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Recording

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◀ On the Cover

Production room A at KEY1-FM, Austin, TX. Photo courtesy of RAMSA/Panasonic.



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Splat

Ssssss. Fffff. Splatter. Zzzzz.

Sound familiar? It will if you regularly listen to almost any broadcast medium or have purchased any one of a large number of albums in the last few years. What you are hearing is the accumulation of sibilant products caused by one or more of the following:

1. The nature of digital clipping.
2. A lack of experience or knowledge in recording vocals.
3. The electronic pre-emphasis circuitry present throughout the recording/reproduction chain.
4. The monitoring environment.

Lack of attention in these areas has produced recorded material that contains far too much level in the sibilance bands (2kHz to 3.5kHz for speaking and 6kHz to 7kHz and 9kHz to 12kHz for singing). This overabundance follows the material from recording through mastering and pressing, and eventually to the broadcaster/listener.

Adding the pre-emphasis found in both TV and FM audio, and used in high-speed commercial cassette duplicating, and you have as an end result vocals and other high-frequency information that makes a big fat splat when reproduced.

This grating distortion begins (as it must) at the recording stage. The absence or improper use of dynamic control systems and absence of sibilance controllers, coupled with the fact that the digital recording medium has an overload margin of zero, produces vocal tracks with both level and frequency content problems. Attempts to correct this at the mix stage lead to excessive EQ (designed to bring the vocals forward in the mix) or further runs with the dynamic limitations of the digital recording medium. Often, the problem gets even worse when it reaches the CD or disc mastering stage.

Faced with excessive sibilance, the mastering engineer has to choose between the lesser of two evils: selectively reduce the excessive sibilant levels (costing the client big bucks in time/rework charges), or attempt to reduce the overall level on the disc, sacrificing

something else to make room for the peaks. Neither is necessary, if proper production practices are followed before the material reaches this stage.

With high-quality analog, we all discovered the wonderfully linear nature of tape saturation. For some, recording with the meters in the red was a common practice and one that was designed to take advantage of the medium's soft, easy overload characteristics. However, whether in the analog or digital domain, sibilance is still sibilance. Even with current-generation analog technology, if you don't control or correct it, your material will still go "splat" sooner or later.

And with digital equipment, engineers and producers who run the meters into the red are due for a rude shock. The "0" reference (wherever it may be set) is a brick wall and there is no room beyond this point. If you overdrive these systems, they hard-clip, chopping off the information and adding unwanted harmonic components.

Couple this with improper microphone technique and a misunderstanding of the dynamic range of the human voice and you have a collection of technical obstacles waiting to trip the unwary.

Now, add a monitoring environment that does not accurately reflect the spectrum of the mix and you end up with a master tape that would give any cutting engineer or CD premastering house nightmares. (A related point for another time is the hearing damage/loss that may contribute to over EQing, further worsening the situation.)

Apparently, many engineers and producers are either unaware of what they are releasing or they don't realize what is happening to their material out in the real world. As a result, we are seeing a proliferation of releases in which the vocals (and more often than not, other tracks) are excessively sibilant, to the point of being unlistenable.

My intent is not to criticize unfairly those involved in the production of recorded program material. In fact, the problems outlined are relatively easy to correct, and technology can offer many potential solutions.

The key is the intelligent application of selective solutions for specific problems. Digital recording systems require considerably more attention to small details if they are to deliver their full potential. Problems in analog that either could be ignored (low-frequency rumble not repro-

duced because it was at or below the noise floor) or were, to a degree, self-correcting (overdriven channels to tape) are glaringly apparent with digital systems. By offering wider bandwidth reproduction, they also open the door to a wider range of problems and will require engineers, producers and artists to learn the limitations of the technology.

Sampling rates are fixed, so as frequencies increase, the number of available samples drops. This can limit the ability of the system to correct and handle signal variations. Members of the production community who are unaware of the electronic limitations imposed by any system can, indeed, create a product that contains problems that cannot be corrected. It is incumbent upon us all as professionals to educate ourselves and understand what happens to our material outside of our own facilities, so that what we render as a final product is representative of what the consumer hears.

I cannot believe that artists, engineers and producers do not care enough to realize that their long, expensive projects are now just 40 minutes of annoying sibilant noise. Given the obvious fact that a number of productions do not exhibit these problems (and used the same technology), the technology itself cannot be held totally accountable. Only its misapplication, or worse, non-application, can be found at fault.

No recording/reproduction medium is perfect—all have limitations. It's working at the edge of these limits with maximum creativity that separates the professionals from the crowd.

Frederick J. Ampel
Editorial Director

REP

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LETTERS

Electronically controlled speaker systems

From: Mike Joseph, manager, pro audio marketing, Electro-Voice, Buchanan, MI.

I would like to commend you on "Electronically Controlled Speaker Systems" in the January issue. It was gratifying to note author David Scheirman's concern in presenting the facts as clearly and objectively as possible, on a subject where manufacturer's and user's emotions seem to rule the day.

There appear to be many myths associated with "processed" speaker systems (a badly misused word, as David pointed out), some promulgated by manufacturers themselves. Case in point: the article's accompanying sidebar penned by Mark Gander, Garry Margolis and John Eargle of JBL. As we have recently entered the electronically controlled speaker system arena, I would like to comment on the conclusions presented therein.

The concept of tailoring an audio signal to compensate for limitations or non-linearities inherent in mechanical devices and transmission/reception processes is not new. Frankly, it is quite amazing that it causes a stir at all. Tape deck manufacturers were "pre-distorting" the audio record signal on their consumer and professional machines years ago in order to get a linear signal cleanly through their physics-limited, non-linear tape heads.

For decades, the broadcast industry has been modifying the input signal to transmitters in order to compensate for non-linearities and performance ceilings in the transmission process. Analog tape deck noise reduction has long been accepted, with systems that do all manner of signal modification to correct for losses and limitations in that specific mechanical/electromagnetic medium.

Let us note that the goal has always been lower distortion and greater dynamic range of the end product, whether the listener may be monitoring on an FM receiver, the output of a cassette deck, or a 10kW speaker stack. Physics is physics and parts are parts, but sometimes a signal chain must ultimately be judged as a system, from the early input (say, a microphone) through to the last output (say, acoustics in the room). If total system performance can be improved by modi-

fying a signal in a given middle stage somewhere, whether by EQ, signal delay, high-pass filtering, etc., then it is difficult to judge that action bad, *assuming the action contributes no detrimental sound qualities to the final output.* This, of course, is the key. One cannot judge the concept or goal as bad merely because certain past designers' interpretations or attempts at sound and reliability improvement have subjectively "failed," aesthetically speaking, in their first generational stage of product development.

We, as others, chose to introduce only things that would improve the sound and reliability above and beyond the performance available, using high-quality components alone. With this in mind, it is difficult to stand mute and quietly accept the comments of those who, to be gracious, seem to be responding in a factually unaware, "knee-jerk" manner. My comment to them: Please educate yourselves.

Objectively, it is difficult to understand any bias at all against electronic signal setup in high-power sound systems. Is not a 1/3-octave EQ signal processing? Is not signal delay for component alignment in a crossover band also processing? How about compressor/limiters on the drive rack feed? I cannot recall the last time I saw a large, high-powered system that did not have a multifunction steep slope analog crossover, with some signal delay integral for component alignment; a multitude of dbx 160X or equivalent compressors and limiters on the drive rack program inputs or crossover outputs; 27- or 30-band graphic equalizers, most with adjustable high-pass filtering, etc. What is electronic speaker control if not the incorporation of these devices into one integral, low-noise, properly gain-staged unit?

Do away with the "one-trick" compressor/limiters and substitute a high-quality, low-distortion, low-noise VCA for variable-state, emergency-only limiting via amplifier sensing to protect devices from overexcursion, voice-coil heat buildup and amplifier clipping, and you have an improved system that safeguards components in a way that is much quicker and more accurate than a human operator with a fixed-point limiter could ever be. You do not wrest aesthetic control from the mixer. You add to his box of tools.

It might be suggested that anyone who indicates that a properly designed and realized electronically controlled speaker system "sounds funny" is merely proving their unfamiliarity with current designs;

the point at which a DeltaMax device, for instance, starts to "sound funny" is typically several decibels beyond where anybody's raw components in a box would have jumped the gap, slammed the backplate, smoked the coil, shattered the diaphragm or in some way failed catastrophically. Choose one. This is especially in light of QSC 3800, Crown Macro 2400 and Crest 8000 power sources (to randomly sample), all unavailable several years ago.

All of us are part of a relatively young industry, always growing, always searching for new and technically superior ways to accomplish our goals. It is painful to witness the evidence of closed minds and tiny attitudes. It is difficult to understand those who would lump many diverse approaches and techniques together, then dismiss them summarily. To all the critics I say: Gentlemen, here is the idea. It works. There are myriad ways to realize its application. It is the future. Can you apply the concept better? Then by all means, feel free. If you choose not to, then at least respect those who are pushing the limits of the envelope.

John Eargle, Mark Gander and Garry Margolis reply:

The article in question presented both benefits and liabilities associated with individual characteristics used in the available "processed" speaker systems. Rather than "responding in a factually unaware 'knee-jerk' manner," the curves and descriptions presented were the result of extensive measurements and listening evaluations on a broad range of systems.

To paraphrase Mr. Joseph, there are myriad ways to realize these systems. All of the manufacturers in the main article, including EV, exhibit their own distinctly different combination of functions, representing each of their differing philosophies.

As David Scheirman pointed out in the preface to the sidebar, JBL also has electronic products designed to integrate with loudspeaker systems that incorporate a specific combination of the various functions available, and choice of parameters for each of these functions. Rather than being "the evidence of closed minds and tiny attitudes," they are simply the embodiment of JBL's current design philosophy.



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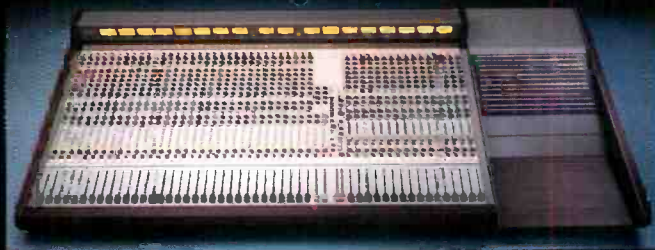
The M-600 is modular. Which means you can custom configure the console to *your* audio or video production needs. The M-600 lets you choose up to 32 input channels, or you can start with 16 or 24 input channels and expand the board as your needs change. Optional stereo modules can also be added to provide even more line inputs for MIDI instruments and video production convenience.

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LETTERS

Professional users will ultimately make their choice from available system concepts based on component and engineering integrity and, above all, sonic performance.

Employment trends

From: Timothy N. Nichols, San Diego.

I wish to take issue with William Moylan's article "Employment Trends" [December issue]. I offer this rebuttal not in the spirit of a personal "sob story," but as an example of what can, and does, happen to people who think it is part of their jobs to gauge trends in the professional audio industry.

I was the audio teacher at San Diego State University, which is one of the largest 4-year institutions in California, for more than three years. While this university is not noted as a particularly astute audio school, I did instruct up to five audio classes in two departments (music, and telecommunications and film) each semester. This gave me a yearly average of between 220 to 250 students. Many of these students, I am proud to say, are now employed in various fields of the audio business throughout the nation.

I was proud to stand in front of a class and pontificate on various aspects of the audio industry, and I am also proud to say that I was always honest in giving personal opinions when it was relevant and asked for by the students. When I was asked to predict possible employment opportunities, I would reply that for each job opening in the industry, there were *at least* 100 qualified applicants. And if someone was lucky enough to get a job, there would always be *at least* 200 unscrupulous people trying to take it away. You must be either lucky or unscrupulous to work in an industry so overcrowded. Being rich enough to start your own business is covered by luck. I think that it is dishonest to give students, or the general audio community, false hopes of employment.

The truth of this philosophy was brought home to me when a qualified, but very unscrupulous, individual stole my job in one of the previously mentioned departments. The remaining class load was insufficient to support me financially, so I had to give up teaching.

While this was disappointing, I could foresee no real problem in finding another job at equal or higher salary. In the mean-

time, I signed on to "extra call" with IATSE as a part-time sound man.

Even with all of the contacts that I have established in more than 12 years in the audio industry, I have not been able to find any audio-related job in Southern California in the past 12 months. My income as an IATSE extra will fall far short of reaching even the 5-figure barrier.

While I support Dr. Moylan's right to offer an opinion, I very strongly feel that the content of the opinion is wrong and does a disservice to those who are considering a future career in the audio industry.

Mega-Monster clarification

From: Todd Wilson, Rack Attack, Hollywood.

I thought I should shed some light on the Mega-Monster rack from Smoketree Studios, mentioned by Patrick O'Hearn ["A Five-Year Look into the Crystal Ball," December, page 44]. While it is true that we deliver, it is not true that Smoketree Studios rents out that system. Rather, our company does. (We just happen to have our office in the same complex as Smoketree Studios.)

Since the article, Smoketree has received numerous calls regarding the system. They are most gracious about transferring calls, but I think it would be better if people had the correct information and phone number.

Contact Rack Attack at 3249 Cahuenga Blvd. W., Hollywood, CA 90068; 818-998-1024—Ed.

Recording schools: hidden impact?

From: Geoffrey P. Hull, chairman, Recording Industry Management, Middle Tennessee State University, Murfreesboro, TN.

Your second annual Salary Survey [November issue] makes a subtle, but perhaps overlooked, statement about the impact of recording programs and schools as training grounds for audio professionals.

The data indicates that about 30% to 35% of respondents received their first audio experience in a college/university

program or recording school. That may not seem all that significant by itself, but one must consider that these programs have only been around since about 1973. Thus, anyone with more than 15 years of experience could not have acquired their first experience in a formal audio program.

If we look only at those with less than 15 years experience in the professional audio industry (47.7% in management staff, 55.8% of technical staff and 63.6% for production staff) and compare those figures with those who say their first audio experience was acquired in a college/university program or recording school, we would find that 71.1% of management people, 53.2% of technical people and 54.7% of production people must have got their first experience in audio in a formal educational setting.

To put it another way, more than half of the recording professionals who could have received their first audio experience in a college/university program or recording school did so!

Maybe we educators aren't doing too badly after all.

The only question remaining is whether the above are lies, damned lies, or merely statistics!

FDR, not JFK

From: Matthew Mattingly, MIT Language Lab, Cambridge, MA.

Jeff Burger should not be too concerned about computers forcing him to be accurate and detail-oriented ["Understanding Computers," January]. Franklin D. Roosevelt, not John F. Kennedy, made the statement, "The only thing we have to fear is fear itself."

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CompuSonics suspends manufacturing operations

CompuSonics has ceased manufacturing its desktop digital audio disk recorders/editors and will concentrate solely on licensing and contract engineering. The company changed direction after it analyzed its capital structure, capabilities and business operations and realized that it could be profitable through licensing and engineering work, said chairman David Schwartz.

Digital Trends Inc., Concord, CA, has been licensed to manufacture the existing CompuSonics line in the United States. Ferrograph Ltd., an English manufacturer, has exercised its option to extend its DSP 1000 manufacturing license to include the hard and floppy magnetic disk machines.

QSC expands, renovates manufacturing facility

QSC Audio Products has expanded and renovated portions of its manufacturing facility, responding to increased product demand. The PCB assembly and quality control areas have been expanded, and a new flow solder machine, automatic power conveyors, workstations and lighting have been installed. Sam Kazemi, QSC's senior manufacturing engineer, said that the improvements would result in better material and product flow.

AES conference to cover digital audio

With last year's digital audio conference laying the groundwork, this year's conference, with the theme "Audio in Digital Times," is intended to advance the technology. The conference is scheduled for May 14-17 at the Royal York Hotel in Toronto.

The first day will start with opening remarks from Ken Pohlmann, conference chairman, and will conclude with a tutorial session. The second day will cover various storage and processing technologies. The intention of these two days is to lay the groundwork and start the attendees on an equal footing.

The last two days will include overlapping morning sessions, which will allow attendees to choose from presentations toward recording studio technology or digital signal processing applications. Evening sessions will be directed to the end applications of digital audio and will focus on consumer products and digital distributed applications, such as broadcast, film and cable.

For more information, contact the AES at 60 E. 42nd St., New York, NY 10165; 212-661-2355.

New England Conservatory schedules summer workshops

The New England Conservatory has scheduled three workshops this summer on MIDI and electronic music. "Controlling Your MIDI," June 16-18, will cover digital workstations for composition, control and synthesis of digital and analog sound. Robert Ceely is the instructor. Cost is \$280 for one credit, \$175 for non-credit and \$550 for NEC graduate students. The "Electronic Music Workshop," June 19-23, will cover the basic principles of sound, analog synthesis, frequency modulation and digital sampling. The course also will survey various computer music programs. Cost is \$560 for two credits, \$350 for non-credit and \$1,100 for NEC graduate students.

Also scheduled is "Musicians and Technology," June 23-25, which will be an overview of current music technology and its application in musical life. Cost is \$280 for one credit, and \$175 for non-credit.

For additional information, contact Mary Street, director of summer school, at 290 Huntington Ave., Boston, MA 02115; 617-262-1120.

DAR starts training workshops

Digital Audio Research has initiated a 3-day training course on the Soundstation II. Subjects include hands-on training, technical overview, and integrating the system in an all-digital studio. Speakers will include John Watkinson, author of "The Art of Digital Audio," and DAR directors and engineers. For more information, contact DAR's U.S. office at 213-466-9151.

Forum to discuss sound for motion pictures

UCLA Extension will present a 1-day program, "Toward the Ultimate Sound System for Post Production: A SMPTE Forum," on Saturday, May 6. Presented in cooperation with SMPTE, the seminar will emphasize the impact of emerging technology, particularly the advent of random-access storage using computers.

The seminar will be taught by Tomlinson Holman, corporate technical director of Lucasfilm Ltd. and assistant professor at the USC School of Cinema-Television. Scheduled guest speakers include loan Allen, vice president, Dolby Labs; Chris

David, film products manager, Solid State Logic; Brian Keely, audio and editing systems engineer, Lucasfilm; J.A. Moorer, vice president, audio development, Sonic Solutions; and Eddy Zwaneveld, the National Film Board of Canada.

The forum will be held at the Directors Guild of America West building, 7950 Sunset Blvd., in Hollywood. The fee is \$95. For more information, contact UCLA extension at 213-825-9064.

News notes

"For You, Armenia," the benefit record to support the Armenian Relief Society's Earthquake Relief Fund, was recorded in January at the **Record Plant**. According to president Chris Stone, it was the single-biggest session at the facility, using more than 100 tracks.

Yamaha has selected **Offbeat Systems** to be one of the development teams to write software for the C-1 music computer. Offbeat's Streamline software will soon be available on the C-1 as a fully integrated hardware/software package.

DIC Digital has unveiled a promotional effort for its digital audiotape. With every 20 cassettes purchased until June 30, DIC will provide a T-shirt, and purchasers will be registered in a drawing to win a DAT player suitable for use in a car sound system. DIC has also introduced new product packaging featuring black, red and gold designs.

LD Systems has added the IMS Dyaxis and the Lexicon Opus to its inventory. Products from Alesis, Monster Cable and Bryston have also been added. The company has also completed an installation for Moffett Productions, for a 3-room complex for video post.

Little Feat's "Let it Roll" album, engineered and produced by George Massenburg, was extensively recorded with **Bruel & Kjaer** microphones. Type 4004s were used for drum overheads and ambient room pickup. A 4006 was used for guitars and mandolin, and a pair of 4011s were used for a variety of applications.

Booth space for **APRS '89** exhibition is almost sold out. As of February, the only space available was on the upper floors. The exhibition is scheduled for June 7-9 at the Olympia Exhibition Centre, London. For more information, contact APRS at

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NEWS

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FM Acoustics has acquired Precision Cable Technology, the Swiss manufacturer of Forcelines cable.

Revox has selected **Ampex** as the tape supplier for its new generation of audio and instrumentation tape recorders. Ampex tape will be marketed alongside the new Revox recorders. Current plans call for the machines to be initially marketed in Europe, with eventual worldwide distribution.

Gentner Electronics has announced that its second quarter of fiscal year 1989 was its eighth straight quarter of profitability.

Sigma Alpha Entertainment, owner of Sigma Studios in Philadelphia, has formed a record and publishing company, part of a 5-year expansion plan in which the studio operations will be de-emphasized and downsized.

Frazier has appointed two rep firms to market its products. Design Factors, Hacienda Heights, CA, will cover Southern California and southern Nevada. Meyer & Ross, Burlingame, CA, will cover Northern California, northern Nevada and Hawaii.

ARX Systems has opened a U.S. office, managed by Algis Renkus, to handle distribution, marketing and service backup for its products. The office's address is Box 842, Silverado, CA 92676-0842; 714-649-2346; fax 714-649-3064.

Sonosax has moved to 1162 St-Prex, Switzerland; 021 806 02 02; fax 021 806 02 99.

QSC Audio Products has named Applied Audio Marketing as its 1988 representative of the year.

Amek has moved into its new 13,000-square-foot factory, acquired as part of its purchase of the Regent Trading Estate in Salford, England.

A TV show with 208 audio tracks? "Round the Bend," a children's TV series in Britain, is one such show, said to be the first TV show in England with all-digitally created, recorded and post-produced music, dialogue and sound effects. Tape Gallery, London, is the facility doing the post work, using a **New England Digital** Tapeless Studio.

Amek/TAC US has appointed **Westlake Audio** as its Southern California dealer. Westlake has also added Larry Deeds to

the staff as an audio/MIDI systems design specialist.

People

Terry Hoffmann has been named president of Centro Corporation.

Korg USA has announced several appointments. **Robert Tyro** has been named product support specialist. **Patrick Mazie** has been named national sales manager. **Jordan Rudes** and **John Martin Lehmkuhl** have been named regional product specialists. **Lawrence DeMarco** has been named product development manager.

Arnie Christensen has been named sales manager at Apex Systems.

George Stage has been named director of engineering at Orion Research.

New York Technical Support has added **Dan Zellman** to the service staff.

Alpha Wire Corporation has appointed three vice presidents. **Grant McLennan** has been named vice president of marketing. **Edward H. Gowett** has been named vice president of sales. **Larry G. Myers** has been named vice president of national accounts.

REP

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RECORDING ENGINEER/PRODUCER is edited to relate recording science to recording art to recording equipment, as these subjects, and their relationship to one another, may be of value and interest to those working in the field of commercially marketable recordings and live audio presentation. The editorial content includes: descriptions of sound recording techniques, uses of sound recording equipment, audio environment design, audio equipment maintenance, new products.

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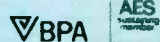
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Dolby

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MANAGING MIDI

By Paul D. Lehrman

Taking MIDI to Multitask

Every year or so, a new buzzword creeps into the world of MIDI. For a while, it catches everybody's attention, and then it fades away—either disappearing, or settling quietly into musicians' and engineers' toolkits.

We've had "system-exclusive," "SMPTE conversion," "controller chasing," "intelligent tape sync," "MIDI Time Code," and maybe a few others I've forgotten. This year's buzzword, without a doubt, is "multitasking."

As is usual with a new catch-phrase, the precise definition of multitasking is a little hazy to some. Broadly put, it's the ability of a computer to perform more than one job at a time—more specifically, to run multiple programs simultaneously.

A computer that can download a file over a modem while working on a different file (editing text, crunching numbers or whatever) is multitasking. So is a computer that lets you print one document while you edit another.

Some computers are built for multitasking from the beginning (like the Commodore Amiga and IBM's new OS/2 line), while others have been dependent on operating-system improvements to allow them to multitask. Switcher and Multifinder are two examples of a "pseudo"-multitasking system being imposed on a computer: These programs were designed by Apple for use with the Macintosh long after the computer was available, and were included in various versions of Apple's system software.

Switcher (which has since been discontinued) was not true multitasking because, although it gave you instant access to a number of different applications, you couldn't leave one program while it was actually *doing* something to go work in another. Multifinder is better in that it allows certain background tasks (like printing, downloading, and in some cases, even MIDI generation) to go on after you start working in a different program. On the

Atari ST, a similar "shell" to Multifinder is Dr. T's Multi Program Environment (MPE), which, likewise, allows instant window-based program switching in a machine large enough to handle multiple applications simultaneously.

The disadvantage of an individual developer coming out with a multitasking system is that other developers are under no obligation to write their programs so that they respect it. In fact, there's nothing to stop them from coming out with their own, completely incompatible multitasking environment.

But is this type of not-really-multitasking appropriate for music? Sometimes the answer is yes—music programs can often take advantage of multitasking just like conventional office-oriented programs. In the office, if two programs need to get to the printer, one of them just waits in line until the other is finished. Same with a modem—Gaston can start uploading tomorrow's sell orders after Alphonse is finished downloading today's commodities quotes.

In the music studio, if you are running a sequencer and a patch editor, under Multifinder or MPE you can stop the sequence, tweak one of your voices, and start the sequence again. Similarly, if you want to load a file created by an algorithmic composing program into a sequencer to look at it and edit it, or into a notation program to print it out, then as long as you have enough RAM, there's no problem having all those programs in the computer at the same time.

If they're going to work together *in real time*, however, music applications need a different kind of multitasking environment. What happens if you want to generate music from a sequencer and an algorithmic composition program at the same time, say, with the sequencer providing the rhythm track, the algorithmic program doing piano fills, and the sequencer recording your smoking solos? Under most existing systems you can't do it. What happens if you want to tweak that patch while the sequence is actually playing? Same thing.

Here's a more serious example: Digidesign's Q-Sheet program for the Macintosh allows you to time and trigger MIDI events for sound effects, Edit Decision List-style and also provides time code-based automation of MIDI-controllable mixers, processors, etc. By

itself, it's a useful program, but it may strike the small-studio owner as a waste to tie up a Macintosh just to do effects and automation.

But what if you had that same computer handling all the sequencing at the same time? One computer would be controlling every piece of gear in the studio in real time. MIDI can handle it, especially if you have two different MIDI lines going, which the Mac can deal with easily. Unfortunately, once again, there's currently no way to do it.

The reason there's no way to do it is because all of these various programs, although they may co-exist on the screen very nicely, do not communicate with each other at the level they must to share a MIDI port. Unlike a printer or modem, you can't just stop sending MIDI data from one program for a few seconds or minutes to make way for the output of the other program.

You also can't just impose one data stream onto another, for the same reason you can't use a Y-adaptor to mix two MIDI lines: if one command gets interrupted by another command, all MIDI Hell breaks loose.

Therefore, a computer, if it is to be truly MIDI multitasking, has to have the intelligence to mix MIDI data streams without interrupting them. It also has to have some kind of overall timer that can control all of the programs while they run, so that they don't go in and out of sync. It would also help if all of the programs involved could use one common MIDI driver—the software module that handles the job of actually putting the MIDI data out the port—so that any potential discrepancies in the way the programs generate MIDI are eliminated.

This type of multitasking, not surprisingly, requires its own special operating system. It also requires the writers of the software that's going to run under it to design their software strictly according to the requirements of the operating system.

At NAMM, there were two MIDI-multitasking systems on display: M.ROS from Steinberg on the Atari ST (with versions for the Macintosh and IBM PC promised), and Apple's MIDI Manager. Both have the potential to take MIDI software one giant step forward, *if* the other software developers agree. If they succeed, then once again, today's buzzword will evolve into tomorrow's tool.

REP

Paul Lehrman is RE/P's electronic music consulting editor and is a Boston-based producer, electronic musician and free-lance writer.



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SPARS ON-LINE

By John St. John

Price, Speed and Quality in Commercials

I was once told that there are three parameters in commercial recording: price, speed and quality—and that you can never have more than two of the three at a time. As an axiom, it is very useful when discussing budgets. The conversation might go as follows:

"How much will my commercial cost?"

"Well, if you have a limited budget [polite approach], it may take some time if you want quality. If you need the spot right away, it'll cost ya!"

