

October 1988

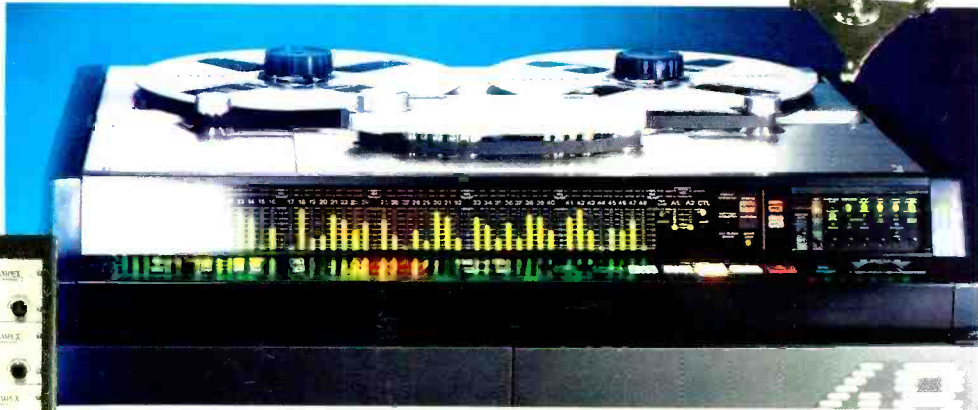
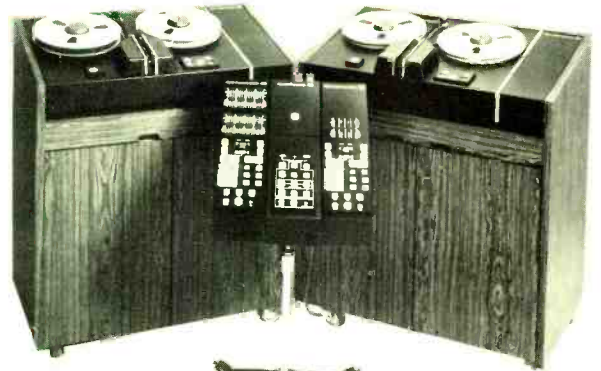
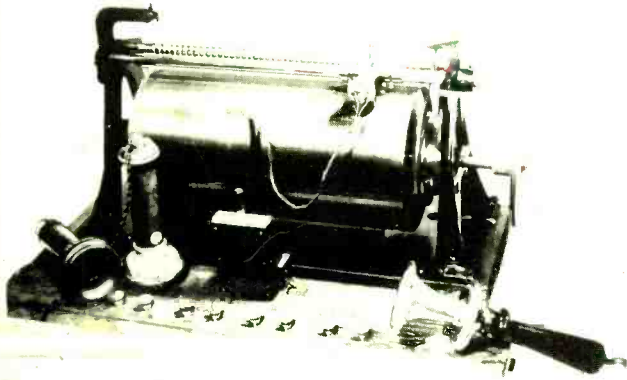
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The Applications Magazine for Audio Professionals

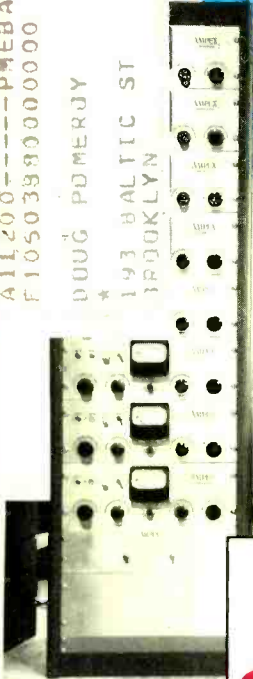
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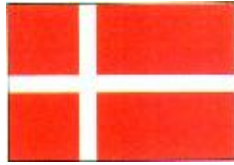
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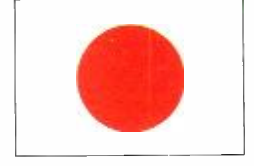
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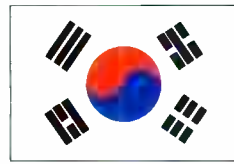
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The 85th AES Convention will take a look at 100 years of audio production while showcasing technology's cutting edge. For attendees and non-attendees alike, *RE/P's* coverage is an invaluable guide to the latest the industry has to offer.

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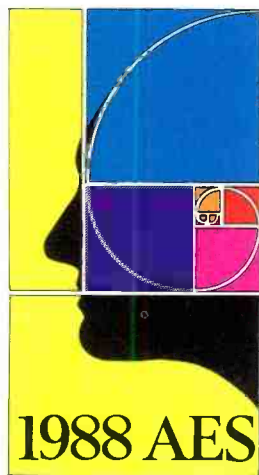
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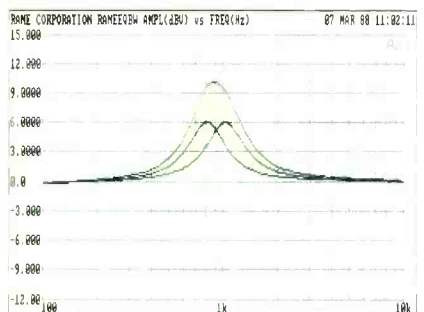
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◀ On the Cover

Milestones in the 100 years of recording history include the advent of audio recording devices (Poulsen drum-type telegraphone, c. 1898, top left), the first *tape* recorder (AEG magnetophone, 1938, bottom right), 8-track recording (Les Paul custom model 300-8, 1954, bottom left), digital recording (3M DMS, 1977, top right) and 48-track digital recording (Sony PCM-3348, to be introduced at the AES convention, center). Photos courtesy of Hammar Communications, Ampex, AEG, 3M and Sony.

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◀ Analog Equalizers: Overview and Terminology

There are over a dozen different types of equalizers and filters, and an even longer list of equalizer terms. Defining the types and terminology should help the operator make better choices when using or buying this equipment.

By Dennis A. Bohn 36

In an age of disk and digital, why buy analog?

We know there are some applications where our 32-channel digital machine, the DTR-900, is the only answer. But if your business is such that you can do anything you want to do in the analog domain, and at the same time do less damage to your budget, then our brand new analog 24-channel MTR-100A may be the perfect machine for you.

When you consider that the MTR-100 will literally *change forever* the way engineers interface with audio machines, and



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.

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MTR-100's sonic performance will rival, or beat any digital machine in the world.

So there you have it. With these powerful benefits available in analog, does it make sense to go digital? Sure, for some applications. But analyze your needs carefully before you buy. For many applications, a hot

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Digital Creativity?

In 1980, digital signal processing was still in its relative infancy. The cost of a 16-bit, 15kHz reverb was well past \$10,000 and there were only a couple of manufacturers producing such devices.

Similar examples can be cited for other digital effects processors such as DDLs. And devices such as samplers, pitch shifters and digital filters were either non-existent or extremely expensive and functionally limited by today's standards.

It's been only eight years since those 10-grand days. Yet, as we all know, you can now go to your local dealer and buy the same 16-bit, 15kHz reverb technology, often incorporating many more features such as MIDI control, sampling, elaborate user-definable patch editing and removable program memory, for well under \$1,000. Isn't technology wonderful!

This November, at the Los Angeles AES convention, we will be seeing the next generation of DSP technology. Obviously, designing and manufacturing digital signal processors has come a long way in a relatively short time. Because of the seemingly logarithmic growth and development in this area, this year's show ought to provide us with some eye-opening devices that have only been available in our dreams until now.

But dream no more. This promises to be a year of quantum advancement in DSP technology and user-definable control. For example, I understand we will be seeing the first wave of 18-bit processors, and possibly some 20-bit stuff too. Not only will the familiar names in DSP be showing their new products, but there will inevitably be several new players. A third segment will be joining the DSP fraternity—manufacturers that have traditionally been "analog only." All this adds up to some stimulating possibilities.

Two developments are at the heart of this explosion: the evolution of VLSI microprocessor chips and MIDI. Without these two developments, we wouldn't have the flexibility or control over the creative use of digital processing that is currently available.

Manufacturers are building more-sophisticated processing power, more range and broader user-definable control into their products than was ever imagined possible. Many times, this is at the request of the users. This flexibility allows even the smaller personal-use studios some of the same processing power that world-class studios offer. Therefore, believe it or not, price is no longer a major barrier to powerful digital signal processing tools.

But there is another issue here—one that isn't being adequately addressed. To go along with the increase in processing power that is available today, some biological progression is needed too. No matter how cool these processors have become, without imaginative implementation by the operator, only a portion of the hardware investment is realized in terms of increased creativity.

Reaching for the presets may be acceptable for the hobbyist, but should not be standard procedure for the professional. Keep in mind, the factory usually exerts minimum time and effort developing their preset programs. And no matter how slick the factory programs sound, chances are dozens of other users are calling up the same sounds or effects. This is not the path to the engineer/producer's hall of fame. Also, in terms of originality, copying the sound of an effect isn't much different from calling up the preset. Besides, listening to the same handful of digital effects, popularized by hit records, is getting boring.

Yet more and more, engineer/producers seem to reach for the familiar, popular and easy-to-access factory preset, leaving a tremendous amount of flexibility behind. Are we getting lazy, letting the factory do the work for us, or is the equipment becoming so complex and sophisticated that learning to use it is more trouble than it's worth?

This is a difficult question, for in many areas, technology is advancing faster than some in the audio community can keep up with. I don't think anyone is to blame here, it's just a growth pattern that we all must come to terms with. It serves neither the engineer nor the manufacturer to have technology outpacing the market. Nor is it desirable for the end-user constantly to crave hardware and software that is not available. We are seeing a little of both at the moment.

Every engineer should go through the processes of learning to operate *all* the basic pieces of recording studio equipment

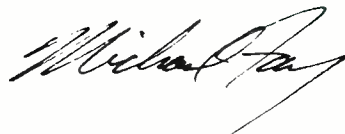
and should know fundamentals such as mic selection and placement, and console, tape machine and signal processor operation. As new products and technologies evolve the engineer must continue to acquire new skills. A good example is using synchronizer systems. This is generally an acceptable proposition, but for some reason audio professionals have been slow to embrace MIDI, which is a powerful tool that can expand the creative environment.

Inventing unique, unusual ways to turn ordinary sounds into memorable "hooks" is a large part of what engineering and producing is about. Now that digital signal processors are beginning to implement automated MIDI control, this should act as a conduit to many new and exciting programs. Unfortunately, this is often not the case.

Learning to use any new technology effectively is one of the more difficult challenges facing most engineers. There are no shortcuts, no one-touch solutions to mastering the highest levels of operation in a fully programmable, MIDI automated, digital signal processor. Fluent operation comes from hours of investigation and experimentation—and many mistakes. But those hours will pay off in the area of creative implementation of any processors full capabilities.

For the moment, I think the ball is in the engineer's court. Let's not become slaves to this explosive technological evolution. We must make all technology work for us, and not the other way around.

RE/P



Michael Fay
Editor

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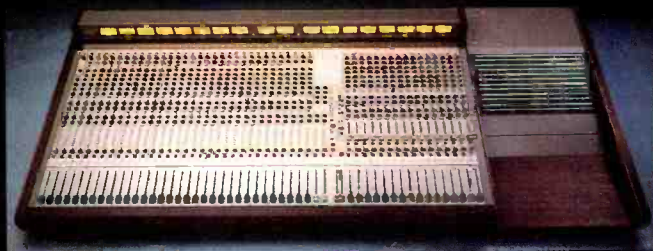
The M-600 is modular. Which means you can custom configure the console to *your* audio or video production needs. The M-600 lets you choose up to 32 input channels, or you can start with 16 or 24 input channels and expand the board as your needs change. Optional stereo modules can also be added to provide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

Installation and wiring is exceptionally easy. The M-600 is the only modular mixer that's available with all the necessary finished cables and installation hardware. And that can eliminate a lot of installation hassles and expense. At the same time, no other mixer at its price gives you multi-pin, computer-type connectors for quieter, more secure connections.

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MANAGING MIDI

By Paul D. Lehrman

Gently Down the Stream

When MIDI first came out, a lot of knowledgeable people complained that it was too slow. Its bandwidth, they claimed, was not enough to handle the myriad real-time commands necessary to control musical events. Fortunately, they were generally scoffed at, and manufacturers went right ahead and developed MIDI hardware and software. And a good thing, too, or else I'd be writing a column for some business magazine called "Managing Modems."

As long as MIDI was asked to do simple tasks such as letting one keyboard control another or carrying a few channels of data from a sequencer, there were no problems. But these days, MIDI is being called upon to perform tricks its creators never dreamed of. With the advent of guitar and wind controllers, inexpensive multitimbral synthesizer modules, MIDI Time Code and sequencers that can handle system-exclusive information in real time, bandwidth problems are becoming rampant.

Part of the problem is caused by the fact that MIDI is a serial protocol, which means information is sent

one
bit
at
a
time.

Serial transmission is a lot slower than parallel transmission, but it's also a lot cheaper to implement in hardware, which was a primary concern to the original MIDI fathers, who wanted the spec to be adopted by as many manufacturers as possible.

The MIDI specification allows 31,250 bits to be sent (one at a time) down a MIDI line each second. Because MIDI is an asynchronous protocol, each byte requires a start and stop bit, so an 8-bit instruction byte actually requires 10 bits. Therefore, we are limited to 3,125 bytes/second. MIDI

commands can range in length from a single byte (such as a clock pulse) to tens of thousands of bytes (such as a sample dump). But a typical instruction needs three bytes, such as note-on command (with channel number)/note number/velocity. So now we're down to about 1,000 commands per second.

If we limit ourselves to playing notes, 1,000 per second is a lot, even spread over multiple channels. Running status, which allows you to discard redundant bytes in some circumstances, can increase the capacity somewhat further. But add in pitch-bend, aftertouch or controllers, and things change drastically. A pitch wheel can theoretically send 128 2-byte commands in the amount of time it takes to slam it from one extreme to the other—maybe a quarter of a second. (Most pitch wheels don't act that fast, and will skip values during such fast motion, but this isn't always the case. And if anyone comes out with a pitch wheel that sends out double-precision information, which the MIDI spec gleefully provides for, we'll really be in trouble.)

Channel (monophonic) aftertouch can create equally dense data, and polyphonic aftertouch, which manufacturers are finally beginning to take seriously, multiplies the data density by the number of fingers you're using, plus another 50% (it's a 3-byte command). Double-precision controllers, which the MIDI spec also allows, but which aren't widely implemented yet, use up to six bytes per command.

MIDI guitars compound the problem when they send individual pitchbend information for each string. The worst culprits for generating humongous amounts of data, however, are wind controllers. Wind controllers are wonderfully expressive, but that expressiveness has its price. When a keyboard player brings vibrato in and out of a sound, the modulation wheel moves, which sends out maybe 100 commands over the length of a phrase.

When a wind player creates vibrato, however, it's those same 100 commands every time he tightens or loosens his lip or diaphragm—which happens several times a second. No wonder that one wind-driver manufacturer sends breath and lip-pressure information only to the driver's own synthesizer, on a dedicated control line, and not out the MIDI port!

Also contributing to this assault on MIDI's bandwidth are the increasing use of system-exclusive commands in real time. Some synthesizers, for example, let

you control vibrato depth through modulation wheel (three bytes per command), but if you want to control vibrato *speed* in real time, you need to send system-exclusive commands (minimum six bytes each, typically more). Like wind controllers, system-exclusive commands open up new realms of expressivity—but again, at a price.

A sequencer sending out a MIDI stream consisting of multiple tracks of dense information will hit the bandwidth limitation pretty soon. Sometimes, the symptoms of a clogged MIDI stream are obvious. The music takes on a "queasy" feeling, as it slows down to accommodate data-thick sections, and then speeds up when the data thins out. Often the speeding up is drastic, as the sequencer tries to recover lost time. Other times, however, the symptoms are not so obvious.

Many sequencers have a "fast forward" control, which temporarily increases the playback speed. When the MIDI stream is running at maximum capacity, you'll know it because that control won't do anything. Another symptom is when you are running the sequencer against picture and your hits are running late, or are inconsistent from one pass to another. (If the sequencer is running from external sync, chances are you'll hear jumpy tempos before you'll encounter this problem.)

I recently came across a bandwidth problem that manifested itself very subtly, and I had to argue with the sequencer manufacturer long and hard before I was convinced it wasn't their fault: The sequence—a short but complex film track was going along swimmingly, and then, out of nowhere, the tempo of a march-like section jumped ahead for a bar, and then settled back.

To make it more aggravating, the tempo jump would occur in a different place and to a different degree each time I played the file. The problem turned out to be a small but cumulative error that built up in the file from the very beginning, and when the sequence hit the march section, with its relatively sparse data, it tried to make up all of that lost time.

There are a number of ways to deal with bandwidth problems. First of all, use continuous controllers, including pitchbend, sparingly. Once you've recorded them, if your sequencer has a "thinning" feature, use it. You'd be surprised how much you can thin out controller data without de-

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MANAGING MIDI

grading the controller's effect on the sound.

If you have a track that's laden with controller data and you want to duplicate it on another track, filter out the controller data first if you can, then copy it separately, thinning it if possible, and perhaps adding a slight time offset. "Simultaneous"

events (which don't really exist in MIDI—remember, we're talking serial here) such as strings of identical controller commands on two different channels, can wreak the most havoc with timing.

Similarly, don't always quantize everything to the same zero point. Shuffle some of your quantized tracks a couple of clock

pulses forward or backward off the beat, to give the MIDI line a little breathing space between events. Some tracks, like string beds, let you get away with this more readily than others, like snare drums. If your sequencer's resolution is high enough, though, you can get away with almost anything, as any change the sequencer introduces will be far less than the error being caused by the choking.

As far as aftertouch is concerned, especially the polyphonic kind, use it extremely sparingly in sequences. Many choking problems are caused by aftertouch information that was recorded unwittingly. If your master controller has a shut-off switch for aftertouch, use it. If there is a "record filter" in your sequencer that eliminates aftertouch, use it too. (Make sure it's on every time you start a new session—in some sequencers the default position for the filter is off.)

Make sure your master controller is not sending any other unnecessary data. One popular keyboard, when it comes out of the box, sends out doubled commands every time you strike a key or move a control—obviously a disaster on its way to happen. If you have any control over whether your input devices, sequencer or slaves use running status, exercise that control and use it. It can cut down overhead significantly.

Finally, split up your data over separate MIDI lines if you can. Today's sequencers work significantly faster than MIDI itself, and some of them allow you to address multiple streams. If you can break up a sequence so that track 12, with all that pitch-bend, can be sent on a separate MIDI line from track 17, which has tons of mod wheel activity, do it. If your sequencer doesn't allow this, some outboard filter/channelizer/splitter devices may help. If you're using MIDI Time Code, make sure it has its very own MIDI line, as it can aggravate bandwidth problems if you mix it in with other MIDI information.

So, it turns out that those original doom-sayers were right—MIDI is too slow. But we don't have to abandon it because of that. With a little thought and ingenuity, we can work around the slowness, and make MIDI do everything we need it to.

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SPARS ON-LINE

By Shirley Kaye

Ten Years Young

This is the 10th year of SPARS, a national organization that aims to serve the recording industry with fresh ideas that reflect the ever-changing profile of our profession. It's hard to believe that it all started with a small group of wishful thinkers in Fort Lauderdale, FL, on June 15, 1979. The industry has changed in many ways since then, and correspondingly, SPARS has changed as well. I think it's fitting that we take a look back at our original goals, our present status and look forward to the next decade.

At that first meeting, it was determined that our profession was badly in need of a responsible, competent, active body that could act as a true catalyst for change through the exchange of information. We sought to establish a forum for professional audio studios as a positive and creative force. We also decided that there was a need to create a standard of excellence throughout the industry—a benchmark we could all use to evaluate our performance. Therefore, the Code of Professional Engineering Practices was formulated.

Prior to SPARS, there was no real way of evaluating the conduct of studios and engineers. We wanted something to legitimize their hard work. The goals were to create and maintain a high technical and cultural standard in the craft and to enforce a high standard of ethical practice by the members of the society. Being a member of SPARS would provide numerous benefits, but it would also demand responsibility.

We also knew that there was a need to create an open channel of communication with the manufacturers of audio equipment. Too often, the manufacturers dreamed up new gear that either had questionable practical value or was not suited to our needs. We wanted to work closely with the design teams while products were still in the prototype stages. Implementing this process has benefited both

the manufacturers and the professional customers. Another goal was to disseminate information concerning studio management techniques. By sharing new ideas about studio management, we felt the industry could move ahead in both finished product and resulting profits. We also hoped to assist the members in the development of projects and with studies that would have long-range benefits for the entire recording community.

