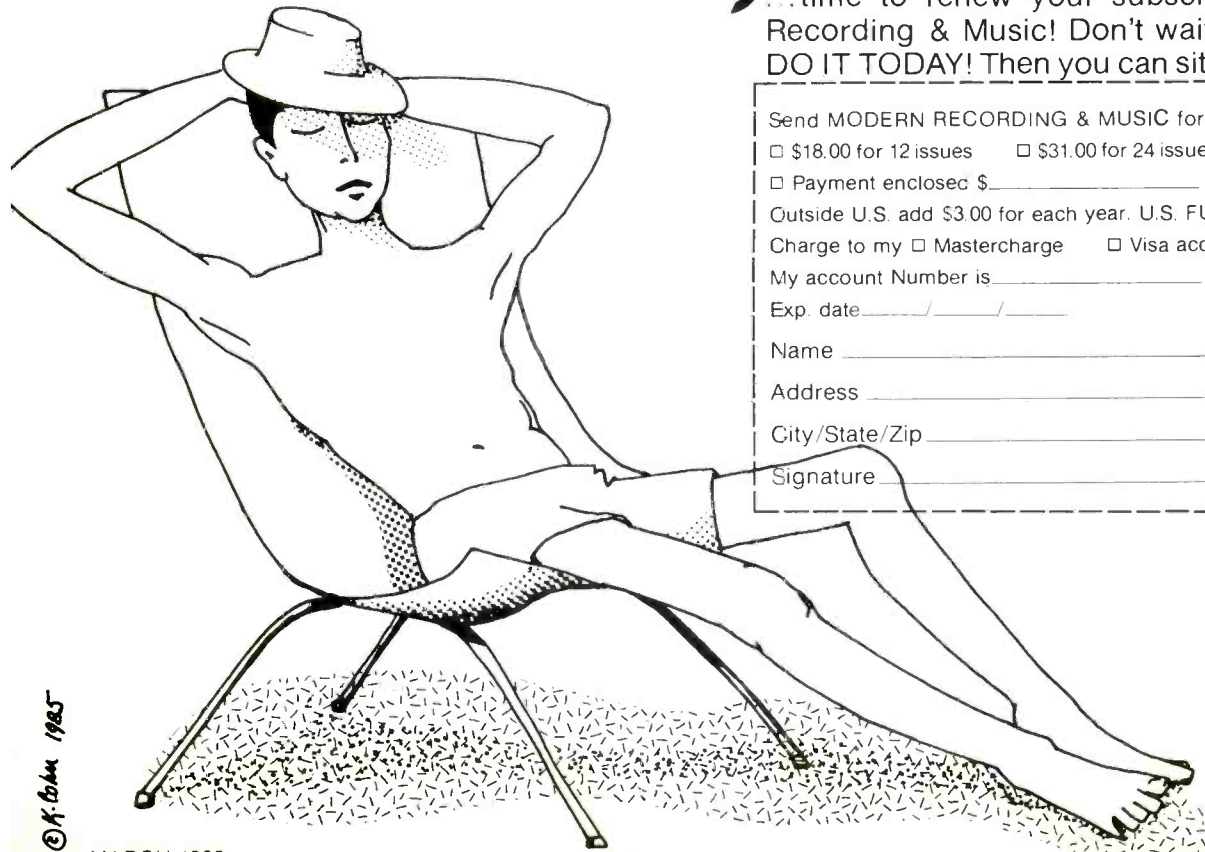
around. We started thinking seriously about how we could run the drums DI. I came up with a few ideas and approached a few drum companies with it and no one was interested. They thought that drummers would never be able to cope with it because drummers are thick—which is how most people tend to think.

MR&M: How'd you finally connect with Dave Simmons?

RB: I took a different tact. I looked at the synthesizers and percussion that were around and none of that was making it at all. I tracked down Dave in England. He was making something very similar to the Syndrum, so I went to see him and he got interested in the idea. He pulled out an ARP 2600 and one of his then-called SDS 3 pads and started messing around. I had the idea of dividing the sound into three major areas. The reason Syndrums or any of those things really don't sound like drums is because they don't operate the same way a drum does. When you hit a drum, there are several things happening. There's the sound of the stick hitting the plastic (drum head); the sound of the huge waft of air going through the drum, and then the

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Richard Burgess shown in the studio with CBS artists "King."

afterglow, which is the sound of the drum heads vibrating up and down. Basically we created these parameters on the ARP 2600 and made the click of the stick with a white noise generator. There were some technological breakthroughs that really helped too. They started making VCA (voltage controlled amplifiers) and VCO (voltage control oscillators) on the market. That enabled the ride time of the envelope generators to be faster. That was the problem before:

none of the analog synthesizers or envelope generators were fast enough to really give you the crack (attack) that you needed. That's how it came about.

MR&M: Do you think it's (the technology) being used as you wanted it to be?

RB: Generally, I think it is as I conceived it, which is to be used live. Virtually every live band you see is using a Simmons. That cuts down a lot of the rubbish on stage because all

those mics aren't around. But like anything else, you do hear it being used tactfully. I can tell when it's being used the way I intended it to be because I don't recognize it instantly, it fits in so well.

MR&M: It seems like you've been a good two years ahead of everybody technologically, especially in your use of drums and the Fairlight. What did you see that other people didn't? What's your prediction for the future?

RB: First off, I never think that progress precludes the past. Mozart's music still sounds as valid and beautiful today as when he wrote it. Nothing that has happened subsequently has invalidated that music. That's also true of rock and roll. I don't think that guitars and drums are invalidated in any way by new technology provided that someone can come up with a creative way to present them. I don't want to hear the records of the seventies recreated in the eighties.

The way technology is going as I see it is cheaper, better, and faster. I think that the age of the really expensive machines like the Synclavier and the Fairlight are probably numbered. Ultimately there will be pieces available in a cheaper form.

I never think that progress precludes the past. Mozart's music still sounds as valid and beautiful today as when he wrote it. Nothing that has happened subsequently has invalidated that music. That's also true of rock and roll.

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There is no substitute for your own ears. You are the only judge of what is good for you. Within the constraints of price and size, sonic quality is best judged in careful listening tests. If you can, try not to compare more than two to three systems at a time. Try to find more than one location to do your listening. What sounds great in one store should sound about the same somewhere else. Try to buy a system with some reasonable return or exchange arrangement, so that if it turns out that they are just not "right" for your needs, you still leave yourself with some options.

The Charts

The charts that follow can supply some of the information you need, but not all. You still must audition, and no chart offers too many clues on how a speaker will sound.

It should be understood that what is in these charts has been supplied by the respective manufacturers. We've tried to get them all, but we may have missed some, and we could not persuade every manufacturer to return the forms we had sent them, no matter how much we tried.

Each of the specs describe some physical aspect of the speaker system. Perhaps the most difficult to assess is Frequency Response. Almost any speaker can be made reasonably "flat" over a fairly wide range. What our charts could not say is just how much power is delivered at those extremes, and how low in distortion it is.

Generally, you can expect that the larger the woofer, the better the bass response will be. But, it is possible for a good eight-inch woofer in a proper enclosure to deliver better bass than a fifteen-inch woofer in a less-than-ideal enclosure. So, we're back to auditioning, again.

Each of the specification questions was carefully chosen to give you a fair picture of the price and size/weight aspects. While it can be considered general that the more you spend, the better you get, this is no more a rule in pro audio as it is in any other consumer product area.

The most important specification may well be the Features section; here is where the manufacturer has the opportunity to tell you about the special or unique features of his product.

In these charts we have used a dash - to indicate that the manufacturer did not supply the information needed. A blank column simply means that the information is not applicable. Use these charts to get close to a few choices. Then go out and do your own tests.