Though striving for quality, most advertising agencies tend to be in a desperate hurry. Unlike record production, there's usually a deadline attached to commercial projects. You often hear statements like, "It airs this afternoon on WCAR's drive-time show."

I've always believed that good audio production takes time. This belief was put to the test a few years ago when I met (shudder, shudder) the Syndicator! The syndicator, for those of you who have not yet met him, is the character who takes generic commercial spots and customizes them for use all over the country. The commercials are marketed by a kind of boilerroom operation, at whatever price the market will bear—usually cheap. To make a profit, the production has to be inexpensive, fast and of acceptable quality. In other words, you'd better forget the opening axiom.

If you are familiar with the usual talent calls, music searches, copy changes, retakes, punch-ins, mixes and mastering that accompany a great spot, the habits of the syndicator will terrify you. While you've had the luxury of three hours or more to complete a single spot, the syndicator wants and gets as many as 200 spots in three hours, complete with sound effects, multiple talent, music, dubs and cassette.

First, you must have a good, cheap voice talent—\$5 to \$10 a spot is average. Armed with a stopwatch, the talent must be able

to read anything flawlessly, correcting for punctuation and spelling errors as they read. They must also be able to speed or slow their delivery on demand. Seasoned radio announcers are very popular.

Second, the studio must have remote controls on everything, including the cassette deck, or you'll find yourself doing the 10km studio run.

Finally, cart machines are a standard requirement, though I have managed to use samplers in their place. These devices contain the generic "cart lines" (the previously recorded copy), which don't require customization. An example of a live announcer/cart line dialogue might be:

Announcer: "Hi there Mr. President, how's that ol' Duesenberg doing?"

Cart: "Well, actually, I was thinking of buying a new roadster."

Announcer: "Have you heard of the great deals down at Joe Blough Imports? They've got a great selection of..."

For this kind of production, you need at least two limiters, one for the announcer's mic and one for the cassette deck. The mic line limiter should be set to accommodate anything from a yell to a whisper, with an optimum output. Use a fast attack and a medium-to-fast release. The limiter on the cassette deck should be set to ensure loud playback so the spot can be heard over the telephone when it is played for client approval. Use a fast attack and medium release.

Audio elements are now pre-prepared like hamburgers in a fast-food restaurant. You can expect the ingredients to be used for weeks, months or even years, so when averaged, the time spent on preparation is very short.

Put the music on ¼-inch tape in the order it will be used, then pre-edit (to 60 seconds), leader and carefully label. Avoid noise reduction so that when the time comes, it will be easy for the syndicator to go elsewhere. Put sound effects on cart or use multiple CD players.

The *master* is usually the broadcast dub. If more copies are required, run a second tape recorder. 7.5ips is the common speed.

Finally, label the mixer and faders for the incoming microphone, cart machine, music and sound effects channels and levels. The output will go simultaneously to both the dub and cassette. You will be allowed one trial run to set levels, so get them right immediately. Otherwise, you will find yourself in a billing haggle.

Now, think "real time." The process is very similar to old-time live radio, only more hectic. You'll be flying by the seat of your pants, following the script and feverishly pressing buttons for the different machines in real time. It's the 60-second "trauma" test. If you're lucky, you may get half a minute of rest between spots while the machines recycle and the announcer takes a drink of water. Make your restroom pit-stop before the session commences. Assistants can be helpful for cutting off the dubs and reloading the tape and cassette machines.

This is fast, cheap production, and by the time you add up all the cassettes and dubs, the money can be good. If all goes well, you can expect the syndicator to be back for other sessions, but don't be lured into a long-term relationship. No one in his right mind wants to keep the syndicator around too long. It can lead to a bad reputation with legitimate agencies. One syndicator leads to another, and they can monopolize your entire operation. Health problems and your 19th nervous breakdown will soon follow. To get rid of the syndicator, just jack up the price. They are used to being squeezed out and will leave quietly, knowing that you'll welcome them back when business is slow.

A lot can be learned from the syndicator. Adding sound effects in real time during a session can really help the talent with timing and delivery. The use of cart machines and samplers can be invaluable if all the talent cannot be scheduled at the same time. Cart lines can be recorded separately (with a phone patch to the agency, if necessary) and assembled in real time at the main session.

Working in this fashion speeds up production, even if all the elements are on separate channels of a multitrack and a final mix is required. Using some of these accelerated techniques will endear you to producers and agencies. Once exposed to your skill and efficiency, they will spread the word to other busy clients. With a little luck, your studio will be booked by quality clientele, you will enjoy the luxury of an occasional coffee break, and, if a budget question arises, you can just remind your clients of the axiom: two out of three.

REP

John St. John is a SPARS member and president of 27th Dimension in Jupiter, FL.

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Audio Tapes for TV and Video Production

By Roy W. Rising

An examination of some problems encountered when preparing audio tracks for a video production.

“**A**American Bandstand” was the prototype TV show for lip-syncing to prerecorded music. Although some guest artists did perform live, most acts synced to their own records. The dance segments also used disc playback for sound.

The format served dual purposes. When

heard on the air, the records sounded the same as they did on the radio. No “special mixes” were used that might hamper the familiarity of the sound. Secondly, there was no added cost for tape transfers or handling. “Bandstand” was truly a DJ-type situation.

Late in its network life, the show stopped using discs for guest artist appearances. Instead, the artists were asked

to supply 7.5ips, ¼-inch tapes of their songs. This is where format (and rights) problems began. Sometimes the tape that came in was a quick copy someone with the group had made on a home, ¼-inch machine. If detected, the disc (usually available) would be played instead. Now and then, special mixes would arrive. These were advantageous when long songs had to be shortened—good editing being better than a fade to get out on time. But there was a hitch.

The networks and other TV stations pay annual ASCAP and BMI fees for use of commercial recordings on air. The American Federation of Musicians allows these recordings to be played without payment to the session musicians who made them. But if a special mix is used—say, one without lead vocal for a live-to-track performance—the show is required to have all the musicians present or to pay them as if they were. “Bandstand” had to be careful not to violate AFM’s rules.

The format question

If the act or artist that you are working with is planning to make a TV appearance, the best ¼-inch format to deliver to the studio is full-track mono or 2-track stereo. If the show is not recording in stereo, a mono tape is safer. Some TV facilities will play the 2-track tape on a full-track machine. Head wear and azimuth anomalies can make this an undesirable way to combine the two channels.

The common speeds at TV studios are

Roy Rising is an audio systems engineer and production mixer at ABC TV in Hollywood, CA.



Photo 1. ABC Studio 59 where “Dolly” was mixed. Console is 36x16x4. L, M, R.

7.5ips and 15ips. Don't send 30ips tape thinking it will sound better. In all likelihood, it will be half-speed dubbed (from 15ips to 7.5ips) and played at 15ips for the show. Clearly, this route corrupts REC/PB EQ standards. For safety, a copy of the disc should be sent, too. CD players are slowly beginning to appear in TV facilities, but don't bet on finding one when it's urgently needed.

Audio cassettes

The progress in cassette quality suggests that they might be suitable backup—don't believe it. Some TV houses classify audio cassettes in the same way they classify Beta videocassettes: sub-standard or unusable. Another problem with audio cassettes is format. A really good cassette will be recorded with Dolby HX or dbx, but can the TV house decode it? Probably not.

Cassettes do have value in their use with special mixes. When a song must be edited for time, both the artist and the TV production benefit from a cassette copy of the edited version. The artist can use it to rehearse and the director can plan camera angles and shots. If circumstances permit a live-to-track performance, the artist might need two versions for rehearsals: one with and one without vocal. The director's copy needs to have the vocal tracks.

Pre-production recording and time code

So far we've been looking at conditions for acts doing guest appearances on TV shows. Now let's consider the activities of a network or syndicated music-production show. Last year's "Dolly," Dolly Parton's excursion into music/variety/comedy television, will serve as our example.

Typical of these shows, there was a house band in addition to guest acts. In the bygone era of this kind of show, the house band usually worked live. For "Dolly," like many shows today, the band was on tape.

The show was produced in stereo and used full, double-system recording. This means that while the video machines recorded two channels of stereo sound, a 24-track ATR was recording the separate elements for probable remix.

The theme music, backing tracks, some underscore and other incidental material was delivered on 15ips 1/2-inch 4-track non-Dolby tape—non-Dolby because television doesn't yet use this form of noise reduction. Tracks 1 and 2 were stereo L/R. Track 3 had count-offs and an occasional protection vocal (laid down in the pre-recording session and used as a backup in case of emergency). Track 4 was non-drop frame SMPTE time code.



Photo 2. Right wing of console area.



Photo 3. Left wing of console area and side car.

During the mixdown from 16- or 24-track to 4-track, a time code generator was running on the same 60Hz reference as the ATRs. When the 4-track was played back at the TV studio, the machine was locked to video sync (color vertical-drive at 59.94Hz), to guarantee exact pitch among the different takes that might later be intercut. (The accompanying sidebar

discusses the relationship between SMPTE TC and NTSC video sync.)

The time code journey

Let's assume the video editor has specified non-drop frame code on the source tape—in our example, the 4-track.

While the tape is being played back at the TV facility, three time code-related

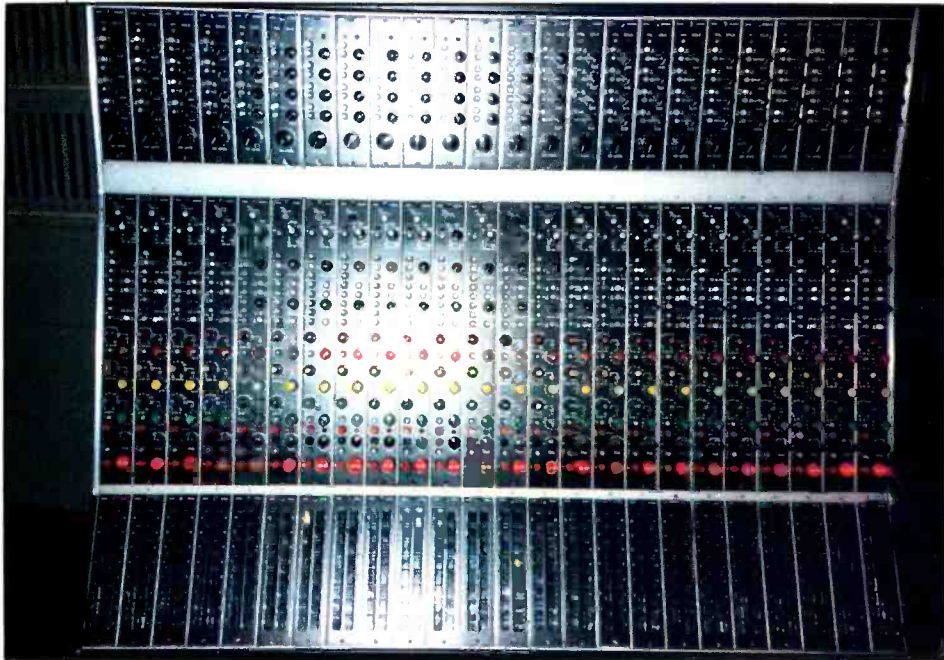


Photo 4. Side car add-on pre-mixer 24x16.



Photo 5. Console right utility area.

things are happening. Code is being used to synchronize the 4-track playback machine so that each take will be at the same pitch. It is also being transferred to a separate track of the double-system 24-track ATR. Thirdly, the 4-track's code, now referred to as "audio tape code," is being combined into the TV system's time-of-day (take-by-take) code as "user area

numbers." This integrated time-of-day code is drop frame, to permit accurate timing. It's sent to the VTRs and to a separate track of the double-system ATR.

When SMPTE standardized EECO's time code, it wisely allowed some extra space for user needs. Known as "user bits," this space may contain a simple house identifier or an entire second set of timing in-

formation. The latter has become the usual practice.

For shows such as "Dolly," the audio code is embedded in the time-of-day code. During various post-production activities, time-of-day code is used to identify the take, while user bits are used to locate verses or other material that might need to be intercut.

Double-system reworks

On "Dolly," it was not unusual for the 24-track tape to be returned to the music recording studio before it went to the video post-production facility. If there had been a time crunch during shooting, a backing track might only have received a rough mix. Or sometimes a replacement vocal was needed because of problems with the wireless body mics used in some segments. One instance involved an actress who should never have been asked to sing. (When the show aired, I'll bet she thought she heard her own voice.)

Upon leaving the TV studio, the 24-track contained three tracks of synchronized information. Track 24 contained both the time-of-day and the non-drop audio tape code from the 4-track. Track 23 held "restored" 4-track ATR code. Time code reader/restorers are used to display current locations. They're also used to regenerate code that may have been damaged by the analog recording process.

Track 22 carried modified "vertical drive." Because the digital pulse-train of time code may cross-talk into an adjacent track, it's a good idea to leave a guard track between it and any program material. Some studios don't have code-based synchronizers, but can use 60Hz as a reference. The signal on Track 22 is a rounded image of the 59.94Hz square pulses of the vertical drive. One way to get this rounded waveform is to saturate a transformer with vertical drive. The useful result is a "poor man's" sine wave.

After various enhancements, corrections and replacements were completed, the 24-track tape was sent to the post-production house, where the double-system audio master had to be attached to the edited video master somehow.

The process in audio post-production uses time code-driven automation to accomplish a polished remix of the audio elements. An additional pass adds the work of an audience augmentation (sweetening) expert. The main purpose here is to bridge some edits and punch up the reactions where necessary.

Getting it home

Once all the elements are in place, the lay-back to videotape occurs, and the product is ready for delivery to the final



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Panasonic
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Photo 6. Machine room.

playback. In the case of a network program, this means on-air.

For most shows, there are some steps yet to be taken. A protection copy of the master is made and subsequently intercut with commercials. Luckily, this process uses video/audio punch-ins, so the program material doesn't lose another generation.

But other practices are not so benign. For example, on shows that originate in Hollywood, the integrated master is sent by satellite to New York for playback to the network. Some breaks might be updated in New York, so the L.A. viewer will

likely be hearing a later satellite rebroadcast of the show.

Preserving the quality

What can be done to preserve the integrity of your efforts? Three specific areas can be addressed: levels, equalization and effects.

When you ship a tape for TV use, remember the many downstream transmission links that complete the chain. The audio operator at the TV facility probably won't use a leveling amp on previously mixed material. Nonetheless, the final product can be expected to en-

counter such devices at several places down the line. Every transmission link will typically impose some kind of level-protective device.

The worst case is that of a West Coast production as heard on the West Coast. "Dolly" was sent by satellite to New York—one leveling amp. Then it was returned to the West Coast by satellite—a second leveling amp. ABC-Hollywood distributed the show to their regional affiliates—a third leveling amp. Local stations sent the program to their transmitters—a fourth leveling amp.

This is clearly a case where less is better. To prove the thesis, take any two of your levelers and cascade them. Play something through the path and note that the first one does all the gain control work. The second one is hardly active. When levels are correctly controlled, there are little or no excursions to activate the latter device(s).

So how can you accomplish this protection? Ship levels that don't exceed the reference established by your tape's head tones. You'd be surprised how often the levels in a mix range beyond reference. For records, this can be OK—the tape can take it and the mastering lab leaves some room, too. Video and television are less forgiving, so take control upstream to protect the product. (For more information, see "Digital Audio, Dynamic Range and the Real World," pg. 26.)

Balance protection

EQ and balance are another question. You might ask: If special considerations are required for broadcast, why do pop record mixes generally sound so good on television? We've already answered part of the question.

"American Bandstand" played discs to avoid confusion. Those records (and their acetate test cuts) had been mix-tested on small loudspeakers, car radios, juke boxes and home systems prior to final mastering. Of course they sounded good on television!

Another question might be: Why go to all the trouble to get a good sound when the results are going to be heard on a 3-inch speaker? The answer is really quite simple. People listen comparatively, and it's relatively easy to discern a good mix from a bad one on any playback system.

Once everything sounds good on your monitors and mix-test systems, the EQ has been finalized for the mix. The best way to preserve this linearity is with complete and consistent head tones. The conventional 100Hz, 1kHz and 10kHz are OK within the regular dubbing and mastering loop. But broadcast television's bandwidth is specified as 50Hz to 15kHz. It's not a bad idea to deliver head tones of 50Hz,



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Color and B&W Compatibility

You need to understand both "drop-frame" and "non-drop-frame" time code. Unlike MIDI, whose extensive internal integrity presents no conflicts, SMPTE code must bridge the historical gap between B&W television and NTSC color standards.

Television's first "sprocket holes" were introduced by EECO. EECO numbers were the first broadly used timing system for video. Their basis was B&W video, which ran at 30fps on a sync frequency of 60Hz.

To make NTSC color television compatible, a subtle adjustment of the sync was required. Instead of 60Hz, the frequency became about 59.94Hz, an even divisor of the color reference frequency of 3.58MHz. Think of this reference as analogous to the 19kHz stereo pilot tone for FM radio.

When SMPTE decided to standardize EECO's time code, it had to accommodate both references. Non-drop-frame time code is for 60Hz B&W. If this rate is used with the slower NTSC color rate of 59.94Hz, a 1-hour show will appear to run slightly longer than 60 minutes. By programming the generator to skip (drop) certain frame numbers, it's possible to make the absolute times match.

Most time code equipment provides a 2-position switch to set the frequency. The question of which switch-position should be used can only be answered by someone downstream. Some video editing systems use only non-drop code; others can use either.

100Hz, 500Hz, 1kHz, 2.5kHz, 5kHz, 7.5kHz, 10kHz, 12.5kHz and 15kHz.

Your local oscillator might not provide all of these frequencies, but because there might be several tape generations, it's worth trying to print several throughout the range, if possible. The 50-100Hz area is where your kick drum and bass fundamentals live. If they're wrong on the first pass, they'll never make it to the home set. VTR record EQ gets sloppy in the 5-10kHz range. A few generations of damage here can really corrupt the bass-treble balance.

Guarding your effects

Reverb and other effects can be critical. TV production stages look better than they sound. Even when your tape is a lip-sync "total track," there might still be some audience reaction mics open. The result is added reverberation, so it's a good idea to use less reverb, or none, on a TV mix.

When the artist will be live-to-track, it's important to convey some information about reverb, DDL times and harmonizer settings. These make it easier to replicate the record mix. It is also helpful to give the TV audio operator a guide mix.

Getting it there on time

Early delivery of program and reference materials is valuable. During production, the cost per minute is staggering. Major video productions can cost about 50 times more than your studio rate card. Late delivery is unacceptable. On-time arrival is OK, but the audio operator (AO) won't get much chance to fine-tune any special elements of the mix. More lead time and information and the AO might be able to obtain special effects equipment that can make an important difference.

Finally, if you can get the time, go to the session. If you haven't spent time in the video or post-production world, some interesting sights await you. We all tend to get caught up in our day-to-day situations, gleaning information about other areas from second-hand reports like this one. The best way to find out what your tapes might encounter is to follow them along. Most TV mixers won't be offended by your attendance, especially if you let them know you're there to learn (and help if possible).

The better we all understand each other's problems, the more easily we can serve a medium in which the picture seems to be the only product!

RE/P



Photo 7. Left wing and side car with P.A. and intercom racks in background.

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analog tape machine like the MTR-100 is the right choice.

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The MTR-100's auto-alignment saves you hours of time by eliminating constant tweaking and re-tweaking between sessions.

that this new way will save you hours spent in non-productive time, the analog choice begins to make even more sense. You see, the MTR-100 features full Auto-Alignment that allows total recalibration of the record and reproduce electronics. This means you can compensate for different tapes in a *fraction* of the time that it previously took, and your studio is not bogged down with constant tweaking and re-tweaking between sessions.

And if you think digital machines have a corner on high performance transports, think again! The MTR-100's new transport incorporates reel motors that approach one horsepower—you'll get fast wind speeds of up to 474 inches per second! Of course, the

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Digital Audio, Dynamic Range and the Real World

By Marvin Caesar

An examination of some of the issues related to program dynamics in contemporary audio and A/V production.

A lot of us thought the pinnacle of audio fidelity had finally arrived when digital recording came on the scene. At last, we were forever liberated from the worry of dynamic range control. Never again would we have to shoehorn our signals into that all-too-narrow gap between the noise floor and the overload ceiling of our equipment. With headroom to burn, we could simply set our meters at -10VU or -20VU , relax and rejoice in the unprocessed purity of the sounds we were capturing.

Well, as often happens, digital didn't work out quite the way we expected. Slowly, the difficulties involved in dealing with digital's dynamic range have become clear. In retrospect, it is clear we were naive in thinking that our worries were over—in the age of multimedia entertainment, how we manage the dynamics of our programs has become more critical than ever.

This article examines some of the issues related to program dynamics in contemporary audio and A/V production, and puts forward the philosophy that:

1. In most audio productions, some

dynamic processing is either necessary or desirable, but

2. It shouldn't create any noticeable effect on the program.

Terminology

One of the problems when talking about dynamic-range processing is terminology. People use different words to mean the same thing and the same word to mean different things. In particular, the terms "limiter," "compressor" and "leveler" are often used interchangeably. For clarification, the following definitions are suggested:

Limiter—A signal processing device that operates to reduce the instantaneous amplitude of signal peaks, leaving average levels undisturbed. Typically used to ensure that the peak ceiling is not exceeded. Has little or no effect on perceived loudness, but may overreact and "suck holes" in a signal if driven too hard.

Compressor—A device that acts to reduce the short-term variation in the average level of a signal. Used to control the apparent loudness of a signal and to ensure that it fits within the *useful* dynamic range of the listening environment.

Leveler—A device that adjusts its gain to maintain a relatively constant long-term average signal level, with no effect on signal peaks. Because of its very slow action, gain changes usually are not noticeable.

Density—A psychoacoustic parameter that is related to the amount of short-term variation in the average signal level. Programs processed by many conventionally designed compressors have little variation and sound "dense."

Peak Ceiling—This is the highest instantaneous value that an audio signal may have. It is either impossible (in the case of digital audio), illegal (in broadcasting), or inadvisable (in conventional magnetic tape recording) to drive the signal waveform any higher than the peak ceiling. Note especially that this parameter is independent of frequency; it is concerned with instantaneous level only.

Usable Dynamic Range—The difference (in decibels) between the noise floor of a system and the onset of peak clipping (with sine wave signals).

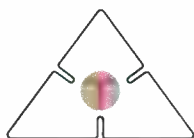
Useful Dynamic Range—The dynamic range that may be delivered to a listener in a given setting. Essentially, the difference between the ambient noise level

Marvin Caesar is president of Apex Systems, North Hollywood, CA.

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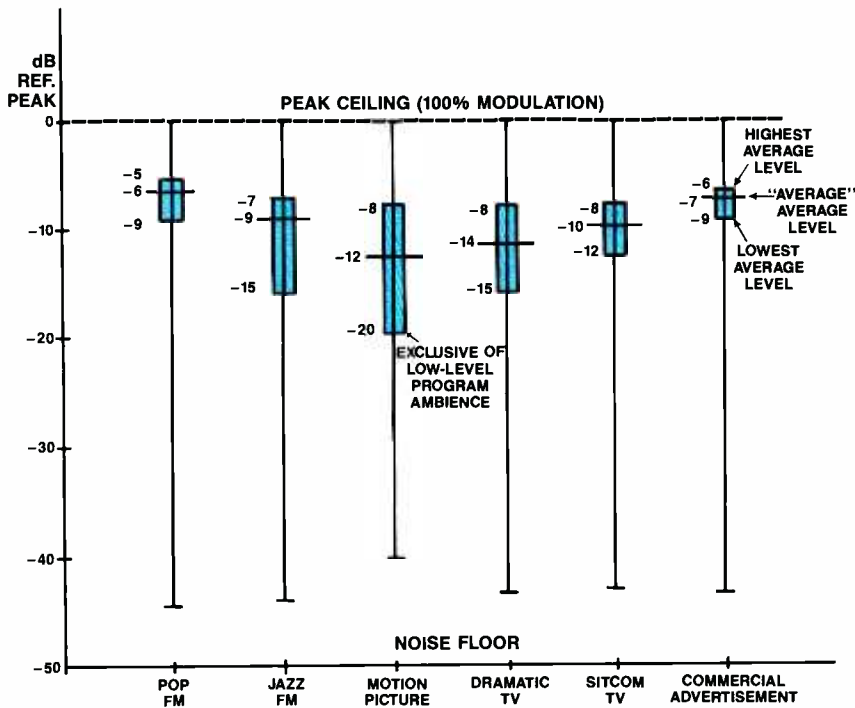


Figure 1. Dynamic profiles of audio distribution media (typical).

and the threshold of equipment overload or listener discomfort (whichever is lower). Note that various psychoacoustic and program-dependent variables are involved in determining useful dynamic range.

Dynamic Profile—A characteristic of a given audio distribution format that shows the relationship between peak ceiling, noise floor, long-term average signal level and short-term average level variation. (See Figure 1.)

If you don't do it...

Dr. John's hit of a few years ago contained the refrain, "If I don't do it, I know somebody else will."

Engineers and producers would do well to remember this at all times. Whether the finished product is intended for records, CDs, television, radio, or film, you can bet that another engineer, somewhere down the line, is going to feel the need to limit, or at least "monitor," the dynamics of your program. (See "Audio Tapes for TV and Video Production" pg. 18.)

Probably the worst offenders are FM broadcasters who, for marketing reasons, want the loudest possible signal, but risk an FCC penalty if they overmodulate too blatantly. Thus, they often take compression, peak limiting and clipping to extremes—with side-effects that are plainly audible, and not exactly flattering.

To put it bluntly: How do you keep the station's audio "crunch boxes" from doing

a hatchet job on your material? By supplying source program material that's properly "packaged" within the station's dynamic profile. That, of course, means careful management of dynamic range. Better for you to do the dynamics processing in the controlled environment of the recording/production facility, than to have a station process your signal in a heavy-handed and completely unpredictable fashion.

Here, it's important to consider the station format when making production decisions. Figure 1 shows typical dynamic profiles of several different radio formats (as well as other media). Looking at a typical pop music station, we see that the maximum average signal level will be around 5dB below the peak ceiling with the overall average level no more than 4dB below that. What this means is that the typical pop station defines its useful dynamic range as 5dB to 9dB below the peak ceiling.

Given these constraints, the idea of fruitfully exploiting a digital recorder's dynamic range of more than 90dB (for pop productions) begins to seem a little absurd. If you deliver a mix with too high a peak/average ratio, the most likely consequence is that the station will turn up the input to the processors, raising the average level and causing their limiter to suck a hole in the program on every transient peak.

However, you don't have to squeeze all the life out of your program to fit it into this profile. What saves you is the fact that perceived loudness is only loosely related to the reading on the station's modulation meter.

The key is to preserve short-term variations in average level. In effect, gain changes are restricted to small, well-defined time "windows" when the current average input level deviates from the historical average. By avoiding constant gain "slewing," the device generally preserves the natural envelopes of the program material.

Digital: the unforgiving domain

The digital medium demands a lot in exchange for its wide dynamic range. For one thing, its overload margin is exactly zero. While analog tape has a wonderfully soft saturation characteristic—one that many producers exploit deliberately—digital overload means only one thing: hard clipping of the signal. The old analog practice of recording with the meters well into the red is a giant no-no with digital.

The answer is simple, right? Just back the levels down so there's no chance of overload. You'll still have a much better signal-to-noise ratio than with analog tape.

But, of course, there's a "gotcha." It's called quantization. Every 6dB reduction in signal level effectively "throws away" one bit of each sample, so that at 24dB below peak level, our 16-bit system has suddenly become a 12-bit system. And most audio engineers would agree that 12 bits simply isn't enough resolution to meet professional standards. Besides adding "grit," low-resolution sampling aggravates the "quenching" or gating effect on note decays and reverb tails caused by low-order bit quantization.