In 1979, there were specific requirements for membership in SPARS. First, a studio had to have been in business for two years. The facility also had to have at least one 24-track studio or mastering room and have a high degree of professional and ethical business practices established. Also, the studio's primary business had to be professional audio recording or mastering time and material sales. Initial membership and annual dues were \$2,000.

Perhaps our original goals were too restrictive. We soon realized that our membership qualifications would exclude many members of the industry who could contribute greatly to our goals. Changes were made, and continue to be made, so that SPARS can operate with all the resources and positive energy that recording professionals have to offer. The most recent change was in our name: SPARS is now Society of Professional Audio Recording Services, not Studios.

We have also established four new categories of membership:

1. *Regular Membership*, \$365 yearly, for professional audio recording, mixing or mastering facilities with gross annual billings of less than \$1 million.

2. *Sustaining Membership*, \$1,000 yearly, for facilities with gross annual billings more than \$1 million.

3. *Advisory Associate Membership*, \$2,500 yearly, for firms or corporations providing services or supplies to the recording industry not otherwise qualified above.

4. *Associate Membership*, \$250 yearly, for a person, firm or corporation engaged in, or employing services of the recording industry not otherwise qualified above. This category includes non-commercial home and personal-use studios.

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The original SPARS charter stated that members would have the opportunity to meet in forums and seminars with colleagues throughout the country to solve common problems and help shape the future of our industry. In keeping with this goal, we have at least three annual board meetings held at various locations across the country. We also have two business conferences each year, one on the East Coast and one on the West Coast. Transcripts and audio cassettes of these conferences are available. In addition, we hold regular meetings with manufacturers at their design facilities to provide our evaluations of their products.

SPARS also administers the National Studio Exam, which is the only nationally recognized benchmark by which professionals can gauge their knowledge of audio engineering and production. We also operate an internship program offering on-the-job training, which provides valuable entry into an increasingly competitive field.

Assistance is available to find employees and help solve problems regarding equipment, manufacturers and business practices. Over the years, one of SPARS's great contributions has been the clarification and revision of various tax laws affecting the audio professional—in different regions of the country. In addition to regional vice presidents and board members located throughout the nation, we have a regional office in New York and national offices in Florida, with a full time executive director and staff.

It should be noted that the SPARS board members receive no salary or travel expenses for their activities. We've worked hard over the years, but it has been a labor of love, and there is no sign of the energy diminishing. The lines are always open and free consultation is readily available. Our telecommunications network (via the PAN computer networks) puts members in touch constantly with all segments of the international music and recording community.

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RE/P

Shirley Kaye is executive director of SPARS.

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UNDERSTANDING COMPUTERS

By Jeff Burger

The Logic of the Machine

When we began this column, we promised not to try to teach computer programming. That promise will be kept, however you'll have a much firmer grasp of the way computers "think" if we spend a few minutes looking at how software applications actually work.

One reason people are attracted to computers is that they are a tool, not for the hands, but for the mind. You can operate sequencers, word processors, databases

and modems all day long without knowing anything about how the computer works inside. Although serious programming for the mass market certainly takes some experience, many people unsuspectingly become intrigued with actually making the computer do their directives through programming because it's fun, challenging and rewarding. Whatever else it may be, programming is also an exercise in logic. Programming is much like sculpting; the computer has no "personality" until the programmer shapes a program to make the machine do his bidding.

Let's take a closer look at what an actual program might look like. As covered last month, the easiest language to understand, for those of us without silicon brains, is BASIC because the commands are in English. Let's say that we want to write a program that prints the numbers 1 to 5 and then prints the word "FINISHED!" (Don't panic; there won't be a test!

We're just illustrating the logical process of how programs operate.) In BASIC the program might look something like Table 1.

Like all languages, the program commands are executed top to bottom unless the program specifies other detours. BASIC uses line numbers (10, 20, 30 and so on) to provide a frame of reference. This crude version of the program singularly uses the PRINT command which the com-

Whatever else it may be, programming is also an exercise in logic.

puter interprets as "print the subsequent character(s) in quotes." Everything else is pretty self-explanatory.

```
10 PRINT "1"           ; print the character "1"
20 PRINT "2"           ; print the character "2"
30 PRINT "3"           ; print the character "3"
40 PRINT "4"           ; print the character "4"
50 PRINT "5"           ; print the character "5"
60 PRINT "FINISHED"    ; print the character-string "FINISHED."
```

Table 1. Simple BASIC program prints the numbers 1 through 5 and "finished."

```
10 FOR X = 1 TO 100    ; front of 100-count loop using the variable X
20 PRINT X             ; print the current count
30 NEXT N              ; increment the value of N and return to top of
                       ; loop.
40 PRINT "FINISHED"    ; print final message.
```

Table 2. More complex BASIC program calculates and prints numbers 1 through 100, then "finished."

```
10 PRINT "Print up to what
   number?"           ; print message
20 GET A               ; assign variable Y to user input
30 GOSUB 100           ; go to the subroutine at line 100
40 PRINT "Do it again (Y/N)?" ; print message
50 GET B               ; assign variable Z to user input
60 IF B = "Y" THEN GOTO 10 ; test input and act accordingly
70 END                 ; end of main program
100 FOR X = 1 TO Y     ; beginning of printing subroutine
110 PRINT X            ; print current counter value
120 NEXT X             ; increment value and go to top of loop
130 RETURN             ; return to main program.
```

Table 3. BASIC program with subroutine.

Our example is very inefficient at doing a repetitive task, however. If we wanted the numbers from 1 to 100 printed, the program would be considerably longer and much more tedious to enter using the above technique. Let's bring in the concept of using variables as value-holders. In Table 2 we'll use the variable X to represent the count up to 100 and a classic "FOR-NEXT" loop to do the repetition.

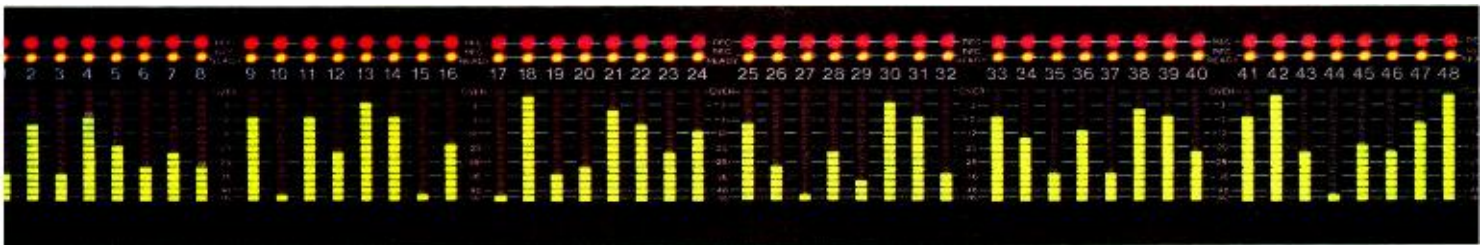
Taking a closer look, the heart of the routine lies in lines 10 through 30. The FOR-NEXT loop first initializes the value of X to 1, prints the value of X (1), returns it to the top of the loop, increments X to 2, prints the value of X (2) and continues this cycle until it falls through at the end of the 100th loop to print the final message.

Let's introduce a few more elements of computer logic. Most languages have a way of testing values for a desired quality and acting accordingly. In BASIC this is the IF-THEN statement. It essentially says "IF the test is true, THEN do this. Otherwise ignore the test and continue."

The other important aspect of computer logic is the subroutine. Programmers

Jeff Burger is RE/P's computer consulting editor and president of Creative Technologies, Los Angeles.

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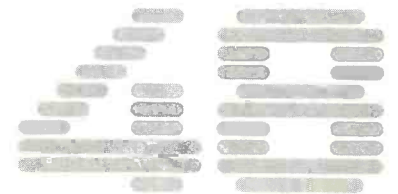


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typically write these small, compact sets of tasks that can be called from the main stream of the program to make it more flexible and efficient. Let's say that we want the computer to ask the user what range of numbers he wants to print and ask if we want to repeat the process. We'll use the GET command to retrieve the user input. Table 3 shows what happens when we put these new elements to work.

You don't have to know beans about programming to use a computer productively.

First, the message in line 10 is printed. Whatever number the user enters is assigned to the variable A in line 20. Then line 30 temporarily reroutes control to the subroutine beginning at line 100, which contains our FOR-NEXT loop that actually does the printing. The loop prints up to the user-specified number by using Y as an upper limit. When the loop completes, the RETURN command in line 130 sends control back to the next line in the main routine where the subroutine was called from, line 40 in this case. After the prompt on line 40, the user response is placed into the variable B in line 50 and tested against the letter "Y." If it is the letter "Y," the entire process starts over again with line 10. If the user response was anything else but "Y," the program falls through and ends on line 70.

Obviously, this program has limited use. It is designed only to illustrate some of the basic concepts of how we mere mortals can take control of our electronic partners. To be fair, we've left out some details and overlooked a few minor inaccuracies for the sake of clarity. Actually teaching you to program is beyond the scope of this column.

I can't stress enough that you don't have to know beans about programming to use a computer productively because programmers worry about all the things we've discussed when they create an application. Hopefully this quick peek inside a hypothetical program has provided some insight into the logic involved in the inner works of these amazing machines.

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Producing Music for the Moscow Ballet Tour

By Ron Streicher

The aim of the project would be to capture and reproduce all of the sonic fidelity, perspective and emotional impact of the original performances.

Like so many projects, this one began with a telephone call: "How would you like to go to Moscow to record the Bolshoi Theatre Orchestra?"

The call was from Les Harrison of Hollywood Sound Systems; he had been speaking with people who were planning to stage a 21-city tour of the United States by the Moscow Ballet. They wanted to use music recorded specially for the performances, and anticipating 16 tracks, to repro-

duce it from within the orchestra pits of the various theaters via a similar number of loudspeakers. And, oh yes, for the sake of authenticity, they wanted to make the recordings in Moscow with the Bolshoi Ballet Orchestra.

The aim of the project would be to capture and reproduce as closely as possible all of the sonic fidelity, special perspective and emotional impact of the original performances. It was decided that a stereo mix, recorded digitally, would be the most appropriate way to proceed. (By the way, at no time was the possibility of using a

live orchestra under discussion; the producers had already deemed this idea too expensive and impractical, given the schedule and itinerary of the tour.)

Les and I discussed various concepts for this project and decided that keeping the recordings in the digital domain all the way through playback in the theaters would be only way to insure the quality of reproduction required.

We considered several digital formats, including synchronized R-DAT recorders, but Les finally conceived the idea of producing the recordings onto custom CDs for playback during the performances. He posed the problem to consultant John Ruck and asked him to join the project to provide finished CDs from the F1 tapes to be brought back. We now had assembled a qualified team to implement the concept, which was: 1. to capture the performance of the orchestra in the Soviet Union as accurately, and with as little hardware, as possible; 2. to edit the recordings into "programs" with a fixed number of variations in the desired sequence; 3. to replicate this material onto multiple sets of CDs; 4. and to reproduce these for more than 60 live performances during the 10 weeks of the tour.

The CD medium solved several problems at once:

- It kept the recordings in the digital domain throughout the entire recording/reproduction process.
- It provided multiple complete sets of the program music so that they could be available for rehearsals and performances.
- It allowed accurate, instantly accessible, simple cuing of any musical selection.

Ron Streicher is owner of Pacific Audio-Visual Enterprises in Monrovia, CA, and is a governor of the AES.

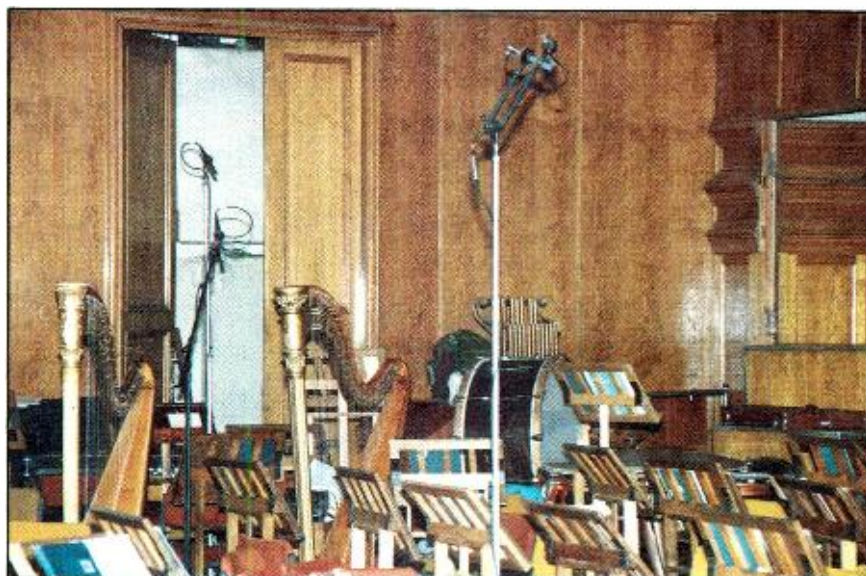


Photo 1. Accent mics. Woodwinds Schoeps CMC3/MK41 pair in "XY" configuration. Harps Schoeps CMC3/MK8. Percussion Schoeps CMC3/MK5.

• In the unlikely event that all three CD players provided with the sound system were to fail, a substitute playback unit would be as close as the nearest hi fi store.

The CD format also allowed us to record different versions of a solo variation to accommodate the individual requirements of the dancers. Ballet is a musically fluid performance medium, and, from moment to moment, dancers and their preferences can change. The music must allow for this and be able to adapt to each dancer's requirements. (To facilitate this, Les chose to use the new Technics SL-P1200 CD player. This machine offers the ability to quickly search for any musical passage by its track, index, or time of play number, and also allows cuing via a scrolling wheel. Of specific advantage for live performance applications, the "auto-cue" feature will cue to the first note of music and pause until the play control is pushed, to provide instantaneous music start.)

Project planning

Preparations for the project began in early spring of 1987, with another telephone conversation, this time with Bill Merriman of Premiere Dance, the producer for the tour.

While the music was being recorded in Moscow, Hollywood Sound Systems would be assembling the special sound system designed for the tour, and John Ruck would arrange and confirm the mastering and pressing schedule for the CDs. (The amount of time between returning with the recordings and the Moscow ballet's premiere in Baltimore was a mere 20 days.)

Before leaving, however, I still had to select and make arrangements for shipping the equipment needed for the recordings. As I had been instructed by several friends to take "everything I expected to use," I culled my equipment inventory, built some custom pieces for the occasion and ultimately prepared a special inventory list. The result: about 1,000 pounds of equipment, packaged into 14 flight cases. (All of these preparations had to be done in two weeks.)

Bill Merriman and I arrived at Moscow's Sheremetievo Airport and, once inside, we were met by Natasha Ivanova. She was to be our constant guide, interpreter and official liaison with Gosconcert, the division of the Soviet Ministry of Culture that governs ballet and concert music.

After a long wait outside the customs warehouse while the "paperwork" was being processed, we finally were called in to meet with a customs inspector. Natasha served as interpreter while I opened the first case and identified each piece of equipment for the inspector—line by line according to the inventory manifest. To do

this, I located each item on my master inventory, cross-referenced it to the telex listing, which Bill had sent ahead (in English), and then found by its number the corresponding listing on the Russian translation of the telex. This process was tedious, until, after several equipment cases, the inspector eased up and the procedure began to go more quickly. The only real time for concern, however, came when the lock on the principal microphone case jammed and would not open immediately.

The entire process took nearly four hours, after which we loaded everything

onto the bus and went to a local TV production facility where the equipment was unloaded for safekeeping until the sessions began. (While there, I noted with interest some of the equipment they were using: a Soundcraft model 1600 mixing console, Tascam 16-track and Studer 2-track recorders, Neumann mics, and a variety of Sony video production equipment. The only Soviet-made equipment I observed were power amps and loudspeakers.)

Natasha then took us directly to the Gosconcert offices for a meeting to discuss some of the specific details of the project,



Photo 2. Concertmaster of the Bolshoi Theatre Orchestra, Sergei Giershenko.



Photo 3. Reverse view, main microphone pickup. Center AKG C422. Violin and cello sweeteners AKG C414/P48.

such as the size of the orchestra we required, the schedule and location of recording sessions.

The next morning Natasha took us to see the recording venue: It was the Grand Salle at the Moscow Conservatory—a beautiful hall with reputedly the best acoustics in all Moscow. While there, I met with the facilities coordinator (he spoke some English) and we made arrangements for the recording sessions, which would begin the next morning. He was cooperative and eager to help.

From there, we went to a rehearsal stu-

dio to meet with Vyachaslav Gordeyev, the artistic director and principal dancer of the Moscow Ballet, and Georgi G. Zhemchuzhin, the conductor of the Bolshoi Theatre Orchestra. We discussed the musical arrangements for the sessions such as recording schedule and procedures, repertoire and tempos.

Recording sessions

The next morning we went to the concert hall to begin equipment set up for the sessions. All equipment was carried up four flights of stairs by helpers (The ele-

vator had been turned off for the weekend.), who were all students of the conservatory and who were very interested in what was going on. The only problem was that there were more of them than could really be of assistance.

The orchestra had been set up in the normal concert arrangement; it was a full 110-piece symphony orchestra, and the modest stage was filled to capacity. I chose to leave the orchestral seating as it was in order to maintain their live concert sound. It was my intent for the recording to create for the ballet audience a “sonic illusion” that the Bolshoi Theatre Orchestra was actually performing in the auditorium as they viewed the performance.

I did not want to add the recorded acoustics of the Moscow Conservatory to the natural acoustics of the performance hall, as this would have resulted in a too reverberant sound in most locations. The overall recorded “illusion” needed was a close, clear and articulate sound. Thus, the approach to mic placement and balancing was to keep the sound somewhat “drier” than I would for a normal commercial recording.

The microphone selection and placement is shown in the accompanying photos, and is described below:

Main pickup: one AKG C422 in a mid-side (M-S) configuration. (Matrixing to conventional stereo was accomplished by using the MS-38DM dual-matrix decoder from Audio Engineering Associates.) This single-point stereo mic was located on a tall stand a few feet above and not too far behind the conductor. As the stage was crowded to the edge, the mic stand had to come up from the orchestra floor (which was a few feet below stage level), so it was set atop a platform to achieve the additional height needed.

Left and right flanking mics: two AKG C414-P48s set to their cardioid patterns. These mics were also located atop tall stands placed in the same plane a few feet to either side of the main mic and were aimed at the concertmaster and principal cellist, respectively, to provide a spotlight for these soloists, as well as to provide a somewhat fatter sound for the string sections. The contribution of these mics to the overall mix was carefully balanced so that they would not distort the basic stereo perspective generated by the main M-S microphone pickup.

Woodwind sweeteners: two Schoeps CMC-3/MK-41 (hypercardioids), configured as an X/Y pair slightly above and in front of the first row of winds. These were added to the mix very lightly, merely to add a bit of articulation to the woodwinds.