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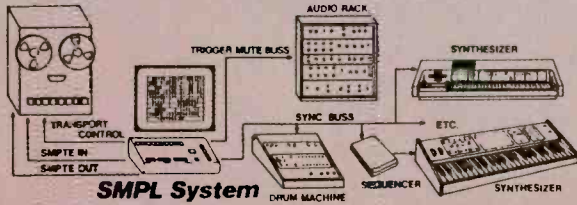
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 Hi Freq. Driver dimen., in.
 Crossover Freq., Hz
 Weight, lbs.
 Price, \$
 Features

Model	Dimensions, HWD, in.	Outside Finish	Grille Finish	Impedance, ohms	Frequency Resp., * / -db	Base Driver Type	Base Driver dimen., in.	Mid Driver Type	Mid Driver dimen., in.	Hi Freq. Driver Type	Hi Freq. Driver dimen., in.	Crossover Freq., Hz	Weight, lbs.	Price, \$	Features
AB Systems															
CFR-180	25 15 13	oil stain	black steel	8	80-16k -	12*	cone	12x12	horn	800	61	1060.00	*Two 12-inch woofers. Compact high definition and high output system. Custom amplifiers optionally available.		
LBS-125	34 30 20	oil stain	black steel	8	27-80k -	15*	cone				124	776.00	*Two fifteen inch woofers are sub woofers for the CRF-180 system. Custom amplifiers optionally available.		
Bose															
302	32 23 16	impreg resin	wire mesh	4	55-180 +1, -3	*	*			180	115	798.00	*Has two 12-in LF-88B low freq drivers. Tandem-Tuned™ Bass System.		
402	23.25 8.17 7.25	struct foam	black cloth	8	90-16k +1, -3	*	*			-	15	418.00	*Speaker complement-four 4.5-in D-22A high-sensitivity drivers. A 402E active equalizer is \$114.00.		
802 Series II	13.5 20.5 13	struct foam	black cloth	8	50-16k +1, -3	*	*			-	31	696.00	*Speaker complement-eight D-11B full-range drivers. A 802C System Controller is \$228.00.		
Carvin															
Woofers 1330	28 24 32	black Tolex	black metal	8	40-4k -	15	cone				100	239.00	Uses E-V/Magna Lab drivers, horn/port loaded design for maximum clarity of response and efficient use of power.		
R-540E	28 24 12	black Tolex	none	16	1.2k-17k -			1	horn	1200	50	279.00	Uses E-V horn for 60° x 90° dispersion.		
980M	24 18 32	black Tolex	black metal	8	36-17k -	15		1	horn	1200	96	379.00	Full range system with Magna-Lab woofer and E-V radial horn tweeter.		
960M	24 15 31	black Tolex	black metal	8	38-20k -	15		2	horn	1500	75	279.00	Uses Fostex exponential horn and Magna-Lab port-loaded woofer.		

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SYNCHRONOUS TECHNOLOGIES

P.O. Box 14467 • 1020 West Wilshire Boulevard • Oklahoma City Oklahoma 73113 • (405) 842-0680

MX1688 Recording Mixer

6 x 8 x 2 with control room mixing

The Carvin MX1688 recording console offers the professional quality features and signal performance you've grown to expect from Carvin! Use of the best components and professional audio design enable the MX1688 to interface with any professional tape deck. For additional info on this console and Carvin's complete product line send \$1 to Carvin, Dept. 1002, 1155 Industrial Ave., Escondido, CA 92025. A similar 16 x 4 x 2 MX1644 mixer is available for \$1995.

Recording Features
 Eight Track Studio Control Center
 Input/Output Channel Organization
 Independent 8 Into 2 Monitor Mixer
 Four Auxiliary Busses w/ Pre/Post
 Three Band Parametric EQ w/ Defeat Switch
 Mute and Solo on all Input and Output Channels
 Two Effects Returns w/ Pan and Solo
 Talkback w/ Built-in Mic and Monitor Dimming
 Peak Warning Indicators w/ Peak Stretching
 Patch Points on all Channels
 Microphone Phantom Power
 Cue and Effects Sends from Output Channels
 Alternate Metering of Cue and Two-Track
 Quick Tape Playback Through Monitors
 Independent Mic and Line Preamps
 Studio Feed w/ Source Selection
 Totally Modular Internal Construction
 Input Noise of -127 dBv THD less than .05%
 20 dB headroom at All Stages

P.A. Features
 Eight Sub-Groups w/ Solo and Mute
 Channels Assignable to L & R Stereo Output
 Four Independent Monitor Mixes Available
 Headphone Monitoring of Main or Monitor
 11 Step Gain Controls for Easy Set-up
 Talkback to Monitors

MX1688
\$2995 + 49 Frt.

Product Information
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Model
 Dimensions HWD, in.
 Outside Finish
 Grille Finish
 Impedance, ohms
 Frequency Resp., +/- dB
 Bass Driver Type
 Mid Driver Type
 Hi Freq. Driver Type
 Hi Freq. Driver Dimen., in.
 Crossover Freq., Hz
 Weight, lbs.
 Price, \$
 Features

Model	Dimensions HWD, in.	Outside Finish	Grille Finish	Impedance, ohms	Frequency Resp., +/- dB	Bass Driver Type	Mid Driver Type	Hi Freq. Driver Type	Hi Freq. Driver Dimen., in.	Crossover Freq., Hz	Weight, lbs.	Price, \$	Features
Eastern Acoustics													
FR-102	19.75 11.75 9.5	black poly	vinyl steel	8	80-18k 2	cone	10	cone	3500	-	300.00	300.00	Ultra compact system, 99 dB SPL 1W @ 1M sens, coverage greater than 120 degrees, all birch construct, mag. damped tweeter.
FR-122	25.6 14.75 11.75	black poly	vinyl steel	8	50-19k 2	cone	12	cone	2500	-	450.00	450.00	Greater than 130 deg. coverage, very compact-all birch construction.
FR-153	19.75 24.6 19.75	black poly	vinyl steel	8	40-19k 2	cone	6.5	poly cone	350/ 3500	-	670.00	670.00	Wide bandwidth and coverage, 98 dB SPL 1W @ 1M, 375W long-term power handling.
FR-252	41.2 24.6 19.75	black poly	vinyl steel	4	33-17k 3	cone	two 6.5	poly cone	350/ 2500	-	1200.00	1200.00	103 dB SPL 1W @ 1M, 625W long-term power handling, all birch construction, includes castors.
JF-500	50.0 24.0 29.0	black poly	vinyl steel	8	60-17k 3	cone	10	horn	250/ 2200	232	1750.00	1750.00	Horn loaded system, 106 dB SPL 1W @ 1M sensitivity, 500 W long-term power, 90 deg. coverage, 130 dB+ maximum output.
KF-400	55.0 30 25.0	black poly	vinyl steel	8	50-16k 3	cone	12	horn	250/ 1500	260	2100.00	2100.00	As JF-500 above except long term power is 700W and 133 dB+ is maximum output.
KF-550	32.0 53.0	black poly	vinyl steel	4	40-16k 3	two cone	12	horn	250/ 1500	320	2900.00	2900.00	As KF-400 above except 109 db SPL, 1000W long-term power, 139 db maximum output, flight hardware standard.
Cetec Gauss													
5226	16 23.63 16	brown carpet	brown fabric	8	80-20k -	cone	12	cone	3600	50	760.00	760.00	300W high-efficiency stage monitor capable of 125 dB.
5280	34.75 24 16.25	brown carpet	brown fabric	8	40-18k -	cone	18	cone	1500	85	*	*	Price n/a at press time. This is a 200W RMS light-weight, high power portable PA system.

Model	Dimensions (HxWxD), in.	Outside Finish	Grille Finish	Impedance, ohms	Frequency Resp., +/-db	Bass Driver Type	Mid Driver Type	Ht. Req. Driver dimen., in.	Crossover Freq., Hz	Weight, lbs.	Price, \$	Features
Electro-Voice												
FW-1202	19.4 19.4 24.4	black carpet	black metal	8	75-20k 3	12 cone		7x9 horn	1500	66	472.00	300W EIA power handling, wood cabinet, portable, multi-tilt positioning.
FM-1502	22.0 22.5 27.9	black carpet	black metal	8	65-20k 3	15 cone		7x9 horn	1500	75	592.00	Same as model above.
S-1202	24.7 19.1 11.7	black carpet	black metal	8	75-20k 3	12 cone		7x9 horn	1500	66	498.00	As model FM-1202 above except is stand mountable or stackable.
SH-1502	31.0 21.1 14.6	black carpet	black metal	8	62-20k 3	15 cone		9x18 horn	1500	78	541.00	As model S-1202 above.
S-1503	28.7 24.4 13.8	black carpet	black metal	8	65-16k 3	15 cone	10 cone	5x6 horn	600/ 4000	105	780.00	200W EIA three-way system, suitable for stacking.
S-1803	35.5 28.0 19.4	black carpet	black metal	8	50-16k 3	18 cone	10 cone	5x6 horn	600/ 4000	134	954.00	As model S-1803 above and has wheels.
S-200	24.0 15.0 8.5	black carpet	gray fabric	8	50-18k 3	12 cone		7x9 horn	2000	36	505.00	280W EIA two-way system, molded cabinet with built-in handles, constant directivity, optional equalizer available.
TL 1225/ 4025	32.25 60.0 34.0	black carpet	-	8	40-12k 3	15 & 12 cone	12 horn	- horn	125/ 250	278	1571.00	300W EIA power handling, stackable, can be used vertically or horizontally.
Fostex												
SP-11	7.0 13.75 8.5	black plstc	black metal	8	150-15k 3	two 5 cone				12.1	195.00	Full range drivers, compact PA can be stacked in multiples for extended low frequency response and high level.
SPA-11	7.0 13.34 8.5	black plstc	black metal	*	80-18k 3	two 5 cone				16.7	295.00	*Has built-in 100W amp with both line and mic inputs. Otherwise similar to SP-11.