It's also important to realize that when a CD master is made from an analog tape, the recorded level of the entire disc is referenced to the highest peak level on the master tape. If a single transient peak that is 6dB higher than everything else on the master is allowed to get through, the level of the entire CD has effectively dropped 6dB!

To overcome these problems, a recommended strategy is to keep program levels to at least the 14-bit level (-12dB) and to use a good peak limiter to avoid digital overload.

It's interesting to note that this kind of dynamic pre-processing must be done in the analog domain—at least until 18-bit and, more likely, 20-bit A/D converters and processors are available—because once you've digitized a low-level signal, the damage is done. No subsequent digital tinkering can undo it!

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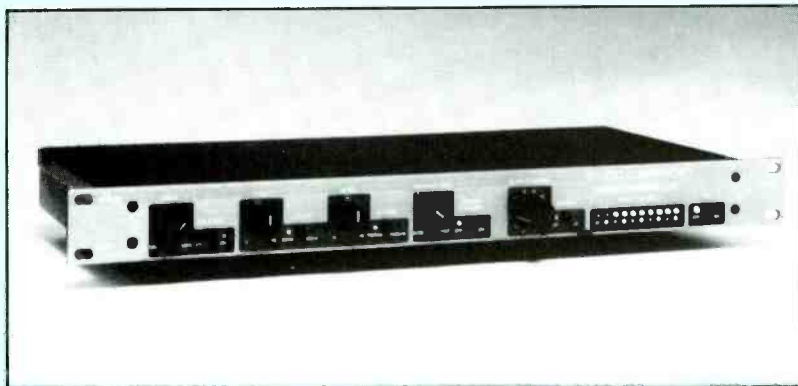
The Aphex Dominator and Compellor

Aphex is concerned with what sounds pleasing and natural to the listener. Our signal processing devices are designed to control dynamic range without removing the "air" and "life" from the program. The Aphex Compellor and the Aphex Dominator are two examples of "intelligent" gain reduction devices that employ sophisticated sidechain circuitry in pursuit of "invisible" dynamic processing.

The Dominator is a multiband peak limiter that allows a substantial increase in average output level.

With it, for example, you can control levels that might otherwise overload the front end of A/D converters.

The Aphex Compellor is a compressor/leveler that exploits such parameters as perceived loudness to create a compressed signal that doesn't sound processed. To achieve this, it relies on that marvel of signal processing—the brain—and its ability to use psychoacoustic cues to "reconstruct" a wider apparent dynamic range than actually exists in a program.



The Dominator limiter.



The Compellor compressor/leveler.

How much dynamic range can you use?

People generally listen to music while doing something else—talking with friends, driving, eating dinner or any number of other things. Under such conditions, they find it distracting, even an-

noying, to have too much variation in the average program level.

Research has shown that a 6dB to 10dB average level variation is about the maximum that most listeners are comfortable with in typical situations. In an automobile, with its high ambient noise

level, even this may be too much. Once again, use of "intelligent" compression and leveling techniques can maintain a pleasingly consistent average level without removing desirable program dynamics.

A completely separate issue is the performance limitations of most consumer playback equipment. Despite advertising claims about "digital-ready" speakers (whatever that means), the fact is that most home stereos have nowhere near the headroom required to reproduce the full dynamic range of unprocessed digital sources. Probably the worst possible scenario would be a laser videodisc with a digital soundtrack played through a TV set's amplifier and speaker.

In cases like this, the choice becomes either to limit dynamic range during production, or to have the consumer's power amplifier do it for you. It should be very clear which is the preferable alternative.

Mastering for release on videocassette provides a classic example of the need for dynamic range management. Because most VHS releases now include both a lo-fi linear audio track as well as a VHS hi-fi stereo track, some tradeoffs are inevitable. It's necessary to have a high average level to mask background noise on the linear track, but at the same time to reward hi-fi-track listeners with the best possible audio fidelity. Here, a high-quality compressor can be invaluable because it can "package" the audio to fit within the constraints of the linear track while maintaining the natural-sounding dynamics of the original cinematic release.

Conclusion

I hope the preceding thoughts will prove useful in your creative efforts. Modern entertainment productions pose some daunting challenges to the audio engineer. These days, it's rare to mix solely for a record, CD, FM broadcast, TV broadcast, videocassette or film. More often, the finished product has to accommodate several of these media—each with its own set of requirements and limitations. In such an environment, well-chosen dynamic range processors can be a great time-saver, if not a lifesaver.

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Analog Signal Processing for Digital Recording

By Michael Morgan

Never before have limiters, compressors and sibilance controllers been so useful, nor the correct application of them so important.

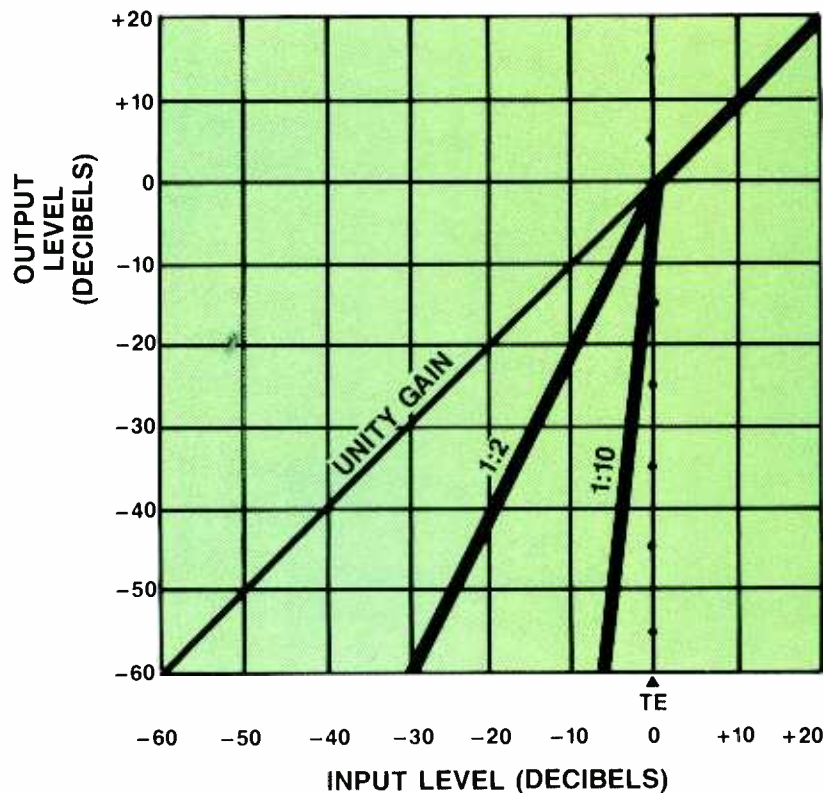


Figure 1. Input vs. output voltage levels of a steady state tone through an expander with threshold at 0dB, slopes of 1/2 and 1/10.

Since the introduction of professional digital recording equipment and the popularization of the compact disc with the promise of 90dB and more of usable dynamic range, many engineers and producers have adopted the attitude that traditional signal processors such as compressors, limiters, expanders and noise gates have become less necessary.

On the contrary, never before have they been more useful, nor has the correct use of them been so important. While it is true that digital technology has theoretically unlimited flexibility (problem-solving and enhancement ability), in practice, it imposes a more stringent set of performance requirements. We will never be ready for more bits and faster sampling rates and all the rest of digital audio's promised potential if we don't stop thinking about it as a reason not to control the *quality* of the recording process.

Problems with digital's greater dynamic range

The same attributes that make digital storage of audio information vastly superior to existing analog storage also

Michael Morgan is an independent audio consultant in Nashville and is former vice president of technical operations at Valley International. He is also an experienced recording and mastering engineer.

make for unique problems. For example, the concept of greater dynamic range is valid only when we compare the digital medium under discussion with its analog counterpart. While the theoretic 96dB dynamic range provided by a linearly encoded, 16-bit PCM tape machine is a vast improvement over the 70dB or less provided by a well-maintained and correctly operated analog machine, it is somewhat poorer than the 105dB to 110dB available in state-of-the-art analog circuitry.

In addition, keep in mind that analog circuits and magnetic analog storage media are much more tolerant of signals that exceed their ranges of linear response. Moderate amounts of analog clipping or tape saturation, especially during transient peaks, may be noticeable, but are not particularly offensive to the average listener. This is not necessarily the case with the digital conversion or storage process, as anyone who has heard the unmistakable sound of digital clipping can attest.

Because of its extended dynamic range, digital conversion and storage *seem* to exaggerate the slightest extraneous noises. The word *seem* is important because the effect is not so much a result of any peculiar property of the process as it is a psychoacoustic reaction. The brain can "process out" such ambient noises as air conditioner wind-noise, low-frequency rumble from outside street traffic and common piano pedal noises. This is possible because it knows those sounds are unavoidable and ultimately of no consequence.

These same noises are certainly noticeable during the analog recording process, but we must listen more critically when recording digitally, or when recording for digital mastering, because much less information will be lost in subsequent processing. This is not the case when we transcribe the information to a lacquer master recording or to cassette tape where we pay a considerable penalty in information loss.

In addition, we must keep in mind the extended frequency response of most digital conversion and storage schemes. Because humans do not hear well in the very low-frequency portions of the normally accepted audio spectrum, we tend to ignore such sounds as room rumble in our acoustic environment, *and* we sometimes cannot hear low-frequency sounds because of shortcomings in monitoring. Most digitizing schemes are flat down to 10Hz. This means we run the chance of sacrificing bits to replicate sounds that cannot normally be reproduced by most loudspeaker systems.

Because the vast majority of professional recording is still accomplished us-

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ing analog tape machines and mixed through analog circuitry, we must remain aware of the special requirements of digital transcription and use appropriate tools and techniques to achieve consistently high-quality mixes prior to the digital mastering process.

During the course of researching this article, I spoke with many mastering engineers about common problems they encounter that can be solved by the proper use of traditional signal processing. The most frequent comment was that engineers and producers were inappropriately using the extended dynamic range of a digitally recorded mix, or were anticipating the digital mastering process by using inappropriate equalization and insufficient transient control when mixing to an analog or digital 2-track format.

Inappropriate use of EQ

A realistic appraisal of the listening environment in which the music will be heard is quite important. In the case of inappropriate EQ, the premise is that most popular music, be it hard rock or country, is heard in the home or, more likely, in an automobile. We gain nothing by mixing a song so that it contains musically significant material over a 60dB dynamic range if we know that it will likely be heard in an environment where the ambient noise level is 60dB to 70dB SPL.

It often falls on the mastering engineer to decide what constitutes an acceptable listening level, and to control the dynamic range of the stereo master to provide peak level control and a listenable peak-to-average-level ratio when transcribing to a digital master. This job is accomplished much more easily during mixdown, or by judicious use of limiting or compression during recording. (For more information see "Digital Audio, Dynamic Range and the Real World," pg. 26.)

In the case of insufficient transient control, we are sometimes guilty of adding unnecessary equalization, usually in the high midrange, to accentuate the presence of vocals. This results in problematic sibilance and even some cases in which vocal glottal stops take on a clicking or popping sound. The best rule of thumb is to keep the vocal tracks clean and flat. Treat sibilance early in the process, preferably during recording. If that is not possible, treat it during mixdown.

Another common problem is getting down into the noise floor with an extended fade. This serves no purpose except to frustrate the mastering engineer and make his job harder. Be aware that you may need to control the noise level in your analog 2-track format, using expansion or noise reduction whenever feasible.

Of the problems cited above, the common thread is simply failure to control

dynamic range adequately in the recording process and during mixdown. This is an easy task when undertaken early in the recording process, but becomes more difficult as the product moves toward its final form.

Even the imminent arrival of sophisticated digital dynamic processors on the mastering scene will not completely solve these common problems. Having heard digital compression in its most sophisticated form, I can assure you that any nastiness you leave in the mix is going to be glaringly obvious if the mastering engineer has to compress your mix in the digital domain.

Digital compression picks out fine detail in a mix, so that even such sounds as hammer strikes in the piano tracks had better be clean. Those lip smacks and breath noises in the vocal had best be gone, too, if they aren't wanted in the final mix.

Here are some suggestions to optimize noise and distortion performance when using signal processors. Although the old hands among you know these things, they bear repeating in light of the difficulties that mastering engineers still frequently encounter when preparing digital masters for CDs.

When recording the percussion kit, pay particular attention to tape saturation or clipping on hot tracks. If necessary, use a fast peak limiter when tracking cymbals or drums. Insert the limiter in the patch point immediately following the microphone pre-amplifier. In some consoles, this may be a line send/line return patch; on others, it may be the pre-fader patch point. Set for rapid recovery times, and *do not* add excessive gain in the microphone pre-amp to hit the limiter consistently, nor should you add gain to the output of the limiter. The secret of using the peak limiter unobtrusively is to set the threshold at a point just below tape saturation (or a few decibels below 100% modulation for digital recorders) and to set the mic pre-amps for sufficient gain to cause gain reduction only upon a very hard strike.

If you are consistently getting more than 6dB of gain reduction, readjust the pre-amp gain. The idea here is to control only the peak levels, not to homogenize the sound. The lazy man's way to do this is simply to allow clipping or saturation on peaks, but control is better, assuming you have a limiter that is up to the task.

The use of noise gates when tracking the percussion kit is well established, the purpose being to minimize leakage between the tracks assigned to the various microphones on the kit. No gate can compensate for careless placement of microphones or the use of an inappropriate microphone on a particular

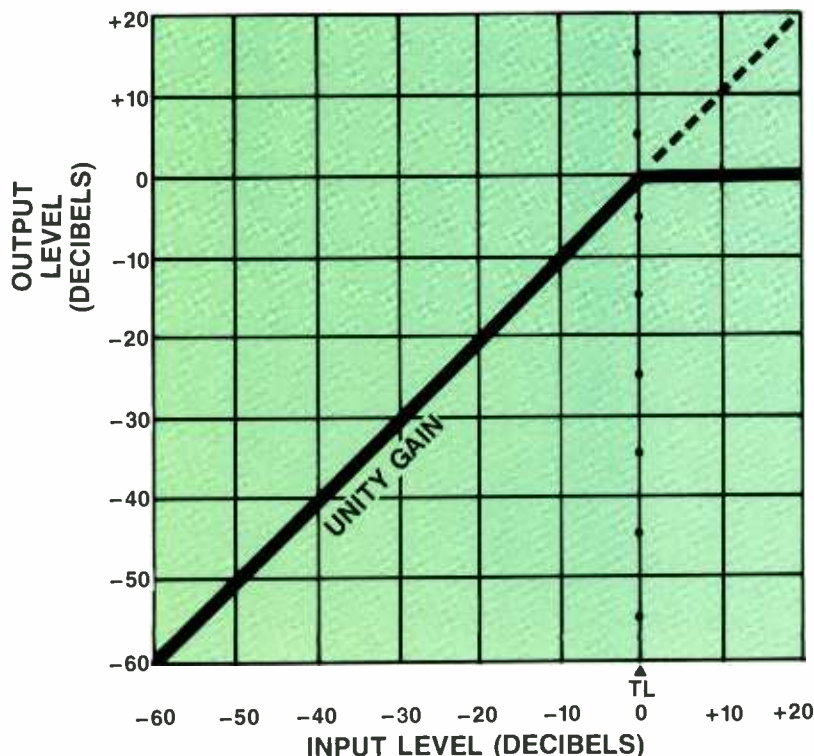


Figure 2. Input vs. output voltage levels of a continuous tone signal through a limiter with threshold at 0dB.

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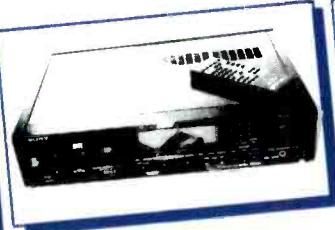
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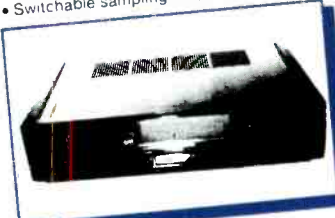
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Dynamic Sibilance Processor

Sibilance is a recurring problem cited by mastering engineers as common to both analog and digital mastering formats. Many recording engineers are misinformed as to the nature of the problem, believing that the presence of the fricative phoneme "sss" is problematic. The obvious solution to this problem, again proceeding on the same faulty premise, is the use of a device that will limit or remove energy in the high-frequency portion of the spectrum when the "sss" sound is present.

Enter the de-esser, a type of high-frequency limiter designed to control the splatter caused by sibilant speech. Originally designed for use by broadcasters, the primary concern was bandwidth limiting, of sorts, but de-essers have a tendency to eliminate "esses" all together. The logic is, no "esses," no sibilance.

These devices soon crossed the border into professional recording, where they were unjustly maligned as a necessary evil in the control of sibilance—recognized for their value in suppressing "ess" sounds (and, only coincidentally, the sibilance therein), but universally despised for their propensity to create holes in the tracks to which they were applied.

With the evolution of analog circuitry, attempts were made—with varying degrees of success—to adopt the basic premise of the de-esser design and to improve its characteristics by adding split-band limiting. This was made possible by the availability of high-performance integrated operational amplifiers, and the accompanying ease of designing filters and gain-controlled stages.

Defining sibilance

In response to repeated requests from friends in the recording and mastering professions, an engineer having a background in linguistics undertook a statistical study of sibilance using live subjects and recorded material. Some of the results were surprising.

The first and most basic discovery was that frication in speech (the audible friction caused by the passing of breath through a narrow aperture in the vocal tract), was generally not problematic and could be easily reproduced by even

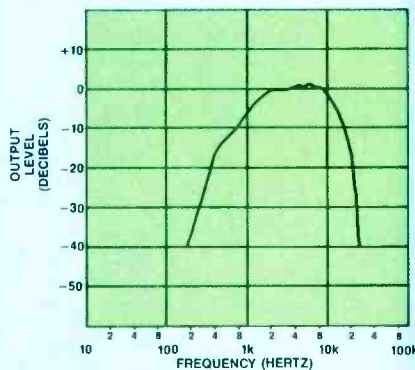


Figure 4. Spectral distribution of normal frication.

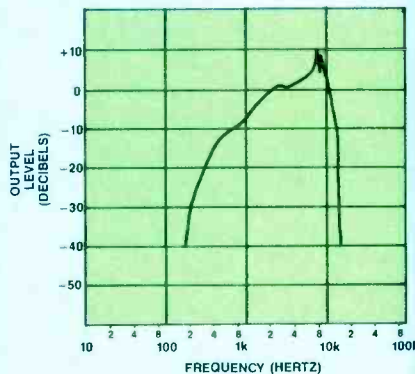


Figure 5. Spectral distribution of sibilant frication.

highly equalized signal chains of the type found in recording and playback technology. This is because the spectrum of frication resembles white noise with relatively even amounts of energy per unit bandwidth from about 2kHz to as high as 9kHz. In other words, it just looks like noise passed through a filter set.

In addition, phonemes are enunciated at a much lower power level than utterances can be produced and are, thus, quite unlikely to exceed the headroom of electronics set to reproduce speech or song. (A phoneme is any sound that separates utterances in speech. Vowel sounds are utterances. For the word *mama*, the *ms* are phonemes and the *as* are utterances.) (See Figure 4.)

The problem is caused by the production of a nearly sinusoidal energy peak in or slightly above the portion of the spectrum occupied by frication. Simply stated, when

we make an "ess" sound, we sometimes whistle. This is quite noticeable when the whistling sound is within the frequency range of our greatest aural acuity, but really starts to wreak havoc in electronic signal chains when it occurs in the higher frequencies, because most transcription and broadcast chains are pre-emphasized. (See Figure 5.) The second discovery was that the frequency bands in which sibilance is produced do not vary widely between individuals, and are primarily dependent upon the volume of that portion of the vocal tract defined by the point of friction and the surrounding surfaces of the teeth and/or lips, depending on the specific sound enunciated. The volume of this "resonant cavity" does not vary widely in a population of individuals of like age and sex because humans are structurally more similar in terms of size than, say, stringed instruments.

Sibilance in the spoken word tends to occur in the 2kHz region for males, and in the 3.5kHz region for females. Sibilance in musical vocals tends to occur in the region of 6kHz to 7kHz for males, and in the 9kHz to 12kHz region for females. Not all friction is accompanied by sibilance, and sibilance may accompany phonemes other than friction. One example is that of a male vocalist of popular note who creates a sibilant "chirp" when enunciating the dental "t" sound.

By using the information gained in this study, Valley International developed the Dynamic Sibilance Processor, which is a processor capable of distinguishing sinusoidal information in its passband from the more complex information inherent in friction. When correctly applied, it can isolate and cancel the sibilant in a fricative without changing the nature of the fricative. In this manner, the processor can remove sibilance from a vocal track and usually even a full mix, without noticeably affecting the quality of the remaining sound, or creating a hole in the material.

drum or cymbal, so do the groundwork first and consider gating as processing appropriate for mixdown if you are unsure of the equipment, the room or have limited experience with these devices. I prefer to operate noise gates post-EQ since they also attenuate most of the channel circuit noise in that position. On some very old consoles I have even applied the noise gates post-fader to quiet first generation VCAs, but modern VCAs have much more respectable noise characteristics than did the old Class AB designs.

"Soft" noise gates

Another very useful device in this general class of "gating" processors is the downward expander, or "soft" noise gate. The theory of operation is similar to that of a gate—that is, a signal exceeding a preset threshold causes the device to exhibit unity gain—but when the input signal falls below the threshold, unlike a gate, the expander causes a controlled amount of gain reduction that is a function of the expander's slope. Thus, if the expander has a slope of 1:2, a 1dB decrease in input signal level below the threshold setting will cause a 2dB decrease in the output level. (See Figure 1.)

This piece of gear is great for controlling breath noises and smacks on vocal tracks or to hush tube-noise and hum when micing a guitar amplifier. Use one any time a gate would be noticeable. High-quality expanders feature variable time constants for attack and release, as well as a variable slope.

Compression and limiting

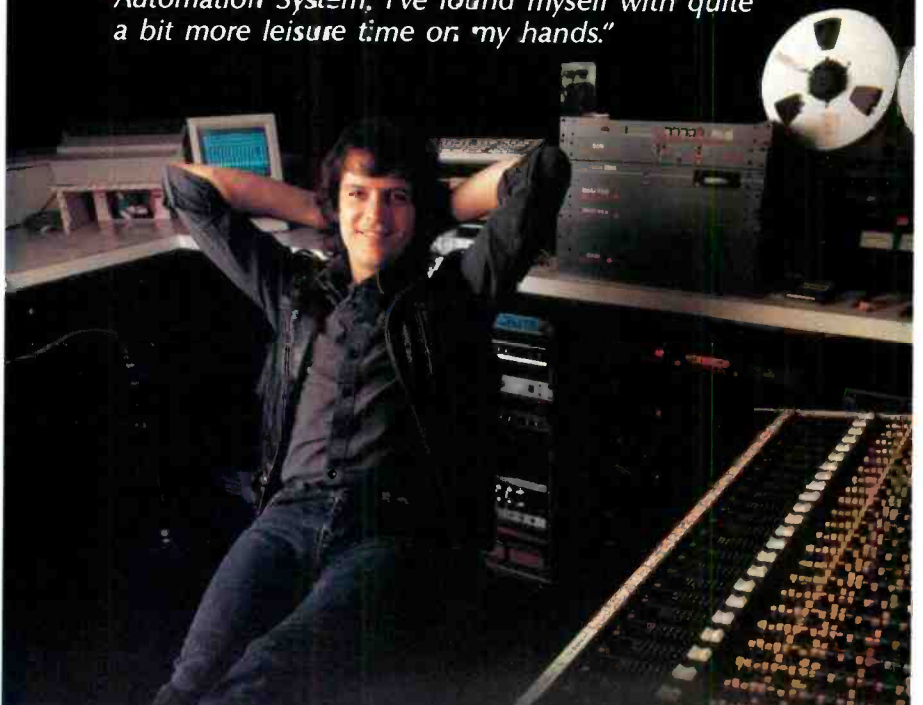
Compression is a frequently used processing function, but few engineers agree upon what a compressor is and precisely what it does. Though a common perception, the difference between limiting and compression cannot be based on the ratio at which a device operates. The ratio is simply a comparison of the increase in input level over a given threshold setting and the resulting increase in the device's output level. A limiting ratio of 20:1 means that an increase in input level of 20dB over the threshold will cause a 1dB increase in the output level. (See Figure 2.)

What the ratio doesn't tell you is what is happening to the signal below the threshold, and that information is necessary to determine whether the device is limiting or compressing. Strictly speaking, a limiter does not add gain to the signal passing through it; thus, if the threshold is set for -20dB, any signal entering the device above -20dB will be reduced in level by an amount determined by the limiting ratio. It may be argued that a perfect limiter possesses a ratio of $\infty:1$, and that limiting at ratios such as 2:1 is

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really compressing. Not so, since we may adjust the limiter threshold downward and cause a corresponding decrease in output level. This is not the case if the device is a compressor.

A compressor has one attribute that no limiter possesses: a rotation point. This is the point in the compressor transfer function where the compressor operates at unity gain—as defined by an internal reference that is independent of the threshold or the ratio of the compressor. A simple way to explain it is to say that regardless of the threshold or ratio settings, when a signal enters a compressor at a level corresponding to the rotation point, it exits the compressor at unity gain.

To maintain its rotation point, the compressor, unlike a limiter, may add gain to signals when the threshold is set below the rotation point. The amount of gain is directly proportional to the ratio and inversely proportional to the threshold setting. Thus, a compressor with a rotation point of 0dB when the threshold is set to -20dB and the ratio is 20:1 will add 19dB of gain to the signal chain to maintain its rotation point. Change the ratio to 2:1, and the compressor gain drops to 10dB. Now reset the threshold control to -10dB, and the compressor gain drops to 5dB. (See Figure 3.)

The compressor begins to reduce gain as the input signal exceeds the threshold, even if the threshold is set below the rotation point. Gain reduction proceeds according to the compression ratio just as it does in a limiter, with this important difference: when the threshold is adjusted downward, the compressor increases gain to maintain its rotation point.

By this point, it should be clear that using a compressor when you really need a limiter or a limiter when you really need a compressor is a big mistake. Use compression when you need to control the average level of a track. A good example is the recording of a guitar or electric bass. Because the frequency response of the pickup may be lacking in the extreme low end and, at the same time, have a pronounced bump in the next octave higher, if we seek to record the instrument at a consistently high level, we must add gain to the low-volume passages, as well as reduce gain during high-volume passages. The same is true with strings or vocals—*don't limit if you really intend to compress (level out) the dynamic range.*

Conversely, if you intend to limit peak levels, you don't want other gain changes to be performed by the processor. Many engineers resist the use of compressors because of the noise "rush-up" that occurs

when the compressor releases, but better compressors include an interactive expander as part of the package, and some operate as limiters when the threshold is set at any point above the rotation point.

Sibilance

Sibilance is the whistle that may accompany fricative sounds such as "sss," "fff" and "zzz." The severity of the sibilant is dependent upon many factors including the type and placement of the microphone used by the vocalist, the presence or absence of pre-emphasis and the TIMD (transient intermodulation distortion) performance of the signal chain. Surprisingly, the bands of frequencies in which sibilance is found are relatively consistent from performer to performer, and for a specific individual performer, a given micing setup will produce sibilance in a predictably narrow bandwidth.

The point of all this is that sibilance is reasonably easy to deal with if you address the problem when it occurs. Several kinds of devices exist to deal with sibilance, ranging from de-essers, to more complex sibilance controllers.

Any time you allow a tape with a sibilance problem to go to mastering, you lose. As one well-known mastering engineer put it: "The tapes come in here with terrible sibilance and the client says, 'we didn't have a de-esser on this session,' like it's no big deal. That's kind of like saying you forgot your pants that day, but it was no big deal." Maybe being billed for an extra few hours of mastering time is no big deal to you?