Harp special: one Schoeps CMC-3/MK-8. This bidirectional pickup was placed just above and between the two harps and was

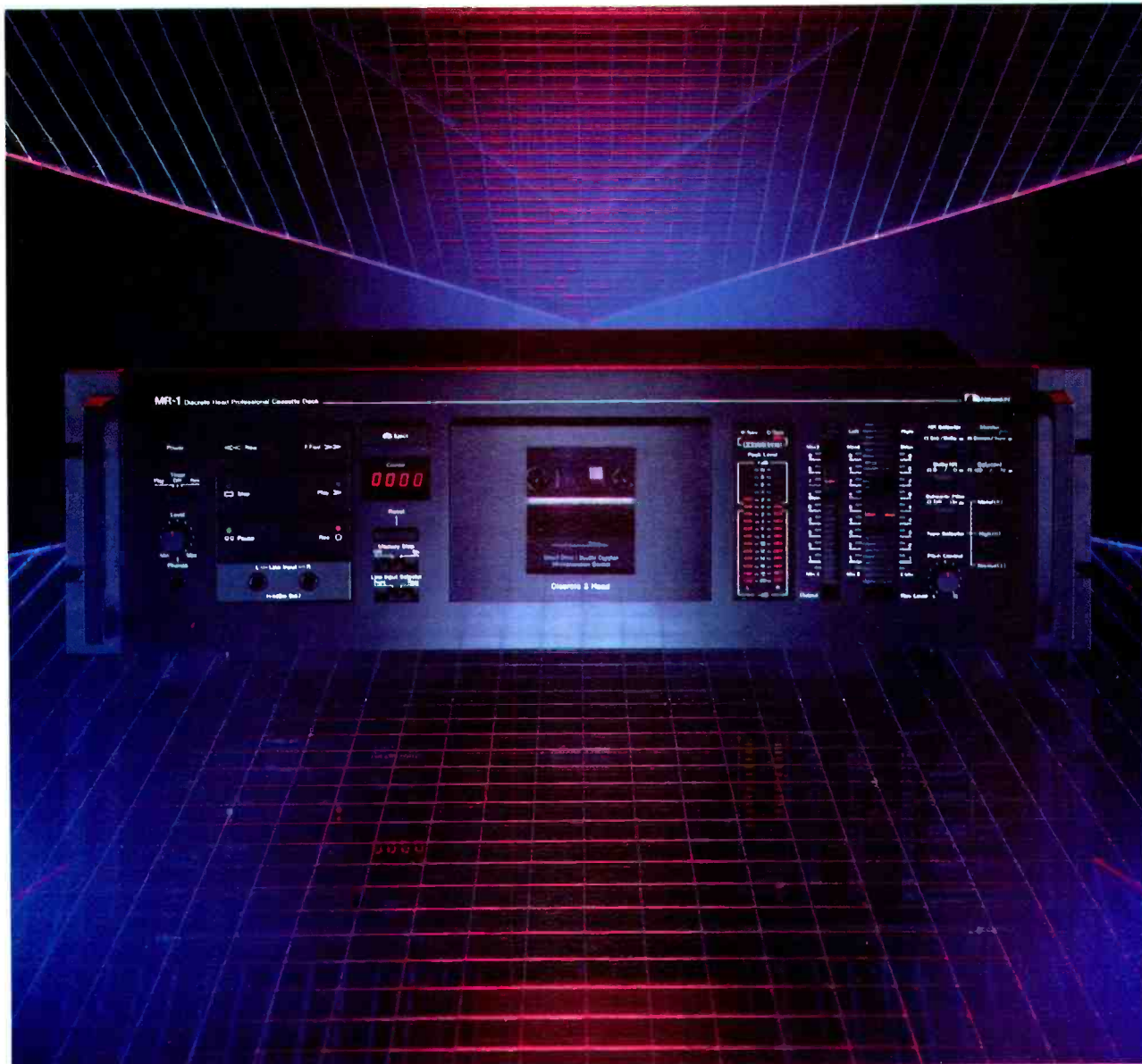


Photo 4. Close-up of principal microphones with murals of composers in the background, Grand Salle, Moscow Conservatory.



Photo 5. Principal microphones. Center AKG C422. Flanks AKG C414 EB (violin and cello sweeteners).

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October 1988 *Recording Engineer/Producer* 25

used only during the harp solos.

Percussion special: one Schoeps CMC-3/MK-5 (cardioid), placed above and in front of the mallet percussion to give a bit of edge to these instruments because

they were located at the extreme rear of the stage and needed a little help to cut through clearly.

The overall stereo perspective was obtained from the main MS microphone, and

all other microphones were balanced to preserve this. Accent microphones were used sparingly, so that they would not draw attention to themselves and thus distract from the overall imaging and sound. The end result was a well-defined stereo image, which, when reproduced in the performance halls, provided the desired effect: to give listeners a feeling that "they are here." (I use this phrase to contrast the complimentary recording technique of providing more "space" around the performance, which results in more of a "you are there" sensation for the listener.)

The "control room" area was in a hallway just offstage from the performers. The console used was a highly customized Quantum 12A mixing console (modifications by Bill Isenberg), and monitored via a pair of Norberg BCS-16 close-field monitor loudspeakers (built by Bob Norberg of Angel Records), driven by a Hafler DH-200 power amp. A pair of Dorrrough model 40 A "loudness monitor" program level meters was used in combination with a custom-built (again by Isenberg), phase-monitor oscilloscope that helped keep track of the signals sent to the tape machines.



Photo 6. Grand Salle, Moscow Conservatory, long view.

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The digital recordings were made on Sony PCM-F1 and Nakamichi DMP-100 digital processors used with Sony SL-2000 (Beta) and JVC HR-S100U (VHS) videotape recorders on Sony ESX-HiFi Beta and VHS videotape. Other equipment used included two Sony TCD-5 cassette recorders using Maxell XL-IS cassettes; a custom-built talkback/signaling system; a custom-built 220:110 Vac power conversion/regulation system (As all of the equipment used operated from internal dc-regulated power supplies, the problem of converting from

50Hz to 60Hz did not arise.); three 15-foot, portable aluminum mic stands by Audio Engineering Associates; and several AKG portable mic stands. Of course, sufficient back up equipment was also taken along, but the only spare item needed was an extension cable for the AKG 422.

The musicians began arriving around 11 a.m., and the first session began promptly at noon. Everyone was excited and ready to go. The conductor wanted to start recording right away, and after only a few brief takes for levels and a little mic ad-

justing, we were on our way.

We began with Act II of Swan Lake. Almost all of this act was recorded in only one take per section because the playing was superb! We continued with Don Quixote and concluded the first session around 3:30 p.m. Everything had gone smoothly with little or no need for rehearsal between takes.

We resumed recording at 6 p.m. and by 8:45 p.m. we had completed the Act III pas de deux from "Swan Lake", and all of Giselle, Ocean and Pearls, Corsaire and Gopak.

Following the session, Zhemchuzhin and several of the musicians stayed to listen to brief, random playback of the tapes. Everyone was very pleased with how well the recording was going. They were particularly impressed with the sound, as digital was unfamiliar to most of them. Also, except for some of the veteran members of the orchestra who remembered the "old days," they were surprised at the clarity and detail of a recording that used "so few microphones." (I was told that the normal microphone complement for recording this orchestra was more than 40.)

The next day's sessions went much as the first. In order to minimize time consuming editing, complete sections of the ballet scores were recorded in single takes. This procedure posed little problem for the musicians; in fact, they seemed to enjoy the challenge and rose to it.

Final day

On the third morning, we were feeling additional pressure, as this was the final day for recording, and there was still quite a bit of music to complete. Also, to add to the tension, the orchestral parts for "Sleeping Beauty", scheduled to be recorded that evening, had yet to be secured from the library. (They had reportedly been sent to Leningrad with one of the orchestra's touring units.) However, a little while later, during the morning session, the orchestra's librarian came into the room carrying a large parcel; his wide smile was all that was needed to tell us that he had received the needed parts. The final session began at 7:00 p.m. and we concluded with Corsaire just before 11 p.m.

Early the next morning, Natasha and I went to the conservatory to collect the equipment; we were pleased to see it already was loaded on the bus when we arrived. (The elevator was operating this time.) We were again accompanied by the agent from Gosconcert as we went to Customs.

Passing the equipment through inspection this time was comparatively easy. Only a few cases were opened, and even then



Photo 7. Long view Georgi Zhemchuzhin, conductor, and the Bolshoi Theatre Orchestra in the Grand Salle of the Moscow Conservatory.



Photo 8. Off-stage "control room" setup modified Quantum mixing console, Norberg BCS-16 close-field monitors, Dorrough loudness-monitor meters, Sony PCM-F1 and Nakamichi DMP-100 digital processors, Audio Engineering Associates MS-38 DM MS matrix, Loftech TS-1 test set.



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only a superficial inspection was made. Next, it was on to more paperwork and arranging the shipment back to the U.S. We also had to secure special clearances that would allow me to take the recorded tapes out of the Soviet Union without having them subjected to playing (Remember, these were videotapes.) or other potentially damaging inspections.

I was most concerned about the X-ray or other electromagnetic devices that might be encountered the next day when hand-carrying them as personal luggage

through airport security. I had prepared a diagram and briefed Natasha on the basics of digital recording and the need for extreme caution with the tapes so that she could explain all this to the customs supervisor.

After about three hours and stops at numerous offices, we finally had a letter of "safe conduct" to take with us when we returned to the airport to leave the next morning.

After only a brief visual inspection of the tapes, thanks to the letter we had se-

cured from the chief of customs, we were through. Now that we were on the inside, Natasha bade us farewell; Bill and I were now on our own.

Surprise! One more inspection of carry-on luggage awaited us just prior to boarding the plane. Bill managed to explain that we had left the letter of clearance at the first inspection point, and the guard finally let us pass with a brief visual inspection of the tapes—but no X-ray.

At Kennedy Airport, clearing customs was easy. Everyone was very understanding of my concern for the tapes. The customs agent accepted my written declaration and didn't inspect the baggage. (The equipment, of course, was on a separate cargo flight.)

After yet one more flight and several more hours, I finally landed at LAX—tired and weary. I was met at the gate by John Ruck, who took me directly to the Ahmanson Theater. Thanks to the good graces of house soundman Tom Angelotti, the Hollywood Sound Systems crew had set up and were putting the shakedown test to the playback system they had assembled for the tour. Eagerly, we put one of the F1 tapes into the player and listened while we walked the house. Even to very tired ears, it sounded good. Everyone there agreed and felt that we could emulate the sound of a live orchestra, and that the touring sound would indeed be a success.

Hollywood Sound Systems chose to provide a system based on the new Renkus Heinz "Smart System." This includes a servo feedback processor ahead of each of the power amplifiers to adjust system operating parameters according to the instantaneous needs of their special loudspeakers.

This system met all the requirements for the project: sufficient level for even the larger theaters; ease of setup and tear-down; minimum space and weight for shipping; and, most important, reliability. The balance of the sound system incorporated the three Technics CD players mentioned earlier, a Yamaha M-512 mixing console, various EQ units, RTS distribution amplifiers and Yamaha PD 2500 power amplifiers.

Following the test, I gave John the F1/VHS set of tapes so he could stripe them with time code in preparation for the editing sessions.

CD prep

On Sept. 4, 18 days before the ballet company would arrive from Moscow and be ready to rehearse with the CDs, I joined John and mastering engineer Fred Mitchell at CMS Digital in Pasadena. Producers Bill Merriman and David Harmon were also there to establish the proper disc



Photo 9. Ron Streicher (author and recording engineer) at the mixing console, members of the Bolshoi Theatre Orchestra in the background.



Photo 10. Close-up of harp "special" Schoeps CMC3/MK8 (bi-directional) placed between the two harps.

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Photo 11. Reverse view of principal microphones, Grand Salle, Moscow Conservatory.



Photo 12. Georgi Zhemchuzhin, conductor, and the Bolshoi Theatre Orchestra. Photo shows position of principal microphones.

order for the four programs.

Editing went as smoothly as planned, as all we needed to do was assemble the various tracks. Although a few cuts needed internal editing for musical continuity, only twice did we need to drop back to a Beta copy to cover a dropout. (Not bad for digital recording via an unmodified consumer VHS portable deck.) We completed two discs each day, and while we caught up on our sleep, the pressing facility worked all night to meet our deadline.

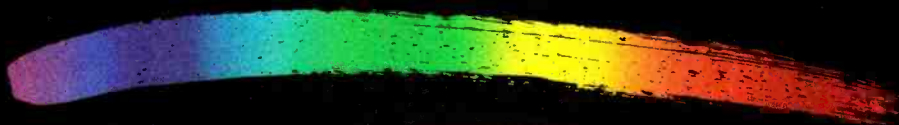
To ensure that no "accidents" would occur during the performances, only the musical material was recorded onto the discs; calibration and setup signals were provided on site by the test equipment supplied with the sound system. To further avoid confusion in the darkened theaters, each of the six discs in the set was imprinted only with a large number; its contents were listed in English and Russian on separate log sheets accompanying each set.

On Sept. 24, I flew to Baltimore for the premiere gala, where I met Dale Rardin (of Hollywood Sound Systems) at the theater. We reviewed what he and the IATSE road crew had done to set up the sound system for the show. All was in place. The control system set up was in the wings backstage, and the loudspeakers had been placed on either side of the proscenium. (Dale had tried them in the "pit" as originally requested, but the resulting sound in this hall was too boomy and lacking presence.) There was still a buzz from a defective lighting dimmer to be found. After rerouting some cables and securing a power-line filter, we had it minimized to an acceptable level. The versatility of the sound-system design allowed it to be configured quickly and easily in this and all subsequent theaters throughout the tour. Each venue had its own set of physical and acoustical requirements, and these were met with little difficulty. (In some, the loudspeakers were effective when placed in the orchestra pit.)

The success of this project was the result of many people working in concert. Les Harrison, as technical coordinator, developed the overall concept for the project. John Ruck effected an appropriate and reliable playback medium. Dale Rardin was project manager and Gary Mikalian of Hollywood Sound Systems provided the sound system. Randy Post and the stage crew tramped the equipment and performed with it every show; everyone worked against a very tight schedule to complete an extraordinary project.

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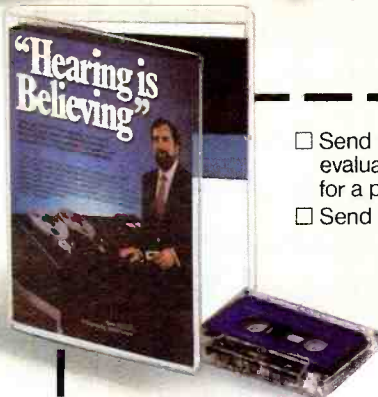


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Once again, it's easy to see when it comes to innovation, there's nothing new about the name Yamaha.

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Analog Equalizers: Overview and Terminology

By Dennis A. Bohn

There are over a dozen different types of equalizers and filters, and an even longer list of equalizer terms. Defining the types and terminology should help the operator make better choices when using or buying this equipment.

Graphic and parametric equalizers proliferate in the professional audio world unrivaled except by power amplifiers and loudspeakers. We are surrounded by them. Seldom would we consider doing any type of audio production or reinforcement job without them. Yet, most engineers know little about the different types of equalizers. They use them by habit, recommendation, mimicry, hearsay, but rarely by careful study and research into which one is best for a particular application.

So, what types of equalizers exist? Which one is best? Why so many?

Choices, choices, choices

Estimates suggest 75% of the equalizers sold find their way into program enhancement and sound reinforcement applications. Program enhancement primarily appears in live performance, recording studio, broadcast, and post-production marketplaces. Within these markets, equalizers do everything from simple bandlimiting to complex sound manipulation.

Sound reinforcement uses equalizers everywhere from small lounge acts to large touring companies. Most applications are for compensating ragged loudspeaker power responses rather than attempting any sort of serious room equalization. This is true for monitor loudspeaker systems as well as mains. Yet, the equalizer is the crucial link in vastly improving the system's sound.

With such diverse applications, it is not surprising to find so many choices. To understand the choices, however, is to first

understand the terminology.

Equalizer terminology deserves better positioning than the back of the book. So, instead of a complete glossary at the end, an abbreviated glossary appears now. To confuse and ensure you are paying attention, it is not in alphabetical order, but in order of importance for understanding equalizers.

Passive equalizer—A variable equalizer requiring no power to operate. Consisting only of passive components (inductors, capacitors and resistors) passive equalizers have no ac line cord. Favored for their low noise performance (no active components to generate noise), high dynamic range (no active power supplies to limit voltage swing), extremely good reliability (passive components rarely break), and lack of RFI (no semiconductors to detect radio frequencies).

Disliked for their cost (inductors are expensive), size (and bulky), weight (and heavy), hum susceptibility (and shielded carefully), and signal loss characteristic (passive equalizers always reduce the signal). Also, inductors saturate easily with large low-frequency signals, causing distortion. Used primarily for notching in permanent sound systems.

Active equalizer—A variable equalizer requiring power to operate. Available in many different configurations and designs. Favored for low cost, small size, light weight, loading indifference, good isolation (high input and low output impedances), gain availability (signal boosting possible), and line-driving ability.

Disliked for increased noise performance, limited dynamic range, reduced reliability, and RFI susceptibility. Used everywhere.

Graphic equalizer—A multiband var-

iable equalizer using slide controls as the amplitude adjustable elements. Named for the positions of the sliders "graphing" the resulting frequency response of the equalizer. Only found on active designs. Both center frequency and bandwidth are fixed for each band.

Rotary equalizer—A multiband variable equalizer using rotary controls as the amplitude adjustable elements. Both active and passive designs exist with rotary controls. Both center frequency and bandwidth are fixed for each band.

Parametric equalizer—A multiband variable equalizer offering control of all the "parameters" of the internal bandpass filter sections, these parameters being amplitude, center frequency and bandwidth. This allows the user not only to control the amplitude of each band, but also to shift the center frequency and widen or narrow the affected area. Available with rotary and slide controls.

Subcategories of parametric equalizers exist for units allowing control of center frequency but not bandwidth. For rotary control units, the most-used term is *quasi-parametric*. For units with slide controls the popular term is *para-graphic*. The frequency control may be continuously variable or switch selectable in steps.

Cut-only parametric equalizers (with adjustable bandwidth or not) are called notch equalizers, or band-reject equalizers.

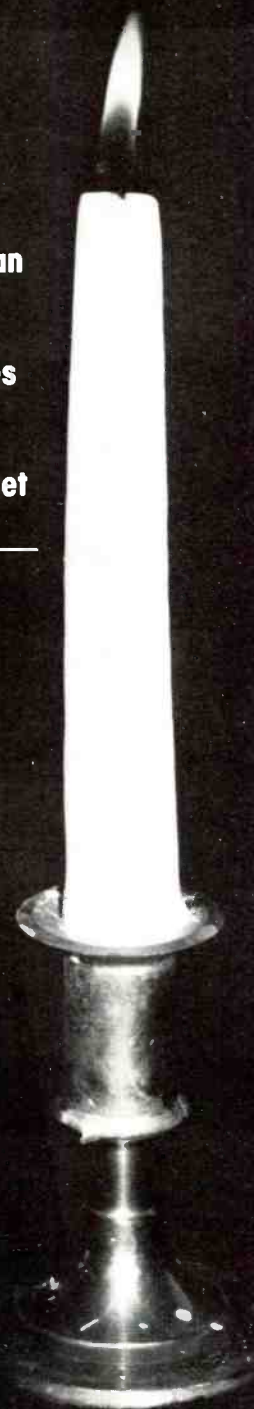
Transversal equalizer—A multiband variable equalizer using a tapped time-delay line as the frequency-selective element as opposed to bandpass filters built from inductors (real or synthetic) and capacitors. The term "transversal filter" does not mean "digital filter." It is the entire family of filter functions done by means of a tapped delay line. There exists a class

Dennis A. Bohn is vice president of research and development, Rane Corporation, Everett, WA.

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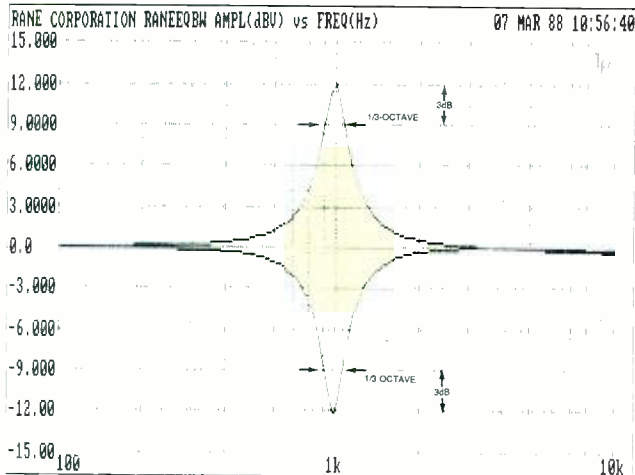


Figure 1. Symmetrical boost/cut response showing 1/2-octave bandwidth.

also many variations between these two extremes.

LC filter (also LCR, LRC, etc.)—Passive filter comprised of capacitors (C), resistors (R), and inductors (electronic symbol “L.” Why “L”? Well, you see, they couldn’t use

“l” because that was being used for current.). Note that both active and passive equalizers use LC filters. In active units, the actual filter element is passive; the active elements act as buffers, mixers and gain blocks.

RC filter—Active filter made from resistors (R), capacitors (C) and an amplifier (either tubes, transistors, or integrated circuits).

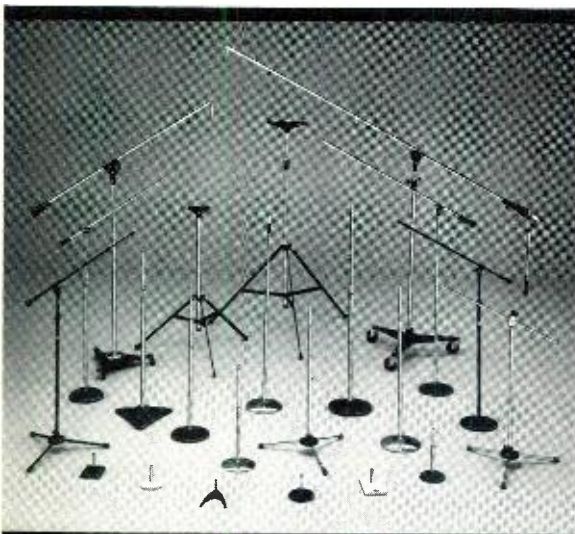
Two main categories exist. The first uses active RC networks to synthesize inductors (gyrators) and then create bandpass or band-reject filters based on original LC designs. The second uses active RC networks directly to create bandpass or band-reject filters.