Model	Dimensions (HWD), in.	Outside Finish	Grtle Finish	Impedance, ohms	Frequency Resp., +/-dB	Bass Driver Type	Mid Driver Type	Hi Freq. Driver Type	Hi Freq. Driver dimen., in.	Crossover Freq., Hz	Weight, lbs.	Price, \$	Features
Modular Sound													
TA-12C	24.0 18.0 15.0	*	metal/ foam	8	70-19k 6	12	cone	12	horn	3500	51	495.00	*Textured paint finish. A two-way time-aligned system built under licence from E.M. Long.
AFI-VD	42.0 20.0 20.0	*	metal/ foam	4	40-19k 3	18	cone	12	horn	125/ 3500	120	1030.00	Same features as TA-12C except three-way system.
S-15B	18.0 27.0 24.0	*	vinyl metal	8	40-2.5k 4	15	**	**			80	***	Low frequency unit,*brown oiled birch at ***\$560 or black texture paint at 380, **Sealed or vented woofer.
S-18B	29.0 22.0 20.0	*	vinyl metal	8	40-500 4	18	**	**			40	***	As S-15-B above.***Prices:\$480 paint, \$680 wood.
Peavey													
S-10425B	10.0 4.0	-	metal	4	-	10	cone				6.75	64.95	Scorpion Series driver.
S-10825B	10.0 4.0	-	metal	8	-	10	cone				6.75	64.95	Scorpion Series driver.
S-1425B	12.0 4.82	-	metal	4	-	12	cone				7.0	74.95	Scorpion Series driver.
S-12825B	12.0 4.82	-	metal	8	-	12	cone				7.0	74.95	Scorpion Series driver.
Renkus-Heinz													
BJ2	30.0 20.0 16.0	black carpet steel	black steel	8	40-17k 3	15	cone	2.0	horn	1200	85	725.00	Optional XJ processor provides enhanced and fail-safe performance with a single amplifier.
BJ4	30.0 20.0 16.0	black carpet steel	black steel	8	40-20k 3	15	cone	1.0	horn	1600	80	625.00	As BJ2 above.
FRS 1582	30.0 21.0 19.0	black carpet steel	black steel	8	45-17k 5	15	cone	2.0	horn	1200	87	570.00	
SMS 1280	21.0 18.0 25.0	black carpet steel	black steel	8	100-16k 4	12	cone	1.0	horn	1600	48	399.00	

Model	Dimensions, HWD, in.	Outside Finish	Grille Finish	Impedance, ohms	Frequency Resp., +/-dB	Base Driver Type	Mid Driver Type	Hi. freq. Driver dimen., in.	Hi. freq. Driver Type	Grossover freq., Hz	Weight, lbs.	Price, \$	Features
B1	51.0 24.0 17.0	black carpet steel	black steel	8/4	40-17k 3	two 15	cone	2.0	horn	1200	125	995.00	Long throw enclosure, Usable with X-series SMART processor, flying hardware optional
B2	30.0 20.0 16.0	black carpet steel	black steel	8	40-17k 3	15	cone	2.0	horn	1200	85	725.00	Wide coverage version of B series, other features same as B1 above.
B3	25.0 18.0 28.0	black carpet steel	black steel	8	40-17k 3	15	cone	2.0	horn	1200	87	555.00	Stage monitor, other features as B1 above except no flying hardware option.
L1	24.0 24.0 48.0	black	black	4	33-300 3	two 18	cone			120	200	995.00	SMART system subwoofer, features as B1 above, also can be used with any system.
SUNN													
2M	25.0 16.0 12	black Tolex	black metal	16	60-30k -	10	cone			3500	38	199.00	
1112H	22.0 16.0 13.0	black Tolex	black metal	8	60-16k -	12	cone			5500	-	249.00	
6M	25.0 19.0 13	black Tolex	black metal	8	55-16k -	15	cone			2400	-	499.00	
2115H	30.0 21.0 17.0	black Tolex	black metal	8	55-16k -	15	cone			2400	-	499.00	
1208H	-	black Tolex	black metal	8	60-30k -	8	cone			-	-	249.00	
Model 14	40.0 24.0 19.0	black Tolex	black metal	8	55-16k -	15	cone	10	cone	500/ 5000	108	599.00	

Model	Dimensions HWD, in.	Outside Finish	Grille Finish	Impedance ohms	Frequency Resp., +/-db	Base Driver Type	Mid Driver Type	Hi Freq. Driver Type	Hi Freq. Driver dimen., in.	Crossover Freq., Hz	Weight, lbs.	Price, \$	Features		
TOA															
380SE	30.0 20.0 16.0	gray poly	black nylon	8	50-20k -	15	cone	1.0	horn	1.75	horn	800/ 8000	79	895.00	360W RMS power handling, mid and hi freq. attenuators, large recessed handles, bi-amp and tri-amp and bridging connectors.
38SD	27.0 20.0 18.0	gray poly	black steel	8	50-20k -	15	cone	1.0	horn	1.0	*	1000/ 10000	59.5	589.00	*Moving coil tweeter, other features similar to 380SE above, also available as a stage monitor (38SDM).
30ST	23.0 17.0 15.0	gray poly	black steel	8	50-20k -	12	cone	1.0	horn	1.0	*	1000/ 10000	46.3	529.00	*same features as 38SD above.
SL-22	33.0 15.0 12.0	gray poly	black steel	8	70-20k -	10/ 12	cone	-	horn	-	horn		44	319.00	240W power handling, designed for touring.
RS-20	17.5 14.0 10.0	black vinyl	black nylon	8	90-20k -	four 5	cone	-	horn	-	horn		29.8	229.00	Portable stage system, carrying strap, stackable, bridging connectors, stand adaptor.
Yamaha															
S10X	6.13 9.5 6.5	black	black mesh	6	65-20k -	4	cone						6.2	120.00	Compact system, 75W program.
S20X	7.5 11.63 7.75	black	black mesh	6	65-20k -	two 4	cone						10	180.00	As above, 150W program power.
S2112H	17.75 19.0 22.25	black	black mesh	8	60-16k 6	12	cone						40	395.00	Slant stage monitor.
S2115H	17.75 19.0 22.25	black	black mesh	8	65-14k 6	15	cone						88	495.00	100W slant stage monitor.
S3112H	23.75 17.0 11.5	black	black metal	8	65-16k 6	12	cone						41.5	375.00	Compact stage speaker, stand mountable.
S3115H	25.88 18.63 14.63	black	black metal	8	65-14k -	15	cone						65	495	As model S3112H above.
S3208H	17.5 22.0 10.25	black paint	-	8	65-17k -	two 8	cone						43	545.00	Compact system, 250W cont., wide variety of optional brackets.