All the problems cited in this article are easily solved by the judicious use of the appropriate processing equipment. Antiquated dynamics processors are not going to make the cut, nor are engineers who have not mastered the use of such simple devices as limiters, gates and compressors. Those skills should be as much an engineer's stock-in-trade as basic micing technique.

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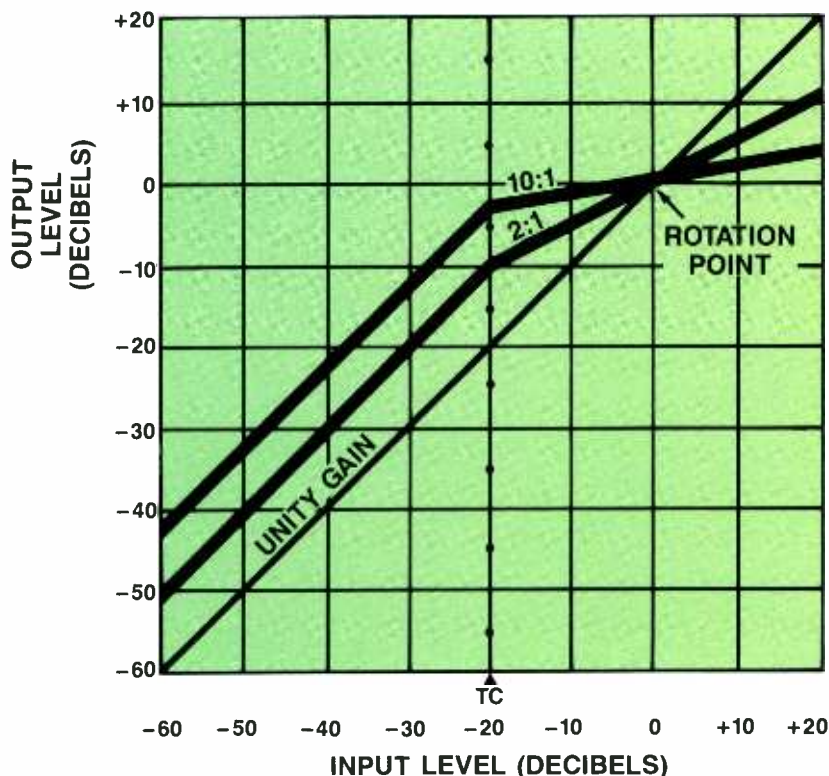


Figure 3. Input vs. output voltage levels of a continuous tone signal through a compressor with threshold at -20dB.

Photo and diagrams courtesy Valley International.

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Digital Satellite Production for the Media Recording Facility

By John Brady

Satellite transmission of digital audio has made its mark, particularly in the field of national radio and TV ad campaigns.

Transmission of digital audio by satellite is still, to a large degree, in its infancy. Generally, real-world applications of new technology are hard to come by, but recording facilities that specialize in work for mass media have found an important use for digital satellite transmission.

Among the country's most successful recording operations are facilities specifically geared to meet the needs of the media

industry. Advertising agencies, creative services for radio and TV commercials, and producers of industrial programs all support a growing number of studios that serve the specialized market of ad production.

Satellite transmission of digital audio has made its mark in just such studios, most notably for its use in the recording of voice-overs for ongoing national radio and TV campaigns. With it, studios can serve their clients with CD-quality audio to or from almost any ad market in the coun-

try and soon anywhere in the world.

Background

In the course of an advertising campaign, changes and deletions are often made to commercial spots. New commercials are also produced, so to maintain consistency and recognizability, the campaign generally relies on a single voice talent. Even so, except for the initial sessions, it is unlikely that the talent, producer and client will all be together in one studio. In addition to scheduling and

John Brady is a media engineer and the studio manager for Fred Jones Recording Services in Hollywood, CA.

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logistic difficulties, the cost of bringing them all together is often prohibitive. As a result, it has become more and more common for the producer to direct subsequent sessions remotely, via a phone patch.

Facilities that specialize in recording commercials usually have as part of their standard outboard gear a device that allows a phone line to be "patched in" to the recording console. This level/impedance matching device enables the pro-

ducer, the voice talent and the engineer all to communicate over long-distance phone lines. It is similar to devices that permit a caller on a radio talk show to be heard over the air.

When a phone-patch session is needed, the producer books time at a studio and arranges for the talent to be there. Then, at the appointed time, the producer calls in from a remote location and directs the talent over the phone. Once a take has been selected, a decision is made either

to build the finished spot at the facility where the voice-over was recorded or, as in the majority of sessions, ship it out for post-production elsewhere. In either case, the tape generally does not arrive until the next day at the earliest.

A new alternative

Through such companies as IDB Communications Group, instant digital satellite communications has become accessible and cost-effective. IDB is a supplier of sat-

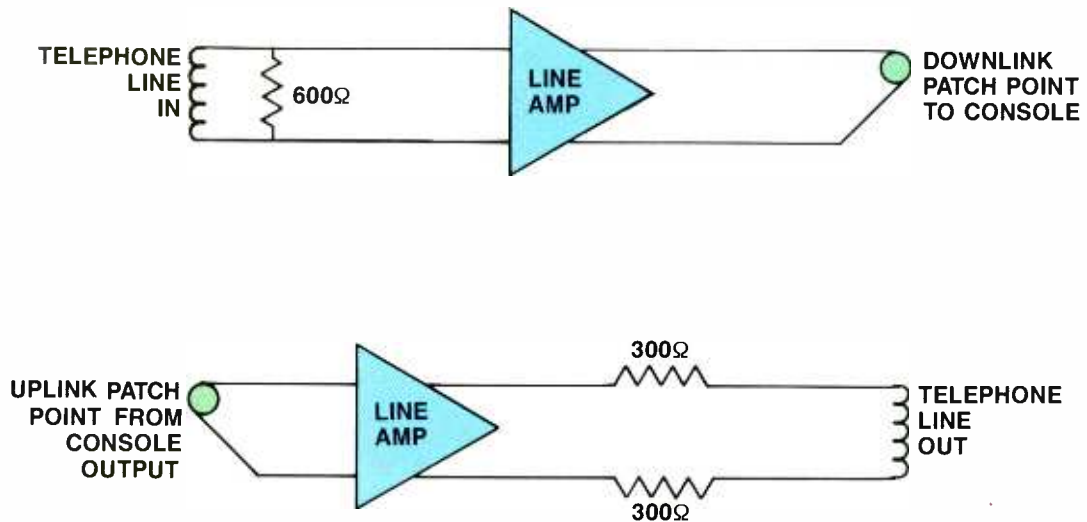


Figure 1. Circuits used to match the impedance of telephone lines to the studio.



Figure 2. IDB satellite interconnect map.



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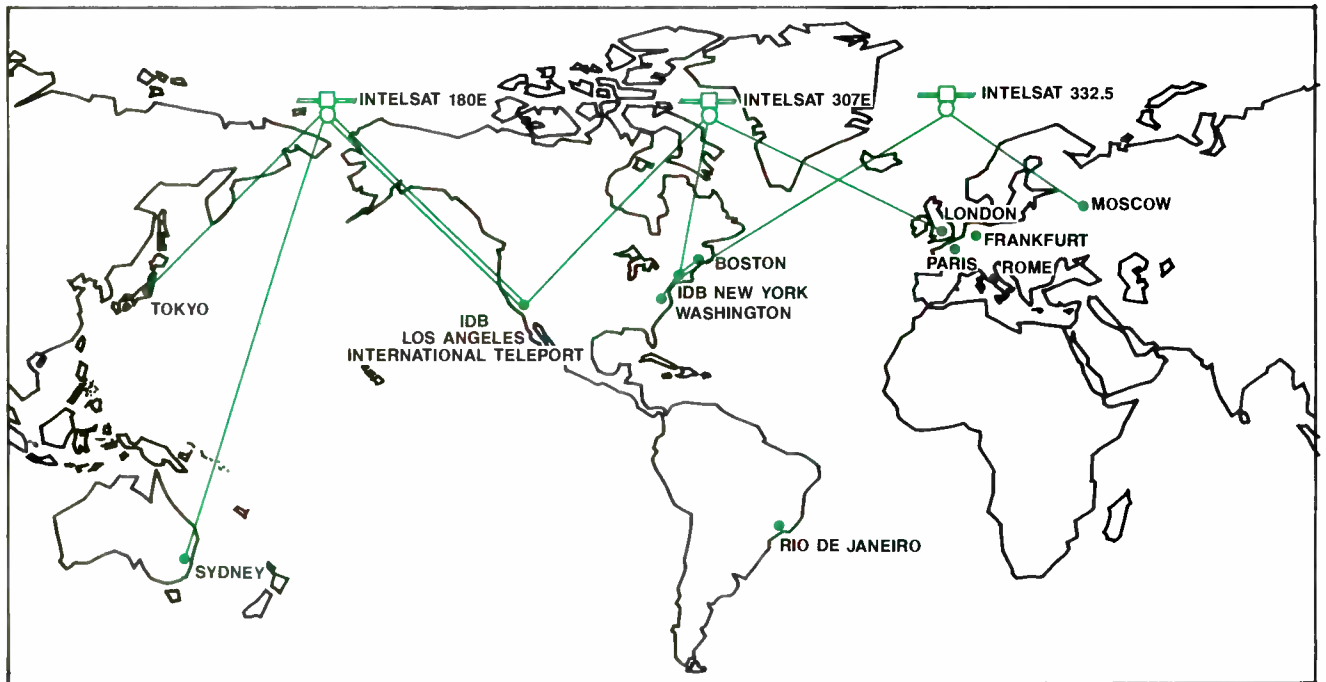


Figure 3. IDB international digital audio transmission (IDAT) routes.

ellite transmission services for the news, entertainment and sports divisions of TV and radio networks, and the only company currently doing digital satellite transmission in volume. The IDB satellite communications network currently consists of 55 earth stations in the United States. (Satellite audio can be received by more than 4,000 earth stations, not just those operated by IDB.)

Satellite service with the older analog technology was attempted by a few facilities. Their individual attempts to bring this service to their clients proved complicated and expensive. Then a small company called Landco Labs created an easy, cost-effective solution: a network of media recording facilities linked to digital satellites.

Landco was established to fill the needs of media recording studios. The president of Landco, Bob Landers, is an established voice-over talent. Over the years his stature in the industry grew to the point that he could conduct most of his voice-over work via phone patch from his San

Diego-area home studio. However, his curiosity with satellite recording was aroused when he was asked to go to Los Angeles for a session.

"It was for Sears paint," recalls Landers. "I did the voice-over at Waves Recording Studio and the people in Chicago were taping me even as I talked in L.A. It was very exciting! I thought, 'Boy, I've got to get this!'"

At that time, there were few ways to transmit high-quality audio via satellite. Studios could use the analog facilities of National Public Radio or they could rent time on a TV satellite and use the audio subcarrier.

Landers negotiated with IDB, then a small audio satellite company, to install a system in his home studio. At first he only broadcast to the studio of one New York client. Not long afterward, he began using the system for other accounts, and inquiries started coming in.

Soon he had installed systems in two of the largest media recording facilities in the nation: Howard Schwartz Recording in

New York and L.A. Studios in Los Angeles. Landco now serves a network of 22 studios.

Landco supplies the equipment to interface with the satellite companies. The network consists of high-fidelity 15kHz land lines operated remotely from Landco. Landco absorbs all the cost of running the lines to and from the recording facility. The cost to the facility is a monthly rental fee for the use of the land lines and satellite charges for any time used. A satellite single hookup is either to or from the studio, so a mono send/receive system would require two lines: one uplink and one downlink.

The signal output from the studio must be impedance-matched to the land lines that are rented from the phone company. The phone company demands a source impedance of 600Ω and anticipates a termination impedance of 600Ω. In modern recording and broadcast facilities, the equipment usually has an impedance of about 150Ω.

Landers suggests that if a facility is us-



ing a regular line amplifier, it should determine its impedance, then use build-out resistors to match the phone company's 600Ω source or termination impedance. If this is not installed, the facility may experience a rise of 3dB to 4dB around 10kHz.

In most major cities, local switching centers are used to assign and, when necessary, reroute the assignment of land lines. The switchers are Ramko Research RS-1616s, controlled via a proprietary circuit—developed in cooperation with Monroe Electronics of New York—that can be operated remotely by Touch-Tone phone. Landco feeds tone on a continuous basis to all subscribing studios. In return, the studios are requested to feed the tone back through the corresponding uplink/downlink. This establishes continuity and allows Landco constantly to monitor every link of the transmission for potential breakdowns.

Because the audio remains analog until it reaches the uplink, many facility engineers think the weakest link in the system is the phone company's land lines. Like regular lines, even the high-quality phone lines are subject to occasional distortion, breakage and loss of fidelity over long distances. Ron Rose Recording in Southfield, MI, built its own satellite receiving station to access the digital satellite network and avoid the 15 miles of analog land lines between the local NPR station and its facility.

Landers believes that normally the analog lines are quite good, and while he couldn't speak for all phone companies regarding the maximum distance between studio and satellite, he said that most phone traffic that goes through two or more central offices is digitized and, therefore, immune to analog distortion.

The lines lead to satellite stations that are either owned or contracted by IDB. The signal is digitized and then beamed to Intelsat 307E, a geosynchronous satellite 22,300 miles above the earth. The uplink/downlink process travels a total of 44,600 miles between studios, all with CD-quality audio.

The session

When a satellite session is needed, a studio first places a call to Landco. The time is booked just as it is at a recording studio. Landco has blocks of satellite time that it can allocate and confirm on the spot. Next, the studio places a call to the remote facility it will be working with—the studios actually book each other. Instead of the old phone-patch method where one studio was booked, now two facilities are in use and being paid. The downlink usually arranges and is billed for

the satellite time. The uplink, in addition to its regular studio rate, usually charges a nominal fee for the use of the land line. The client is charged only a one-way satellite fee.

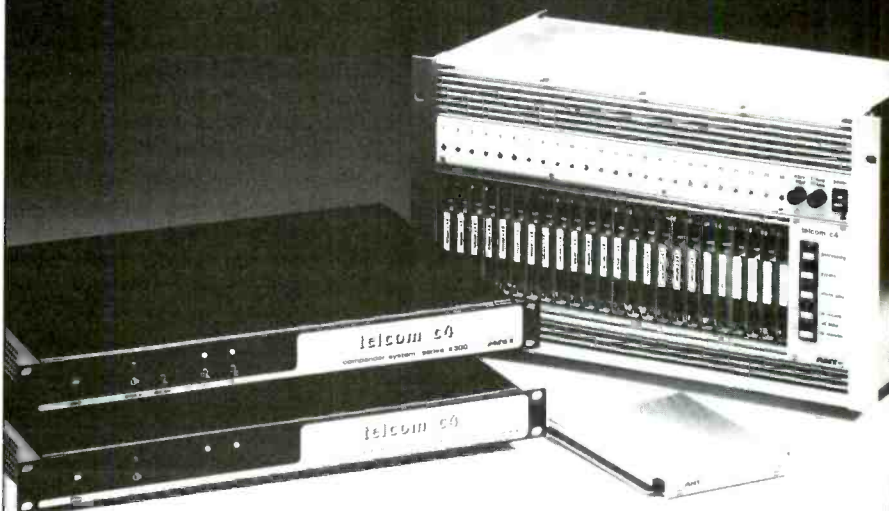
It's recommended that five minutes before the session begins, the two engineers on the date get in contact with each other and do a tone sweep and level set from uplink to downlink.

The session is conducted in similar fashion to the phone-patch sessions. Two-

way communication is established by phone. Using a phone-patch device, the talent, who's located at the uplink facilities, takes direction from the producer over the phone, while at the downlink facility, the producer listens to the final product being recorded.

Steve Weisbrot, engineer at The Mix Place in New York, says, "For TV spots, 99% of the time, the voice is recorded, and while the session is still on-line with the satellite, the track is dropped into the

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Studios on the Landco Satellite Network

Conventionally, the studio that books the session also books the satellite and the remote studio. Markups vary. Landco helps link studios together, but does not participate in any studio fees or other arrangements. For more information, call one of the studios listed below.

Boston

Soundtrack Studios, 617-367-0510
Professional Sound Film & Video,
617-423-0007

Chicago

Chicago Recording Co. (downlink
only), 312-822-9333
Streeterville Studios (downlink
only), 312-644-1666
Universal Recording Studios
(downlink only), 312-642-6465

Cleveland

Beachwood Studios (downlink on-
ly), 216-292-7300

Dallas

Omega Audio & Production
(downlink only), 214-350-9066
Real to Reel (downlink only),
214-827-7170

Detroit

Ron Rose Productions (downlink
only), 313-424-8400

London

Abbey Studios, 011-44-1-286-1161*
BBC, 011-44-1-927-4175*
Capital Radio, 011-44-1-388-1288*
Molinare Studios,
011-44-1-439-2244*
*011 = international exchange
44 = Great Britain
1 = London

Los Angeles

Bell Sound Studios, 213-461-3036
Fred Jones Recording Studios,
213-467-4122
LA Studios, 213-851-6351
Tele-Talent (uplink only),
213-466-8517
WAVES Sound Recorders,
213-466-6141

New Orleans

4WWL Production (downlink only),
504-529-6234

New York

DB Sound Studios, 212-764-6000
Howard Schwartz Studios,
212-687-4180
The Mix Place, 212-759-8311
New Sounds, 212-581-5025
Soundtrack Studios, 212-420-6010
Voices, 212-935-9820

Seattle

Steve Lawson Productions
(downlink only), 206-443-1500

multitrack, in sync with picture, music and effects." In this way, even though the final mix takes place after the satellite session is through, the client has a better idea of how the entire spot will work and is reassured that the voice-over is going to be "right" before the link is broken and the talent released.

In many sessions, the voice-talent has to read to picture. On or before the day of a session, a window dub copy of the master video is delivered to the uplink facility. Michael Laskow, former manager of Howard Schwartz Recording in New York and current manager of LA Studios in L.A. states, "About 50% of the sessions I did in New York were to a 3/4-inch workprint." During the session, the source engineer counts down the time code to the first frame of picture using a talkback circuit that is routed through the satellite. The downlink facility can set its videocassette on a preset time code number and can use the phone-feed countdown to start its playback. With a little trial and error, you can get both picture playbacks relatively in sync.

If exact sync is required, the uplink can feed a preroll of time code through the satellite and the downlink can slave to it. The downlink, if equipped to do so, can jam-sync through its time-code generator, and slave the machines. In Boston recently, a singer sang on a jingle in sync with a 24-track that was recording her voice in New York.

A digital satellite link can have its problems too. While transmitting setup tones, an engineer at an uplink in Los Angeles noticed, through the phone patch, that it was coming back from New York at a different frequency. He did a tone sweep and (to everyone's amazement on both coasts) found that the higher the frequency he sent, the lower it was received in New York. The problem was traced to a new transponder that had not been aligned properly. The session was rerouted through another transponder and the session proceeded as scheduled. "We have three digital transponders," Landers says, "each with 20 channels. We can route our feeds to or from CBS, ABC or United Stations Radio Network."

Universal Recording in Chicago is also on the network. Studio manager Foote Kirkpatrick says, "One of our biggest clients works with a jingle writer who lives in New York. So the producers come here, and we open our stereo satellite lines to New York. They are able to direct it as if they were there, because it sounds as though the musicians are just on the other side of the glass."

Universal has used the system to overcome other logistical problems as well. "We recorded Betty White while she was



Photo 1. A digital audio control room used to route digitized audio to the transponders coordinating the uplink and downlink.

on a break from 'Golden Girls,' explains Kirkpatrick. "We were called by our client and told that she was going to take a half-hour break. They asked if we could record her, and I said 'sure.' First I called Landco, then a studio Betty White could get to. We brought up the fader and there she was. I don't think 45 minutes had elapsed from the first phone call."

Facilities in the Midwest, unlike those on either coast, seem to book satellite sessions further in advance. These agencies and studios seem to use the satellite system more as a production tool, rather than as a technology to be used only in emergencies. For the ad agencies, it's cost-effective compared to flying in one or more people and putting them up in a hotel.

Laskow says, "From my perspective, the people who benefit most from the whole satellite system are those from the Midwest and smaller advertising markets, who want to use the New York and L.A. talent." As for its impact on the facilities themselves, he adds, "The basic difference between New York and Los Angeles is that New York does more post-production after the satellite session. In L.A., we are almost always uplinking and very rarely downlinking. I don't see the benefit that I saw in New York and Chicago—that after the facilities finished an hour or so on the satellite, they also sold three hours of post-production time right after it."

One of the unexpected benefits of the satellite network has been a developing spirit of cooperation between facilities. Because the two studios booked for a session are not competitors in the same market, the facilities can think of each other as allies instead of competitors. Laskow says, "The studios that are on the network all do a similar kind of business, and the engineers have all had similar training. I think it's a real kick for engineers to get on the satellite and do a session with a colleague in another city."

The most difficult satellite session Landco has handled was done between Israel and New York. Richard Crenna, the voice for a Jeep Eagle campaign, was in Israel for the filming of "Rambo III" when the ad agency needed him right away.

The arrangements were challenging not only because of the time difference, but also because the shooting schedule for the movie was constantly changing. After many phone calls and innumerable fax communications, talent, downlink and a double-hop satellite connection were finally secured. The downlink facility was Howard Schwartz Recording in New York and Howard Schwartz himself was the engineer on the date. The session was a complete success.

Conclusion

New technology can go unnoticed for years while businesses search for applications. Satellite transmission of digital audio is an exception, having found quick acceptance as a communication tool. In addition to its commercial success, digital satellite transmission has challenged our perception of distance. In most previous modes of electronic communication, distortion was a function of distance; if a radio signal or phone connection came in garbled, we assumed that it was received

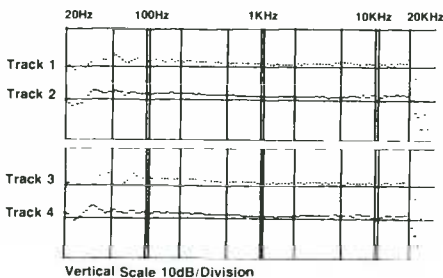
from far away. In a sense, distortion was a way to quantify distance and the size of our world. With digital satellite technology, that is no longer the case. Distance can now be conquered without distortion. Through digital satellite technology, the earth is now smaller than it has ever been.

RE/P

Photos and Figures 2 and 3 courtesy of IDB.

EXCEPTIONAL FREQUENCY RESPONSE

AT 1 7/8 IPS (REAL TIME)



TEST METHOD A 40KHz to 20Hz sweep at -20dB from a Sound Technology 1510-A was recorded at 1 7/8 ips in a KABA slave deck on TDK SA tape. The tape was played back at 1 7/8 ips in the KABA master control deck and the output displayed on the Sound Technology. The curves represent the SUM of the record and playback response of the KABA system at 1 7/8 ips.

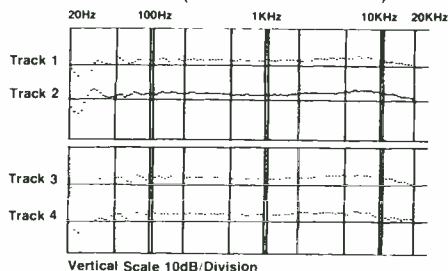
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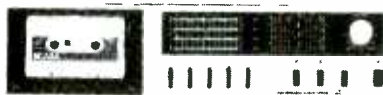
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EXCEPTIONAL FREQUENCY RESPONSE

AT 3 3/4 IPS (DOUBLE TIME)



TEST METHOD Same as above except the sweep was recorded at 3 3/4 ips on the KABA slave deck and played back at 1 7/8 ips on the master control deck. Highest frequency on playback was 20KHz so there is no response beyond 20KHz.



RTDS-4TM MASTER CONTROL DECK



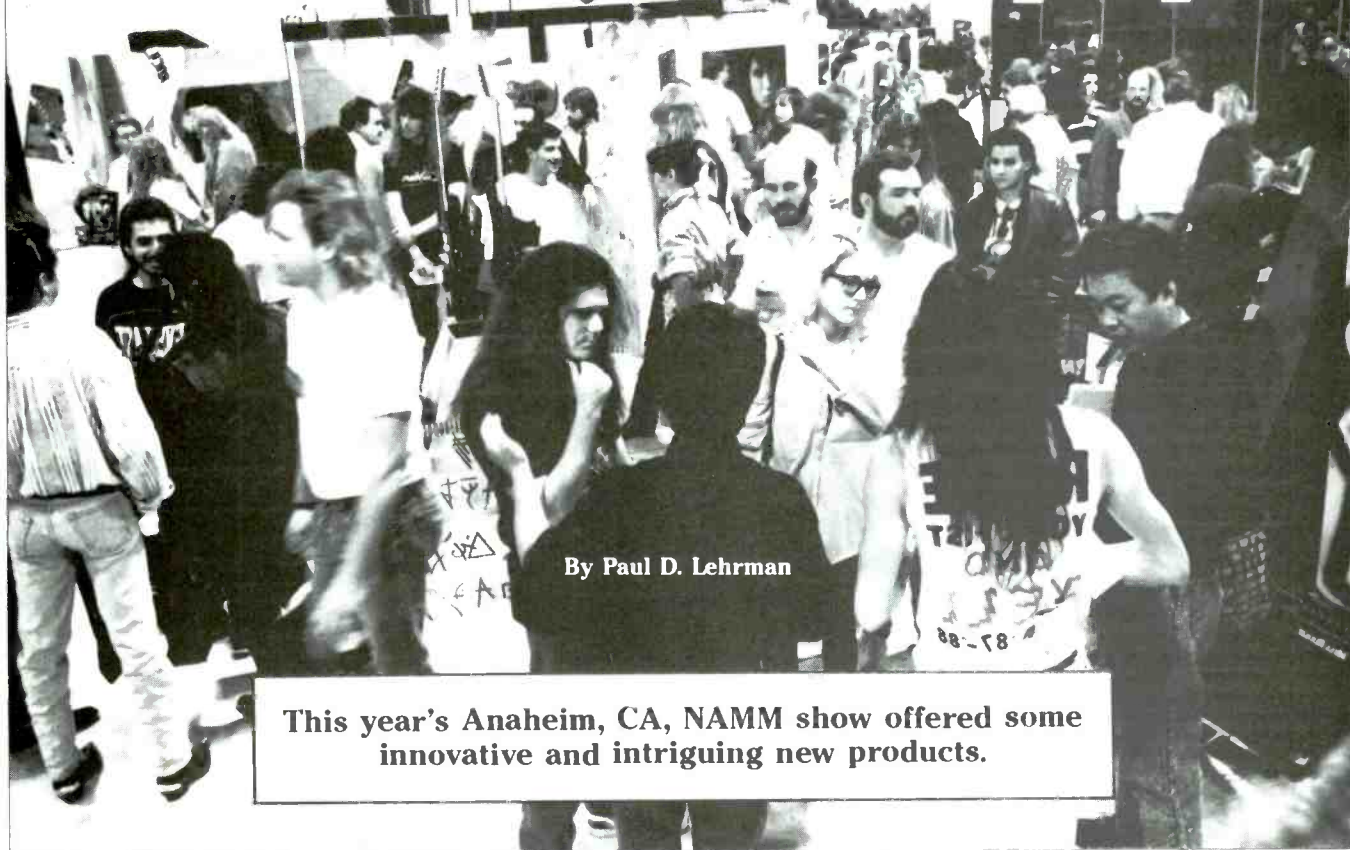
RTDS-4TS DUAL TRANSPORT DECK

FOUR TRACK REAL TIME AND 2X DUPLICATION SYSTEM

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NAMM Show Wrap-up



By Paul D. Lehrman

This year's Anaheim, CA, NAMM show offered some innovative and intriguing new products.