Q (bandwidth)—The quality factor, or “Q,” of a filter is an inverse measure of the bandwidth. To calculate Q, divide the center frequency by the bandwidth measured at the -3dB (half-power) points. For example, a filter centered at 1kHz that is 1/2-octave wide has -3dB frequencies located at 891Hz and 1123Hz respectively, yielding a bandwidth of 232Hz (1123-891). The quality factor, Q, is therefore 1kHz divided by 232Hz, or 4.31.

Going the other way is a bit sticky. If Q is known and the bandwidth (expressed in octaves) is desired, direct calculation is not obvious—nor easy. Development of a direct expression appears in reference No. 3 along with a hand-held calculator program to make this easier.



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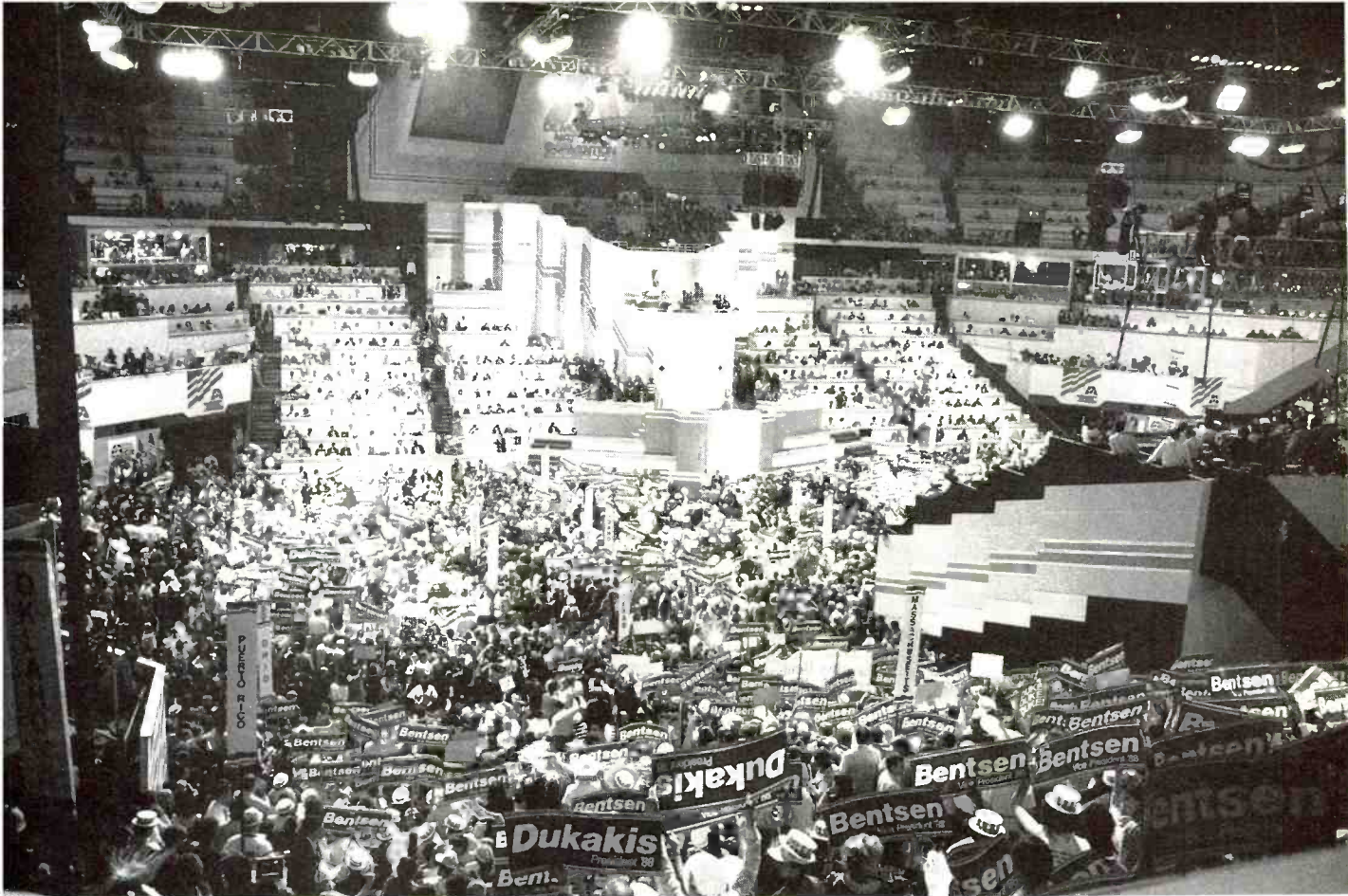
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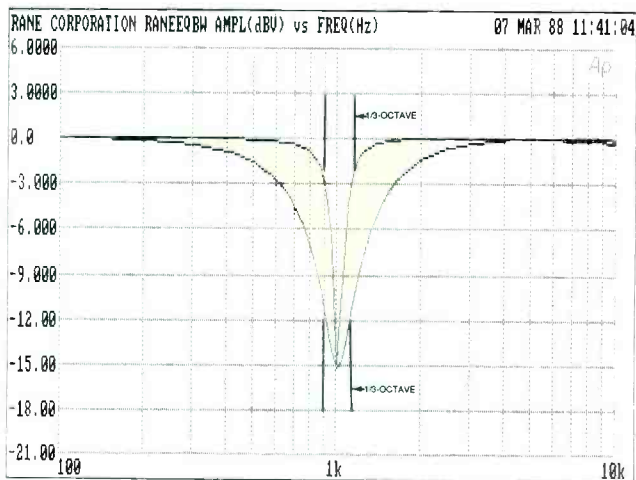


Figure 2. Cut-only (notch or band-reject) response showing different $\frac{1}{3}$ -octave measurement points.

Proportional-Q equalizer (also variable-Q equalizer)—Term applied to graphic and rotary equalizers describing bandwidth behavior as a function of boost/cut levels. Paul Wolff of SPI recommends the term “proportional-Q” as be-

ing more accurate and less ambiguous than “variable-Q.” If nothing else, “variable-Q” suggests that the unit allows the user to vary (set) the Q, when no such controls exist.

Figure 3 shows proportional-Q response

for four different boost settings. The bandwidth varies inversely proportional to boost (or cut) amounts, being very wide for small boost/cut levels and becoming very narrow for large boost/cut levels. The skirts, however, remain constant for all boost/cut levels. Compare with Figure 4.

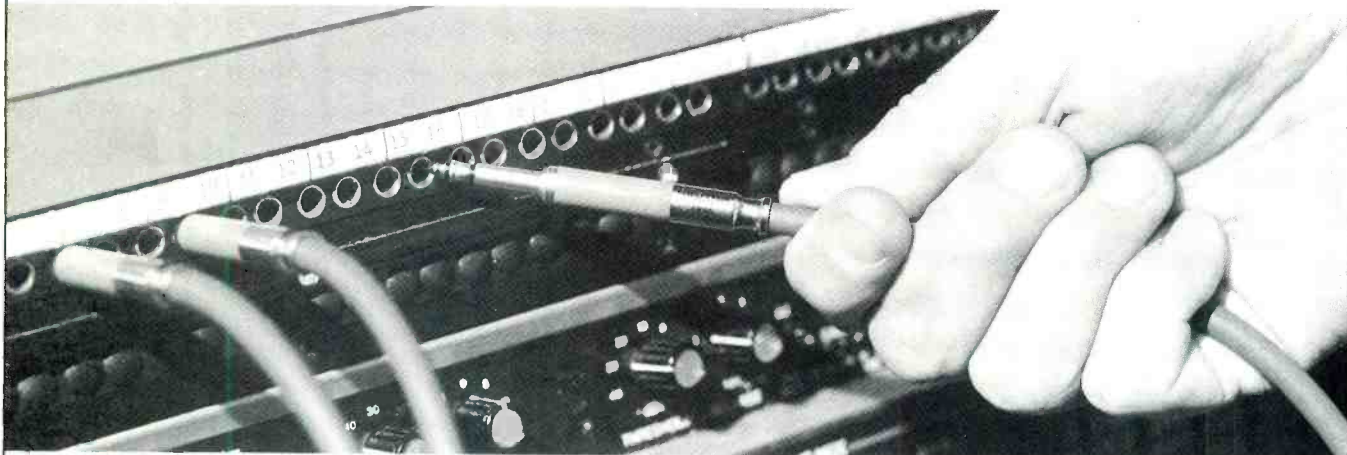
Constant-Q equalizer (also constant-bandwidth equalizer)—Term applied to graphic and rotary equalizers describing bandwidth behavior as a function of boost/cut levels. Since Q and bandwidth are inverse sides of the same coin, the term are fully interchangeable.

Figure 4 shows constant-Q response for four different boost settings. The bandwidth remains constant for all boost/cut levels. For constant-Q designs, the skirts vary directly proportional to boost/cut amounts. Small boost/cut levels produce narrow skirts and large boost/cut levels produce wide skirts.

Equalize/attenuate—Original terms used by Art Davis (Cinema Engineering) to signify direction of equalization. Equalize meant to make bigger and attenuate meant, of course, to make smaller. Replaced today by boost/cut terminology.

Lift/dip—Popular European term meaning boost/cut.

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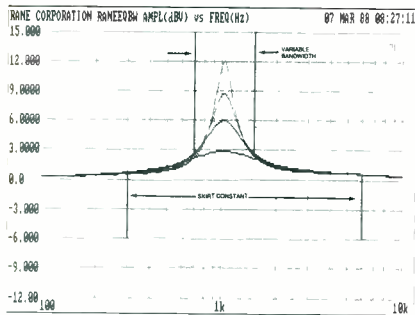


Figure 3. Proportional-Q (variable-Q) equalizer performance.

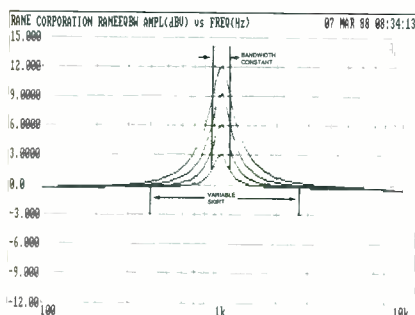


Figure 4. Constant-Q (bandwidth) equalizer performance.

Peaking response—Term used to describe a bandpass shape when applied to program equalization. Figure 1 shows a peaking response.

Shelving response—Term used to describe a flat (or shelf) end-band shape when applied to program equalization. Figure 5 shows shelving responses. Also known as bass and treble tone control response. Ambiguities exist when describing shelving equalization controls regarding corner frequency. Figure 5 shows the two conflicting definition points. Corner frequency 1 represents the normal engineering definition of the ± 3 dB point. Corner frequency 2, however, represents a definition point more relevant to the user. Normally a user wants to know the available boost/cut amount at the top or bottom of the shelving response.

Symmetrical (reciprocal) response—Term used to describe the comparative shapes of the boost/cut curves for variable equalizers. Figure 1 shows symmetrical and reciprocal responses.

Asymmetrical (non-reciprocal) response—Term used to describe the comparative shapes of the boost/cut curves for variable equalizers. Figure 6 shows asymmetrical or non-reciprocal responses.

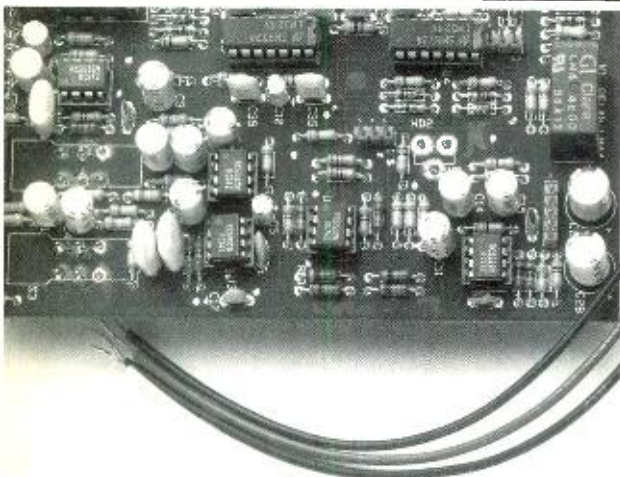
Gyator filters—Term used to describe a class of active filters using gyator networks. Gyator is the name given for RC networks that mimic inductors. A gyator is a form of artificial inductor where an RC filter synthesizes inductive characteristics. Used to replace real inductors in filter design.

Discrete equalizer—A variable equalizer comprised solely of separate (discrete) transistors, as opposed to designs using integrated circuits. Currently, it is believed only API makes discrete equalizers.

Combining (interpolating) equalizer—Term used to describe the summing response of adjacent bands of variable equalizers. If two adjacent bands, when summed together, produce a smooth response without a dip in the center, they are said to combine well.

Good combining or interpolating characteristics come from designs that buffer adjacent bands before summing; i.e., they use multiple summing circuits. If only one summing circuit exists for all bands, then the combined output exhibits ripple between center frequencies.

Altec-Lansing first described Art Davis's buffered designs as combining, and the terminology became commonplace. De-

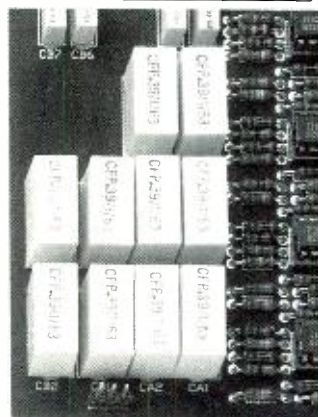


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*All specs taken from manufacturers' published literature.



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	Audio Logic SC 31	RANE GE 30	JBL/Urei 5547A	Klark Teknik DN 300
Noise	Less than -90 dBm	Less than -90 dBm	Less than -90 dBm	Less than -90 dBm
Maximum Output	+27 dBm	+24 dBm	+22 dBm	+22 dBm
Dynamic Range	+117 dBm	+114 dBm	+112 dBm	+112 dBm
Frequency Response	18 Hz to 30 kHz +/-0.5 dB	10 Hz to 40 kHz +0/-3 dB	20 Hz to 20 kHz +1/-2 dB	20 Hz to 20 kHz +/-0.5 dB
Number of Bands	31	30	30	30
THD plus noise	Less than .005% @ +22 dBm @ 1 kHz	Less than .01% @ +4 dBm	Less than .5% @ +22 dBm	Less than .01% @ +4 @ 1 kHz
Suggested Retail Price	\$550.00	\$749.00	\$849.00	\$1,050.00

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Why your next console should be as difficult to hear as it is easy to operate.

The studio is more complex and less forgiving.

Electronic production techniques using MIDI and SMPTE sync require more control than a "wire with gain" can provide. But as functions and components accumulate, the console's signal path has grown more complex, and its audio performance has suffered. On analog recordings, higher levels of crosstalk, noise and intermodulation were an acceptable price for additional control. On digital multitrack, however, these flaws become glaringly obvious.

Crosstalk blurs the stereo image.

Now that digital recorders have virtually eliminated crosstalk, this is an especially annoying problem. *The AMR 24 matches the channel separation performance of digital multitracks* because it employs balanced buses that eliminate crosstalk the same way mic inputs do. This radical design approach takes full advantage of digital's more coherent stereo imaging.

Balanced buses also eliminate the intermodulation that plagues the sound of conventional "virtual ground" mix amps. *The AMR 24's noise floor is constant whether you route one input*

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Features shouldn't degrade audio performance.

Automation widens creative possibilities — and narrows the margin for console error. For example, FET mute switches that are "silent" individually can produce audible glitches when grouped. The AMR 24's carefully controlled switching time constants eliminate this problem.

Every circuit in the AMR 24 has been calculated with equally close attention. Each stage has at least 22 dB of headroom; total dynamic range is over 100 dB. Even so, *unused stages are bypassed to produce the shortest effective signal path in every operating mode.*

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The feel is familiar; the functions are unprecedented.

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Imaginative design and uncompromising construction give the AMR 24 flexibility and sonic transparency that represent clear achievements: especially clear on digital recordings. For all the facts on this innovative console, send your business card or letterhead to:

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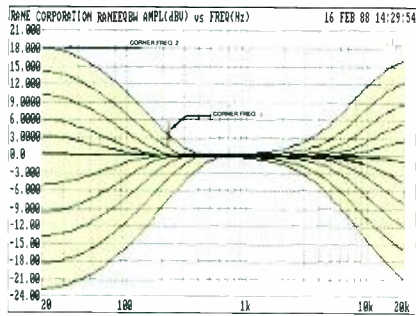


Figure 5. Equalization curves showing shelving response.

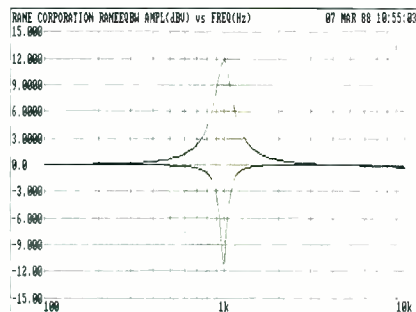


Figure 6. Asymmetrical (non-reciprocal) boost/cut curves.

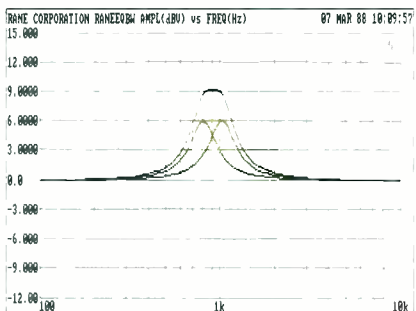


Figure 7. Summed response of adjacent filters showing good combining or interpolation between bands of an interpolating constant-Q equalizer.

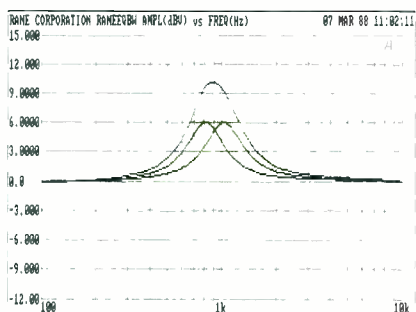


Figure 8. Summed response of adjacent filters showing combining or interpolation between bands for a proportional-Q equalizer.

describing how well adjacent bands combine is good terminology. However, some variations of this term confuse people. The phrase “combining filter” is a misnomer, since what is meant is not a filter at all, but rather whether adjacent bands are buffered before summing. The other side of this misnomered coin finds the phrase “non-combining filter.” Again, no filter is involved in what is meant. Dropping the word “filter” helps, but not enough. Referring to an equalizer as “non-combining” is imprecise. All equalizers combine the outputs of their filters. The issue is how much ripple results.

For these reasons, Rane suggested the term “interpolating” as an alternative.⁴ Interpolating means to insert between two points, which is what buffering adjacent bands accomplishes. By separating adjacent bands when summing, the midpoints fill in smoothly without ripple.

Figure 7 plots the summed response of adjacent filters showing good combining or interpolation between bands for an interpolating constant-Q equalizer. Figure 8 plots similar results for a proportional-Q equalizer. Figure 9 plots the summed response of adjacent filters showing combined response with ripple for either constant-Q or proportional-Q designs not buffering adjacent filters. Demonstrated here is the lack of interpolation between centers.

Minimum-phase filters (or minimum phase-shift filters)—A much confused term, having little meaning for today’s variable equalizers. There seem to be two issues intertwined here. The first concerns minimum-phase filters and the implication that some equalizers do not use minimum-phase filters. From a strict electrical engineering viewpoint,^{5, 6} the precise definition of a minimum-phase function is a detailed mathematical concept involving positive real transfer functions, i.e., transfer functions with all zeros restricted to the left-half S-plane. References demonstrate that all equalizer designs based on second-order bandpass or band-reject networks have minimum-phase characteristics.^{7, 8} This says, in essence, all variable equalizers on the market today use minimum-phase filters.