Performance Speaker Manufacturers

AB Systems Inc.
11480 Sunrise Gold Ct.
Rancho Cordova, CA 95670

Bose Corporation
Pro Sound Division
100 The Mountain Rd.
Framingham, MA 01701

Carvin Manufacturing Corp.
1155 Industrial Ave.
Escondido, CA 92025

Cetec Gauss
9130 Glenoaks
Sun Valley, CA 91352

Eastern Acoustic Works
P.O. Box 437
Jenkintown, PA 19046

Electro Voice Inc.
600 Cecil Street
Buchanan, MI 49107

Fostex Corp. of America
15431 Blackburn Ave.
Norwalk, CA 90650

JBL Incorporated
8500 Balboa Blvd.
Northridge, CA 91329

Meyer Sound Labs
2832 San Pablo Road
Berkeley, CA 94702

Modular Sound Systems, Inc.
P.O. Box 488
Barrington, IL 60010

Peavey Electronics
711 A Street
Meridien, MS 39301

Renkus-Heinz Inc.
17851-AB Sky Park Circle
Irvine, CA 92714

Sunn Electronics
19350 SW 89 Avenue
Tualatin, OR 97062

Toa Electronics
480 Carlton Court
South San Francisco, CA 94080

Yamaha International Corp.
Combo Products Division
P.O.Box 6600
Buena Park, CA 90622

Write directly to these manufacturers for further information on products in the charts.



The Yamaha DX7 and the State of the Synthesizer Art



In the last five years there have been significant and rapid breakthroughs in the development of electronic musical instrument technology. The most exciting of these electronic breakthroughs are in the area of computer assisted digital musical instrument composition and performance. Today it is possible for the musician/composer to perform all of the functions of a multitrack recording studio while using digital synthesizers to recreate the exact and specific waveform of a given musical instrument. All of these functions can now be controlled by a single computer controlled MIDI interfaces keyboard. MIDI stands for Musical Instrument Digital Interface and is basically a standard that allows all of the functions of any MIDI controlled keyboard to be controlled through a computer data system. It also allows for musical composition to be done outside of traditional keyboard control and allows you to compose music directly onto the computer itself. This allows for computer composition where you can have a room full of synthesizers all controlled by a single MIDI controlled keyboard.

Several years ago, the process of FM digital synthesis was developed by Dr. John Chowning who was working under a grant from the Yamaha International Corporation. The first commercially marketable process by which the actual waveform of a given musical instrument could be realized and stored for user recall via a computer based storage and retrieval information system was what resulted from the vast amount of experimentation. This process of FM digital synthesis was then licensed to Synclavier (New England Digital), who proceeded to produce a very expensive (\$35,000) synthesizer which was by far the most sophisticated commercially available instrument of its kind. The Synclavier was completely

computer based and for the first time introduced the possibility of computer controlled computer musical composition. However, \$35,000 is of course too much for the average musician to afford and for a few years FM digital synthesis was a novelty that only the schools, institutions or the rich could afford.

Meanwhile, over at Yamaha, engineers were looking at developing a FM digital based synthesizer of their own. Yamaha, in taking into account what would be the most important design aspects in designing a synthesizer, looked to combine the essence of FM digital synthesis with a compact, user friendly, completely programmable package. The result of their labor was the DX7 digital synthesizer.

The DX7 was the world's first fully user programmable and preset digital synthesizer. On it, there were no knobs and no presets, only a small alphanumeric LED display and a number of flat panel membrane switches. Furthermore, there were no voltage controlled oscillators, amplifiers or filters; nor were there any conventional envelope generators. By using the process of FM digital synthesis, the instrument was capable of recreating the exact waveform of any given musical instrument with a realism that is truly amazing. Now, for the first time musicians, composers, arrangers, schools and institutions could all afford to buy the synthesizer that only a year ago was available only to a select few.

Voices (sounds or instruments) can be saved in three different ways with this keyboard. The Yamaha DX7 FM digital synthesizer comes with 32 internal voice memories that can hold any combination of 128 factory preset voices or voices you create. Obviously they (128 preset voices) all cannot fit into the 32 internal memories at once; these voices are actually supplied to you in solid state ROM (Read Only Memory) cartridges

vertically ("series connected"), arranged side by side ("parallel connected") or a combination of both. Most algorithms have multiple carriers and modulators. In one algorithm a given operator may be a carrier while in the next algorithm it may be a modulator. As you move from algorithm #32 to #1, there is a greater potential for increased harmonic complexity due to the structure of the algorithm. However, the algorithm alone does not determine the sound. The actual nature of the sound you achieve is highly dependent on the frequencies and levels you program into the operators (modulators and carriers). The 32 algorithms available in the DX7 were selected because they offer a broad spectrum of useful programming possibilities.

The DX7 is fully polyphonic with 16 note simultaneous capability so that the sustain of previous notes will not be cut short when you're playing with all ten fingers. The DX7 is also highly responsive to player expression and allows the user to realize fine and minute details of musical technique and expression. The harder or faster a key is played, the louder the initial attack of the note, just like true tactical feel on a piano. Unlike a piano, however, the degree of touch sensitivity is fully programmable and allows the user to custom program the keyboard to a given application.

The DX PRO software package was recently developed by Kevin Laubach and is being distributed by Yamaha. The DX PRO software package has been designed to compliment and enhance the already remarkable features of the Yamaha DX7 by incorporating the information processing capabilities of the Apple IIe or Commodore computers as well as representing a considerable leap in state-of-the-art MIDI technology.

DX PRO stands for Program Recall and Organize. It is a complete voicing system that allows the user to work with the digital parameters of voices with greater ease and manageability, while the Recall and Organize makes programming aspects of the DX7 much more user friendly.

Once the DX PRO software is booted up on your computer, the user finds a series of program screens (menus) which greatly simplify the process of viewing, editing and creating voices for the DX7. All of the parameters of a given voice can be seen on four screen pages which are appropriately titled as the Envelope Page, Scaling Page, Algorithm Page and Modulation Page. This is a considerable improvement over the dozens of readings you would have to take on the DX7's LCD display in order to accumulate the same information. These screens also feature graphic displays which are an invaluable aid in visualizing envelope graphs, scaling curves etc....

The Recall and Organize functions are displayed on the screen as menu cards. All of the selections are made by simply positioning the select bar over the desired command. These functions offer a significant enhancement of the existing voice storage capabilities of the DX7. The user now has the capability to select from over 800 voices per disc either individually or in groups. Once loaded into the DX7 it is possible to easily rearrange the order of the voices or the name of the voice, for ease. Voices in the DX7 can now be saved on disc for future use or transferred to a ROM cartridge for use without the aid of the computer. A further feature, reference printouts can be made which list the

voice names currently in a group or volume or create catalogs of the groups or volumes on a given disc.

The development of computer controlled musical composition represents a significant breakthrough in expanding the creative potential of the artist. Traditionally in composing film scores, orchestral parts or really any style of music, the composer is not able to compose the score as fast as it really is supposed to be performed. Because of the nature of the process of writing notes, his speed is limited to how fast he can get the notes out of his head and on to paper which is at best a note every second. The advantage of composing with computers is that you can manually go in and compose a line at a very slow speed regardless of whether your personal technique will allow you to play the line at the same speed as you hear it in your head. So you have the opportunity to record your part exactly as you want it with no technical imperfections, and then speed the tempo up therefore allowing you to hear the music in real time. You can compose unhumanly possible musical ideas and also because all of the information is digitally sequenced, there is absolutely no change in pitch when the music is speeded up. In conventional tape recording, unless you are using harmonizers there is always a pitch change along with the speed change. Speeding up the digital musical information via the computer has the effect of compressing the tracks and actually improves the sound. Using a feature called auto-correction, even a unskilled musician can approximate a musical line or melody and then the computer will go back and put the music in correct rhythm. In short, for the first time we have the technology to put the creative aspect of making music within the reach of just about everyone, regardless of whether or not they have formal musical training.

Looking ahead to the future, I would say that we are going to see dramatic leaps in the development of computer based recording software and which is only going to become more and more accessible to the consumer. It seems pretty clear what will happen is that once you have a computer, MIDI interfaced keyboard and recording software, you can lay your sixteen tracks down with the melodic harmonic ideas and compositional foundation of the arrangement, and then go through the same procedures as if you were orchestrating a big piece. You can go through the process of laying down basic tracks, overdubs, everything up to a rough mix. Then, you can take that disc to a facility that provides all of the latest outboard equipment and do your mixdown there. Using this process of digital recording there is absolutely no significant loss of sound quality as you lay the various tracks down. There is no hiss as the information is all digital.

The development of computer based technology is going to create more and more work for the musician as well as having the effect of ultimately transforming the way in which music is produced commercially. I think we can all look forward to seeing some tremendous technological breakthroughs in the next few years that will allow all of our creative abilities to take a quantum leap forward. Just as important, I see the development of this technology bring the various musical instrument manufacturers together in a spirit of cooperation that will result in better technology for everyone.