The 1989 winter NAMM show, for many, was one of the most successful music trade shows in recent memory. Exhibitor space and hotel rooms were both sold out weeks in advance, and anticipation ran high. Major advances in hardware, software and accessories were abundant, and the parties weren't bad, either. A prominent trend was "doing more for less money," as the professional recording, semipro, and musical instrument technologies markets continue to merge. The following represents a sample of some of the new products on display at the show.

Signal processing

Nowhere is this merging more evident than in the area of signal processors. When you think of how few years ago it was that the first, 5-figure cost, "Porsche-console," EMT digital reverberator arrived on the scene, the amount of bang for the buck available in digital signal processing today is nothing short of miraculous.

ART had three new products on display,

Paul Lehrman is RE/P's electronic music consulting editor and is a Boston-based producer, electronic musician and free-lance writer.

all due out in March. The Multiverb II can handle four effects simultaneously, and pitch shifting is now included. The unit has extensive MIDI implementation, allowing up to four individual parameters within a preset to be controlled, in real time, over MIDI—and the configuration, or patching, of the effects themselves can also be externally controlled. The price is \$600. The Multiverb EXT, for an extra \$75, includes a 2-second delay line and sample recorder that can be triggered manually or via MIDI. The SGE, at \$650, allows nine simultaneous effects, including the usual delays and reverbs, but also dynamic processing (compression/expansion/gating), distortion and overdrive, envelope filtering, and something the company calls a harmonic "exiter," presumably because Aphex holds the rights to the word with a c in it!

DigiTech has updated its DSP 128 to the DSP 128 Plus, allowing four simultaneous effects, and expanding the bandwidth to 20kHz. The unit is available for \$480, and a chip to upgrade older models to the current spec was scheduled for release in March. Also scheduled for March release was the MSP 4, another 4-at-a-time pro-

cessor, with a slightly smaller vocabulary of effects, at \$370.

Alesis has begun shipping its QuadraVerb, which provides four simultaneous effects, including 3-band parametric and 11-band graphic EQ, pitch shifting, and real-time MIDI control, for \$450.

A company that has not been taken too seriously in the studio processing market, but may be soon, is **Peavey**. Known primarily for guitar amps and P.A. systems, Peavey has been quietly developing some pro-level products. The QFX 4X4, from the company's Audio Media Research division, contains four effects modules in one unit, which can be accessed separately or chained together. Price is \$1,150. The AEQ 2800 is a 1/3-octave graphic-style digital EQ with 128 MIDI-accessible program memories. In addition, separate MIDI continuous controllers can be assigned to each of the bands for real-time adjustment. The boost/cut resolution of each faders is 0.5dB (within the first 6dB of its range). From 6dB to 12dB, the resolution is 1dB. Price is \$450. Both devices are scheduled to be available this month.

Equalizers were also on display at the

Rane booth, including the MPE series of programmable graphics, which comprises three models: the MPE 28, a 28-band, 1/2-octave unit; the MPE 14, a 2-channel, 14-band, 2/3-octave unit; and the MPE 47, with four channels of 7-band, 1-octave EQ. All of the models have equalization from +12dB to -15dB on each band, internal memory for 128 curves—accessible via MIDI program change commands—and can be edited using MIDI system-exclusive commands. The speed at which the curves change is user-definable, and two curves can be combined to form a new curve. The units are scheduled to ship in June, with prices between \$600 and \$800.

Automation, control and synchronization

The integration of MIDI into the post-production studio continues at a furious pace with a growing number of companies developing systems to link sequencers, video recorders, audio recorders, and processors—using various types of control signals and time codes.

Tascam showed its highly anticipated MTM-1000 MIDlizer, a 2-machine transport synchronizer and SMPTE-to-MIDI converter. It can store 20 transport cue points, displayable either in absolute time or in



ART Multiverb EXT.

measures and beats, based on its internally programmable tempo map. The tempo map—used for SMPTE-to-MIDI clocks and pointers conversion—can contain 999 changes and can be constructed by punching in the numbers from the front panel, tapping in the tempo as a tape plays, or by playing it in real time from a sequencer that generates MIDI clocks. Maps can be stored on external RAM cards. The device will also output MIDI Time Code.

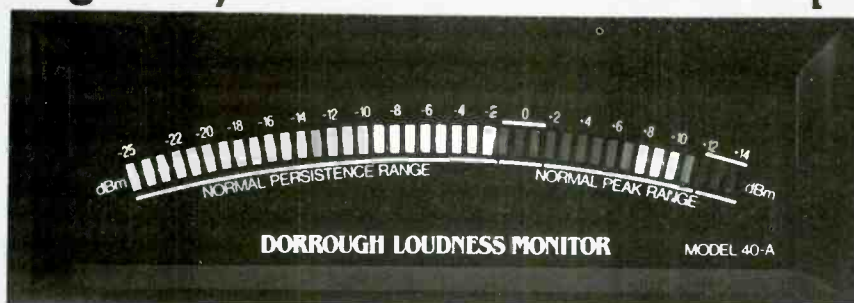
Tascam showed the unit hooked up to two of its own multitrack tape recorders—one reel-to-reel and one cassette. They say that it is usable with any video or audio tape deck equipped with serial ports for transport control, although some will require a converter box, which the company

plans to have available soon.

Tascam also showed its CD/CR701 compact disc-based post-production system. The CD701 is a player, while the CR701 is an editing controller that can handle up to four players. The system is designed to set up and isolate individual sounds for entering into a sampler or recording on an effects track. Cuing is instantaneous and the pitch can be altered up to ±6%. Loops can be set up as long as three minutes, and an internal RAM buffer stores enough audio that the loops are completely glitch-free. The units are scheduled to ship in March.

Fostex introduced new software for its FAME automation system running on a Macintosh, which provides computer con-

50 year old ballistics are incapable of monitoring today's state-of-the-art audio equipment.



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This meter correlates all types of program material and has led the way to open and clean programming throughout the system.

Specifications

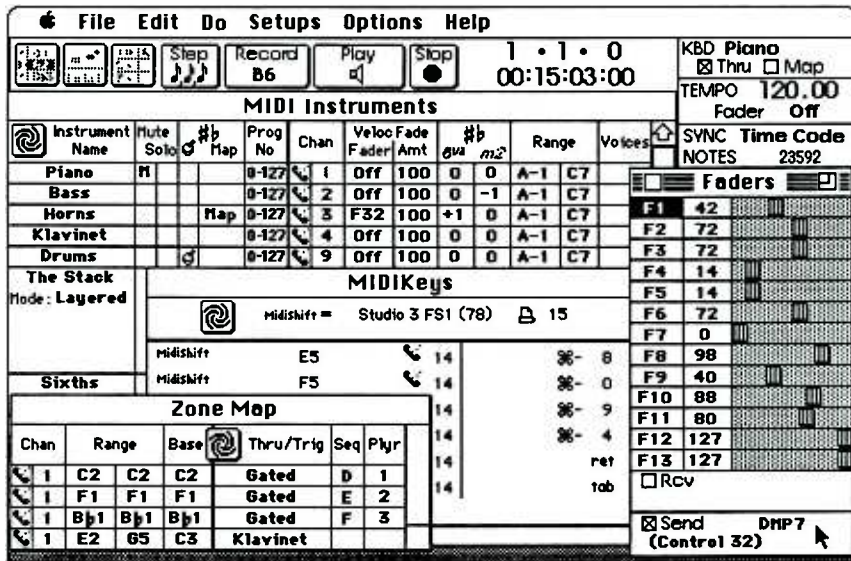
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 Input Impedance: 20k bal, 10k unbal.
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Screen dump of Opcode Systems Vision software showing the instrument map, zone map, Midikeys and faders.

control over its 4030 synchronizers. The software provides an EDL-like environment with up to 999 cues per list. It will remotely control the company's 4035 controller switches and 4010 SMPTE reader/generator, with dedicated dialogue windows for each device. Edit lists can be manipulated, sorted and printed out like any database. There is also a version for the IBM PC.

Also shown was a desk-accessory program called "MIDI Remote" for controlling all of the functions of the R8 8-track reel-to-reel deck via MIDI, in conjunction with the company's MTC-1 interface. This program is available for the Mac, IBM or Atari ST. A product that is still only in the prototype stage, but that holds great promise, is the 4020 MIDI event controller, which will read MIDI or timing cues and trigger up to 999 events, either over MIDI or an 8-channel parallel cable for transport and trigger control.

Peavey's Sync Controller is an update of the pioneering SMPL system developed originally by Synchronous Technologies. The system, which is priced at less than \$1,000, provides SMPTE-based control over two transports and will lock them together. In addition, it generates SMPTE code and converts SMPTE-to-MIDI clocks and pointers (although there is no provision for a tempo map, so MIDI is output at a constant tempo). Up to 99 program-mable events can be stored. The company will be providing cables to interface the system with a wide variety of tape machines. The system programming is EPROM-based, which will allow it to be easily upgraded.

A newcomer to the field of music production (which took many at the show by surprise) was **Sansui**. The company was showing the WS-X1, which combines a 6-track double-speed cassette deck, a 2-track cassette deck, and an 8-channel mixer into one unit—selling for less than \$2,000. The device has Dolby B and C noise reduction, $\pm 20\%$ pitch control on the multitrack transport, a built-in, adjustable, digital reverb, two balanced mic-level inputs, a mono-out/stereo-in effects loop, and patch points for effects insertion between the mixer and the 2-track deck. The transport can be synchronized to another Sansui deck or to a Fostex or Tascam system using a \$300 control box, which also contains a MIDI-to-FSK converter. A rack-mountable version of the 6-track deck alone goes for \$1,300.

Aphex has entered an entirely new market with its Studio Clock, designed by Michael Stewart. From almost any source, the device can detect where the beat is by looking at the segments of the signal exhibiting the fastest rise times. The device will also generate MIDI clocks in real time from audio triggers. It was scheduled for delivery in late February, and is priced at about \$600.

Aphex has also taken over Stewart's "Feel Factory," first seen at last year's NAMM. This device can subtly alter MIDI rhythm tracks and doubles as a Macintosh-MIDI interface. The newest version of the product was scheduled for shipping in late February, at a price of \$795. (More information on these Aphex products can be found in the March "Cutting Edge" column on pg. 70.)

And speaking of MIDI interfaces, **Opcode Systems** combined its Studio Plus Two Macintosh interface and its SMPTE-to-MIDI Time Code converter into a single rack-mount box called the Studio 3. The new box, which sells for \$459, has two independent MIDI ins, six assignable MIDI outs, and jacks for footswitches, which can be assigned using the new Vision software (more about this later) to various control functions, including punching and tempo tapping.

Samplers and sample players

There were no revolutions in samplers at this NAMM, but there were a few important upgrades to existing lines. **E-mu** was showing several additions to its Emax. Hyperflex, from **Data Technologies**, is a 20Mbyte disk drive that uses removable data cartridges, each of which can hold 35 Emax sound banks. The drive can load a bank into the sampler in less than seven seconds. A rack-mountable 45Mbyte drive with removable cartridges, the RM45, is also available. Also new is a SCSI port for the instrument, which increases the speed of exchanging samples with a computer dramatically and allows up to eight external drives to be on line simultaneously.

Casio showed an "advanced" version of the FZ-10M, the FZ-20M (rack-mount only), with a SCSI port that allows direct access to an Apple hard disk. New disk-based software for the device allows automatic loop and fade optimization when editing samples.

Korg's S1 "Production Workstation" (the first company to drop the "W" word from their product line will win an award from me) combines 1Mbyte of ROM for drum sounds with 512K of RAM (expandable to 2Mbytes) for user samples. The sampler is stereo, 12-voice polyphonic, and allows resampling. The S1 also contains a MIDI sequencer (32 channels, 192 ppq resolution, 120,000-note storage), a SMPTE generator, and a disk drive for file storage and software upgrades. Reportedly, the unit will be available at the end of the summer, for around \$2,500. Options will include extra audio outputs, a SCSI port, CRT and ASCII keyboard interfaces, and AES/EBU digital I/O.

Fans of the old Prophet series of samplers will be interested in knowing that **Yamaha**, which purchased Sequential Circuits not long ago, was discreetly handing out literature offering SCI Prophet 3000s for the fire-sale price of \$1,999, including a 1-year warranty.

The hit of the show, arguably, was not a true sampler at all, but a "playback-only" unit, the Proteus from **E-mu**. Proteus uses 4Mbytes (expandable up to 8Mbytes) of ROM to store some of the more-popular

16-bit sounds developed on the Emulator III. The unit provides extensive editing functions, as well as the ability to map up to 40 of a sound's parameters to incoming MIDI commands or internal LFOs and envelopes. The device is multitimbral, with 32-voice polyphony assignable to six audio outputs. All this for \$995. Delivery is expected for late spring. E-mu has been working closely with Opcode Systems, and the latter plans to have editing software for the Proteus that will run on both Macintosh and Atari ST computers by the time the unit is available.

As for other play-only samplers: **Kurzweil**, whose 1000 series expanders were a big hit at last year's show, has not been standing idly by. The company introduced the 1000 AX, an orchestral-oriented sample-based expander with the improved front panel and software introduced in the PX Plus late last year. Even more significantly, **Opcode** announced a Macintosh editing program for the series, which should go a long way toward realizing the potential of the instrument.

Computer sampling and recording

With the advent of the Macintosh II and Atari Mega, and the falling prices of hard-disk storage, the computer itself is taking over more of the functions of a sampler, and is moving into the area of hard-disk recording so far dominated by such companies as Fairlight and New England Digital. As always, the trend is more for less.

Digidesign's Sound Tools is a system for stereo sound editing on the Mac II or SE. It uses the company's Sound Accelerator D/A converter card for playing back sounds directly from the Mac, their new AD IN A/D converter for recording (obviating the need for a separate hardware sampler), and their Sound Designer II software. The software features assembly list editing, and events can be triggered from MIDI Time Code. File length is limited only by the amount of hard-disk storage available.

Editing functions include file merging, real-time, 7-band parametric equalization, non-pitch-shifting time compression, and various crossfade algorithms. All editing is non-destructive. In addition, the program supports file transfers among many different samplers. On an SE, the sampling rate is 32kHz, while on a Mac II or the new SE/30, the sampling rate is a full 44.1kHz. The system was scheduled for March delivery, at a price of \$3,285, not including the computer. The various components are available separately, and a combined digital input/output card, called DATIO (pronounced "datty-o," of course), is scheduled for released later in the year.

Not to be outdone, **Blank Software**



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Circle (24) on Rapid Facts Card

For more information on the products in this article, use the Rapid Facts Cards in the back of this issue and the following Rapid Facts numbers:

Alesis QuadraVerb	(100)
Aphex Feel Factory	(101)
Aphex Studio Clock	(102)
Apple MIDI Manager	(103)
ART Multiverb EXT	(104)
ART Multiverb II	(105)
ART SGE	(106)
Blank Software	
Alchemy 2.0	(107)
Blank Software Alchemy	
Apprentice	(108)
Casio FZ-20M	(109)
Data Technologies	
Hyperflex	(110)
Digidesign Sound Tools	(111)
DigiTech DSP 128 Plus	(112)
DigiTech MSP 4	(113)
E-mu Proteus	(114)
E-mu RM45	(115)
E-mu SCSI port for	
Emax	(116)
Fostex FAME automation	(117)
Fostex MIDI Remote	(118)
Korg S1	(119)
Kurzweil 1000 AX	(120)
Opcode Systems	
Studio 3	(121)
Opcode Systems Vision	(122)
Peavey AEQ 2800	(123)
Peavey QFX 4X4	(124)
Peavey Sync Controller	(125)
Rane MPE 14	(126)
Rane MPE 28	(127)
Rane MPE 47	(128)
Resonate Portrait	(129)
Sansui WS-X1	(130)
Sequential Circuits 3000	(131)
Steinberg Cubit editor	(132)
Steinberg M.ROS	(133)
Tascam CE/CR701	(134)
Tascam MTM-1000	
MIDizer	(135)
Zero One Research	
Editor	(136)

showed version 2.0 of its Alchemy software for the Macintosh. Besides time compression without pitch shifting, it can do the reverse: change the pitch of a sample without changing its length. Another new feature is the ability to detect pitch differences and automatically correct them when samples are being spliced together. The program supports Digidesign's Sound Accelerator card, as well as more than a dozen different samplers, whether they conform to the MIDI Sample Dump Standard or not. The price is \$695, and it is scheduled to be out in late spring. Mean-

while, Blank has dropped the price on the original version of Alchemy, which will now be called "Alchemy Apprentice" and sell for \$345.

Composition software

The best thing about the plethora of composition software on display in this NAMM's "MIDI ghetto" was that there were fewer "me too" sequencers, and quite a few ambitious and adventurous approaches to the art of making music.

The two most impressive programs were both for the Macintosh. Vision, from **Opcode Systems**, combines the live-performance orientation of the company's previous sequencers with comprehensive graphics and list editing of MIDI events. Hosts of advanced functions are included, including note mapping according to key or mode, sequence chaining, loop recording, and system-exclusive recording and playback. Controllers can be displayed as graphic "faders" and operated directly from the screen—in real time. The program stretches the Mac interface a bit with its use of submenus, but it looks quite intuitive. It should be shipping by the time you read this, and is priced at \$495.

Portrait, from **Resonate**, is another multimode approach to sequencing. It provides a "multiple-staff" environment, in which selected tracks and types of data can be shown simultaneously—using different formats for items such as velocity, controllers, notes, and text events. One particularly attractive feature is a "Touch Tool," which lets you perform a user-definable function (e.g., shorten duration by 30%, transpose up an octave, etc.) only on notes that you specify. Another is that notes can be entered first and bar lines inserted later. The MIDI input buffer is always active, so if you're noodling along with a track and play something you like, you can easily add it to the sequence.

One of the authors of Portrait, Geoff Brown, is also the author of the notation program Deluxe Music Construction Set, and files can be exchanged between the two programs directly. Portrait should also be out by the time this appears in print, and will cost \$495.

Multitasking

The biggest news in software development is multitasking MIDI: the ability to have several programs running on the computer *and* recording or putting out MIDI data at the same time. The Amiga has been able to do it, more or less, since it first appeared, but the more popular music computers have lacked the ability, until now.

Steinberg, the German software company, showed "M.ROS" (for "MIDI Real-Time Operating System") running on an

ST, with a new multidimensional sequencer called Cubit, an editor for the Korg M1, and their Mimix hardware-based automation system, all operating at the same time. The system handles events, timing and I/O, and is smart enough to not break up long command strings such as system-exclusive data dumps. According to a spokesman for Russ Jones, the company's American marketing group, the operating system has also been written for the Macintosh and the IBM, although there are no definite plans yet, either from Steinberg or any other developer, to write programs that will run under it on those machines.

A couple of companies showed Macintosh desk-accessory patch-editing and librarian programs that can run at the same time as a sequencer. **Zero One Research** had a desk-accessory editor for the Roland MT-32 running along with Mark of the Unicorn's Performer. It was scheduled for release in early February, at a price of \$160, with versions for the D-10, D-110 and D-20 synths to follow at the end of the month, at \$200. **Opcode** announced a series of desk-accessory librarians for the Mac that will run simultaneously with Vision. Prices have yet to be determined.

But the product with the most potential was being shown very quietly at **Apple's** booth. The MIDI Manager is scheduled to be included with Apple's next system software upgrade for the Macintosh, and is already being licensed to a number of third-party developers. It will allow any number of MIDI programs to be run simultaneously under MultiFinder, from a common clock—either internal or external—and in any configuration. It will also merge data from multiple programs intelligently, so that commands don't interfere with each other.

For example, an algorithmic composing program might output data directly into a sequencing program without any external hardware connection, and then the sequencer can play its notes at the same time that an edit-list manager like Digidesign's Q-Sheet is putting out controller data, and at the time that Alchemy is retrieving audio tracks from a hard disk. It will also allow direct linking of music to graphics and will work with Apple's own internal Sound File format.

The important difference between this and other attempts at MIDI multitasking is that MIDI Manager is being developed by Apple. Therefore, there is almost no question that every developer of music and sound software for the Mac will eventually support it. I can predict with utmost confidence that in the next few years, MIDI Manager will play a major part in redefining the role that computers play in music production.

REP

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ENGINEER/PRODUCER INDEX

A

Jim Anderson (E/P): 86 Dexter Ave., Watertown, MA 02172; 617-926-6914.

Credits: Beat Surrender (MP-AT), "One Fine Day" (Sound Techniques); Mickey Bones (MP-A), "Mickey Bones" (Sound Techniques); B. Frank (MP-A), "White Lies" (Sound Techniques); Roy Doolittle (PP-CI), Digital Equipment Corp. (Sound Techniques); Ideaworks (PP-CI), General Cinema Corp. (Sound Techniques).

Patrick Arnold (E): Box 12, Charleston, WV 25321; 304-744-5164.

Credits: Larry Groce (MP-A), "A Rustle in the Leaves" (SoundTracs Recording); Raedon Entertainment Group Inc. (MP/PP-F), "Chillers" (SoundTracs Recording); West Virginia Department of Culture and History (MP-AR), "The Music Never Dies" (SoundTracs Recording); Fahlgren & Swink (CP-R), West Virginia Lottery ads (SoundTracs Recording); Willard & Auge (CP-R/TV), "Go For Go-Mart" (SoundTracs Recording).

Key

Name (Title Code): Address; Phone Number.

Credits: Client/Artist (Credit Code-Subcode), Project Title (Facility Used).

Title Codes:

E (Engineer); P (Producer); E/P (Engineer/Producer).

Credit Codes:

CP (Commercial/Advertising Production).
Subcodes: R (Radio); TV (Television).

MP (Music Production).

Subcodes: S (Single); A (Album); AT (Album Track); AR (Album Remix); SR (Single Remix).

PP (Post-Production).

Subcodes: F (Film); MV (Music Video); CI (Corporate/Industrial).

Note: Starting with the January issue, reply cards contain lines to list the facility used for each individual project. Some respondents listed this month filled out older cards, so this information was not available.

B

Michael Bard (E/P): 2315 S.E. Lincoln, Portland, OR 97214; 503-230-8880, 503-233-9421.

Credits: Dan Balmer/CMG Records (MP-A), "Becoming Became"; Purina/Will Vinton (CP-TV), "Indian"; Gerber Advertising/Computerland (CP-TV/R), "Confusion?"; Payless Drugs (CP-TV), "Smile Shop."

Brian Basilico (E/P): Box 1491, Bolingbrook, IL 60439; 312-759-9311.

Credits: Scott Thomas (CP-R), St. Margret's Hospital (Body Electric); Jim Raddatz (MP-A), "Suburban Surreal" (Body Electric); Ed Dunn (MP-S), "Merry in My Christmas" (Body Electric); Matt Sisson (MP-S), "Ain't Comin' Home" (Body Electric); Donna McAfee (MP-S), "If" (Time Zone).

Paul Bauman (E/P): 696 Main St. E., Hamilton, Ontario, Canada L8M 1K5; 416-544-7572.

Credits: The Dik Van Dykes (MP-A), "Waste Mor Vinyl"; The Wetspots (MP-A), "Wake up With the..."; Parts Found In Sea (MP-A), "Every Soul's House"; The Dik Van Dykes (MP-A), "Nobody Likes..."; Henry Rollins (MP-A), "Live."

Bob Blank (E): 1597 Hope St., Stamford, CT 06907; 203-968-2420.

Credits: Columbia Records/Paquito D'Riviera (MP-A), "Paquito and Strings" (Hip Pocket, Blank Productions); RCA Records/Peter Moffit (MP-A), "Second Album" (Blank Productions); Vinylmania/LOLA (MP-S), "Just Like High School" (Blank Productions); McCann/Erickson/Opel (CP-R/TV), "Making It" (Blank Productions); Atlantic Records/Release (MP-S), "Now or Never" (Blank Productions).

Chuck Burge (E/P): Box N, Winder, GA 30680; 404-867-8133.

Credits: WBPS FM (CP-R), underwriter spots, station promos; Pastor Rodney Queen (CP-R), "Jewels of Truth."

Paul Butterfield (E/P): 762 Baffie Ave., Winter Park, FL 32789-3377; 407-647-1177.

Credits: Days Inn (CP-TV), "The Weather Channel Business Planner" (Van Der Kloot, Atlanta); Southern Bell (CP-TV/R), "The Real Yellow Pages" (Rice Produc-

tions, Atlanta); Walt Disney World, HRD (CI), management presentation (Disney/MGM); WUCF-FM (MP-SR/AR/R), "The Folkshow" (Overland Media, Winter Park); Florida Department of State Folklife Programs (MP-AT/AR), "Florida Traditions" (Overland Media).

C

Eugene S. Canevari (P): Eucan Productions, 4466 Montgomery Drive, Santa Rosa, CA 95405; 707-539-2349.

Credits: Carm Canevari (MP-A), "Lullabies and Starry Skies"; Village Hopecore International (CP-TV/R), "Kiraithe"; Santa Rosa Junior College (CP-TV/R), "Isn't it Time You Went to or Back to College?"

Chris Cassone (E/P): RD #2, Pudding St., Carmel, NY 10512; 914-225-1733.

Credits: Duke Ellington (MP-AR), "The Unknown Ellington"; Ace Frehley (MP-A), "Frehley's Comet"; Larry Chance and the Earls (MP-A), "The Earls Live"; Charles Schwartz with Freddie Hubbard (MP-AR); U.S. Orienteering Federation (PP-CI), "Orienteering—All Welcome."

Robert Chickering (E): 7317 Split Rail Lane, Laurel, MD 20707; 301-206-3023.

Credits: WGAY Radio, Air Studio construction; WGAY Radio, post-production studio construction; WRL Radio, news production studio construction; WGAY Radio, dubbing studio.

Alex Cima (E): 1501 E. Chapman Ave., #100, Fullerton, CA 92631; 714-680-4959.

Credits: Sixtieth Parallel (MP-A), "Into Bliss."

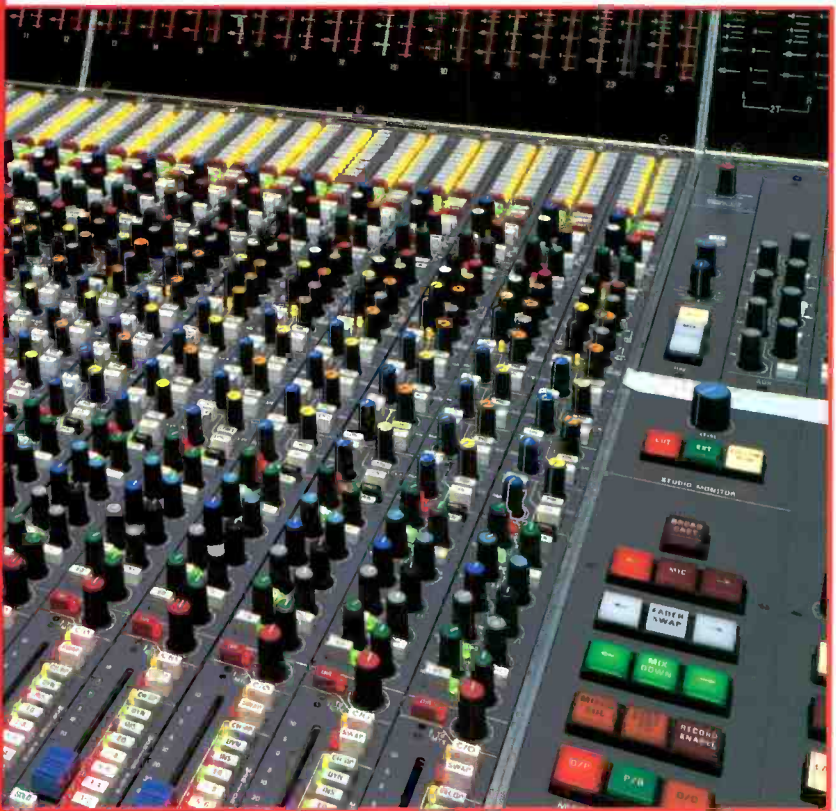
Scott Cochran (E): 1615 Rancho Ave., Glendale, CA 91201; 818-507-7982.