The second issue involves minimum phase shift filters. There is an implication that some equalizers produce less phase shift than others. Again, this does not seem to be the case. All second-order bandpass or band-reject filters (active or passive) shift phase the same amount (the bandwidth of this phase shift differs for various second-order responses, but the phase shift is the same), and when used to create boost/cut responses, do so with the same phase shift. Different phase responses do exist, but they are a function

of boost/cut levels and individual filter bandwidths; that is, there will be less phase shift for 3dB of boost/cut than 12dB, and a 1-octave filter set will have a wider phase response than a 1/3-octave unit (but the number of degrees of phase shift will be the same). Figures 10 and 11 demonstrate this. In Figure 10 the phase responses for different levels of boost appear (cut responses are identical but mirror image). This verifies Pennington’s rule-of-thumb regarding 10° of phase shift per 3dB of amplitude change.⁹ Figure 11 shows the bandwidth variation for this phase shift for wider and narrower bandpass responses.

This completes the most common variable equalizer terminology. Lots of other terms exist, but this is the foundation for understanding the remaining variations and alternatives.

Conclusion

This many categories exist primarily because of simple historical evolution. As technology evolved, so did equalizer design—a natural course of events. Transistor and integrated circuit developments led to active designs. Invention of gyrators created a new category. Proliferation of modern active RC filter designs created new ways of doing old tricks and old ways to do new tricks. And today, digital technology propels us into a whole new generation of equalizers.

My favorite is the parametric. It allows you to go anywhere and do anything. Yet, there are those who claim the best parametric does not sound as good as old passive bridged-T designs. Perhaps, but that cannot be objectively proven. Tightly controlled A-B testing demonstrates that all equalizers’ designs, creating the same exact frequency curve (important: it *must* be identical) are indistinguishable. It does not matter whether they are passive or active, proportional-Q or constant-Q, LC or RC, fixed band or parametric, or operate in the frequency or time domain. With apologies to Gertrude Stein, a transfer function is a transfer function.

Differences do exist, but they are in areas other than those described above. Secondary consideration such as noise performance, dynamic range, and transient stability all enter into explaining perceived sonic attributes.

Many designs are decades old, while others are but a few years. The latest is not necessarily the best, although we tend to think so. Each new development is embraced as the ultimate—for a while. Then, we tend to migrate back to proven ways that are comfortable and known, if for no other reason. This, too, is not always best. Ours is a human industry, with human quirks.

The decision as to which is best is a per-

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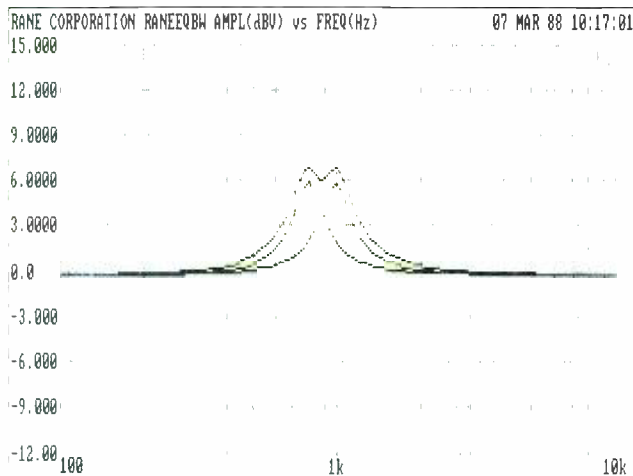


Figure 9. Summed response of adjacent filters showing combined response with ripple for constant-Q or proportional-Q designs not buffering adjacent filters.

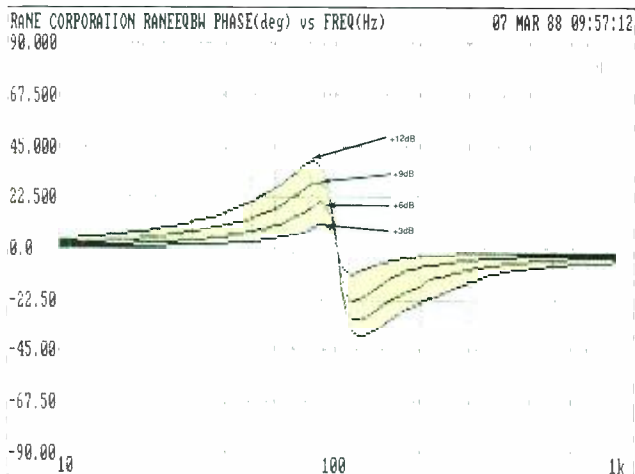


Figure 10. Phase response of a second-order bandpass filter used to produce four boost levels for a 1/3-octave equalizer.

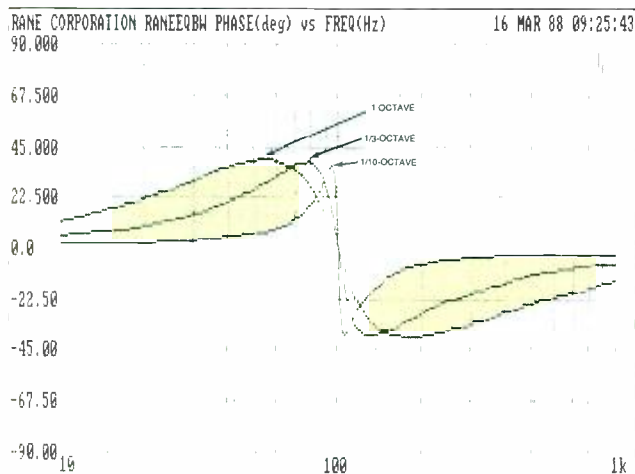


Figure 11. Phase response for second-order bandpass filter used to produce +12dB boost levels for three bandwidths.

sonal one. Many subjective factors enter into the selection process. There are those who swear by one design over another and will never be convinced otherwise. Nothing can be done about this, nor should we try. Objectively, much could be written regarding the performance virtues of each design. Nevertheless, suffice it to say, applications exist for all these designs. Eventually, the market determines lasting favorites.

For now, vive la difference!

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REP

(Abridged from the original paper entitled, "Operator Adjustable Equalizers: An Overview," presented at the Audio Engineering Society Sixth International Conference on Sound Reinforcement, May 5-8, 1988, Nashville. Complete paper is scheduled to be published in the Conference Proceedings by the AES in September.)

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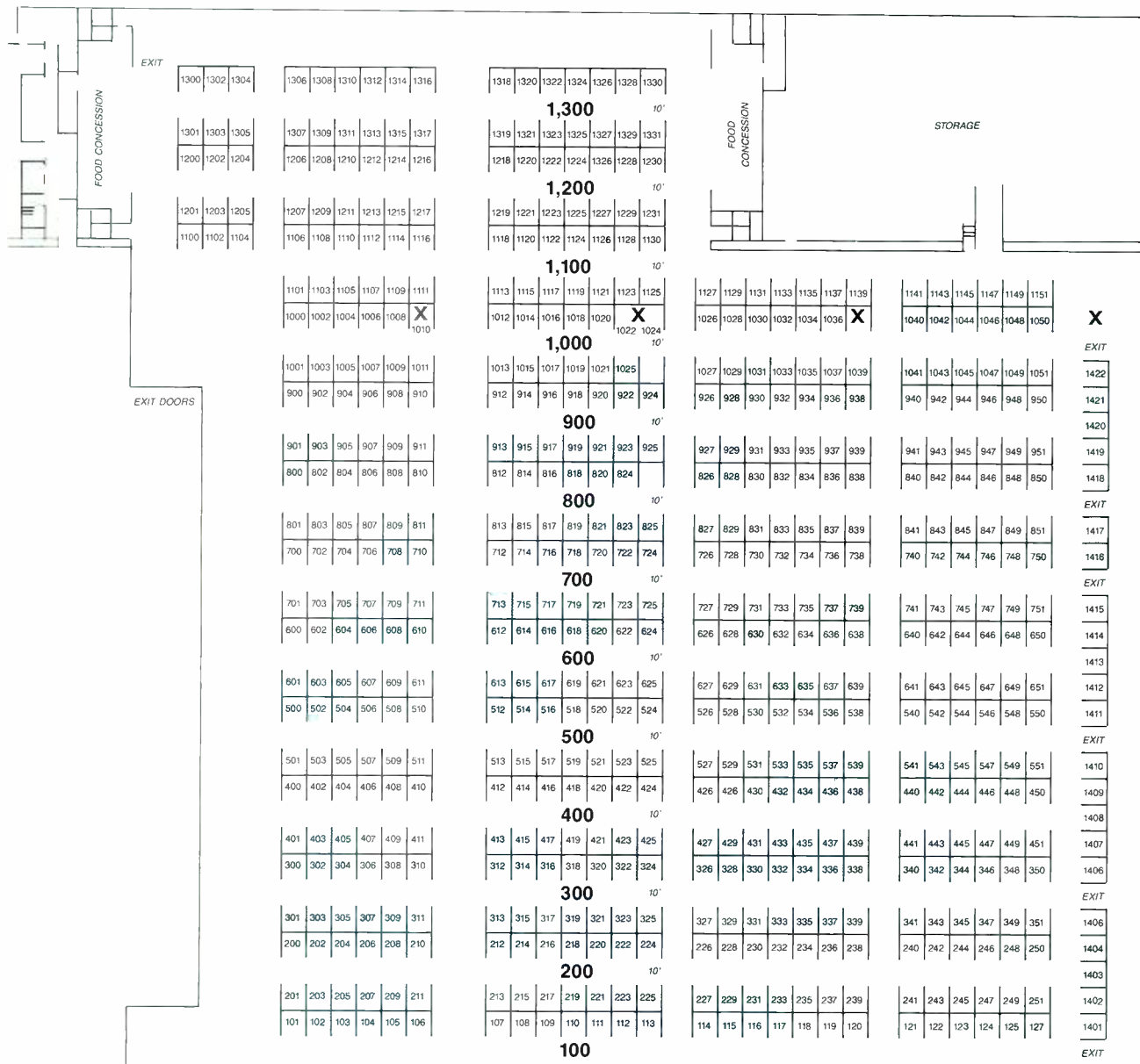


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 Saki Magnetics (340)
 Samson Technologies (520, 522, 524, 621, 623, 625)
 Schoeps/Posthorn Recordings (1013)
 Selco/Sifam (351)
 Sellmark Electronic Services (849)
 Sennheiser (808, 810)
 Shep Associates (933)
 Shure Brothers (107, 108, 213, 215)
 Solid State Logic (612, 614, 616, 618, 620, 713, 715, 717, 719, 721)
 Solid Support Industries (1006)
 Sonic Solutions (1015)
 Sontec Electronics (1004)
 Sony (101)
 Soundcraft (326, 328, 330, 332, 334, 336, 338, 427, 429, 431, 433, 435, 437, 439)
 Soundcraftsmen (1041)
 Sound Ideas (633)
 Soundmaster International (1423-1422)
 Sound Technology (840)
 Soundtracs (520, 522, 524, 621, 623, 625)
 Sound Workshop Professional Audio Products (237, 119, 120)
 Sound & Video Contractor (1204)
 SPARS (848)



At the top of the charts

Ampex hits the top of the charts with Ampex 467 digital mastering tape.

We not only pioneered digital audio tape, we refined it. The result is Ampex 467, a tape that sets the highest standards for all digital audio applications. And it's available in all open reel and cassette formats, including the 80-minute cassette length.

More top performers record their hits on Ampex tape than any other tape in the world. While opinion may vary on what it takes to make a hit, there's no argument on what it takes to master one.

AMPEX

Ampex Corporation, Magnetic Tape Division,
401 Broadway, Redwood City, CA 94063. 415/367-3809.

Circle (38) on Rapid Facts Card

Stanton Magnetics (426)
 Star Case (637)
 Steinberg Digital Audio (932, 934)
 Stewart Electronics (744)
 Studer Revox America (218, 220, 222,
 224, 319, 321, 323, 325)
 Summit Audio (1002)
 Sunkyong (734, 736, 738, 835, 837,
 839)
 Swire Magnetics (936)
 Symetrix (630)
 Tannoy North America (912, 914)

Tape Automation (445)
 Tascam (110-113, 219, 221, 223, 225)
 TC Electronic (641)
 Telex Communications (922, 924, 1023,
 1025)
 3M/Magnetic Media (512, 514, 516, 613,
 615, 617)
 360 Systems (1018, 1020)
 TimeLine (1027, 1029)
 Trident Audio USA (432, 434, 436, 438,
 533, 535, 537, 539)
 27th Dimension (705)

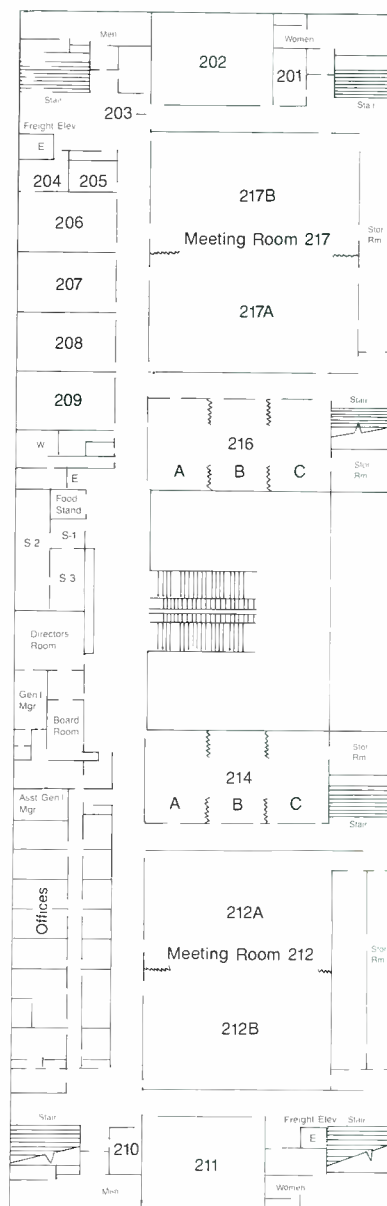
UREI (326, 328, 330, 332, 334, 336,
 338, 427, 429, 431, 433, 435, 437,
 439)
 US Audio/Div. of Whirlwind (532)
 Valley International (609)
 Veetronix/Reach Electronics (950)
 Versadyne International (1417)
 WaveFrame (646, 648, 650, 747, 749,
 751)
 Whirlwind (530)
 Wireworks (1401-1402)

Convention Center Demo Rooms

*Issue advertisers and their rooms are
 printed in blue.*

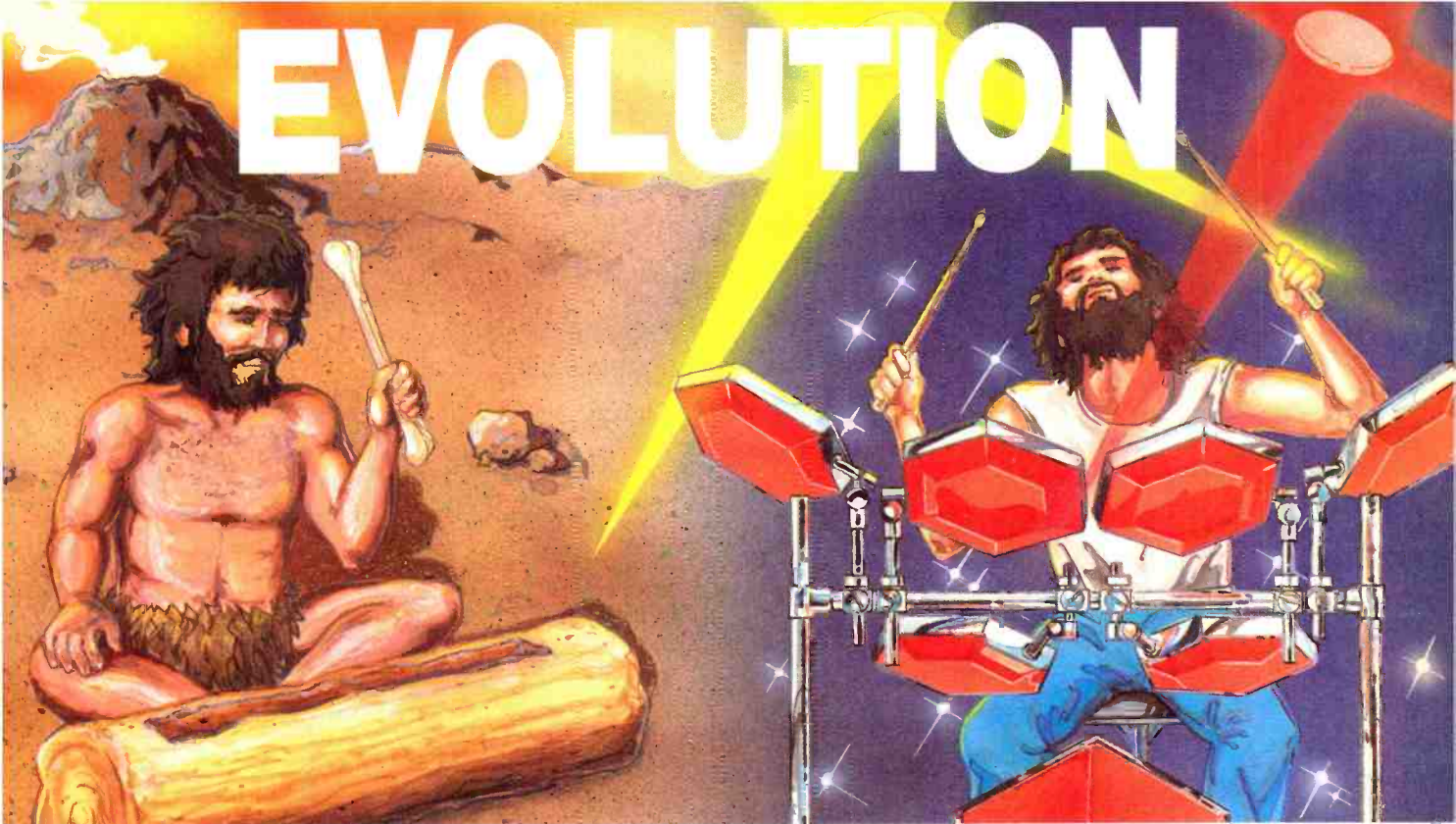
Court Acoustics (204)
 Klipsch and Associates (201)
 Korg USA (205)
 Meyer Sound Laboratories (214A, 210)
 New England Digital (216A-B)
 Panasonic Industrial/Ramsa (209)
 Roland Corp. US (208)
 Westlake Audio (203)

The map, exhibitor listings and *RE/P* issue advertisers are
 current as of Sept. 1, 1988. Production deadlines did not
 permit the inclusion of later information. Check your show
 program for updated information.



Continued on page 115

EVOLUTION



IN THE BEGINNING THERE WAS RHYTHM

Rhythm is the basis of life. It is the waves lapping steadily on every shore. Perhaps rhythm was discovered by some caveman who tried to flush wild game out of a hollow log by pounding on it with a stick and was surprised by the booming sound pattern that echoed back. Hence, the first drum was born.

Today, the modern drummer has entered the computer age. MIDI—musical instrument digital interface—represents the epitome of today's musical technology. MIDI software enables the composer to store, edit, cut, and paste electronic drum riffs as easily as a word processor can perform these feats.

TIMELESS QUALITY

For 40 years Switchcraft has played an important role in the evolution of recorded sound. In session after session musicians and audio engineers insist on our state-of-the-art audio components. Not only is Switchcraft counted on to meet the latest technology, Switchcraft is relied on to provide the most durable, reliable components in the recording and broadcast industries. Our commitment to making only the finest audio accessories has made Switchcraft the most-asked-for name in the market.

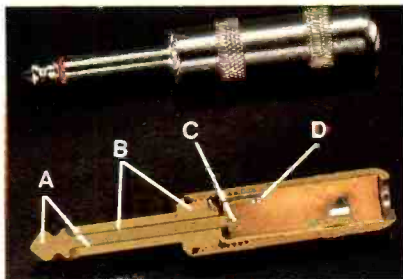
WHY SWITCHCRAFT IS THE INDUSTRY STANDARD

Our jacks, plugs, adapters, cable assemblies, microphone connectors—

no matter what sound accessory you need—all offer our unchanging commitment to quality components.

For example, our 1/4" guitar plug has set new standards in quality. Switchcraft features one-piece construction and cable clamps to prevent breakage. Our guitar plug has been copied by our competitors. Don't be fooled by the counterfeits. Switchcraft construction outlasts the others. Ask for it by name.

Our Q-G, or "quick-ground," connector features our exclusive



- A. 1 PIECE TIP AND TIP RCD:** Cheap imitations use 2 piece construction which is a "weak link."
- B. 1 PIECE SLEEVE AND BODY:** Cheap imitations use tubing pressed into body which is a failure point.
- C. ANTI-ROTATIONAL TAB:** Prevents tip rod from turning which can create a weak solder joint.
- D. ELECTRO TINNED TERMINALS:** Makes for easy soldering with good electrical connections.

ground terminal which eliminates noise at connection. The Q-G's housing stands up to abuse, while providing full shielding and protection to the cable. Lost insert screws are eliminated by our captive design insert screw.