Practical Music Video Production

Part 7: Performing for the Camera

If you're approaching video as a musician, you're probably pretty excited about the prospect of seeing yourself perform on screen. But you may also be a little nervous about it. After all, you've had enough trouble learning to command a stage and work a live audience. Now, as if that weren't enough, on top of all the other skills you've had to master, there's *video* to contend with. Zap! You're an actor. Say cheese, look sharp, and don't pay any attention to that big black camera lens staring you in the face.

This month we're going to turn things around and look at the specialized tricks and techniques of performing in *front* of the cameras.

We'll start by running through a typical studio shoot from the performer's point of view. Then we'll give you some specific tips on how to adapt your performance for the silver screen.



What to Expect at the Shoot

In an audio recording session the musicians are pretty much the center of attention, and the session runs more or less according to their creative needs. After all, the whole focus is on recording music, right? That seems so obvious it goes without saying—but hold on a minute. Music video isn't like that at all. If you walk onto a video soundstage expecting to find that same atmosphere, you may be in for a bit of a shock.

The fact is that in video, the “talent”—that's you—is often treated almost like an afterthought. (I'm not

saying that's the way it should be, but that's the way it seems to be.) The performer is a much smaller part of the total picture. The production process is so complex, with so many people trying to coordinate so many diverse tasks, that you may feel at first like you're getting lost in the shuffle.

Instead of working in careful, studied tandem with a single engineer and maybe a producer, you'll find yourself surrounded by a full production crew of a dozen people or more, each rushing madly around performing a specialized role, and each as vital to the success of the shoot as you are. The director has so many details to attend to that he may not have time to offer you much more than a quick greeting and a gentle shove toward the dressing room.

In the dressing room you'll find a well-lit mirror and a place to change your clothes. You'll be expected to wear make-up, and there should be someone there to help you put it on. This is often embarrassing for first-time male performers, but be professional about it. It's as much a part of the job as placing the microphones or aiming the lights. Just sit there and take your pancake foundation like a man.

By the time you're dressed, made up and ready, the butterflies should be doing loop-the-loops in your stomach. This is normal. You may feel like running a few laps around the building, but you'll have to settle for some warm-up riffs or a few stretching exercises instead. (Just so you don't mess up your hair.) Don't go out onto the set until you're sent for;

you'll only be in the way. Do use the bathroom. Once the shooting starts you may not have another chance.

As in an audio recording session, you can figure there will be a lot of waiting around. There will be cameras to tweak, lights to aim, and audio levels to set, as well as countless other last-minute details and delays to be dealt with. This, too, is normal. Stay alert, and be ready. When the word comes, things will start to move fast.

Just about the time you begin to feel like a prisoner watching his own gallows being built, you'll be summoned for execu...uh, final lighting and camera check.

The set will be bright and hot under the lights. You may be a little disoriented in all the apparent confusion, but hang in there. Even though they may have said they were ready for you, there's still a lot to be done. This is the production crew's craziest time, and you're a very low priority at this point. You may not be able to get anyone's attention. Be patient. You'll have your chance to ask those urgent questions and get clear on your cues soon enough.

At this stage in the countdown procedure the director will most likely have taken up his position in the control room, and the action in there will be hot and heavy. He'll be firing up the intercom system, checking with his camera and floor people, and setting up his opening shot sequences. You'll be out on the soundstage, isolated from the main action, and it may not be clear what's going on. It may seem like nothing's happening, but in fact the whole huge production machine is coming to life and drop-

ping into its crouch for the blast-off. The tension will be intense, but try to stay focused. You're about to get the rush of your life.

A floor director or one of the camera people will approach you with your final instructions. Be sure you understand what they're saying. This is the time to ask those last-minute questions and get absolutely clear on your entrance cue.

Then, suddenly, someone will be saying "thirty seconds" or "tape rolling." You'll only dimly remember getting the cue signal, and then you'll be on your own, up and running on pure adrenaline.

Performing for the Cameras

In video, the camera is your audience. It scrutinizes you much more closely than any polite human being would, and sees you much more clearly than any live audience could. Unlike a live audience, the camera eye can move around; it can see you from the front, the back, the side; from up close on stage or from the back of the house. It can zoom in on the tiniest detail, revealing a subtle gleam in your eye, that drop of sweat hanging from the end of your nose, or the way you hold your guitar pick when you play an eighth note fill.

Movement on Camera

As you know from our installment on camera operation, action tends to appear exaggerated as the camera moves closer to the subject. Since the camera works mostly in close-up, you may find your freedom of movement restricted somewhat. Let's say you're in the habit of bobbing up and down as you sing, for example. This may appear perfectly natural to a live audience; in fact it might be barely visible. But now suppose we zoom in to fill the screen with a close-up of your head and shoulders. You can be moving only a few inches and still be bobbing clear in and out of the frame. We either have to restrict the camera to longer shots or get you to tone down your movement.

Space Restrictions on Stage

You should figure on having to work in a little tighter quarters than you're used to. Your stage area may have to be smaller due to lack of studio space or because of lighting considerations. You'll be sharing what space you do have with cameras, extra cables, and crew people, so

watch for unexpected obstacles as you perform. Camera people try to be unobtrusive on stage, but sometimes they get caught off guard. If they're concentrating on a critical shot of one of the other players and you're swinging your guitar over your head ala Pete Townsend...well, you get the picture.

Sometimes band members will have to be arranged at what appear to be completely unnatural angles on stage in order to look natural from the camera's perspective. If the director sets you up like this, don't just arbitrarily decide to rearrange things on your own. Remember, it's what the camera sees that's important. If you're really having trouble with a particular set-up, let the director know. Maybe you can work out a compromise that's more comfortable and still gives him a workable camera angle. Check the monitor and see for yourself what works best on tape.

Acting on Camera

Not only will your actions be exaggerated by the camera, but your facial expressions will be intensified as well. An expression that might appear subtle from the twenty-fifth row in a concert may come across as ridiculous mugging when magnified into a full-screen close-up. If your show relies a lot on "attitude" and facial expressions, you may want to practice in front of a mirror until you can underplay it just slightly for the close-up camera.

Timing and Blocking

A good performance always depends on timing. It's true on stage, and it's especially true in video. You not only need split-second timing between the musicians, but between the musicians and the production crew as well.

Even a seemingly simple run from one side of the stage to the other may necessitate a massive, carefully coordinated adjustment by the production crew. They'll need to know it's coming and be prepared for it. Before your shooting session you should hold a "blocking" rehearsal in which you go over all your major stage moves with the director. He'll need to know what to expect so he can set up appropriate cues for the camera and lighting crews.

As you work through your moves, you may be given marks to hit. A mark is simply a predetermined spot on the stage where you're supposed to

be at a certain time. It's important that you hit your marks accurately. If you miss a mark you may be out of focus or out of frame, and the shot will be lost.

Working with Multiple Cameras

One thing that throws many first-time performers is the multiple-camera shoot. With the director switching back and forth between several cameras, you won't always be sure which camera is hot at any given time. There are tally lights on the cameras, but you can go nuts trying to follow them around. The best advice here is simply not to worry about it. In music video you don't need to be mugging into the camera all the time. People are used to seeing musicians caught up in performing; they don't expect as much eye contact as they would from, say, a newscaster. If you have a particular spot where you need to make eye contact with the camera, you can work it out as part of your blocking, and the director will make sure there's a hot camera there for you when the time comes.

Maintaining Your Performance Quality

Like recording studio work, video involves a lot of "hurry up and wait" tension. The musical flow is constantly being interrupted by technical concerns. It's tough to maintain your performing edge through sixteen takes of a song, and even tougher to look fresh and excited while you're doing it. On the other hand, it's rare to run more than a few takes of anything in video, and things seem to move a lot faster once they get moving. This becomes a double-edged sword for the performer.

Because video production is so expensive and so complex, the quality of your performance will simply not be as much of a determining factor in video as it is in audio recording. When you get a good technical take there's a tendency to call it good and move on. You don't want to get steam-rollered into accepting a lackluster performance on tape, so you'll have to make sure all your performances are consistently sharp, right from take one. It's important that you come to the shoot fully prepared and well rehearsed.