Credits: Hoppy Hallman (PP-F) two Disney movies of the week; MGM (PP-F), main title for "Group One Medical"; MGM (PP-F), main title for "Heat of the Night"; Mazda (PP-CI), National Sales Convention 1989; KROQ FM-Los Angeles (CP-R), 1989 IDs.

Michael Collins (E/P): 2105 Maryland Ave., Baltimore, MD 21218; 301-685-8500.

Credits: When Thunder Comes (MP-A), "Animal Pride" CD; W.B. Doner & Co., Baltimore (CP-R), Arby's campaign; WJZ-TV, Baltimore (CP-R) "Evening Magazine"/ABC lineup; Various Artists (MP-A), "Essential Attitudes," Vol. 3.

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ENGINEER/PRODUCER INDEX

Jack Connors (E/P): 505 Piccadilly Row, #171, Antioch, TN 37013; 615-360-9950.
Credits: The Murphy Brothers (MP-S), "Peace on Earth"; Jade (MP-A), "EP"; The Burdons (MP-A), "The Burdons."

Warren Crawford (E/P): Box 1192, New Smyrna Beach, FL 32070-1192; 904-427-6626.

Credits: WFTV, Channel 9, Orlando (MP-TV) "They Love Me, They Love Me Not"; WFTV (MP-TV), "Victims of Crime/Victims of Justice?"; WFTV (MP-TV), "Give Me Shelter"; WFTV (MP-TV), "Aging, Disease of Destiny?"; WFTV (MP-TV), "I Grow Old, I Grow Old."

D

David Dachinger (E): 127 W. 78th St., New York, NY 10024-6750; 212-496-0049.
Credits: Roberta Flack (MP-AT), "Oasis"; Keith Sweat (MP-AR), "Make it Last Forever"; Michael Bolton (MP-AT), "The Hunger"; Was (Not Was) (MP-AR), "What Up, Dog?"; Arnold Schwarzenegger (MP-AT/AR), "Full Body Workout."

Joe Dixon (E/P): 694 Holly St., Memphis, TN 38112; 901-327-4293.

Credits: Sherrye Advertising (CP-R), Rice College; Federal Express (PP-CI), "Overnight"; Federal Express (PP-CI), "International Procedures"; WKNO-TV (CP-R), "Action Auction"; Gary Topper (MP-AR), "Earth Tones."

Mitch Dorf (E/P): 120 Interstate North Parkway East, Suite 164, Atlanta, GA 30339; 404-956-7956.

Credits: Sinclair Productions (MP-A), "Sinclair"; J. Russie & Associates (CP-R), "Toyota Spotlight"; Institute of Nuclear Power Operations (PP-CI), "Simulator Instructor Training"; The Bams (MP-A), "In Your Eyes"; MCA Records (MP-A), "The Producers."

Tom Dubé (E/P): Box 444, Back Bay Annex, Boston, MA 02117; 617-266-1460.

Credits: Too Happy/Playtime (MP-A), "Too Happy"; Treat Her Right/RCA (MP-A), "Tied to the Tracks"; East of Eden (MP-A); The Walkers (MP-A), "One Step Two Step"; Dogzilla (MP-A), "Lunch With Ed."

E

Gary Epstein (E): 981 Black Canyon, Simi Valley, CA 93063; 805-527-8613.

Credits: Patrick O'Hearn (MP-A), "River's Gonna Rise"; Wind River Prod./Patrick O'Hearn (PP-F), "The Destroyer" soundtrack; Patrick O'Hearn (MP-AT), "Between Two Worlds."

Jim Ervin (P): 29836 W. Rainbow Crest Drive, Agoura Hills, CA 91301; 818-715-2268.

Credits: Eva Boyd Harris (MP-A), "Little Eva—Back on Track"; Glen Duncan (MP-S), "The 12 Days of Freddy."

F

Ray Fister (E/P): 8339 S. 76th St., Milwaukee, WI 53132; 414-425-5482, 414-291-9666.

Credits: Miller Lite Beer (CP-R), "Sports Rap" with Bob Uecker"; Milwaukee Admirals Hockey (CP-R), "It's a Hockey Night in Milwaukee"; Hot Beds Music Factory (CP-R/TV), "Hot Beds Music"; Great American Homes (CP-TV), "Great American Homes"; Robb & Stucky Furniture (CP-R/TV); "Robb & Stucky Christmas."

Del S. Fox (E/P): Forth Wall Productions, Box 3098, Cocoa, FL 32924; 407-636-4661.

Credits: Stage America/American Airlines (CP-TV), "Celebration"; WRES-TV (CP-TV), "Places and Faces"; Brevard Community College (CP-R), "BCC Communique"; Fiddlesticks (CP-TV), holiday promotion; Migual Kertsman (MP-AT), "Migual Live."

Jeffrey M. Friend (E/P): 1526 Arrowhead Trail, Xenia, OH 45385; 513-372-9359.

Credits: National Cash Register (PP-CI), "The Key to Success"; Celotex (PP-CI), "You, the Very Best"; WCPO Channel 9 (CP-TV), "Who Dey" (Bengals rap); Ludlow Cellular (CP-R), "No One Does What We Do Better!"; American Diamond Brokers (CP-R), "More, More, More."

G

Paul Goldberg (E): 1806 Warfield Drive, Nashville, TN 37215; 615-298-4436.

Credits: Don Bluth/Steven Spielberg (PP-F/AT), "Rock-A-Doodle" animated movie; Alabama (MP-A), second through 12th albums; Tom T. Hall (MP-A), "Country Songs for Kids"; Glen Campbell (MP-A),

"Letter to Home," "No More Night"; Lou Rawls (MP-A), "Wind Beneath My Wings."

Morris D. Golodner (E/P): 8946 Ellis Ave., Los Angeles, CA; 213-836-4028.

Credits: Legend (MP-A), "Legend Live"; Dr. Frank E. Stranges (PP-F), "UFOs"; Morris Golodner (MP-MV/A), "Young Mr. Q"; Adeem & Raashmeen (MP-A), "Flowers From India"; Institute of Human Services (PP-F), "Homeless in USA."

Dave Gordon (E/P): 3941 W. Wrightwood Ave., Chicago, IL 60647; 312-252-5552.

Credits: Dave Gordon (MP-A), "Green Things"; Steve Laxton (MP-A), "Steve Laxton"; Medical Media Systems (PP-CI), "The Guide to Heart Sounds"; Doctor Music (PP-CI), United Airlines, Safety Kleen Industries, Lilly Pharmaceuticals; Lovett Productions (PP-CI), Allied Aftermarket Division project.

Rob Gough (E): The Recording Workshop, 455 Massieville Road, Chillicothe, OH 45601; 614-663-2544.

Credits: Rose Alley (MP-S), "Virgin Snow"; State of Mind (MP-S), "Don't Quit Your Job."

R. Darroll Gustamachio (E/P): 23 Sherwood Drive, Westport, CT 06880; 203-454-2004, 212-877-4829.

Credits: Whitney Houston/Arista Records (MP-AT), "Whitney"; Johnny Kemp/CBS Records (MP-A/AR), "Secrets of Flying"/"Just Got Paid"; George Benson/Warner Bros. Records (MP-AT), "While the City Sleeps"; Billy Ocean/Jive/Arista (MP-A), "Love Zone"; Dionne Warwick/Arista (MP-AT), "Reservations for Two."

H

C.D. Hart (E/P): 223 15th St., Brooklyn, NY; 718-965-1143.

Credits: Sin City (MP-A), "Sin City Live"; NKB's (MP-AT), "NKB's"; The Edge (PP-F), "The Edge"; MK's Niteclub, New York, live sound; Tunnel Niteclub, New York, live sound.

Curtis Heckwolf (E/P): 102 Otter Creek Apts., Rutland, VT 05701; 802-773-8622.

Credits: Edgewood Entertainment (CP-TV), "New England Tonight" theme; OZA Productions (PP-F), "Fit to Kill" theme; LAM Productions (CP-TV), "Aliens—Peace"; Karilar Productions (PP-CI),

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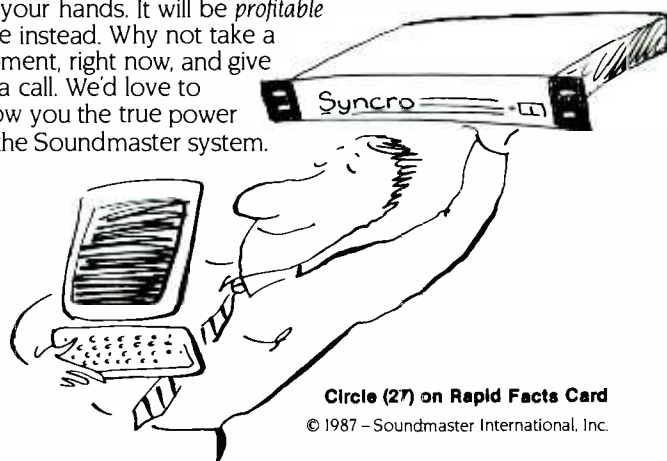
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ENGINEER/PRODUCER INDEX

"Homes by Owners"; LAM Productions (CP-TV), "Dream Landscapes of Midwest."

Gary S. Hickinbotham (E/P): 213 A Pat Garrison, San Marcos, TX 78666; 512-396-4352, 512-396-1144.

Credits: Noise International/Watchtower (MP-S), "Dangerous Toy" (Fire Station Studios, San Marcos); Antone's Records/Doug Sahm (MP-A), Doug Sahm LP (Fire Station Studios), Superbeet/Augie Meyers (MP-A), "Sausalito Sunshine" (Fire Station Studios); Silverstar/John Legg (MP-A), "Pillar of Stone" (Fire Station Studios); Silverstar/The Nelsons (MP-AR), "The Nelsons" (Fire Station Studios).

Dewell K. Holmes (E/P): 2351 Carnes Ave., Memphis, TN 38114; 901-324-1955.

Credits: Big Star (CP-TV), "Free Groceries"; Tiger Bookstore (CP-R), "Bahamas Trip Giveaway"; 56Q/Montesi Supermarket (CP-R), "Thanksgiving Promotion"; 56Q/Dos Amigos Restaurant (CP-R), "Monday Night Football"; 56Q/Various Sponsors (CP-R), "Working Women Week."

Barry Hufker (E/P): 3026 Aberdeen, Florissant, MO 63033; 314-921-9075.

Credits: Kathleen Thro/One Accord (MP-A), "Pleasure Tunes My Tongue"; St. Louis Brass Quintet (MP-A), "Baroque Brass"; Les Arts Florissants (MP-R); Amabile Piano Quartet (MP-AT), "Amabile Piano Quartet"; National Public Radio (MP-R), "Czech Music Festival."

L

Patrick Lacey (E/P): 511-B Victor St., Saddlebrook, NJ 07662; 201-368-2909.

Credits: Two Colors (MP-A), "Two Colors"; Ines Sikiric (MP-AT), "Ines"; Marathon (MP-A), "Marathon"; Stacy Cullen (MP-S), "Stacy"; Mike Sesta (MP-A), "One on One."

M

Rich Macar (E/P): 455 E. 86th St., #5A, New York, NY 10028; 212-439-9615.

Credits: Dave Kolin (PP-R), "Dr. Dave's Comedy Service/Laugh Attack"; Michael Bacon Music (MP-TV) "Man Hunt"; Elsinore Productions (MP-F), "In a Pig's Eye"; Rich Macar Music (CP-TV), "Mutual of America"; Michael Bacon Music (MP-TV), "Trackdown"/ABC-TV.

Randy Mahon Jr. (E): 1697 Broadway, 14th Floor, New York, NY 10019; 212-582-5473.

Credits: Full Force Productions/Cheryl "Pepsi" Riley (MP-A); Full Force Productions/La Toya Jackson (MP-A); Full Force Productions/Cheryl "Pepsi" Riley (MP-SR).

Russ Maier (E/P): 6065 Scenic Ave., Hollywood, CA 90068; 213-464-0007.

Credits: Lorimar Telepictures (CP-TV), "Family Medical Center"; Council on Foundations (PP-CI), "AIDS in the Workplace"; MCA/Glenn Frey (MP-TV), "Soul Searchin'" ("True Love"); The Zikes (MP-S), "Newsday Blues."

Robert P. Majors (E/P): Box 95187, Seattle, WA 98145; 206-367-7770.

Credits: 7th Wave Productions (PP-MV), "Another Footpath"; Manson Kennedy (PP-F), "24 Sur (Round the Clock)"; Prentice/Hall (PP-CI), "Sound Advice."

Scott Martinez (E/P): 8935 SW. 21st Terr., Miami, FL 33165; 305-226-7272.

Credits: Ira Sullivan Jr., (MP-S), "Under the Gun"; James Larsen (MP-S), "Keep on Movin'"; Tony Fuentes (MP-S); "I Wanna Know"; Tony Fuentes (MP-S), "Undecided"; Tony Fuentes (MP-S), "Back Home."

David Mazmanian (P): Armedia Communications, Box 257, Postal Station C, Toronto, Ontario M6J 3P4 Canada; 416-530-4676.

Credits: RCA Records (CP-TV/R), various; Ontario Greenhouse Marketing Board (CP-R/TV), "From Our House to Your House" (English and French versions); First Choice/Superchannel (CP-TV), "Free Weekend at the Movies"; Pindoff Record Sales (CP-TV), "The Nice Price"; Ontario Ministry of Energy (CP-CI/TV), "The Conserving Kingdom" (English and French versions).

Michael McKern (E/P): 1651 Hoyt Ave E., St. Paul, MN 55106; 612-771-1006.

Credits: Aspen Records/Peter Lang (MP-A), "American Stock"; Replacements/Sire/Warner Bros. (MP), demo; Johnny Ray (MP) "Blueprints"; Simitar Video (PP-MV), "Rockin' and Four-Wheelin'"; 3M (CP-R), Ag. products.

Bronlow K. Miller (E/P): Grapevine Recording Studios, 2525 Imlay City Road, Lapeer, MI 48446; 313-664-1995.

Credits: J. Grondin (MP-S), "Ballad of the American Taxpayer"; Jon Andrews (MP-

AT), "The Harvest Song"; Laurie Good (MP-A), "Sweeter (As the Days Go By)."

Roger Moutenot (E/P): 810 Garden St., Hoboken, NJ 07030; 201-659-7112.

Credits: Bill Frisell (MP-A), soon to be released; Ambitious Lovers (MP-A), "Greed"; Ryuichi Sakamoto (MP-A), "Live at the Beacon Theatre"; Caetano Veloso (MP-A).

Robert B. Mugrdechian (E/P): 300 Glen Ave., Palisades Park, NJ 07650; 201-461-0750, 201-461-0812.

Credits: WHYZ/Z-100 Radio (MP-SR), Duran Duran, "I Don't Want Your Love"; WHYZ/Z-100 Radio (MP-SR), The Escape Club, "Wild, Wild West."

Ken Mullenix (E): Box 5027, Ft. Lauderdale, FL 33310; 305-748-0885.

Credits: Studio Centre Productions/A&W (CP-TV/F), "Star Bear"; The Home Show/ABC (CP-TV), "Back to Basics"; State and Local Government Labor-Management Committee (CP-TV), "Together They Serve"; AFT Productions (PP-F), "The Disturbance"; Donna Allen (CP-MV), "Serious."

Richard D. Myers (E/P): 512 N.W. 97th Ave., Plantation, FL 33324; 305-370-6195.

Credits: WKPX-FM (CP-R), "Modern Music" liner package; Some People's Children (MP-AR), "Dot to Dot"; Atomic Pictures Inc. (PP-F), "Cool World"; X-Band (MP-S), "Dangerous Radius."

N

James Nelson (E/P): 2155 Bennett Creek Road, Cottage Grove, OR 97424; 503-942-5877.

Credits: Jimmy Blue & Data (MP-F), "Welcome to the Future"; Goldstar Productions (CP-TV), "Game of the Week"; Data Studios (PP-F), "Data Turns Your World Around."

P

Ken Pine (P): 4 Horizon Road, Suite G21, Fort Lee, NJ 07024; 201-224-0043.

Credits: Gym Corp. (CP/MP-A/MV), Gymboree—"Zoo Safari" (Ted Spencer's, New York); Uniworld Group Inc. (CP-R), Burger King "Nitefeeders" (Atlantic Studios); ABC Sports/D. Stern (MP-MV), Winter Olympics '88, "My Small Town"

(Power Station); NBA Productions (CP-TV) "Deefense" :30 (Ted Spencer's); ESPN/David Stern (CP-TV), Citicorp Gold Hall of Fame Classic (Metropolis Sound).

Sam Prager (E/P): 4500 Tapscott Road, Baltimore, MD 21208; 301-484-7597.

Credits: Vigil/Chrysalis Records (MP-A/S), "The Escape Artist" (Sheffield A/V); Vigil/Chrysalis Records (MP-AT), "Nightmare on Elm St. Part 4" (Sheffield A/V); Interface Production Support (MP-A/AR/SR), "The Lunatic Fringe" (various facilities); Major Records (MP-SR), "Deff Chronics" (Black Pond, High Heel); Michael Sciuto (MP-AR/SR) "Certain Damage" (High Heel, Sheffield).

Bill Prentice (E/P): 7479 S. Teller St., Littleton, CO 80123; 303-972-4255.

Credits: The 40th Day (MP-A), "Something Hidden Here" (Audio Works Recording); Andy Salas (MP-A), "Andy Salas Group (Audio Works Recording); Gary McKnight (MP-A), "The Dial Tones" (Audio Works Recording); Caught In The

Act (MP-A), "...If You Can" (Audio Works Recording); Ron Williams (MP-A), "Silent Partners" (Audio Works Recording).

R

Mark Richman (E): 11016 S.W. 15th Manor, Davie, FL; 305-476-3530.

Credits: CBS/Epic/Will To Power (MP-AT), "Baby I Love Your Way"; Vision/Betty Wright (MP-A), "Mother Wit"; CBS/Epic/Miami Sound Machine (MP-A), "Primitive Love"; CBS/Epic/Nicole (MP-AT), "Ruthless People" soundtrack; Black & White Records/Secret Society (MP-AT), "You Said That You Loved Me."

Jim Robinette (E): 531 Rocky Step Road, Winfield, WV 25213; 304-744-5164.

Credits: Larry Groce (MP-A), "A Rustle in the Leaves" (SoundTracs Recording); West Virginia Department of Culture and History (MP-AR) "The Music Never Dies"; (SoundTracs Recording); West Virginia Public Broadcasting (CP-R), "Mountain

Stage" (West Virginia Public Broadcasting); Fahlgren & Swink (CP-R), "West Virginia Lottery Ads" (SoundTracs Recording); Willard & Auge (CP-R/TV), "Go For Go-Mart" (SoundTracs Recording).

Tom Root (E/P): 1555 S. Beverly Drive, Los Angeles, CA 90035; 213-277-6235.

Credits: A&M/Chuck Gentry—The Fit (MP-A), "Just Havin' Fun"; Capitol/Durrell Coleman (MP-A), "Durrell Coleman"; Solar/Dynasty (MP-SR), "Way Out."

S

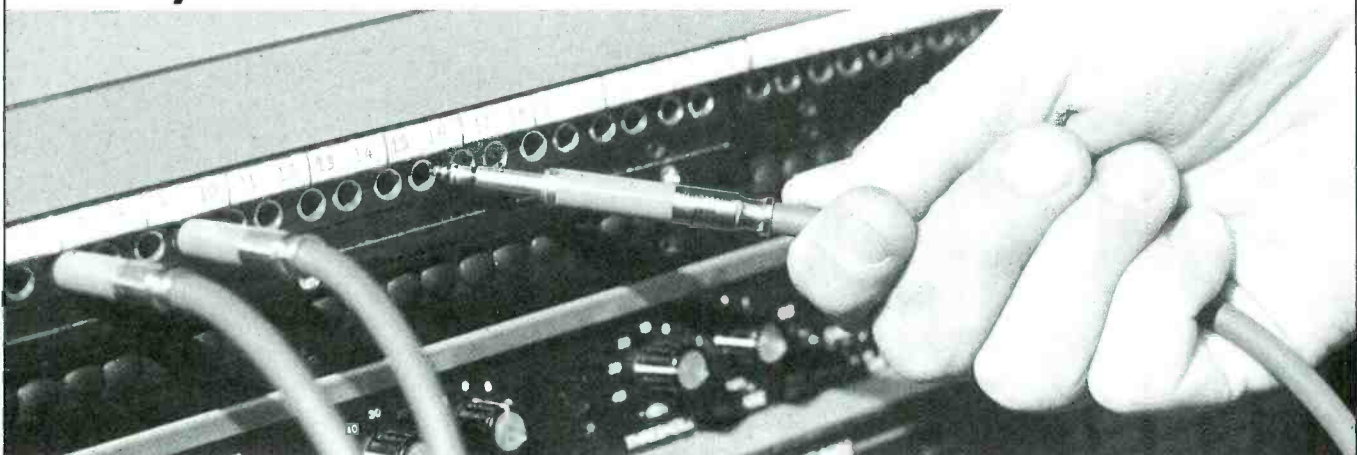
Bill Scanlan (E/P): 13411 Oriental St., Rockville, MD 20853; 301-946-8533.

Credits: DC-101/Radio (MP-A), "Best of Greaseman" cassette; DC-101 (CP-R), "Best of Greaseman" show; DC-101 (CP-TV), TV spots.

Alan Silverman (E/P): 330 E. 58th St., New York, NY 10022; 212-223-3295.

Credits: Bill Evans & John McLaughlin

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ENGINEER/PRODUCER INDEX

(MP-AT), "The Alternative Man"; Miki Howard (MP-AT), "Love Confessions"; Judy Collins (MP-A), "Trust Your Heart"/"Sanity & Grace"; David Mamet (MP-F), "House of Games"/"Things Change"; McCann-Erikson (CPTV), Coca-Cola Classic and Nabisco; Foote Cone Belding (CP-TV), Coors Light.

Jim Szyplik (E): Box 5, Glen Ellyn, IL 60138-0005; 312-495-3790.

Credits: College of DuPage Jazz Ensemble (PP-CI), "Jazz Era"; Buffalo Theatre Ensemble (PP-CI), "Praying Mantis"; Midwest Chinese Alumni Services (PP-CI) (PP-CI), concert; Buffalo Theatre Ensemble (PP-CI), Beckett plays; College of DuPage (PP-CI), "Man of La Mancha."

T

Harley Toberman (E): 2325 Girard Ave. S., Minneapolis, MN 55405; 612-377-0690.

Credits: 3M Leisure Products (PP-F), "Hunting for Turkey"; Maytag (PP-CI),

"Gone With the Wash"; Norwest Corp. (PP-CI), "Norwest Center"; Northwest Airlines (PP-CI), "The Spirit of Northwest"; Honeywell (PP-CI), "Reach for the Stars."

Gary Tole (E/P): #3115, 13827 100th Ave., Surrey, British Columbia, Canada V3T 5L2; 604-589-1789, 604-525-3423.

Credits: Word Records/Crosssection (MP-AR), "After the Fire"; Michael Godin Managment/Jeff Sutherland (MP-AT); Sam Feldman Associates/Frenzy (MP-A); Tokyo Television/Bon Jovi (TV), "Studio Hits Deluxe (live MV); Tokyo Television/Brian Adams (TV) "Studio Hits Deluxe" (live MV).

W

Chris W. Warren (E/P): 35-H Crossings Circle, Boynton Beach, FL 33435; 407-734-4657.

Credits: Lady Sabre (MP-A), "Strange Spell"; Lady Sabre (MP-A), "The Calm Before the Storm"; Iron Overload Diseases Assn. (MP-S), "Iron Overload"; American

Lung Association (CP-TV); Bob Rice (MP-A), "Domo Erectus."

Mark Wolfson (E/P): 11115 Magnolia Blvd., North Hollywood, CA 91601; 818-505-0001.

Credits: Island Records (MP-S); Sire/Ice T (MP-A/SR), "Power"; Warner Bros./Orion (MP-A/F), "Colors"; Manhattan Records (MP-AT), "Everlasting"; Warner Bros. (MP-A/F), "Stop Making Sense."

Jonathan Wyner (E/P): 50 Amory St., Cambridge, MA 02139; 617-547-7973, 508-753-1192.

Credits: Rykodisc/Marty Willson Piper (MP-S), Promo LP; Royal Crescent Mob (MP-A), "Omerta"; The Stompers (PP-MV), "Live Your Dream for Real"; Gussie Miller (MP-S), "She Said"; Pro Arte Orchestra (MP-A), "Wilson, Kupferman Concerti."

REP

Editor's note: The Engineer/Producer Index is a monthly department. To be listed, fill out the postage-paid reply card located in the back of this issue.

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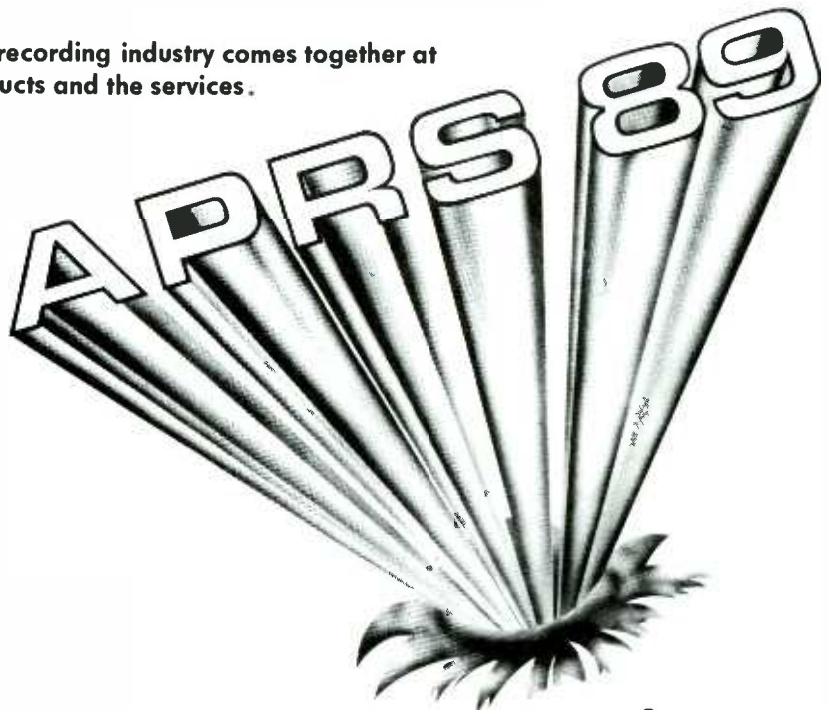
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TRACKS

A

AudioWorks Recording: 7479 S. Teller St., Littleton, CO 80123; 303-972-4255; Bill Prentice, owner.

Credits: Artistic Commercial Enterprises (CP-R/TV), "Channel 12" (RE: Bill Prentice; ME: Bill Prentice, Tom Pittman, Rich Ciparro; AE: Rich Ciparro); Ready Personnel, (CP-R/TV), "ACE" (RE: Bill Prentice; ME: Bill Prentice, Rich Ciparro; AE: Tom Pittman); Sir Speddy (CP-R), "Fred Ward" (RE: Bill Prentice; ME: Bill Prentice; AE: Cindy Bolas); Decorate Interiors (CP-R), "Spring Fling" (RE: Bill Prentice; ME: Bill Prentice; AE: Cindy Bolas); Cokesbury Books (CP-R), "Cokesbury" (RE: Bill Prentice, Cindy Bolas; ME: Bill Prentice; AE: Cindy Bolas).

B

Blank Productions: 1597 Hope St., Stamford, CT 06907; 203-968-2420; fax

203-329-7193; Bob Blank, owner.