INTERFACE WITH THE FUTURE

Enter the dawn of a new age in recording and broadcast equipment quality. Famous Switchcraft quality. You can depend on it.

Send me information on your quality components:

- Please have a representative contact me.
- Please send me your General Line Catalog covering the complete Switchcraft line.

My area(s) of interest is:

- Switches Connectors Power Cords
- EAC Receptacles Jacks/Plugs
- Molded Cable Assemblies Patch Panels

My application is Current

Future (date) _____

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Company _____ Title _____

Address _____

City _____ State _____ Zip _____

Telephone () _____

Mail To: Marketing Communications Dept.,
Switchcraft, Inc.,
5555 N. Elston Ave.,
Chicago, IL 60630

REP 10-88

Switchcraft

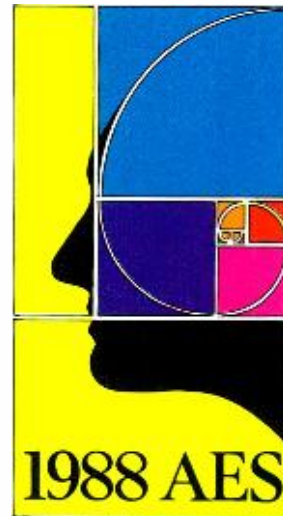
A Raytheon Company

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Chicago, IL 60630
(312) 792-2700

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www.americanradiohistory.com

Exhibitor Listings



Who's at the show? What are the new products? Whether or not you're attending the show, this alphabetical exhibitor listing is the best place to start sorting out this year's show.

This listing is the result of more than three months' worth of work and planning. We solicited information from the exhibiting companies, asking for new products that will be introduced and the product lines that will be exhibited. From the forms that were returned to us, as well as from phone calls to some companies, we obtained the information that is presented here.

Companies that were able to submit new product information have a new products entry, containing the model name or number and a short description. Product lines are listed below the new products.

Each entry has been assigned a circle number. If you want more information on any of the companies, circle the appropriate number on the Rapid Facts Card, which is bound into the back of this issue.

For companies that have advertised in this issue, the company names are listed in blue. On the same line as the circle number, also in blue ink, is the page number where the ad appears.

Although this list is as comprehensive as possible at press time, there are changes and additions occurring every day. Every effort has been made to ensure that the listings are as up-to-date as possible. For final show information, refer to the official show program at the convention site.

If you are looking for a specific piece of equipment and want to find out which companies make it, refer to the Product Directory. And for additional information on many of the products listed in this directory, see Product Preview.

AB International Electronics (816)

Product line _____
Amplifiers.
Circle (200)

Accurate Sound Corp. (428)

Not available at press time.
Circle (201)

ACO Pacific (331)

New products _____
PS9200 microphone power supply; Alternative family of Type 1 measurement microphones; Acoustical Interface system; PS9048 battery supply; ACM48UP cardioid studio microphone.

Product line _____
Maintenance, test and measuring equipment; microphones, booms, stands and accessories; microphones, studio and PA; microphones, wireless and RF.
Circle (202)

Acoustics Design Group (534)

Not available at press time.
Circle (203)

Adams-Smith (600*)

New products _____
New features for 2600A/V audio-video editor; Zeta-Remote.

Product line _____
Editing systems, digital; MIDI devices; synchronizer systems.
Circle (204)

AEG/Olympia (700*)

Not available at press time.
Circle (205)

Agfa-Gevaert (406*)

Product line _____
Recording tape, audio; recording tape,

video; tape duplication, cassette and reel-to-reel.
Circle (206)

Aircraft Music Library (1039)

Product line _____
Libraries, music production.
Circle (207)

AKG Acoustics (312*)

New products _____
Software V4.0 for ADR 68K; MicroMics microphone series.

Product line _____
Headphone and headsets; microphones, booms, stands and accessories; microphones, pre-amplifiers; microphones, studio and PA; microphones, wireless and RF; MIDI devices; reverb devices.
Circle (208) See inside back cover

Alesis Corporation (901*)

New products _____
Quadraverb digital signal processor; Micro EQ and Micro Cue Amp.

Product line _____
Equalizers; headphones and headsets; limiters/compressors; noise gates/expanders; pitch shifters; reverb devices; sequencers; signal processors, other.
Circle (209) See ad page 1

Allen & Heath (1406*)

New products _____
Scepter rack-mount mixer; Saber-16 recording console; Saber-PA live sound console; Sigma recording console.

Product line _____
Consoles, recording and production; consoles, sound reinforcement.
Circle (210)

Alpha Audio (604*)

YOU'VE NEVER HEARD A TAD SPEAKER AND YOU NEVER WILL.

With TAD speakers, technicians get the purest, most powerful reproduction of sound in the industry. And nothing more. Because the TAD division at Pioneer Electronics prides itself on being colorless.

Our Professional Sound Lab insures the outstanding quality of our products through a series of tests, including Doppler lasers, holography lasers and anechoic chambers. Products are also tested by computer for phase uniformity, transient response and frequency response. Then, using only the finest



materials available, every component is assembled by hand, allowing for tolerances down to a millionth of an inch.

At Pioneer, we put so much more into our TAD speakers, they don't sound like speakers at all.

For more information regarding TAD speaker components, please contact Leon Sievers at Pioneer Electronics (USA) Inc.

TAD Technical
Audio Devices

Professional Productions Division of Pioneer Electronics (USA) Inc.,
2265 E. 220th Street, Long Beach, CA 90810 (213) 816-0415

Alpha Audio, continued

New products _____
Boss II automated audio editing system.
Product line _____

Acoustic treatment materials; editing systems, digital; synchronizer systems.

Circle (211) See ad page 98

Amber Electro Design (527)

New products _____
Total Solution Automated Audio Measurement package.

Product line _____
Maintenance, test and measuring equipment.

Circle (212)

Amek/TAC (818*)

New products _____
Mozart console.

Product line _____
Consoles, recording and production; consoles, sound reinforcement.

Circle (213) See ad page 47

American Multimedia/ Concept Design (807*)

Product line _____
Tape duplication, cassette and reel-to-reel.

Circle (214)

American Recorder Technology (631)

Not available at press time.

Circle (215)

Ampex Magnetic Tape Division (212*)

Product line _____
Recording tape, audio; recording tape, video; tape duplication, cassette and reel-to-reel.

Circle (216) See ad page 57

AMS/Calrec (722*)

New products _____
Logic 1 automated digital mixing console.

Product line _____
Consoles, automation systems; consoles, digital; consoles, recording and production; delays, analog and digital; digital audio workstations; editing systems, digital; microphones, booms, stands and accessories; microphones, studio and PA; pitch shifters; recorders, hard disk; reverb devices; sound samplers.

Circle (217) See ad page 89

Analog Digital Synergy (1207*)

Product line _____
Consoles, digital.

Circle (218)

ANT Telecommunications (333*)

New products _____

AC-27 card for Sony BVH-2000 VTR; E-11 mono system for broadcast remote pickup and mono recordings.

Product line _____
Noise reduction systems.

Circle (219) See ad page 64

Apex Machine Co. (449*)

Product line _____
Tape duplication, cassette and reel-to-reel.

Circle (220)

Aphex Systems (913*)

New products _____
Model 120 servo-balanced distribution amp.

Product line _____
Noise gates/expanders; signal processors, other.

Circle (221) See ad page 43

API Audio Products (829*)

New products _____
550B EQ; 560B 10-band graphic EQ; 525B motorized rotary compressor/gate; 500VP12 rack with 10 500 series modules; 5004B 4-position rack for EQs; 4032 console.

Product line _____
Amplifiers; consoles, automation systems; consoles, recording and production; disc mastering systems; equalizers; limiters/compressors; metering devices; microphones, pre-amplifiers; noise gates/expanders; patchbay and jack panels; signal processors, other; transformers, audio.

Circle (222)

Apogee Electronics (730)

New products _____
Mastering Box A/D converter; model 1000 DAT/1000-EIAJ enhancement modules.

Product line _____
Metering devices; other products (specialized digital components).

Circle (223)

Applied Research and Technology (250)

New products _____
MultiVerb 20-bit effects processor; ProVerb 200 digital effects processor; PD3-1000 alignment delay system.

Product line _____
Delays, analog and digital; equalizers; pitch shifters; reverb devices; signal processors, other.

Circle (224) See ad page 63

Ariel (832)

New products _____
SYSid acoustic measurement system; DSP-C25 DSP co-processors; PC-56 DSP board for IBM PCs and compatibles.

Product line _____

Computers, hardware and peripherals; digital audio workstations; editing systems, digital; maintenance, test and measuring equipment; recorders, hard disk; signal processors, other.

Circle (225)

A&S Case Co. (1033)

Not available at press time.

Circle (226)

Ashly Audio (800)

New products _____
CL-100 half-rack compressor/limiter; SG-100 half-rack noise gate; XR-100 half-rack electronic crossover; MP-100 half-rack mic/line pre-amp; HP-100 half-rack headphone amp; PQ-100 half-rack parametric EQ; PA-100 half-rack 40W mono amp; PA-200 stereo amp; CG-85 limiter/compressor; SG-35 noise gate; SG-34 noise gate; XR-1000, -2000, -3000, -4000 crossovers.

Product line _____
Amplifiers; crossovers and frequency dividers; equalizers; limiters/compressors; noise gates/expanders; signal processors, other.

Circle (227) See ad page 38

Associated Production Music (444*)

New products _____
Sound effects and production libraries: "Broadcast One," "Sound FX—The Library," "Sonoton," "Bruton Gold Classics," "Coombe International"; audio-for-video facility.

Product line _____
Libraries, music production; libraries, sound effects.

Circle (228)

Audico (611)

Product line _____
Tape duplication, cassette and reel-to-reel; video equipment, all.

Circle (229)

Audio Accessories (928)

New products _____
Telephone jacks, jack panels, patch cords, standard and custom pre-wired jack panels, all available in miniature and full size.

Product line _____
Patchbay and jack panels.

Circle (230) See ad page 104

Audio Animation (645*)

New products _____
Muse digital console.

Product line _____
Consoles, digital.

Circle (401)

Audio Developments (412*)

TOTAL AUDIO BRILLIANCE



- Up to four incredible studio sounds simultaneously!
 - Reverberation
 - Arpeggiated Effects
 - Reverse Gates
 - Easy to use front panel controls
 - 200 user memory locations
 - Over 100 studio-crafted presets
 - Fully programmable
 - Full parameter control
 - Random access keypad
 - Ultra-wide bandwidth
 - Full midi with battery back-up
 - Remote footswitch jack with preset increment
- Pitch Transposition
- Digital Delays
- Pitch Shift Doubling
- Chorusing
- Imaged Doubling
- EQ



Total Audio Brilliance! ART takes digital processing into the 21st century. Four effects at the same time. Full parameter variability. Thirty-two character LCD for operational simplicity. Create custom programs. Stack multi-effects. Store them in 200 memory locations! ART's NEW ultra-high resolution circuitry yields audio performance unequaled at any price.



We Put It All Together...

Applied Research & Technology
 215 Tremont Street
 Rochester, NY 14608
 (716) 436-2720
 TELEX: 4949793 ARTROC
 FAX: (716) 436-3942

Circle (41) on Rapid Facts Card

Export Distributors:
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Audio Developments, continued

New products _____

ADO66-11 two-channel mic amp; AD110 computerized mixing system; enhanced versions of AD160 and AD260 ENG mixers.

Product line _____

Consoles, recording and production; limiters/compressors; microphones, pre-amplifiers.

Circle (231)

Audio/Digital (248)

New products _____

PAD-300/18 delay system.

Product line _____

Delays, analog and digital; signal processors, other.

Circle (232)

Audio Intervisual Design/Sanken (1031)

Not available at press time.

Circle (233)

See ad page 97

Audio Kinetics (626*)

New products _____

ESbus synchronization system.

Product line _____

Synchronizer systems.

Circle (234)

Audio Logic (826*)

New products _____

SC 131 1/3-octave EQ; R1 D1 digital room delay; SC 610 mixer.

Product line _____

Consoles, recording and production; consoles, sound reinforcement; crossovers and frequency dividers; delays, analog and digital; equalizers; limiters/compressors; noise gates/expanders; signal processors, other.

Circle (235)

See ad page 44

Audio Precision (841*)

New products _____

DSP module for System One audio test system.

Product line _____

Maintenance, test and measuring equipment.

Circle (236)

Audio-Technica (726*)

New products _____

AT4049, -4051, -4053, -4031 microphones; AL60 omnidirectional system; ATH909, -910, -911 stereo headphones; AT859A Uni-Point cardioid element; AT861 calibrated omnidirectional element.

Product line _____

Cable and connectors; consoles, recording and production; headphones and headsets; loudspeakers, sound reinforcement; microphones, studio and PA; phonograph

cartridges.

Circle (237)

Audio Video Consultants (804*)

New products _____

SAM static audio master.

Product line _____

Tape duplication, cassette and reel-to-reel; tape machines, cassette and cartridge.

Circle (238)

BASF (526*)

Information Systems

New products _____

52149 calibration mechanism; 52151 BASF Chrome Super tape.

Product line _____

Maintenance, test and measuring equipment; recording tape, audio; recording tape, video.

Circle (239)

BBE Sound (938)

Not available at press time.

Circle (240)

See ad page 55

B&B Systems (940)

New products _____

AM-2HR audio test system; AM-3B phase monitor.

Product line _____

Maintenance, test and measuring equipment.

Circle (241)

Beyer Dynamic (341)

New products _____

MCE 86 condenser shotgun microphone; OT 770 and 990 Pro monitoring headphones; SHM 10 miniature hypercardioid gooseneck microphone; SHM 420 and 422 cardioid and supercardioid gooseneck microphones; MPC 40 low-profile boundary layer microphone; S186 wireless body back lavalier mics; Tourgroup microphones: M69TG, M88TG, M300TG, M500TG, M380TG.

Product line _____

Cable and connectors; equalizers; headphones and headsets; microphones, booms, stands and accessories; microphones, pre-amplifiers; microphones, studio and PA; microphones, wireless and RF.

Circle (242)

BGW Systems (320)

New products _____

750F and 750G monitor amplifiers.

Product line _____

Amplifiers; signal processors, other.

Circle (243)

Bose (1216*)

New products _____

SpeakerCAD graphics program.

Product line _____

Computer software, business; loudspeakers, sound reinforcement.

Circle (244)

Brainstorm Electronics (547)

New products _____

TB-4 Communicator; modification kit for Trident console talkback; interface for MCI JH-24.

Product line _____

Intercom systems.

Circle (245)

Broadcast Electronics (851)

Product line _____

MT-90-12 on-air modular console; PT-90 PS playback stereo cart machine; PT-90 RPS recorded playback stereo cart machine; DV-2 digital voice recorder/reproducer.

Product line _____

Consoles, recording and production; tape machines, analog; tape machines, cassette and cartridge.

Circle (246)

Bruel & Kjaer (239*)

Instruments

New products _____

Types 2123 and 2133 digital filter analyzers; type 4128 head and torso simulator; type 3544 laser velocity transducer.

Product line _____

Educational courses and programs; maintenance, test and measuring equipment; microphones, studio and PA.

Circle (247)

Bryston Ltd. (1012*)

Product line _____

Amplifiers; crossovers and frequency dividers.

Circle (248)

Cal Switch (249*)

Product line _____

Cable and connectors; maintenance, test and measuring equipment; microphones, booms, stands and accessories; patchbay and jack panels.

Circle (249)

Cetec Gauss (708*)

New products _____

2480 duplicating system; 1100 series test equipment.

Product line _____

Loudspeakers, component; loudspeakers, sound reinforcement; loudspeakers, studio monitoring; maintenance, test and measuring equipment; tape duplication, cassette and reel-to-reel.

Circle (250)

See ad page 75

Cetec Vega (706)

New products _____

Ranger 2 and PRO 2 wireless mic systems.

SSL G SERIES



For Tracking And Mixing

A production becomes a classic when the sound of the console matches an inspired performance, and the mixing system is true to the talent of the producer and engineer.

With G Series, every stage between the microphone and the recorder sounds rich and full. The Total Recall Computer instantly stores all eq and mic settings,

monitor mixes and routing – from the first track you lay to the last mix you create.

Today, there is more pressure than ever to produce a finished mix – fast! The tracking data compiled on an SSL means fast, effective mixing on an SSL.

If you want to produce classics — give us a call.



Solid State Logic

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Via Cesare Cantu' 1, 20092 Cinisello Balsamo, Milan · (2) 612 62 81
320 West 46th Street, New York, NY10036 · (212) 315-1111
6255 Sunset Boulevard, Los Angeles, California 90028 · (213) 463-4444

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US TOLL-FREE NUMBER 800 343 0101

Cetec Vega, continued

Product line _____

Intercom systems; microphones, booms, stands and accessories; microphones, studio and PA.

Circle (251)

Cipher Digital (346*)

New products _____

Softouch-PC audio editing system; Phantom VTR/emulator; Shadowpad-Maxi Shadow II controller; Shadowpad-Mini offset controller.

Product line _____

Synchronizer systems; video equipment, all.

Circle (252) See ad page 101

Clarity (1026)

New products _____

XLV effects automation interface.

Product line _____

Consoles, automation systems; MIDI devices; signal processors, other.

Circle (253)

CMX (3*)

New products _____

New features for CASS-I: Gismo control, track select, I2 control.

Product line _____

Consoles, automation systems; synchronizer systems.

Circle (254)

Community Light & Sound (421)

New products _____

CS Series II loudspeakers.

Product line _____

Loudspeakers, component; loudspeakers, sound reinforcement.

Circle (255) See ad page 83

Connectronics (714)

Product line _____

Cable and connectors.

Circle (256)

JL Cooper Electronics (607)

New products _____

PPS-100 SMPTE event generator and SMPTE/MIDI synchronizer; new features for MSB Plus 8x8 MIDI switching box; Mix Mate 8-track automation package.

Product line _____

Consoles, automation systems; MIDI devices; synchronizer systems.

Circle (257)

Countryman Associates (926)

New products _____

TV-H wireless microphone; Isomax headset microphone.

Product line _____

Headphones and headsets; microphones, booms, stands and accessories; microphones, studio and PA; microphones, wireless and RF.

Circle (258) See ad page 109

Crest Audio (909*)

New products _____

Model 7001 power amplifier.

Product line _____

Amplifiers.

Circle (259)

Crown International (1209*)

Product line _____

Amplifiers; microphones, booms, stands and accessories; microphones, studio and PA.

Circle (260)

CST Manufacturing & Sales (1411*)

Not available at press time.

Circle (261)

dbx (NA)

THE ULTIMATE MACHINE FOR DRIVERS.

The new generation of Renkus-Heinz Smart Processors boasts features that deliver unsurpassed levels of performance from the entire line of Smart Speaker Systems.™

The Smart Processor shows its true character when sound pressure levels are extreme. Spectrum Power Transfer™ noiselessly eliminates excessive driver excursion and heat build up. And the Sense Fail™ detection circuitry protects the system even if sense lines are interrupted.

An L.E.D. matrix on the front panel provides complete system status at-a-glance, revealing just how smoothly this machine goes through its paces.