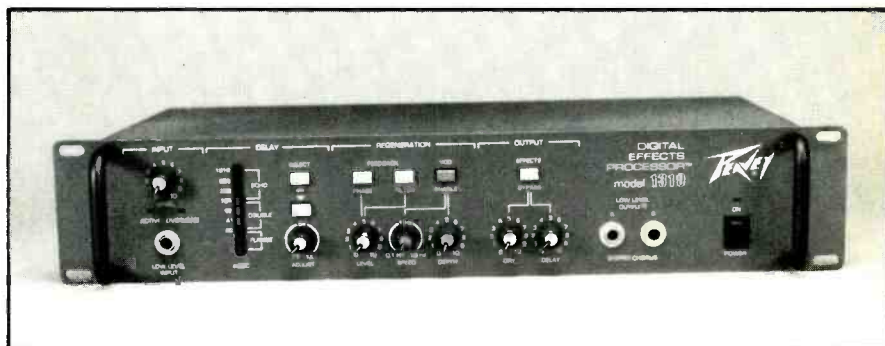
Next month we'll show you how to improve your band's visual image and use video to develop a more professional showcase act on stage.

The Market Place

what's new in sound and music

DIGITAL EFFECTS PROCESSOR

Peavey Electronics further expands into digital audio processing with their new DEP-1310 digital effects processor. Cosmetically, its face includes a 9 bar LED array, input/output level controls, delay time adjustment along with level, speed, and delay, stereo chorus $\frac{1}{4}$ -in. output female phone jack, and a rack mount design. A compander has been added to increase the dynamic range from 72 dB to 100 dB and independent dry and delay lever controls have also been added to improve operability. The DEP-1310 provides continuously adjustable delay settings from 0.1 milliseconds to 1310 milliseconds (1.31 seconds) with absolutely no change in signal quality. A full audio bandwidth (20 Hz to 20 kHz) is available at all settings and with any of the effects



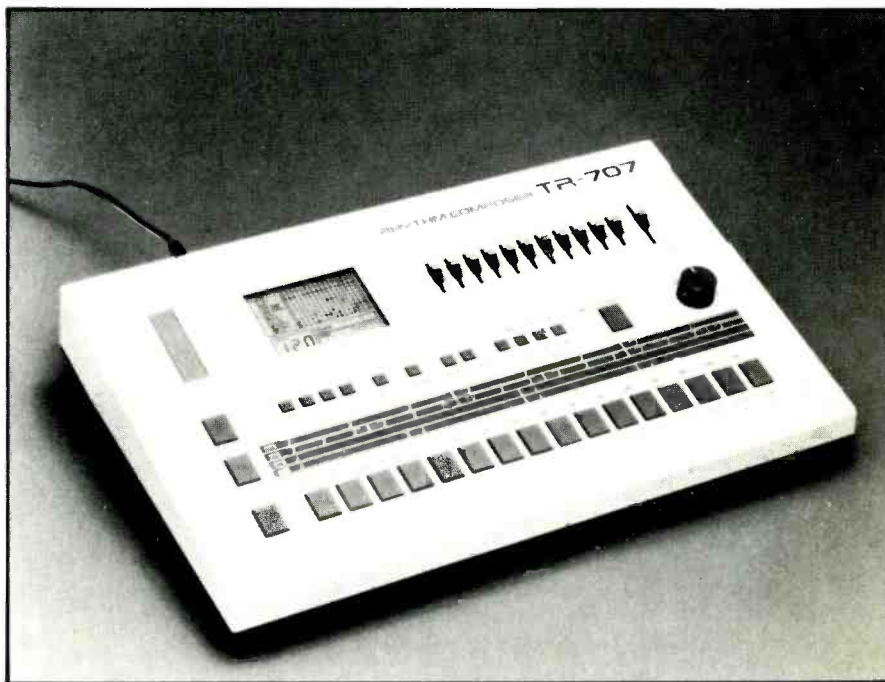
enabled allowing for use not only with musical instrument signals, but also studio and PA quality signal inputs. This capability is provided by a unique hybrid Relative Time Monitor (RTM) system utilizing state-of-the-art time/frequency equal-

ization techniques. The DEP-1310 is available in a 19-in. \times 3.5-in. package and the suggested U.S. retail price is \$649.50.

Circle 31 on Reader Service Card

THE ROLAND TR-707 RHYTHM COMPOSER

The new TR-707 Rhythm Composer offers digital sound, digital display, and percussion timbres in a drum machine that is both a pleasure to hear and a snap to program. Roland uses a digital sampling process (digital recordings of real instruments) to create the 13 sounds in the TR-707 Rhythm Composer. Flam and shuffle functions allow you to produce rich and expressive patterns. Create up to 64 individual patterns and use these patterns to write complete rhythm tracks with a total memory capacity of 998 measures. Once completed, this pattern and track data can be stored externally in two formats, an audio tape recorder or Roland M-64C Memory Cartridge which serves to double the instrument's immediately available memory. A Liquid Crystal Display gives a beat by beat readout for easy graphic editing. Individual drum scoring, accents, measure numbers, track numbers, tempo, and operating modes are all displayed in this handy graphic window. The TR-707 comes equipped with all of today's popular interface options including MIDI, Sync 24 (pulses per quarter-note),



programmable Trigger Out, and full Tape Sync facilities. Complete dynamics can be programmed with any dynamic MIDI controller or sequence controller. Each digital instrument has its own audio output in addition to master stereo outputs so that sounds can be individually processed

by effects, reverb, equalization, etc. The TR-707 Rhythm Composer measures 15-in. \times 3-in. \times 9.8-in. and weighs 3.3 lbs. Suggested retail price of \$595.

Circle 32 on Reader Service Card

SOUNDCRAFT ELECTRONICS SERIES 500 CONSOLE

The Soundcraft Series 500 console is the newest product in Soundcraft's full line of audio mixing consoles. Long known as a leader in the sound reinforcement console field, Soundcraft was made aware of the need for a cost effective 8 buss sound reinforcement console. The result is the new Series 500. Available in 16, 24, and 32 channel input mainframe sizes, it features 6 auxiliary sends which utilize a unique series of "jumpers" which enable each pair of aux sends to be used either pre or post fader, or pre or post EQ on each input module. The console features Soundcraft's acclaimed 4 band EQ with sweepable hi and lo mid frequency. There is a high pass filter which controls low end frequency (i.e. stage rumble, etc.). The split configuration of the console allows for 8 completely independent effect returns



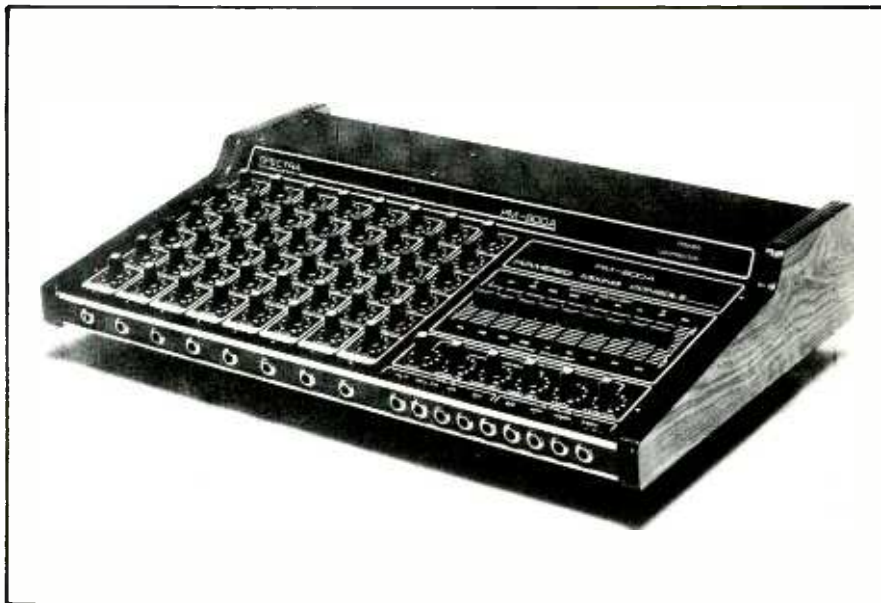
and doubles in use as an eight track recording console. The Series 500 has direct outputs on each channel, and individual insert jacks facilitate easy patching to outboard signal proces-

sing equipment. The Series 500 is priced as follows: 16 channels for \$6,250; 24 channels for \$7,950; and 32 channels for \$9,950.