Credits: BBD&O Advertising (CP-R/TV), Pizza Hut, "Making It Great" (RE: Bob Blank; ME: Bob Blank; AE: Kenny Blank); McCann Erickson Advertising (CP-TV), Opel, "Making It" (RE: Bob Blank; ME: Bob Blank; AE: Kenny Blank, Kristin Stone); Sunday Productions (CP-TV), New York Life campaign (RE: Bob Blank; ME: Bob Blank; AE: Kenny Blank); Associated Production Music (PP-CI), "Coombe Sampler" (RE: Bob Blank; ME: Bob Blank; AE: Kenny Blank); Teledisc USA (PP-CI), "Boston Pops Compilation" (RE: Bob Blank; ME: Bob Blank; AE: Kenny Blank).

Body Electric Studios: Box 1491, Bolingbrook, IL 60439; 312-759-9311; Brian Basilio, owner.

Credits: Video Network (CP-PP), Ed Napelton Dealers (RE: Brian Basilio; ME: Brian Basilio; AE: Bruce Dickert); AT&T (CP-CI), "Metro Digital Transition" (RE: Brian Basilio; ME: Brian Basilio; AE: Tim Collins; AT&T (CP-CI), "We All Win," RE: Brian Basilio; ME: Brian Basilio).

C

Candlewick Productions: 1161 N. Highland Drive, Hollywood, CA 90038; 213-462-7979; Larry K. Smith, president. **Credits:** ESTV (PP-TV), "Great Escape"

Key

Facility Name: Address; phone; contact name/title.

Credits: Client (Credit Code-Subcode), Project Title (Recording Engineers; Mixdown Engineers; Assistant Engineers).

Codes

CP (Commercial/Advertising Production).

Subcodes: R (Radio) TV (Television).

PP (Post-Production).

Subcodes: F (Film) MV (Music Video) CI (Corporate/Industrial).

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(RE: Kris Jergenson; ME: Kris Jergenson; AE: Dale Jergenson, Randy Perry); TBJ Files (PP-F), "The Game" (RE: Kris Jergenson; ME: Larry K. Smith, Kris Jergenson; AE: Dale Jergenson, Randy Perry); Chelmar Productions (PP-CI), Coke/Diet Coke industrials (RE: Kris Jergenson; ME: Larry K. Smith; AE: Dale Jergenson; Dennis Lofgren Productions (PP-TV) "Hush Little Baby" special (RE: Kris Jergenson; ME: Larry K. Smith, Randy Perry); Gemini Productions (PP-TV), "Ski Dazzle" series (RE: Larry K. Smith, Dale Jergenson; ME: Larry K. Smith; AE: Randy Perry).

Commercial Sight & Sound: 106 College Ave., LaGrange, GA 30240; 404-884-4400; Pat Patten, owner.

Credits: Milliken & Co. (CP), "Partners of Excellence" Theme '89 (RE: T. Dumas/P. Patten; ME: P. Patten; AE: T. Dumas); Milliken & Co., (PP-CI), "Hospitality National Sales Meeting" (RE: P. Patten; ME: T. Dumas; Mansour's (CP-R), "January Baby Clothes Sale" (RE: P. Patten; ME: P. Patten); Mansour's (CP-TV), "Valentine: Heart to Heart" (RE: P. Patten; ME: P. Patten); Basset/Partain Advertising (CP-R/TV), Ken Thomas "EYT" (RE: P. Patten; ME: T. Dumas/P. Patten).

Creative Professionals Inc.: 1245 N. Water St., Milwaukee, WI 53202; 414-291-9666; James Kagan, manager.

Credits: Lance Robarsun Productions (CP-TV), "Great American Homes" (RE: Ray Fister; ME: Mark Kagan; AE: Dave Michuda); Miller Lite Beer (CP-R), "Sports Rap With Bob Uecker" (RE: Ray Fister); Briggs & Stratton (PP-CI), "Run With the Winners" (RE: Mark Kagan, Jim Kagan); Milwaukee Admirals Hockey (CP-R), "It's a Hockey Night in Milwaukee" (RE: Ray Fister; AE: Dave Michuda); IDF (PP-CI), "International Design Forum" (ME: Ray Fister, Mark Kagan; AE: Victoria Ray).

Crystal Sound Recording Inc.: 220 W. 19th St., Sixth Floor, New York, NY 10011; 212-255-6745; Abigail Reid, studio manager.

Credits: Josh Selman/McCann Erickson Inc. (CP-TV), Coca-Cola (RE: Steve Vavagiakis; ME: Steve Vavagiakis; AE: Abigail Reid); Dan Snyder/RangeWars (MP-A), "Range Wars" (RE: Larry Buksbaum; ME: Larry Buksbaum; AE: Nicole Kelly); Hamid Khan/Khan Int'l Films (PP-F), "The Dance Goddess" (RE: Steve Vavagiakis; ME: Steve Vavagiakis; AE: Abigail Reid); Reggie Segers (MP-AT),

"Homeless Not Helpless" (RE: Larry Buksbaum); Billy Kirsch (MP-A), "Billy Kirsch" (RE: Larry Buksbaum; ME: Steve Vavagiakis).

D

Data Studios: 2155 Bennett Creek Road, Cottage Grove, OR 97424; 503-942-5877; James Roger Nelson.

Credits: Jimmy Blue and DATA (PP-F), "Welcome to the Future" (RE: Jimmy Blue, John Eastman, Valerie E.C.; ME: Jimmy Blue, Valerie E.C.; AE: Mark Coombs, David Allen Lynch); Gold Star Productions (CP-TV), "Game of the Week" (RE: John Eastman, Valerie E.C.; ME: Valerie E.C.); Jimmy Blue (CP-TV), "Calling Rock 'n' Roll" (RE: Jimmy Blue, Valerie E.C.; ME: Valerie E.C.); Leonard Burns Productions (PP-CI), "Airborn 1930" (RE: Valerie E.C., David Allen Lynch, Mark Coombs; ME: David Allen Lynch).

F

Forte Audio: 1129 W. Roland, Flint, MI 48507; 313-238-8228, 313-238-5043; Brian Phillips.

Credits (all sound reinforcement): Phil Keaggy/Randy Stonehill, spring tour (ME: Brian Phillips; AE: Dan Greer); Margaret Becker (ME: Brian Phillips; AE: Dan Greer); Servant (ME: Brian Phillips); Noel Paul Stookey & Body Works (ME: Brian Phillips); Michael Card (ME: Brian Phillips).

G

Scott Gordon Enterprises: Box 791, Paramus, NJ 07653-0791; 201-670-0054; Scott Gordon, CEO.

Credits: Floyd Vivino (CP-R), "The Italian-American Serenade" (RE: Scott Gordon; ME: H.S. Buehlmeier); Colavita Pasta and Olive Oil Co. (CP-R), "The Colavita Music Hour" (RE: Scott Gordon; ME: H.S. Buehlmeier).

H

HG Studio: 21332 7 Mile Road, Franksville, WI 53126; 414-425-3885; Don Hunjadi, owner.

Credits: National Auto Dealers Assn. (CP-R), "Holiday Safe Driving Tips" (RE: Don Hunjadi; ME: Don Hunjadi); Allied Van

Lines (CP-R/CI), "Movin' On" (RE: Don Hunjadi; ME: Don Hunjadi).

K

Kren Studios: 6553 Sunset, Hollywood, CA 90028; 213-461-5781; Russell Bracher, chief engineer.

Credits: Chris Young (PP-F), "The Fly II" (RE: Jeff Vaughn, Russell Bracher; ME: Jeff Vaughn, Russell Bracher); Chris Young (PP-F), "Hellraiser II/Hellbound" (RE: Jeff Vaughn, Russell Bracher; ME: Jeff Vaughn, Russell Bracher; AE: Ron Manus); Virgin Records (PP-MV), Paula Abdul, "The Way That You Love Me" (RE: Russell Bracher; ME: Russell Bracher; AE: Ron Manus); Virgin Records (PP-MV), Paula Abdul, "Straight Up" (RE: Russell Bracher; ME: Russell Bracher; AE: Ron Manus).

L

Le Studio Inc: 715 Boylston St., Boston, MA 02116; 617-267-2825; Samuel Boroda, president.

Credits: Hill Holliday (CP-TV), Labbatt's beer (RE: Sam Boroda; AE: Robert Flynn); Bed and Bath (CP-TV), "Dropping" (RE: Sam Boroda; AE: Robert Flynn); 3M (PP-F), "Ideas in Hand" (RE: Sam Boroda; AE: Robert Flynn); Form in Teak (CP-R), "Winter Sale" (RE: Sam Boroda); Fisons Co. (PP-CI), Annual Sales Meeting (RE: Sam Boroda; AE: Robert Flynn).

Logical Emotion: 19139 Seminole, Redford, MI 48240; 313-537-1281; Jeff Ceja, owner.

Credits: Diamond Tim Productions (PP-MV), "Harlot: Virgin Wings" (RE: Jon Hall, Brian Berg; ME: Brian Berg); David Danielle (PP-MV), "Videotunes Live" (RE: Jeff Ceja; ME: David Danielle, Jeff Ceja).

M

David Mark Audio: 3781 Silsby Road, Cleveland, OH 44118; 216-321-4321; David Mark, president.

Credits: WERE Radio Whiz Quiz Program (CP-R), Come-in Music (RE: David Mark, Jim Mehring; ME: David Mark); Kovach & Co. (CI), "Nested Boxes & Metamorphosis" (RE: David Mark; ME: David Mark); Magic by Adam (CI), "Stage Show Music" (RE: David Mark; ME: David Mark); Gold Mountain Corp. (CI), Stage Show

Play-on (RE: David Mark, Jim Mehrling; ME: Jim Mehrling); Elyria Savings and Trust National Bank (CP-R), various radio commercials (RE: David Mark).

Bob Moulton Audio: Ellsworth Hill Road, Wentworth, NH 03282-0141; 603-764-9324; Robert Moulton, owner.

Credits: Trinity Pulpit (R), syndicated weekly broadcast (RE: R. Moulton; ME: R. Moulton); Wentworth Baptist Church (CP-R), commercial series (RE: R. Moulton); Shalom International (CP-R), Shalom broadcast (RE: R. Moulton; AE: F. Eiklor); New Sound Concerts (CP-R), Amy Grant, Concert on Common (RE: R. Moulton).

O
On Trak Productions/Magic Moonlight Recording Studio: 314 Sumner St., Elyria, OH 44035; 216-322-5560; David W. Holt Sr., owner.

Credits: HSA Inc. (CP-R), "Catering to You" (RE: David W. Holt Sr.; ME: Philip J. Costello Jr.); Baby Doll Band (PP-MV), "Transatlantic Jet Airliner" (RE: Edward R. Minnich, David W. Holt Sr.; ME: Edward R. Minnich; AE: Philip J. Costello Jr., Vivian M. Terry).

S
Sound Innovations: 5520 Lake Otis Parkway, Suite 104, Anchorage, AK 99507; 907-563-8273; Bruce Graham, owner/engineer.

Credits: Mystrom Advertising/Alascom (CP-R/TV), corporate and product advertising (RE: Bruce Graham; ME: Bruce Graham); Husky Advertising/Anchorage Chrysler (CP-R/TV), ongoing product advertising (RE: Bruce Graham; ME: Bruce Graham); NYE Ford (CP-R/TV), "In the Mood" jingle package (RE: Bruce Graham; ME: Bruce Graham; AE: Vinnie Palazzotto); Isenson Associates/Alaska Film Studios/Alaska Department of Education (PP-F), "Home in Alaska," "Alaskan Geography" film series (RE: Bruce Graham, Mike Kruzan, Jeff Owens; ME: Bruce Graham, Mike Kruzan); Arco Alaska (PP/F-CI), info and safety programs (RE: Bruce Graham; ME: Bruce Graham).

REP

Editor's note: This is the first installment of Tracks, a monthly column featuring commercial and post-production projects in facilities around the country. To have your facility listed, fill out the reply card located in the back of this issue. Please note that this department is for facilities; individual producers and engineers should fill out the Engineer/Producer Index reply card, also located in the back of this issue.

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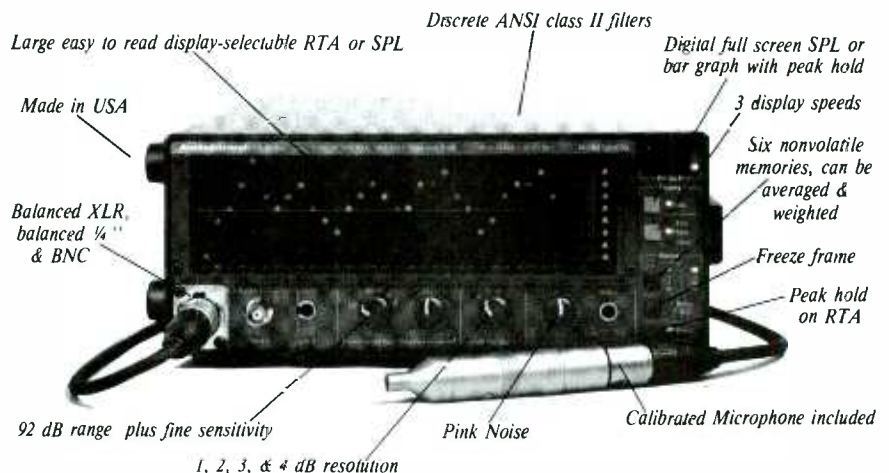
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April 1989 *Recording Engineer/Producer* 63

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STUDIO UPDATE

Northeast

Blank Productions (Stamford, CT) has added Kristin Stone to the staff as a music production assistant. 1597 Hope St., Stamford, CT 06907; 203-968-2420; fax 203-329-7193.

The Toy Specialists (New York) has marked its fifth year in business as a musical computer and pro audio rental company. The company also plans to expand its technical support services to 24 hours a day, seven days a week. 333 W. 52nd St., New York, NY 10019; 212-333-2206; fax 212-262-4095.

Bair Tracks (New York) has expanded its MIDI room. New equipment includes an Apple Macintosh with Performer software, Opcode's Studio Plus Two and Timecode Machine, and AKG 414, Electro-Voice RE20 and Crown PZM mics. Box 1162, New York, NY 10009; 212-529-1954.

A&J Recording Studios (New York) has added 16mm magnetic film recording and transfers, allowing clients to record directly to 16mm film, and then transfer to and from ¼-inch and ½-inch audiotape or ½-inch or ¾-inch videotape. 225 W. 57th St., New York, NY 10019; 212-247-4860.

39th Street Music Productions (New York) has added a variety of equipment, including a Korg M1-R, Roland MKS-20, Eventide H3000, Akai S950, J.L. Cooper MSD Plus Rev. II and a Publison 21-second memory expansion. 260 W. 39th St., 17th Floor, New York, NY 10018; 212-840-3285.

Omega Recording Studios (Rockville, MD) has acquired a Dyaxis digital recorder/editor with 1-hour capability. 5609 Fishers Lane, Rockville, MD 20852; 301-230-9100.

Midwest

SoundStage 1 Productions (Battle Creek, MI) has added Jonathan Frazer as senior engineer. 13270 6½ Mile Road, Battle Creek, MI 49017; 616-979-1532.

General Television Network (Detroit) has installed two Grass Valley 200 switchers. The facility also reports that its annual revenues have increased by at least 15% for the third straight year. Income reached \$13 million in 1988, including the sale of video and audio equipment.

Southern California

Aire L.A. Studios (Glendale) is the new name of the former Yamaha Research and Development studio. Aire has three working rooms, with an SSL 4064 G Series console in Studio A, a custom Neve 8038 in Studio B and an SSL 4048 E Series in a pre-production room. The owners are Craig Burbidge, Dude McLean and Raymond A. Shields II. 1019 S. Central, Glendale, CA 91204; 818-500-0230; fax 818-241-3348.

Creative Media (Cypress) has marked its 19th year in business with a move to a new facility, featuring two control rooms with 16-track capability. Client areas have been expanded to include a conference room, kitchenette and more seating in the control rooms. The facility provides audio production for businesses and advertising/communication agencies. 11105 Knott Ave., Suite G, Cypress, CA 90630; 714-892-9469; fax 714-897-0824.

Larrabee Sound (Los Angeles) has installed a 72-input SSL G Series console in Studio A. 8811 Santa Monica Blvd., Los Angeles, CA 90069; 213-657-6750.

Realtime Studios (Van Nuys) has opened a Fairlight-based pre-production and scoring room, run by Michael Dosco and Craig Aloisio. 14511 Delano St., Van Nuys, CA 91411; 818-994-9973.

Northern California

Different Fur Recording (San Francisco) has reached a management agreement with Mobius Music, also of San Francisco. Susan Skaggs, Different Fur's vice president and general manager, will now co-manage and handle bookings for Mobius. With Different Fur having an SSL 4056 console with Total Recall and Mobius having a Neve 8068 board, the agreement presents clients with a wider choice of equipment, rates and studio availability. 3470 19th St., San Francisco, CA 94110; 415-864-1967.

Northwest

Spectrum Sound Studios (Portland) has acquired the Hybrid Arts ADAP I digital audio workstation. The facility's three custom consoles have also been modified to make them smoother and quieter. Spectrum engineer Jim Baer has been elected president of the Oregon Media Production

Association. 1634 S.W. Alder St., Portland, OR 97205; 503-248-0248.

Steve Lawson Productions (Seattle) has acquired the New England Digital PostPro system, the first studio in Seattle with the system. It will be installed in its own suite and interfaced with a digital console to ensure that all projects can be produced in the digital domain. New to the staff is Matthew Sutton, who is head of technical support. Sixth and Battery Building, 2322 Sixth Ave., Seattle, WA 98121; 206-443-1500.

Canada

Trax One (Toronto) has celebrated its first anniversary. Owned by Magnetic Fax, Trax One provides audio services for commercial, corporate and long-form broadcast video clients. A mid-priced 24-track room, Trax Two, is being planned and is expected to be up and running by the summer. 550 Queen St. E., Suite 205, Toronto, Ontario M5A 1V2 Canada; 416-367-8477; fax 416-367-8356.

Wellesley Sound Studio (Toronto) has added a Dyaxis digital audio workstation. 106 Ontario St., Toronto, Ontario M5A 2V4 Canada; 416-364-9533.

Manufacturer announcements

Focusrite has delivered modules to the following studios in the United Kingdom: AIR London, Music Works, Olympic, The Church, Fisher Lane Farm and Swanyard.

Neotek has announced the following console installations: Last Chance Recordings, London, 32-input Elite; Coley Sound Productions, Los Angeles, 36-input Elite; Soundworks Recording, Las Vegas, NV, 36-input Elan; Viz-Wiz, Brookline, MA, 28-input Elan; Ron Rose Productions, Southfield, MI, its second Elite with 56 channels and Audio Kinetics Mastermix automation; and Cegep College's recording program, Drummondville, Quebec, 28-channel Elan.

Soundcraft has installed consoles at the following facilities: 30 Second St., Albuquerque, NM, 200B; the Roxy Theatre, Hollywood, 24-channel 200B; Color Zone Productions, Novato, CA, 44-channel 6000 with Twister Automation; and Wizard Lighting and Sound Equipment, Cortland, NY, 40-channel 500.

RE/P



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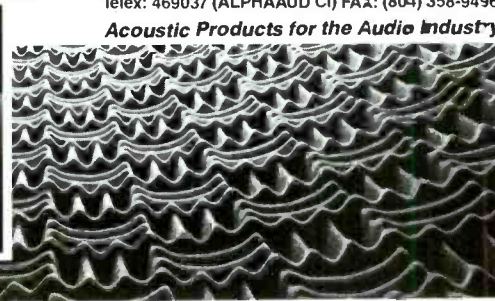
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THE CUTTING EDGE

By Laurel Cash

Audio Paragon introduces Playstation



Audio Paragon's Playstation is a modular rack and shelving system for a variety of production applications.

The Playstation is a modular rack and shelving system for MIDI pre-production, recording studio, A/V production and post-production, as well as video post, media and broadcast use.

It's for anyone whose production equipment organization is out of control and who is tired of trying to fix it with another rack. The Playstation offers a complete organized production environment and can be scaled down from there. Should you require more slide-out shelving and fewer patchbays, you can have them. The setup depends on your needs and how you want your room to go together. You can start small and expand as your needs do. The Playstation is a distillation of 15 years of commercial and personal studio use, and was codesigned by Emmitt Siniard and Jackie Cartwright.

"With the advent of the personal use studio, space is at a premium," Cartwright says. "The aesthetic design and attractive finish already have gained an acceptance, and best of all, assembly requires only a screwdriver."

"It was obvious to us a system was needed to satisfy a problem of too much gear and too little space," Siniard adds. "By wrapping the user in both the horizontal and vertical planes, the equipment can effectively be used and monitored at the same time."

Several configurations are available, including the Mothership 200, which contains 200 rack-equivalent spaces, enhanced speaker imaging and a considerable complement of rack and shelving capability. Other models include the Rackman, which contains 88 rack-

Laurel Cash is RE/P's executive consultant and a free-lance writer based in Los Angeles.

equivalent spaces in less than 7.5 feet of floor space, and the Spinnet 167, designed for 88-note master keyboards with 54 rack-equivalent spaces.

In late January, Audio Paragon created Playstation Products, which will manufacture and distribute this product line. The Playstation design team is also available to studios, producers and artists who would like to integrate the Playstation into a redesign of their facility. Services include space planning and interior design.

Circle (97) on Rapid Facts Card

DAR changes, upgrades and marketing moves



Digital Audio Research's Soundstation II is now available in 4- and 8-track versions and has a variety of enhanced features.

For the first time at a European AES convention, Digital Audio Research is scheduled to demonstrate a Soundstation II with eight channels and an optical disk backup system. The 8-channel operation is relatively new (the system is now available in 2-, 4- or 8-channel units), and is a true 8-in, 8-out system. It should offer even more control and flexibility over extremely complex audio recording, editing and post-production tasks.

The Optical Disk subsystem provides high-speed backup of audio data and edit decision to 800Mbyte, ISO-standard, write-once optical disks. Each can store one hour of stereo audio. On-line editing, playback and audio archiving are also available from the subsystem.

Some new and enhanced features include a Stereo Time Warp (high-quality time compression and expansion), and Line and Unlink operations for assembling and disassembling multitrack operations. There are Fix and Unfix keys for locking or unlocking segments to time code, and a user-defined organization of segment directory with a Find command.

The system also has drop-in recording; project reels containing multitrack sequences can be instantly saved or recalled. The company says that users can play

back from, and edit in, the directory, as well as scroll the playback display. There are instant segment looping and copying commands, and chase synchronization and time code in the remote mode. Also, sampling rates can be locked to external time code or digital clocks.

As reported in previous issues of RE/P, DAR recently sold a system to Autograph, a London-based theater sound production company, and to the BBC. The company is also setting up regional offices in many major U.S. cities.

Circle (98) on Rapid Facts Card

Symetrix DPR-100 Digital Processing Recorder

Symetrix, well-known for its widely used signal processing equipment, has entered the digital workstation market with the DPR-100. Symetrix considers this a true second-generation product because it does not require the traditional separation of a signal recorder and signal processor. Instead, the DPR-100 does it all.

The DPR-100 is said to provide a studio with digital domain recording, mixing and signal processing in a compact, modular system with a throughput of 50 million instructions per second. The system uses multiple 24-bit DSP ICs, the Motorola 56001. With this much DSP power on-line, simultaneous real-time effects include level, pan and 3-band parametric EQ, all of which can be automated.

Other types of processing can be loaded into the system and run "off-line." The first off-line software offering will be a time squeeze/expand program. User interface is through an Apple Macintosh computer (Mac+, Mac SE or Mac II).

The DPR-100 is presented in two basic "track" formations: 4- and 8-track. The 4-track format permits simultaneous 2-track recording and 4-track playback, while the 8-track format allows for simultaneous 4-in and 8-out. The system is also field-expandable in both tracks and record time.

The SMPTE/AES/EBU module reads VITC and house sync, reads and writes longitudinal time code and provides a stereo AES/EBU input and output.

According to Dane Butcher, Symetrix president, the DPR-100 will be aggressively marketed to film and video post-production, and recording and broadcast production facilities later this year.

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RE/P

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At Aphex we have a problem with the President. Marvin Caesar wants everything the company makes to be the “best.” Marvin is *not* an engineer, he is an audio zealot who doesn't understand the word “impossible.”

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know of a commercially available expander/gate that can begin to compete with the Aphex 612, write for full details of this offer.

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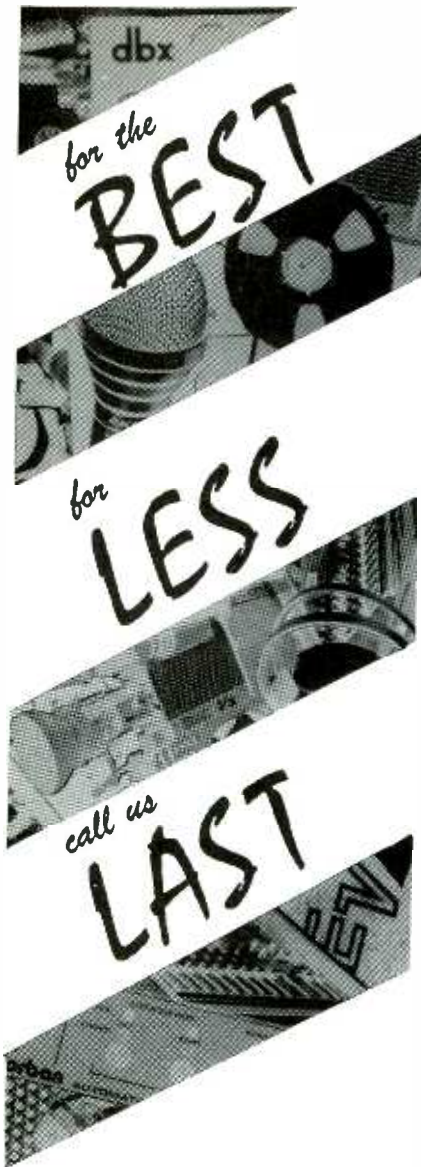


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NEW PRODUCTS

Shure Beta Series mics

The series contains two models. The Beta 58 is designed for vocal applications, while the Beta 57 is designed for musical instrument micing, particularly drums, cymbals, horns and instrument amplifiers. According to the company, both mics have exceptional gain-before-feedback characteristics because of a "true supercardioid" polar pattern that stays uniform at all frequencies. A new pneumatic shockmount system minimizes handling and stand noise. User net price for either mic is \$258.

Circle (160) on Rapid Facts Card



Prosonus Studio Reference Disc

The 70-minute CD turns a CD player into a test generator for all audio needs. The disc includes two sets of 17 different sine wave calibration codes, four bands of different sine wave sweeps, pink and white noise, two different control room tests, polarity check, left/right test, musical pitch references and acoustic piano listening tests. Because of the CD format, the material can be programmed or be repeated in any order. Price is \$49.95.

Circle (150) on Rapid Facts Card

Passport Designs Encore software

For use on the Macintosh, Encore is a music composing and printing program that lets composers think and work directly with music notation in an interactive environment. Music can be entered into the system using a mouse or MIDI keyboard, in real or step time. Symbols can be placed anywhere on the page. Master Tracks Pro and Jr. sequences, MIDI files or live MIDI input is transcribed and printed out. Suggested retail price is \$495.

Circle (151) on Rapid Facts Card

Rainbow monitors and mains

Rainbow Productions has introduced two monitoring systems. The RYHO-12-12T is a 12-inch 2-way system featuring two titanium drivers coupled to a single horn of proprietary design. Frequency response

is 60Hz to 21kHz (-3dB); power handling is 300W long-term. Mains are available in an all-in-one design, the 1510MB, or a split system, the 1015MB-S, with each pair in a sealed compression chamber coupled to a focused, expanded flare. Highs are handled by four titanium drivers manifolded to a single horn. All systems use Electro-Voice components.