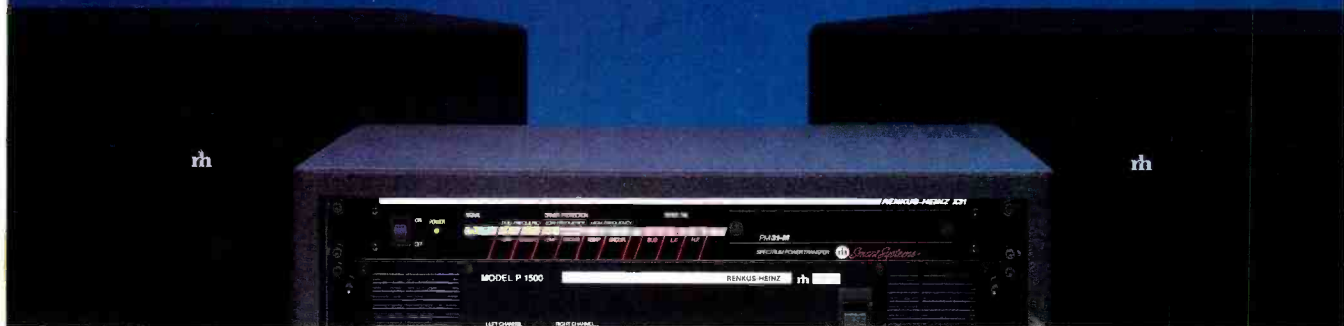
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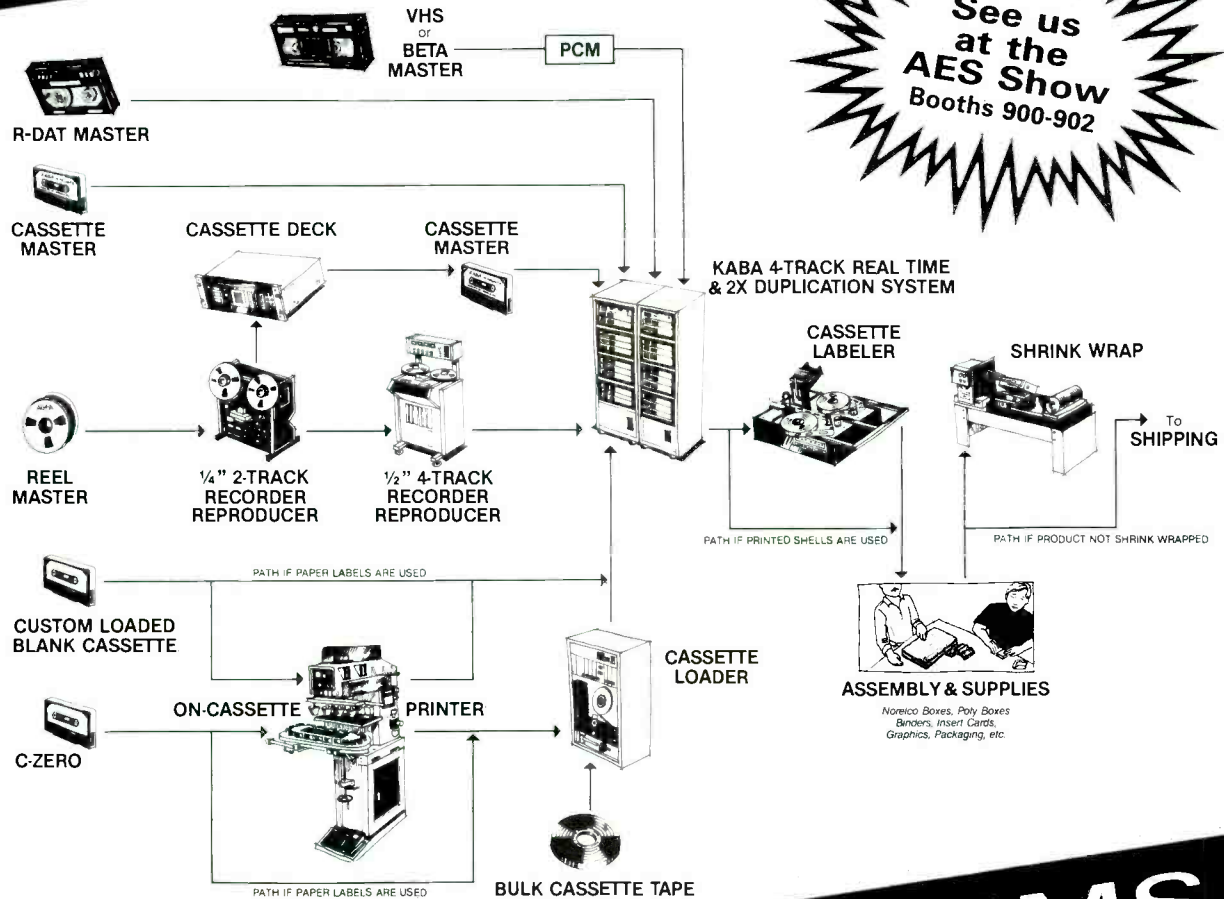
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Circle (43) on Rapid Facts Card

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dbx, continued

New products _____

563X single-ended noise reduction system.

Product line _____

Limiters/compressors; maintenance, test and measuring equipment; noise gates/expanders; noise reduction systems; signal processors, other.

Circle (262)

DDA (540*)

New products _____

Q Series console.

Product line _____

Consoles, recording and production; consoles, sound reinforcement.

Circle (263)

DIC Digital (1040*)

Not available at press time.

Circle (264)

See ad page 29

Digidesign (544*)

New products _____

Sound Accelerator DSP card; Turbosynth modular synthesis/sample processing software; Q Sheet A/V SMPTE/MIDI automation software; Sound Designer Universal waveform editing/DSP software; Creator sequencer software; Notator sequencing/notation software.

Product line _____

Computers, hardware and peripherals; computer software, MIDI.

Circle (265)

Digital Audio (Hillhurst Rm.)

Research

Product line _____

Digital audio workstations.

Circle (266)

Digital Audio Technologies (1016)

Not available at press time.

Circle (267)

**Digital Automation/
Tape Automation (445)**

New products _____

KSd-48/96 digital audio mixer.

Product line _____

Consoles, digital.

Circle (268)

Digital Creations (549*)

New products _____

Upgrade to Diskmix Moving Faders automation; Video Interface Computer.

Product line _____

Consoles, automation systems; video equipment, all.

Circle (269)

DigiTech (826*)

New products _____

IPS-33 Smart Shift pitch shifter.

Product line _____

Delays, analog and digital; MIDI devices; pitch shifters; reverb devices; signal processors, other.

Circle (270)

DOD Electronics

Product line _____

Consoles, recording and production; consoles, sound reinforcement; crossovers and frequency dividers; delays, analog and digital; equalizers; limiters/compressors; signal processors, other.

Circle (271)

Dolby Laboratories (322*)

Product line _____

Noise reduction systems, signal processors, other.

Circle (272)

See inside front cover

Dorrough Electronics (538)

New products _____

Model 1200 stereo signal test set.

Product line _____

Limiters/compressors; maintenance, test and measuring equipment; metering devices.

Circle (273)

Drawmer Distribution (842*)

Not available at press time.

Circle (274)

Edge Distribution (836*)

Not available at press time.

Circle (275)

Editron USA (916*)

Product line _____

Synchronizer systems.

Circle (276)

Electro Sound (910*)

New products _____

80:1 master speed kit; 80:1 slave speed kit.

Product line _____

Tape duplication, cassette and reel-to-reel.

Circle (277)

El Mar Plastics (1409)

Not available at press time.

Circle (278)

E-mu Systems (Westwood Rm.)

New products _____

Emulator Three Rack, rack-mount version of EIII; Accessories for EIII: HD300 hard disk storage system, new sounds, tutorial manual, software revision 1.21.

Product line _____

Digital audio workstations; sound samplers; synthesizers and keyboards.

Circle (279)

Euphonix (1000)

New products _____

Crescendo automated mixing console.

Product line _____

Consoles, recording and production.

Circle (280)

Eventide (812*)

New products _____

H3000-B Ultra-Harmonizer.

Product line _____

Delays, analog and digital; equipment rental and leasing; limiters/compressors; MIDI devices; noise gates/expanders; pitch shifters; reverb devices; signal processors, other.

Circle (281)

Everything Audio (624*)

Not available at press time.

Circle (282)

See ad page 49

Fairlight Instruments (400*)

New products _____

New products and features for the Series III: Waveform supervisor option, 280MB ESDI hard disk, 800MB WORM optical drive, MFX control console, 4MB WRAM cards, digital/high performance analog sampling card.

Product line _____

Computers, hardware and peripherals; computer software, MIDI; computer software, studio applications; editing systems, digital; libraries, music production; MIDI devices; recorders, hard disk; sequencers; sound samplers, synthesizers and keyboards.

Circle (283)

Fane Acoustics (1410)

New products _____

Court Series: Miniflex, Hiflex, Powerflex enclosures; Lowflex bass bin; System 1000 speaker system.

Product line _____

Crossovers and frequency dividers; loudspeakers, sound reinforcement; loudspeakers, studio monitoring.

Circle (284)

FM Acoustics (740)

Product line _____

Amplifiers; cable and connectors; crossovers and frequency dividers.

Circle (285)

Focusrite US Ltd. (1414*)

New products _____

ISA130 limiter/gate module; designs and modules for the Focusrite console.

Product line _____

Consoles, recording and production; equalizers; limiters/compressors; microphones, pre-amplifiers; noise gates/expanders; signal processors, other.

Circle (286)

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Circle (45) on Rapid Facts Card

**Fostex Corporation (500*)
of America**

New products _____
4020 event controller; RM-1200 close-field monitor system; Digital Master Recorder.
Product line _____

Amplifiers; cable and connectors; computers, hardware and peripherals; computer software, studio applications; consoles, automation systems; consoles, recording and production; consoles, sound reinforcement; crossovers and frequency dividers; headphones and headsets; limiters/compressors; loudspeakers, component; loudspeakers, sound reinforcement; loudspeakers, studio monitoring; microphones, booms, stands and accessories; microphones, studio and PA; MIDI devices; noise gates/expanders; racks and stands; signal processors, other; synchronizer systems; tape machines, analog; tape machines, digital.

Circle (487) See ad page 27

**French Expositions (900*)
in the US**

Not available at press time.
Circle (288)

Full Compass Systems (347)

New products _____
Psychologist series of remote-control matrix mixers.

Product line _____
Consoles, automation systems; delays, analog and digital; digital audio workstations; equalizers; intercom systems; limiters/compressors; signal processors, other.
Circle (289)

**Full Sail Center (941)
for the Recording Arts**

New products _____
Training program for New England Digital Synclavier and Direct-to-Disk system.

Product line _____
Educational courses and programs.
Circle (290)

Gefen Systems (635)

New products _____
BBC sound effects library on compact disc; M&E Library system database software program.

Product line _____
Computer software, studio applications; libraries, sound effects; sound samplers.
Circle (291) See ad page 105

Gentner Electronics (1048*)

New products _____
Pre-wired audio patch panels; Easyterm rack-mount wiring termination; EFT-3000 3-line telephone bandwidth extender; Digital Hybrid telephone line interface; RDA routing distribution amplifier; IC-20 inter-

com system; Silence Sensor unattended audio feed monitor; 6X headset/speaker amplifier; Program Switchers passive routing switcher; Combination Remote Mixer; Studio Timer; Digisound digital audio storage.

Product line _____
Amplifiers; consoles, recording and production; intercom systems; patchbay and jack panels; recorders, hard disk.
Circle (292) See ad page 74

Gold Line (339)

New products _____
PBM-1 pyramid boundary microphone; HPA-1 and -2 6-channel headphone systems; HPA Jr. portable single-channel stereo headphone amp.

Product line _____
Crossovers and frequency dividers; limiters/compressors; maintenance, test and measuring equipment; metering devices; microphones, booms, stands and accessories; microphones, studio and PA; noise gates/expanders; noise reduction systems.
Circle (293)

Gotham Audio (412*)

New products _____
New modules for Harmonia Mundi Acustica digital processing system: digital dither, A/D conversion, limiting/compression; EMT 448 hard disk digital audio recorder.

Product line _____
Cable and connectors; compact disc players; consoles, digital; consoles, recording and production; delays, analog and digital; digital audio workstations; disc mastering systems; equalizers; limiters/compressors; loudspeakers, studio monitoring; microphones, booms, stands and accessories; microphones, studio and PA; noise reduction systems; phonograph cartridges; phonograph turntables; reverb devices; synchronizer systems; tape machines, analog; tape machines, digital.
Circle (294)

**Harrison Information (1008)
Technologies**

Not available at press time.
Circle (295)

Heino Iseman (707)

Product line _____
Tape duplication, cassette and reel-to-reel.
Circle (296)

Howe Technologies (1051)

Product line _____
Synchronizer systems.
Circle (397)

ILP Manufacturing (349)

Not available at press time.
Circle (398)

IMC/Akai (548*)

Product line _____
Consoles, digital; delays, analog and digital; equalizers; MIDI devices; patchbay and jack panels; reverb devices; signal processors, other; sound samplers; synthesizers and keyboards; tape machines, digital.
Circle (299)

**Industrial Stength (447)
Industries**

New products _____
Wendel Jr. digital sampling drum machine and percussion replacement device; R16 programmable stereo digital effects processor; PM-1600 16-input stereo mixer; PM-800 8-input stereo mixer; P700 stereo power amplifier; CN40 electronic crossover; PE30 parametric EQ.

Product line _____
Amplifiers; cable and connectors; computer software, business; computer software, MIDI; computer software, studio applications; consoles, recording and production; consoles, sound reinforcement; crossovers and frequency dividers; delays, analog and digital; equalizers; reverb devices; signal processors, other; sound samplers.
Circle (300)

Innovative Electronic Designs

New products _____
Model 540 ambient analysis system.
Product line _____
Amplifiers; computers, hardware and peripherals; microphones, pre-amplifiers; signal processors, other.
Circle (301)

Integrated Media Systems (905*)

Not available at press time.
Circle (302)

IQS (NA)

New products _____
Model 402 audio signal analyzer.
Product line _____
Acoustic design and construction; computers, hardware and peripherals; computer software, studio applications; maintenance, test and measuring equipment; microphones, booms, stands and accessories; signal processors, other.
Circle (303)

**Ivie, a (643)
Mark IV Co.**

New products _____
RC-12 room combiner; model 7000 integrated sound reinforcement electronics; IBMI PC-40 1/3-octave portable EQ.
Product line _____
Amplifiers; crossovers and frequency di-

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Circle (46) on Rapid Facts Card

Ivie, continued

viders; equalizers; limiters/compressors; maintenance, test and measuring equipment; signal processors, other.

Circle (304)

JBL Professional (326*)

New products

Control 10 reference monitor loudspeaker system.

Product line

Amplifiers; delays, analog and digital; equalizers; limiters/compressors; loudspeakers, component; loudspeakers, sound reinforcement; loudspeakers, studio monitoring.

Circle (305)

JRF Magnetic Sciences (337)

New products

Center-track time code retrofit kit for Otari TC50.

Product line

Tape machines, replacement heads.

Circle (306)

See ad page 117

JVC (125*)

Professional Products

Product line

Digital audio workstations; editing systems, digital; tape machines, digital; video equipment, all.

Circle (307)

See ad page 13

KABA (716*)

Product line

Racks and stands; tape duplication, cassette and reel-to-reel.

Circle (308)

See ad page 69

Kenwood USA (850)

Product line

Maintenance, test and measuring equipment.

Circle (309)

King Instrument Corp. (709*)

Product line

Tape duplication, cassette and reel-to-reel.

Circle (310)

Klark-Teknik (540*)

New products

Jade One MkII linear phase active monitor.

Product line

Delays, analog and digital; equalizers; loudspeakers, studio monitoring; maintenance, test and measuring equipment, reverb devices.

Circle (311)

See ad page 45

Klipsch and Associates (Rm. 201)

Not available at press time.

Circle (312)

Klotz & Co. (731)

Not available at press time.

Circle (313)

Korg USA (Rm. 205)

New products

Q1 MIDI workstation; S1 production workstation; M1 music workstation.

Product line

Delays, analog and digital; digital audio workstations; equipment cases; libraries, sampled sounds; limiters/compressors; MIDI devices; patchbay and jack panels; racks and stands; reverb devices; sequencers; signal processors, other; sound samplers; synthesizers and keyboards.

Circle (314)

Lexicon (418*)

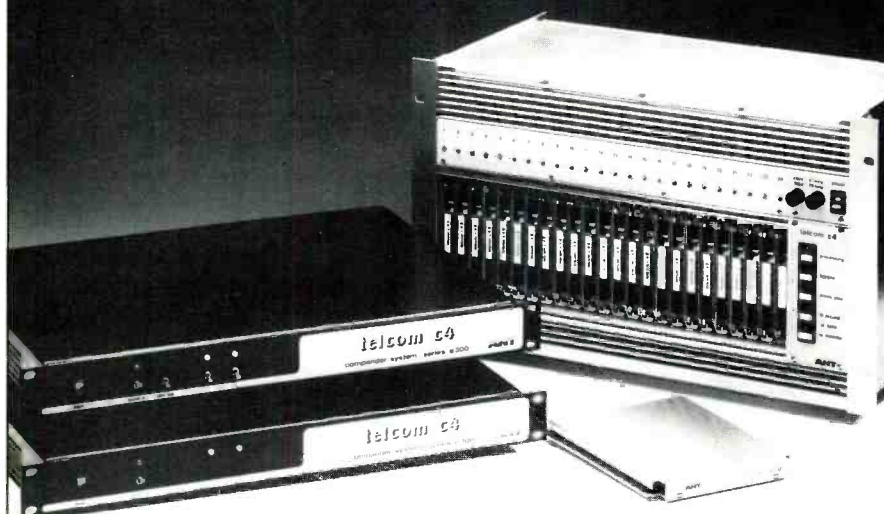
New products

LXP-1 multi-effects processing module; MRC MIDI remote controller; 2400 TCF stereo audio time compressor/expander.

Product line

Delays, analog and digital; digital audio workstations; editing systems, digital; MIDI

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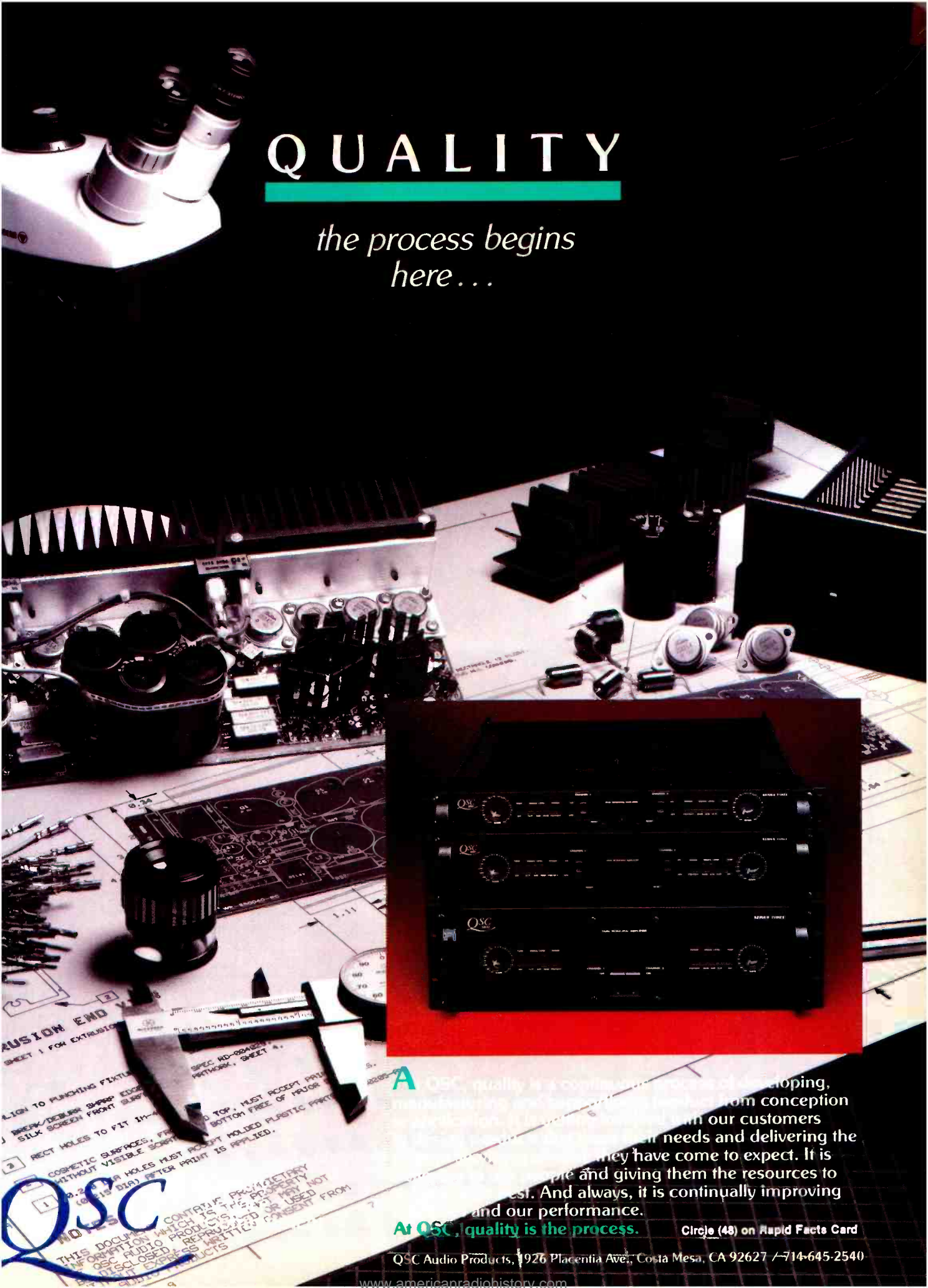
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Lexicon, continued

devices; pitch shifters; recorders, hard disk; signal processors, other.
Circle (315)

Lyre (NA)
New products _____
FDSS Studio additive synthesizer/resynthesizer; FDSOft V1.05 software-only version of FFDS Studio.
Product line _____

Computers, hardware and peripherals; computer software, MIDI; computer software, studio applications; synthesizers and keyboards.
Circle (316)

Magnefax International (450)
Product line _____
Recording tape, audio; tape duplication, cassette and reel-to-reel.
Circle (317)

Marshall Electronic (712)
New products _____
XLC Macintosh controller/librarian/compiler for Quantec XL.
Product line _____
Computer software, studio applications; crossovers and frequency dividers; delays, analog and digital; equalizers; limiters/compressors; noise gates/expanders; reverb devices; signal processor, other; sound samplers.
Circle (318)

Marshall Electronics (1408)
Product line _____
Cable and connectors; patchbay and jack panels; racks and stands.
Circle (319)

MB Electronics/ Josephson Engineering (1017*)
Not available at press time.
Circle (320)

Meyer Sound Laboratories (Rm. 214A*)
New products _____
2U and 3U amplifiers.
Product line _____
Amplifiers; equalizers; loudspeakers, sound reinforcement; loudspeakers, studio monitoring.
Circle (321)

MicroAudio (1416)
New products _____
Tamper-proof single-rack slave equalizers: EQ POD 2.1, 2.2, 2.2R, 3.1, 3.2, 3.2R.
Product line _____
Computers, hardware and peripherals; computer software, MIDI; equalizers; maintenance, test and measuring equipment; MIDI devices; signal processors, other.
Circle (322) See ad page 85

Milab (540*)
New products _____
The company's full product line, including the VIP-50, DC96B and LC-28, will be exhibited as part of Milab's new U.S. distribution agreement with Klark-Teknik.
Product line _____
Microphones, studio and PA.
Circle (323)

Minim Electronics (720)
Not available at press time.
Circle (324)

Mitsubishi Pro Audio Group (121*)
New products _____
X-880 32-track digital tape recorder.
Product line _____
Consoles, automation systems; consoles, recording and production; limiters/compressors; noise gates/expanders; tape ma-

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Circle (49) on Rapid Facts Card

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chines, digital; tape machines, other.