Circle 33 on Reader Service Card

DEAN MARKLEY EIGHT-CHANNEL SELF-POWERED MIXER

The new Dean Markley Spectra Series PM800A Mixer is a self-powered audio console producing 180 watts RMS at 4 ohms. Complete with its own compressor-limiter and 9-band graphic equalizer, each of the channels is equipped with one transformerless LO-Z low impedance input, one Hi-Z input, a channel level, monitor send, low, mid, and high EQ with ± 15 dB boost or cut, and an effects/reverb send. A sub-in on the main bus allows the console to easily be daisy-chained with other components, while the master section includes an auxiliary level, effects send, effects main return, effects monitor return, main and monitor auxiliary, power amp, effects, and graphic equalizer inputs are provided; outputs include jacks for the graphic equalizer, effects, main, and monitor. All Hi-Z inputs and patching connectors are located on the front panel for easy access; Lo-Z inputs and speaker jacks are located



on the rear of the chassis. Completely portable and compact, the PM800A measures 4 $\frac{3}{8}$ -in. high \times 25 $\frac{1}{4}$ -in. wide \times

17 $\frac{1}{2}$ -in. deep and has a suggested retail price of \$795.

Circle 34 on Reader Service Card

SFI 17 FLAT WAVE STEREO HEADPHONES DEBUT

SFI-Sawafuji America Corp. has introduced the SFI 17, a high quality flat wave stereo headphone. It represents a new generation of headphones designed to harmonize with the human ear. The SFI 17's transducer structure is a unique design employing high energy strontium magnets and a heat resistant polymer membrane with an integral, unitized voice coil. This structure is capable of wide frequency response with excellent linear phase response and fast transient response. This flat wave transducer also reproduces sound with high definition and extreme

clarity. The bidirectional transducer in the SFI 17 utilizes an open air ear cushion design which is free of the resonances typical of the "closed cup" design of conventional headphones. The entire assembly is lightweight and comfortable. The specifications of the SFI 17 are matching impedance from 4-800 ohms with a frequency response of 10 Hz to 100 kHz. The sensitivity is 98 dB SPL and the weight is 180 grams. Suggested retail price is \$79.95.

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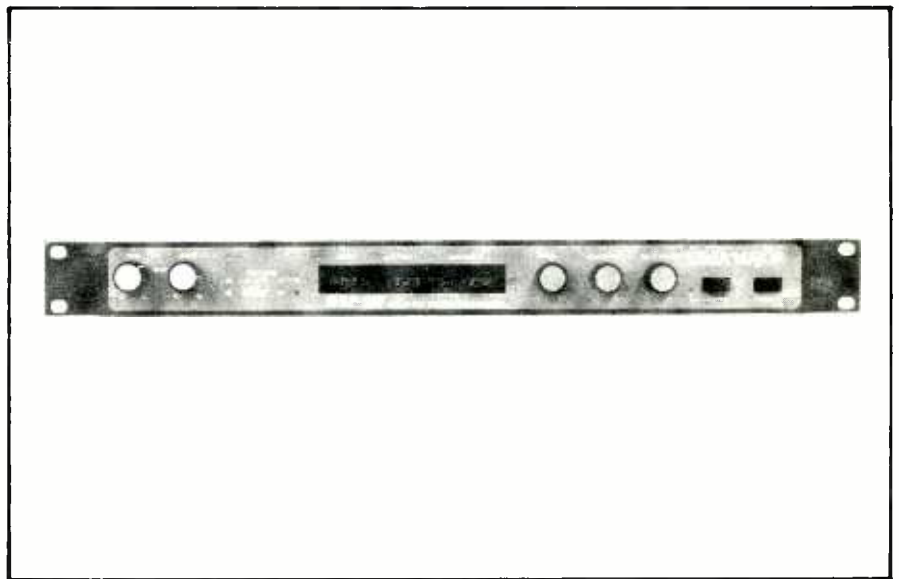
URSA MAJOR STEREO PROCESSOR

Ursa Major's new MSP-126 Multi-Tap Stereo Processor performs a multitude of stereo processing functions, including stereo synthesis from monaural sources, precise image manipulation, ambience simulation, individual and cluster repeats, plus more. The MSP-126 is expected to have a wide range of applications in music recording, film and video soundtrack production, and even electronic music synthesis. Its features will be appreciated by broadcasters and broadcast producers, particularly those involved with television and AM radio, who are faced for the first time with the need to produce high-quality stereo source material. Because it uses PCM digital technology, the MSP-126 delivers uncolored response over a 20-kHz bandwidth. It contains eight pre-programmed modes, each of which can be adjusted with two 16-position controls. The eight modes built into the MSP-126 are as follows: 1. Multi-tap stereo processing creates a full, stereo image from a mono source with flat response and complete mono (left, right, and left-plus-right) compatibility. Able to be used with a wide range of program sources and adjustable from mono to full width. 2. Comb Filter stereo processing creates stereo "the old fashioned way," using comb filters with left-plus-right compatibility. Adjustable from mono to full width. 3. Pan pot: a notable function that places the apparent location of a source anywhere in the stereo field using time delay—equal signal energy in both channels is main-

tained at all times, and has a flat response. Position and overall image width are adjustable. 4. Binaural manipulation is similar to Pan pot, but in the binaural mode for headphone applications. Adds front-to-back depth to the image via digital "reflections." Source position and depth are adjustable. 5. Room generates the early reflections of a room or concert hall, with adjustable delay and dry/wet mix. Good for adding realistic ambience to dry sources. 6. Delay cluster generates a cluster of signal repeats, with adjustable pre-delay and mix. Realistic "slap" and explosion effects. 7. Repeats generate from two to ten equally-spaced repeats, alternating between channels, with adjustable overall length, and rising or falling gain. Great for motion and other special effects. 8. Scale provides a stereo comb filter

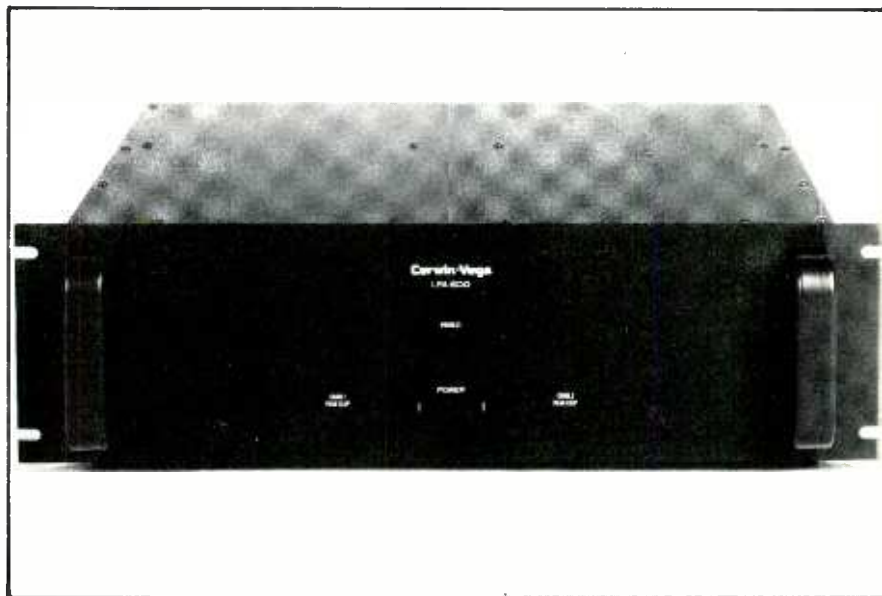
whose "teeth" are at precise musical intervals, adjustable up a chromatic scale from unison to an octave plus a minor third. "Harmonize" any source, or make it into a musical instrument. The MSP-126 features a 16-character alphanumeric readout for instant mode and parameter identification and easy repeatability. Mono or stereo inputs are selected by a switch, and another switch—remotable via a rear-panel jack—provides for instant bypass of all processing functions. Separate input and output level controls are provided. Because the MSP-126 is totally software driven, new programs can be developed for it at any time and suggestions would be most welcome. Suggested retail price is \$2500 pro net.