Circle (152) on Rapid Facts Card

CMT Mac n' Rak

Available from Current Music Technology, Mac n' Rak is a 4U system that is based on the Apple Macintosh that includes 20Mbytes of hard disk storage. A built-in Opcode MIDI interface has two MIDI Ins and six MIDI Outs, which eliminates transporting the extra component and helps with cable clutter. A SMPTE time code converter is optional.

Circle (153) on Rapid Facts Card

Audio-Technica AT833R mic

The studio condenser mic has a uniform, unidirectional polar pattern that helps provide isolation between the sound source and unwanted sounds. Standard features include a removable foam windscreens, internal shock-mounting and a carrying case. Specs include 30Hz to 20kHz frequency response, 150Ω balanced output, 141 SPL handling capability and -45dBm sensitivity.

Circle (154) on Rapid Facts Card

A-T cables

Audio-Technica has introduced a line of Full Audio Transfer cables, made of oxygen-free copper wire for maximum signal transfer. They are available in two diameters and in pre-cut lengths of 30 and 50 feet, or in 500-foot bulk rolls.

Circle (155) on Rapid Facts Card

dbx 120X stereo subharmonic synthesizer

The 120X-DS is a 1U rack-mount unit that processes frequencies between 100Hz and 55Hz and synthesizes new bass one octave lower, from 55Hz to 27Hz. Level faders for the new bass frequencies, centered on 28Hz, 34Hz, 40Hz and 50Hz, enable fine control of the synthesized harmonics. The unit also contains a phase-coherent subwoofer crossover output, adjustable from 55Hz to 210Hz. A subwoofer output level control is provided. Suggested retail price is \$349.

Circle (173) on Rapid Facts Card

Renkus-Heinz RH-23

The RH-23 is a stereo processor designed to be used with the company's Dyna-Gard FRS and SMS series speaker systems. The processor can also be used with other 2-way passive crossover speakers. Automatic level-dependent loudness compensation is front panel-adjustable, and HF level controls are provided so that an accurate balance can be achieved with a variety of speaker enclosures. The signal and protection status is monitored by color-coded LEDs. By sensing the signal sent to the speaker, the protection circuit allows the speaker components to be safely used at their maximum levels. Suggested resale price is \$1,650.

Circle (144) on Rapid Facts Card



Audio Kinetics ES Penta

ES Penta is an ESbus controller/autolocator capable of controlling up to five machines in conjunction with five ESbus synchronizers. When used with Audio Kinetics' ES 1.11 synchronizer, all of the enhanced AK-ESbus specifications can be used. Ten loops or GOTO points can be stored and identified as music cues on a scribble strip. Four offset functions offer maximum user flexibility and a true FIT function provides controlled expansion or compression of material within a standard loop. The system has full event firing capability when interfaced to the ES SSU system service unit.

Circle (141) on Rapid Facts Card

Passport Designs Sound Track System

Passport Designs has bundled several of a film and TV composer's most valued tools into a cost-effective system. The Sound Track System consists of an Apple Macintosh, MIDI Transport, Master Tracks Pro 2.0 and Clicktracks. The system offers fully integrated sequencing, SMPTE synchronization, time calculation software and is MultiFinder-compatible. The company plans to release similar systems for other computers later in the year.

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NEW PRODUCTS

East-West CD drum sampler

The sampler contains more than 700 digitally sampled drum and percussion sounds, including matched kits, for pop-rock and dance music production. Sounds range from close, dry sounds to heavily processed sounds. Most sounds will require additional reverb, the company says, because long sounds with reverb take up too much sampling memory and it assumed that users would want to add effects themselves. A track-select is included at every 11th sound. Price is \$99 plus shipping and handling.

Circle (171) on Rapid Facts Card

Yamaha SPX900 processor

Designed for a variety of uses, the SPX900 contains 50 professional effects presets in ROM, including 13 multiple programs that allow up to five effects at once. New effects include a new reverb algorithm that provides user control of room dimensions, 2-D panning effects, distortion combina-

tions and programmable early reflections. Users can modify effects and store them in 49 on-board RAM locations. Selected parameters may be controlled via MIDI or other control devices. The optional RCX1 remote control is also available.

Circle (170) on Rapid Facts Card



Milli-Chart from Lo Bianco Enterprises

Milli-Chart is a wall or tabletop reference chart showing the relationship between digital delay time settings and musical tempos. It was designed to alleviate computing delay times with a stop watch and a calculator. The chart gives delay times in milliseconds for tempos from 60bpm to 250bpm, for quarter, eighth and 16th notes, quarter- and eighth-note triplets and beats per second. It can also be used to

compute tempos and the number of beats within a fixed time frame, such as a 30-second commercial. The chart is plastic-coated, measures 10"x17" and costs \$15.95.

Circle (165) on Rapid Facts Card

MIDI programming book from M&T Books

"MIDI Programming for the Macintosh," by Steve De Furia and Joe Scacciaferro, is for programmers and musicians who want to write their own Macintosh music software using MIDI conventions. The book contains an introduction to MIDI and Macintosh programming, covering such topics as MIDI devices, the Mac user interface, program design, Mac programming languages and tools, and MIDI code resources. The book also covers the basics of programming the Macintosh's ROM-based Toolbox. Price for the book is \$22.95; the book with an accompanying disk is \$37.95.

Circle (174) on Rapid Facts Card

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The ADx-02 is being used around the world in a variety of environments and applications. But the diagnostics function is not the end of the story, the ADx-02 is a very versatile timecode reader-generator-insert, with multiple screen displays, selectable fonts, three jam-sync modes, stable code generation, full speed range read and much more. So why buy just a timecode reader-generator?

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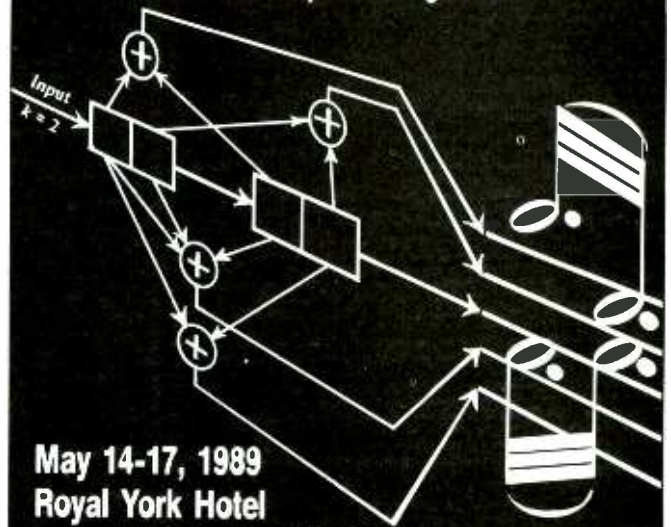
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NEW PRODUCTS

Bose 302 Series II Acoustimass bass system

The second generation of the Bose 302 bass system, the 302 Series II is designed specifically for use as bass reinforcement with the Bose 802 loudspeaker. It features the company's Acoustimass speaker technology and a new woofer. According to the company, the result is greater output and purer bass sound. Each unit contains two MB-12 woofers, both in discrete Acoustimass enclosures. The system can handle up to 600W and a maximum SPL of 124dB.

Circle (145) on Rapid Facts Card



U.S. distribution for Seck mixing consoles

The live and studio consoles are now available through JBL Professional and are available in 2- and 8-bus versions. They feature 3-band mid-sweep EQ, up to six aux sends and numerous effects returns. Available versions are six, 12, 18 and 24 inputs.

Circle (140) on Rapid Facts Card

Modem Security Device from B&B Electronics

The 232MSD protects computers or bulletin board systems from hackers and computer viruses by using the callback method of protection. After a user calls in and gives the proper password, he must hang up; the unit will then call the phone number stored in its memory. The user at that number is then allowed access to the system. The unit works with most stand-alone modems that are AT Command Set-compatible.

Circle (158) on Rapid Facts Card

Biamp studio mixer

The MAXXAM 8+8 is a rack-mount mixer designed for users with large electronic musical instrument setups. The 6U mixer has 16 input channels, with eight channels

designed to handle stereo input signals. Also included are two unassigned low-noise mic pre-amps with XLR connectors and ¼-inch phone assign jacks, allowing the pre-amp signals to be assigned to any of the input channels with a short patch cord. Four sends are included, one of which is selectable pre/post fader on each channel, as are four stereo returns.

Circle (159) on Rapid Facts Card

Kinometrics/Truetime time code unit

The 800 Series consists of three units: the 814 time code generator, the 820 time code translator/display, and the 840 translator/generator. Features include generation and/or translation of all IRIG time codes and most special codes, parallel BCD, and RS-232 and IEEE-448 interfaces. User I/O ports can be provided with band-pass filters, 50Ω drivers or most any custom interfaces/levels needed. Prices are \$475 for the 814, \$550 for the 820 and \$475 for the 840.

Circle (163) on Rapid Facts Card

Blank Software metal percussion sounds

"Anatomy of an Automobile" is the first sound collection in the Macintosh Audio IFF format, and contains sounds by, in, on or around an automobile. All sounds have been captured and constructed using high-fidelity digital sampling techniques and equipment. The library is available on CD-ROM or in 45Mbyte removable cartridges.

Circle (164) on Rapid Facts Card

Siemens Crossmatic D audio routing system

Crossmatic D contains 16(32)-bit microprocessors and computer control for single and multi-user systems. Up to 16 levels, including stereo, SAP, feedback monitoring, intercom, TC and remote control, with electronic crosspoints or relays are possible. It can be controlled by a personal computer via a Centronics interface or by specific keyboards, data terminals and external hosts via RS-232/-422 interfaces.

Circle (167) on Rapid Facts Card

dbx 929 hiss-reduction module

The 929 is a single-ended noise-reduction system that requires no encoding but eliminates constant hiss without sacrificing musical high frequencies. The module

provides two channels of one-step hiss reduction. A control for each channel enables the dynamic filter's action to be adjusted for maximum effectiveness and flexibility. As musically meaningful high frequencies enter the system, a sliding filter network opens and allows them through. Suggested retail price is \$399.

Circle (168) on Rapid Facts Card

Processor Sciences NTSC video overlay

The VGAvision video overlay board adds full NTSC video to an IBM PC, XT/AT or compatible computer equipped with any VGA board. The fully programmable board features non-interlaced video output at VGA frequencies to produce a flicker-free, high-resolution image. Test, graphics, full-motion video and live video within windows can be integrated. System requirements are one computer slot and two I/O ports; the system uses no PC memory space or internal connections. List price is \$1,299.

Circle (161) on Rapid Facts Card

ASA auditory demos on compact disc

Issued jointly by the Acoustical Society of America, the Institute for Perception Research and Northern Illinois University, the discs demonstrate various characteristics of hearing. A text booklet is provided with each disc, containing introductions, narrations of each topic and bibliographies. A total of 39 sections are presented in seven areas, including frequency analysis and critical bands, sound pressure, power and loudness, masking, pitch, timbre, beats, combination tones, distortion and echoes, and binaural effects. Cost is \$20 per disc; cost for bulk orders of five or more is \$17 per disc.

Circle (162) on Rapid Facts Card

Akai XE8 drum expander

The XE8 features 16-bit samples of a variety of drum and percussion sounds in a single rack-space design. Sixteen different sounds reside in internal ROM, with two slots provided for additional ROM cards. The unit can produce up to eight sounds simultaneously, and each sound in a program can be routed to a Mix output, or to one of eight separate outputs. The unit can be triggered by any MIDI controller, and the Akai ME35T can be used with electronic pads, miced drums or any audio triggers. Retail price is \$899.95.

Circle (148) on Rapid Facts Card

Audio-Technica ATM25 mic

A wide-range, moving coil dynamic mic with a hypercardioid pickup pattern, the ATM25 is designed to be used with highly dynamic instruments that generate high SPLs, such as kick drums, timpani, acoustic and electric bass, harp, piano and tuba. The narrow acceptance angle of the pattern allows the mic to focus on a desired sound source, control feedback and provide more flexible mic-to-instrument working distances. Frequency response is 30Hz to 15kHz, balanced output is 600Ω and sensitivity is -57.8dBm.

Circle (149) on Rapid Facts Card



Roland compact disc

"Roland: A Sound Approach" features 12 selections in a variety of styles created by Roland product specialists and affiliated artists. Roland equipment was exclusively used, the intent being to show the equipment's capability. A 24-page book accompanies the disc, which includes the techniques used to produce the music, such as the type of signal processing used and sequencer/synchronizing techniques. Retail price is \$11.95.

Circle (156) on Rapid Facts Card

Gotham GAC-2 mic cable

GAC-2 cable features double Reussen shielding, 48-strand No. 2 conductor and a PVC separation tube between the two twisted conductors and the two shields. The result, according to the company, is lower capacity, higher flexibility, greater strength and more effective handling. It is available in seven colors in spools of 328 feet (100 meters).

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the EDL of the SC series controller.

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Circle (45) on Rapid Facts Card

NEW PRODUCTS

Hardware and software updates

New software for AMS AudioFile

Version 8 software for the AudioFile provides major operational enhancements for both new and existing systems, according to the company. Some of the new features include varispeed through the digital port, digital outputs available in all pages, faster lockup, digital de-emphasis, dc offset removal, high-resolution metering and simplified screen structures. Several additional hardware upgrades are available, including 2x oversampled A/D conversion with Apogee filters, R-DAT backup, full 701 I/O and a ProDigi interface.

Circle (175) on Rapid Facts Card

New automation software for Trident Di-An

AUTOMate II software gives console user's automated dynamic control of all console parameters in real time, with replay triggered by time code. The software also features Personalized System Setup, which lets a first-time operator create and permanently store presets for initial console configurations in tracking, mixdown and overdub modes; D-Line, which allows two or more channels to be grouped together and operated by a dedicated master; and D-Copy, an enhanced editor allowing selected desk parameters to be copied to one or more additional channels. AUTOMate II is compatible with existing Di-Ans; the upgrade is free to existing users and does not affect the base price of new consoles.

Circle (176) on Rapid Facts Card

Leonardo Professional Librarian update

Version 3.0 of Leonardo's Professional Librarian software runs under a windowing environment with pull-down windows. New and enhanced features include searches, roll listings and clipboards configured as individual windows; pull-down menus to allow access to most functions from all parts of the program; Quick Keys that can be defined to select items from menus without pulling down the menu; and "point and shoot" selection of various items from a list. The new version is priced at \$995; an upgrade for existing users is \$100.

Circle (187) on Rapid Facts Card

Forte Music Mentor MIDI processor

The Mentor has been updated to include six MIDI inputs and six independent MIDI outputs, which will address up to 96 different synthesizers of sound modules. Internally, the unit consists of eight fully independent, programmable MIDI processors, each capable of a wide range of functions. New software improves performance for sequencer applications. Any of the eight data processors may be set to pass all 16 channels of MIDI data. New system-exclusive program load and store functions may be used to save preset data in a personal computer. Suggested retail price is \$995.

Circle (191) on Rapid Facts Card

Video of C-ducer Drum Wizard mic

An instructional video explaining the capabilities of the C-ducer Drum Wizard mic is now available. The system contains eight mics/triggers, an 8x2 audio mixer, two MIDI outputs and a 100 MIDI program facility. The video show how an acoustic kit can be used to trigger electronic percussion using the system. Cost is \$10.

Circle (193) on Rapid Facts Card

New options for TC graphic EQ

The TC Electronic 1128 programmable EQ/spectrum analyzer now has a PC board option, which can be installed in the unit. This allows the original display to be viewed on a computer monitor with an RCA video input. The other option allows the unit to read and generate SMPTE code, allowing the unit to change EQ settings by reading code. The SMPTE cue list can be edited and dumped out for external storage.

Circle (194) on Rapid Facts Card

Hard drive interface for Akai S950

The IB105 interface board doubles as the port for connecting a hard disk drive and as a direct digital input from DAT and CD. Atari or Supra disks can be used, and up to eight drives can be cascaded to allow massive storage of sounds. Dumping sounds from CD or DAT into the S950 avoids an A/D conversion required in normal sampling. Suggested retail price is \$169.95.

Circle (188) on Rapid Facts Card

SCSI interface for E-mu Emax

The high-speed serial interface allows the use of external sound storage devices, such as the Data Technology Hyperflex removable cartridge disk drive, and will load an Emax sound bank in less than seven seconds. Newly developed Emax SE SCSI software allows the access of up to eight external SCSI devices at once from the Emax front panel. The interface will be shipped standard on all Emax SE samplers; suggested list price is \$3,495. It is also available as an update from authorized service centers for \$195 plus installation.

Circle (183) on Rapid Facts Card

Mac II color edition of Opcode Cue software

The latest version of Cue includes color capabilities accessible on the Mac II, and also uses the computer's ability to use various "gen-lock" boards, allowing the software to send information to a standard NTSC color TV monitor. Other features include reprogrammed operations designed to the computer's 68020 processor.

Circle (184) on Rapid Facts Card

Memory expansion for Akai S950 sampler

The EXM006 memory expansion board adds 750k of RAM to the S950. The unit has two slots available; with two boards added, the sampler's maximum sampling time can be expanded to just under 30 seconds. The board retails for \$499.95.

Circle (185) on Rapid Facts Card

Focusrite ISA131 module

The ISA131 dynamics processor module is a dual-channel version of the company's ISA130 module, and shares its performance specifications. It provides two channels of compression/limiting and noise gating, and it also incorporates a new Stereo Link facility.

Circle (190) on Rapid Facts Card

Protective covers for JBL Performance Series

JBL has introduced protective covers for this line of speaker systems. Made of heavy-duty Naugahyde, the covers are custom-tailored to fit all models and protect the speakers during transit and storage.

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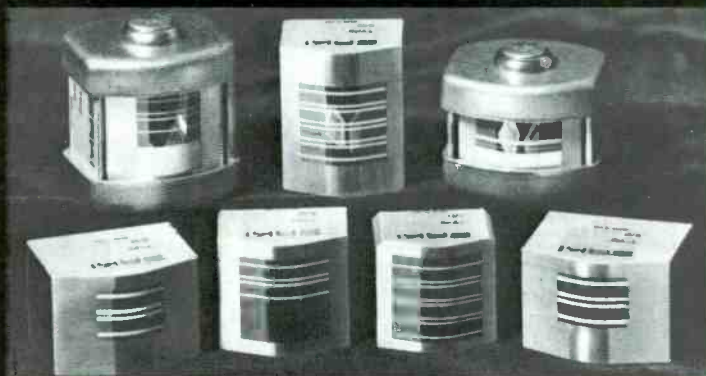
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NEW PRODUCTS

Leslie emulator from Avalanche Effects

The Brianizer Leslie emulator uses a phase-compensated active crossover followed by speed-dependent tremolo, flange and Doppler shift circuitry in the horn and bass rotor channels. Both the input level and the effect intensity are



switch-selectable. The unit's motor accelerations and decelerations have been modeled, allowing users to employ classic techniques based on the Leslie's motor inertia.

Circle (157) on Rapid Facts Card

Pacific Digital DM-1 digital audio workstation

Said to be the first portable digital audio workstation for film and video post-production, the DM-1 has a storage capacity of more than 760Mbytes, allowing users to store thousands of effects. Sound effects can be spotted to SMPTE hit points on the fly and fine-tuned with the mouse or keyboard. The DM-1 can send MIDI commands at exact time code points, allowing synchronized control of effects. It is also available with AES/EBU digital interface and direct-to-disc capability, making it available for R-DAT editing.

Circle (143) on Rapid Facts Card

Korg A3 performance signal processor

The A3 is equipped with 40 different types of effects, including reverb, delay, exciter, chorus, distortion, compressor and rotary speaker. All processing is digital, and up to six can be selected and combined. A total of 20 of the more common combinations have been programmed in the internal preset memory. An additional 200 user program memory locations, 100 in internal memory and 100 in memory card, can be used for storing custom effects settings. Additional effects and combinations can be added with optional ROM cards.

Circle (172) on Rapid Facts Card

Aphex Impulse interface

The model 810 Impulse is an "intelligent" interface for triggering electronic percussion from analog input signals. The unit has 12 independent analog inputs that may be driven from live or recorded drum signals, or with contact pickups mounted in a conventional drum kit. When triggered, each of the input signals generates a corresponding MIDI Note On message, with user-programmed MIDI channel and note numbers. A total of 50 user patches can be stored, each allowing reassignment of MIDI channel and note numbers for each input.

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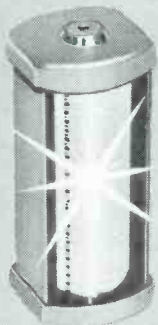
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Soundtracs Division	31	15	
Spars (Society of Professional Audio Recording)	53		407/641-6648
Sprague Magnetics, Inc.	63	31	800/553-8712
Standard Tape Laboratory, Inc.	79	64	415/786-3546
Studer Revox/America	5	4	615/254-5651
Symetrix	51	24	206/282-2555
TASCAM Div./Teac Corp.	7	5	213/726-0303
Trident USA, Inc.	27	13	213/533-8900
3M/Magnetic Media Division	23	12	

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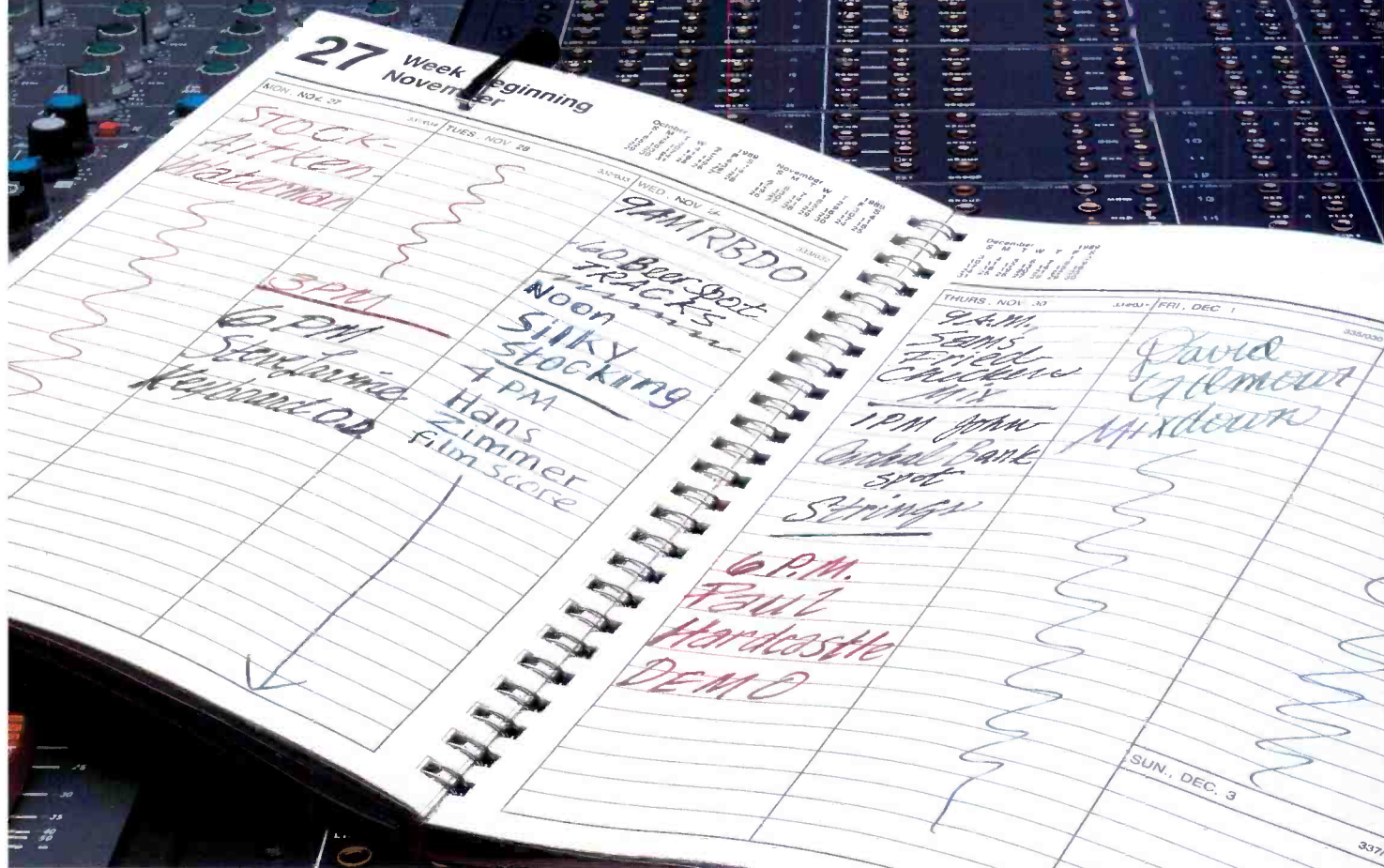
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AMR²⁴

Track Record



BUSY

Today, some of the world's busiest studios are built around the AMR 24 console. Designed for a higher standard of performance, the AMR 24 offers more inputs, more flexibility and the highest levels of audio quality for day-to-day recording and mixdown.

TRACKING

As a tracking console, the AMR 24 consistently achieves superior results the *first time* — no re-recording required. With exceptionally low crosstalk and noise, and a total dynamic range of

100 dB, it is fully compatible with digital audio.

MIXDOWN

Configured for mixdown, the AMR 24 offers unrivaled flexibility. It handles all kinds of inputs — up to 84 of them in a standard format. Just push *one button* and the 24 Track Select switch changes the monitor returns to full-function line returns normalled to a second 24 track or to synchronized MIDI "virtual tracks." Simple switching creates an additional 24 inputs through the cue faders for effects returns.

Up to 64 channels can be automated with a wide range of factory fitted systems available.

Of course, these DDA design innovations are complemented by the highest quality components and designs that *feel right*.

INVESTMENT

Studio owners know why the AMR 24's track record represents an impressive return on their creative and financial investment. If that news sounds interesting, write us on your letterhead for full information.



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Circle (1) on Rapid Facts Card

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This is the mixing console that will cause a revolution in 24 track studios.

The world's first Dual Mode mixing console.

With the advanced features and performance of a desk you'd expect to cost a great deal more than it actually does, it's a remarkable achievement. Take Dual Mode.

When you record with the TS12, its in-line monitoring means you create a control room mix on the main faders.

In mixdown this becomes the basis for your master mix. Saving time and helping you keep a train of thought as to how the final mix will sound.

Unlike other in-line desks, though, the TS12 also allows true stereo subgrouping on long-throw group faders.

In this mode the routing matrix offers either six stereo groups or four extra auxiliary sends – totalling ten sends – plus four stereo groups.

No other console in the world provides such versatility.

The TS12 is an open-ended investment, with optional disc-based SMPTE automation for faders, mutes, EQ in/out and auxiliary on/off. Again, at the price it's unique.

And fittingly, audio performance is superb.

Recent Soundcraft advances in summing amp technology, and in grounding and decoupling systems, make the TS12 one of the cleanest and quietest consoles ever.

The mic amplifiers, a critical factor in console quality, create less than 0.01% distortion at 10kHz at 70dB of gain. (Easily exceeding 16-bit digital specifications.)

Standard features are impressive, to say the least. Six auxiliary sends, seven stereo line inputs or effects returns, a 'musician friendly' headphone mix, an extensive 19" metal frame patchbay – and the option to create a massive total of 102 inputs.

Quite a line-up.

Attention to detail is equally stringent with modular PCBs, no dual concentrics and a clear, logical layout that belies the sophistication inside.

But the most remarkable feature of the new TS12 is without doubt the price.

We suggest you call us today to find out just how remarkable.

ALL THE FEATURES YOU'D EXPECT IN A \$50,000 CONSOLE, EXCEPT ONE THE PRICE.



Soundcraft
TS12