Circle 36 on Reader Service Card



CERWIN VEGA LPA-600 DUAL-CHANNEL POWER AMPLIFIER

Cerwin-Vega's new LPA-600, a dual channel, power amplifier, was designed for sound reinforcement and commercial sound applications as well as for use by audiophiles who desire a heavy-duty, high power amplifier for in-home use. The LPA-600 can be used under the most demanding professional applications. It will deliver 350 watts RMS per channel into 8 ohms (600 watts RMS per channel into 4 ohms) at less than .03% THD, and incorporates protection and cooling features which will unconditionally protect the amplifier itself and help protect associated speakers and equipment. The LPA-600 is designed to be equally at home in a variety of commercial applications, including discotheque use, recording studios, live performance reproduction, sound reinforcement, and virtually any other professional situation where durability, reliability and high performance are required in a power amplifier. The LPA-600 has a symmetrical, differential, fully complementary circuit design which is notable for its accuracy in reproducing even the most complex musical waveforms. This circuit configuration utilizes only the finest audio signal processing electronics and is powered by massive, well regulated power supplies. The LPA-600's power transformer utilizes dual secondaries to realize the performance advantages of separate transformers without the extra cost and weight. With the high power available from these supplies and a nearly inaudible noise floor (-90 dB re 1 watt), the LPA-600 is able to achieve an enormous dynamic range of 115 dB. Even when pushed into a condition of peak clipping, the LPA-600 responds by clipping almost unnoticeably, with excellent transient overload recovery time. One of the most critical aspects of amplifier design is the ability to respond to and reproduce the intense transients which occur in contemporary program material. The speed of the LPA-600, as indicated by its slew rate specification, is exceptionally fast and allows the precise definition of even the most dynamic live or recorded program material. Cerwin-Vega has taken care to construct the LPA-600 to the highest standards of durability. The circuit is printed on military spec grade circuit boards to virtually eliminate all unnecessary



wiring. In addition, the chassis has been designed to withstand abusive operating conditions. The LPA-600 has extra output devices which allow the entire output section to operate more efficiently. Even at high output levels into reactive loads, each output device will be operating well within the limits of its maximum rating. The sophistication of the LPA-600 is evident in its systems of protection. By incorporating thermal overload protection, thermostatically controlled forced air cooling, and a completely independent output protection circuit, the LPA-600 will fully protect itself and all auxiliary equipment for the duration of any unsafe operating conditions. With these protection systems, its rugged construction and the use of high grade components throughout, the performance lifetime of the Cerwin Vega LPA-600 can be expected to be considerably longer than that of similar units which use conventional design techniques. For ventilation, the LPA-600 is equipped with a single integral fan which switches to high speed whenever the temperature at the output heat exceeds 75°C. By incorporating this extra protection against overheating, the LPA-600 is able to perform optimally under the most demanding operating conditions. Connections from the preamplifier or other input source can be made either by one set of standard ¼-in. phone jacks or barrier strip. These input facilities

are parallel connections and can be used to continue the input "Peak clip" LED's on the front panel of the LPA-600 provide a visual reference to the point of clipping in the amplifier. Unlike conventional LEDs, meter or bar graph indicators, the peak clip indicators on the LPA-600 are connected to an analog comparison circuit which senses the actual clip point with reference to the power supply. This allows the indicators to accurately indicate the point of clipping regardless of AC line voltage or load impedance. The LED "protect" indicator, on the front panel, will light when the protection circuits have become active. This indicator will also light whenever the amplifier is turned on or off, as the protection circuits become active when the AC power is lost or restored in the amplifier. Level controls, located on the rear panel of the LPA-600, adjust the volume attenuation for each channel. Specifications for the LPA-600 with full bandwidth are: 8 ohms, (below 0.03% THD + N) 25.4 dB W, 350 watts and 4 ohms (below 0.05% THD + N) 27.8 dB W, 600 watts. The signal to noise ratio is for IHF "A" weighted ref (rated output into 8 ohms) 115 dB. The input impedance is a nominal 10kohm. The Dimensions (WHD) are 19.0-in. x 5.25-in. x 18.0-in. The suggested retail price for the LPA-600 is \$1,700.00.

Circle 37 on Reader Service Card

1/4 Notes

MAKING TRACKS

At TNA Records in CT: **Cub Koda** was in working on overdubs for his LP which is being co-produced by himself and Thomas "Doc" Cavalier. Cub has signed an exclusive contract with TNA after releasing four LPs on various independent labels in 1984. **Bob Mel** finished recording four more songs for his first LP, and **Rebel Montez** was in working on the final stages for their first LP. The success of **The B. Willie Smith Band's** single "Party" in Canada has led to an album on Globe Records, distributed by RCA, and licensed from TNA Records. The LP will consist of 12 tracks from their two domestic TNA albums, plus the single... **Omar Mesa** and **Joseph Armillas** were in at NY's Platinum Factory finishing tracks and mixing for the "Luna" LP. The album is being produced by Claude Cave with Jon Evans at the board and help from Derek Davis... Renovations have taken place at Mastermind Studio A. An automated MCI JH636 console, a Carver PM 1.5 power amp and a pair of new Westlake monitors have been added. Keyboardist **Jorge Dalto** was also recently there completing a new album of South American jazz with **Eddie Gomez**, Daniel Homer, and Peter Erskine... **The Weather Girls** were at Park South cutting tracks for a new LP for Columbia. Producers for the project are Hank Medress and Jeff Kent with associate producer/engineer Joe Venneri. Jamie Chaleff lent a hand... Producer **Richie Zito** was in at Capitol Studios with The Motels. David Leonard and Michael Fondelli were at the board... **Swing Set** was in recording tracks for its newest project with Chris Bubacz at the board... **The Four Tops** were cutting vocal tracks at Detroit's Sound Suite. Producers for the project are Willie Hutch and Iris Gordy for Motown. Jim Vitti is engineering with Steve King assisting... Stanley Turrentine was recently in laying tracks at NY's Power Play. Tony May was at the board with Rick Gratz assisting... **Terry Manning** was at Treasure Isle Records producing Nashville's Tim Krekel & the Sluggers... **Mark Egan** was in recording a solo album at Skyline Studios in NY with producer/engineer Steven Miller for Windham Hill Records. Scott Ansell was assisting... Producer Mark Liggett was in mixing **Shannon's** latest single for Emergency Records. Paul Wickliffe was at the console with Mario Rodriguez assisting... At Power Play Studios: **The Intruders** were in finishing up their album for Polygram Records with Leon Bryant producing and **Julian Herzfeld** and Rick Gratz engineering. Richard Bassoff and Nick Braddy produced Linda McConnel's followup to the chart hit "One Step At A Time." It's called "Anyway I Can Get It" for Atlantic Records. Julian Herzfeld was at the board. **Skipworth and Turner** cut their next single for Memory Lane Music called "Thinking About Your Love." Patrick Adams produced and engineered...

ON THE ROAD

Sonny Rollins toured Japan with special guest artist Bobby Hutcherson in January. He is scheduled to pick up again with various bookings in Ohio and North Carolina...

MISCELLANY

Capitol recording artists **Duran Duran** are about to release a documentary for the home video market. The 87-minute long "Sing Blue Silver" will be available through Thorn/EMI Video and will combine live footage with more personal offstage insights, showing the band in various aspects of their work... David Sterling announced the recent signing of Kevin Panizza, the new lead vocalist/keyboardist to **Planet**, the San Diego based group managed by Sterling. Planet, whose members include Doug Haynes, Dale Breedon, Marcel Simoneaux, and Steve Ward, are currently in the studio working on their first release... The complete line of **Gretsch** drums has been reacquired by Fred Gretsch Enterprises, Ridgeland, SC, from the Baldwin Piano & Organ Co. Included in the Gretsch drum line as part of the acquisition are drum outfits, tom toms, bass drums, snare drums, outfit accessories, drum heads, cymbals, percussion devices, Blackhawk electronic kits, etc. ...

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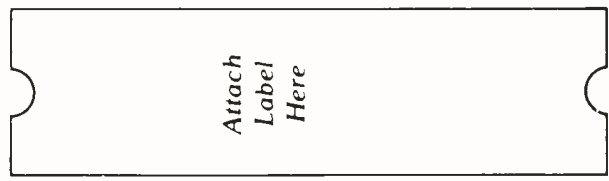
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