Circle (325)

Mosses & Mitchell (813*)

New products _____

Pre-wired jackfields.

Product line _____

Cable and connectors.

Circle (326)

Motorola (729)

Not available at press time.

Circle (327)

Musik Produktiv (746)

New products _____

Hitec Audio MkIII full-range cabinet processor for a variety of manufacturers.

Product line _____

Signal processors, other.

Circle (328)

Nady Systems (727)

New products _____

1200 VHF wireless system; 650 VHF wireless system; IR 300 infrared transmission system.

Product line _____

Headphones and headsets; intercom systems; microphones, wireless and RF.

Circle (329)

Neutrik USA (1403)

New products _____

Weatherproof, rotary on-off switch connectors; Speakon connector series; Bantam, 1/4-inch frame plugs and latching jacks.

Product line _____

Cable and connectors; loudspeakers, component; maintenance, test and measuring equipment; patchbay and jack panels; transformers, audio.

Circle (330)

See ad page 42

Neve (300*)

New products _____

V60 console; Digital Transfer Console; Prism Series; 8232 console.

Product line _____

Consoles, automation systems; consoles, digital; consoles, recording and production; consoles, sound reinforcement; disc mastering systems; faders.

Circle (331)

See ad page 37

New England Digital (Rm. 216A*)

New products _____

Updates to PostPro/Direct-to-Disk system; 96-voice, 64Mb RAM version of Synclavier.

Product line _____

Digital audio workstations.

Circle (332)

Optical Disc Corporation (640*)

New products _____

Model 533 CD analyzer; model 534 CD EFM encoder.

Product line _____

Disc mastering systems; maintenance, test and measuring equipment.

Circle (333)

Orban Associates (327*)

New products _____

642B parametric equalizer/notch filter; 787A programmable mic processor.

Product line _____

Equalizers; limiters/compressors; signal processors, other.

Circle (334)

Otari

(114*)

New products _____

MX-55TM/MX-55NM 1/4-inch, 2-track recorders; MTR-100A 2-inch 24-track analog mastering recorder.

Product line _____

Racks and stands; recording tape, audio; recording tape, video; synchronizer systems; tape duplication, cassette and reel-to-reel; tape machines, analog; tape machines, cassette and cartridge; tape machines, digital.

Circle (335)

See ad page 3

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Circle (50) on Rapid Facts Card

Oxmoor (632)

New products _____
DCA-2 digital control attenuator; RC-16 remote control; RC-2 remote control; 4x4 buffer amplifier; DEQ-29 programmable 1/3-octave equalizer.

Product line _____
Computer software, studio applications; equalizers.
Circle (336)

Pacific Radio (545)

Electronics

Not available at press time.
Circle (337)

Panasonic Industrial/Ramsa (Rm. 209)

New products _____
SV-250 portable DAT recorder; SV-3500 DAT recorder; SL-4300 compact disc player; SL-4700 multi-compact disc player; WRT820B recording console.
Product line _____

Amplifiers; compact disc players; consoles, recording and production; consoles, sound reinforcement; crossovers and frequency dividers; delays, analog and digital; loudspeakers, sound reinforcement; loudspeakers, studio monitoring; microphones, booms, stands and accessories; microphones, studio and PA; recording tape, audio; tape machines, digital; tape machines other; video equipment, all.

Circle (338) See ad page 11

Passport Designs (802)

Not available at press time.
Circle (339)

Penny and Giles (813*)

Product line _____
Faders; patchbay and jack panels.
Circle (340)

Post Logic Systems (845)

Not available at press time.
Circle (341)

Pro Co Sound (639)

Product line _____
Cable and connectors; patchbay and jack panels.
Circle (342)

Professional Audio Systems (737*)

New products _____
TOC studio monitors 1 and 2; TOC sound reinforcement systems; CX-2580C 15-inch coaxial; permanent installation systems with TOC.
Product line _____

Amplifiers; crossovers and frequency dividers; loudspeakers, component; loudspeakers, sound reinforcement; loudspeakers; studio monitoring.
Circle (343) See ad page 21

Professional Sound Corporation (847)

New products _____
Range of mic boom poles by van den Bergh; Sonosax SX-PR mixer; PSC-SC-4 sound cart; PSC-MS-2 M-S stereo matrix decoder; PSC-MP-12T/48-P microphone power supplies; MP-48PH-Stereo power supply for Neumann 190i mic.

Product line _____
Consoles, recording and production; consoles, sound reinforcement; microphones, booms, stands and accessories; microphones, pre-amplifiers.
Circle (344)

Publison America (634*)

Not available at press time.
Circle (345)

QSC Audio Products (342*)

New products _____
1100 stereo amplifier.

On The Floor . . . or In the Rack.

Stewart Electronics *Active Direct Boxes* are designed to provide superb performance and are surprisingly affordable. Stewart offers you a choice of a rugged single channel model, ADB-1, and a four channel half rack model, the ADB-4. Both models feature all active circuitry, no transformers for amazingly flat frequency response.

The ADB-4 can be rack mounted from the front or back for flexibility. Each channel gives you all the versatility of the ADB-1 . . . they can handle up to 400 Watts RMS so you can connect an amp's speaker output to it (many other direct boxes would simply burn up) . . . accept instrument level inputs and can even be used to convert Hi-Z mics to Low-Z. The ADB-4 can also be used as a way to convert the output of a four channel -10dBm recorder to +4dBm for mix down, and it can send signals direct to tape!

The specs are as impressive as the features: Frequency Response 20Hz to 20kHz ± 0.5 dB; S/N Ratio greater than -116dB below rated output; Distortion <.02%. Go directly to your dealer today to go direct with Stewart.

Stewart

ELECTRONICS

11460 Sunrise Gold Circle
Rancho Cordova, CA 95742
(916) 635-3011



Designed and manufactured in the U.S.A.
© 1988 Stewart Electronics.

Circle (51) on Rapid Facts Card

Product line _____
Amplifiers; crossovers and frequency dividers; limiters/compressors; signal processors, other.
Circle (346) **See ad page 73**

Quested Monitoring Systems (1413)
Product line _____
Loudspeakers, studio monitoring.
Circle (347)

Real World (Fernwood Rm.) Research
Not available at press time.
Circle (348)

Re-Ann Products (939*)
Not available at press time.
Circle (349)

Recording Engineer/Producer (733*)

Stop by booths 733 and 735 to meet RE/P's sales and editorial staff, including Cameron Bishop, group vice president; Dennis Milan, publisher; Michael Fay, editor; Fred Ampel, editorial director; Dan Torchia, staff editor; Linda Stuckey, associate editor; Stan Kashine, East Coast sales representative; Mary Tracy, Midwest sales representative; West Coast sales representatives Herb Schiff, Jason Perlman and Chris Leonard; and Nick McGeachin, International sales representative.

Renkus-Heinz (1404)
New products _____

X31 Smart Systems processor; Coax 60 and 90 coaxial mid-frequency and HF horn and driver assemblies.

Product line _____
Amplifiers; loudspeakers, component; loudspeakers, sound reinforcement; signal processors, other.

Circle (350) **See ad page 66**

ROH (827)
New products _____

303PS party line power supply; ARMS7000 audio routing switcher.

Product line _____
Amplifiers; headphones and headsets; intercom systems; maintenance, test and measuring equipment; metering devices.
Circle (351)

Roland Corp. US (Rm. 208)
Product line _____

Delays, analog and digital; MIDI devices; reverb devices; signal processors, other; sound samplers; synthesizers and keyboards.

Circle (352)

RPG Diffusor Systems (1405)
New products _____

QRD Diffusor, Abfussor and Triffusor acoustical treatment materials.

Product line _____
Acoustic design and construction; acoustic treatment materials.
Circle (353)

RSEC (345)
Not available at press time.
Circle (354)

RSP Technologies (930)
Not available at press time.
Circle (355)

Saki Magnetics (340)

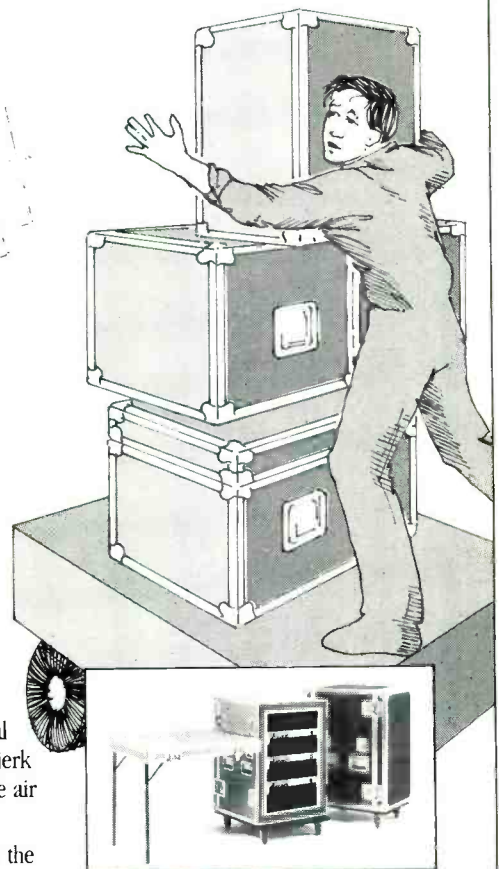
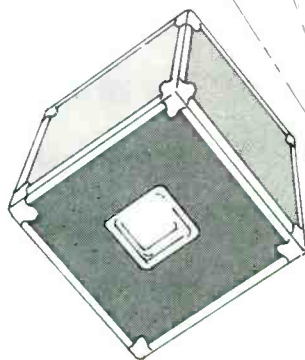
New products _____
Replacement heads for Sony BVH series recorders.

Product line _____
Tape machines, replacement heads.
Circle (356) **See ad page 20**

Samson Technologies (520*)

New products _____
SR-22 wireless system.
Product line _____

Will your equipment survive outrageous fortune?



ANVIL cases safeguard your critical gear from every bump, bang and jerk you'll likely encounter—both in the air and on the ground.

Our ATA cases meet or surpass all the shock and vibration criteria in the Air Transport Association's Specification 300, Category 1—the industry's toughest standard for reusable shipping containers.

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Circle (52) on Rapid Facts Card

October 1988 *Recording Engineer/Producer* 77

Samson, continued
Microphones, wireless and RF.
Circle (357)

Schoeps/ (1013)
Posthorn Recordings

New products _____
VMS 52 UB portable mic pre-amp/phantom supply/M-S matrix.

Product line _____
Equipment rental and leasing; metering devices; microphones, booms, stands and accessories; microphones, pre-amplifiers; microphones, studio and PA.
Circle (358)

Selco/Sifam (351)

Product line _____
Metering devices.
Circle (359)

Sellmark Electronic (849)
Services

Not available at press time.
Circle (360)

Sennheiser (808*)

New products _____
MD 518 dynamic microphone.
Product line _____
Consoles, recording and production; headphones and headsets; microphones, booms, stands and accessories; microphones, studio and PA; microphones, wireless and RF.
Circle (361)

Shape (NA)

New products _____
R-DAT cassette; Reel-to-Reel Mark 10 audio cassette; bidirectional audio box.
Product line _____
Recording tape, audio; recording tape, video; tape machines, cassette and cartridge.
Circle (362)

Shep Associates (933)

New products _____
SE1 4-band parametric EQ; SE2 power supply; SE6 EQ rack.
Product line _____
Consoles, recording and production; equalizers; equipment cases.
Circle (363)

Shure Brothers (107*)

New products _____
SM 99 gooseneck microphone; W15HT/58, -87 wireless mics.
Product line _____
Amplifiers; headphones and headsets; limiters/compressors; microphones, booms, stands and accessories; microphones, pre-amplifiers; microphones, studio and PA; microphones, wireless and RF; phono-

graph cartridges; transformers, audio.
Circle (364)

Solid State Logic (612*)

Product line _____
Consoles, automation systems; consoles, digital; consoles, recording and production; digital audio workstations.
Circle (365) See ad page 65

Solid Support Industries (1006)

Product line _____
Racks and stands.
Circle (366)

Sonic Solutions (1015)

Not available at press time.
Circle (367)

Sontec Electronics (1004)

New products _____
MES-450 programmable EQ system; BW-2X3 3-band FM broadcast level controller; MEP-250EX 2-channel parametric EQ.
Product line _____
Disc mastering systems; equalizers; limiters/compressors; microphones, pre-amplifiers; signal processors, other.
Circle (369)

Sony (101*)

New products _____
PCM-3324A 24-track multitrack recorder; PCM-3348 48-track digital recorder; APR-24 24-track analog recorder; APR-5003V 2-track analog recorder/reproducer; MXP-3056VF console; WRR-28 UHF wireless mic tuner; WRR-28 UHF transmitter; DAE-3000 digital audio editor; RM-KIT 3310 software upgrade for PCM-3324.
Product line _____
Computer software, studio applications; consoles, digital; consoles, recording and production; editing systems, digital; microphones, studio and PA; microphones, wireless and RF; tape machines, analog; tape machines, digital; video equipment, all.
Circle (370) See ads pages 17-19, 50-51, 95

Soundcraft (326*)

New products _____
6000 console.
Product line _____
Consoles, recording and production; consoles, sound reinforcement.
Circle (371) See ad page 5

Soundcraftsmen (1041)

New products _____
CD750 compact disc player; 300X4 MOSFET power amplifier.
Product line _____

Amplifiers; compact disc players; equalizers; signal processors, other.
Circle (372) See ad page 91

Sound Ideas (633)

New products _____
"New Ambience Series 3000" sound effects library; "Sound Ideas Music Production Library" on compact disc.
Product line _____
Libraries, music production; libraries, sound effects.
Circle (373) See ad page 111

Soundmaster International (1420*)

New products _____
Version 5 of Soundmaster Integrated Audio Editing System.
Product line _____
Computer software, studio applications; editing systems, digital; synchronizer systems.
Circle (374)

Sound Technology (840)

New products _____
Model 2000A external computer controlled audio test system.
Product line _____
Maintenance, test and measuring equipment.
Circle (375)

Soundtracs (520*)

New products _____
IL3632 in-line production console; Tracmix fader automation system; CMX recording console; MRX32 recording console; MRX32 sound reinforcement console; PC24 in-line recording console; FME24 dubbing/video post-production console.
Product directory _____
Computer software, studio applications; consoles, automation systems; consoles, recording and production; consoles, sound reinforcement.
Circle (376)

Sound Workshop (237*)

Professional Audio Products
New products _____
Custom consoles for film and video post-production.
Product line _____
Consoles, recording and production.
Circle (377)

Stanton Magnetics (426)

New products _____
500AL/MP cartridges and replacement styli; 890 AL back-cuing cartridge; headphone with boom mic.
Product line _____
Headphones and headsets; phonograph



IN THE PAST WE HAD A BIG ADVANTAGE OVER THE COMPETITION. NOW WE'VE GOT A SMALL ONE.

Until UREI's 813 Time Align® Monitor entered the studio, speaker systems had become a "smear" on the industry. A "time smear," in which high and low frequencies subtly assaulted the ear because they arrived out of sync. The results were general listener fatigue and unrealistic sound, particularly on lead instruments and vocals.

The UREI 813 solved the "time smear" problem with Time Alignment™, unifying sound into a single point source. This dramatic breakthrough, along with other major technical advances, soon established the 813 as the industry standard.

Now UREI introduces less of a good thing: the 809 Time Align® Studio Monitor. The 809 delivers all the engineering depth of its big brother, but at a compact size and price that's ideal for small control rooms and near-field applications.

UREI's 809 features a remarkable, all-new 300mm (12") coaxial driver that achieves a true one-point sound source, superior stereo imaging, and tight bass. It incorporates a unique titanium diaphragm compression driver that unleashes unequalled high frequency response.

The 809 has exceptional power handling capabilities, high sound sensitivity, and low distortion. It accomplishes precise acoustic impedance matching and smooth out-of-band response with UREI's patented high-frequency horn with diffraction buffer. And its ferrite magnet structures assure the system's high sensitivity drivers will not degrade with time and use.

UREI's Model 809 Time Align® Studio Monitor. Smaller package. Smaller price. Same impeccable "813" sound quality. See how it fits into your studio today.

JBL Professional
8500 Balboa Boulevard
Northridge, CA 91329

UREI

Time Align® is registered trademark of E.M. Long Associates...Oakland, CA.

Circle (53) on Rapid Facts Card

Stanton, continued

catridges.

Circle (378)

Star Case (637)

New products _____

Case Legs rack lid modification.

Product line _____

Equipment cases; racks and stands.

Circle (379)

Steinberg Digital Audio (932*)

New products _____

CCR computer controlled recorder.

Product line _____

Computers, hardware and peripherals; computer software, studio applications; digital audio workstations; editing systems, digital; recorders, hard disk.

Circle (380)

Stewart Electronics (744)

New products _____

HDA-4 headphone distribution amp; PM-6 phantom power supply.

Product line _____

Microphones, booms, stands and accessories; microphones, pre-amplifiers.

Circle (381)

See ads pages 76, 93

Studer Revox America (218*)

New products _____

A807 recorders; C270 recorders; DE 4003 digital electronic editing system; A730 professional CD player.

Product line _____

Amplifiers; compact disc players; consoles, automation systems; consoles, recording and production; editing systems, digital; synchronizer systems; tape machines, analog; tape machines, cassette and cart; tape machines, digital; tape machines, other.

Circle (382)

See back cover

Sunkyong International (734*)

Not available at press time.

Circle (383)

Symetrix (630)

New products _____

Model 111 Adaptive Hybrid digital telephone interface; Digital Processing Recorder.

Product line _____

Digital audio workstations; equalizers; limiters/compressors; microphones, pre-amplifiers; noise gates/expanders; noise reduction systems; patchbay and jack panels; recorders, hard disk; signal processors, other.

Circle (384)

See ad page 103

Tannoy North America (912*)

New products _____

PBM-8 reference monitors.

Product line _____

Amplifiers; loudspeakers, component; loudspeakers, sound reinforcement; loudspeakers, studio monitoring.

Circle (385)

Tascam (110*)

Product line _____

Compact disc players; consoles, recording and production; consoles, sound reinforcement; equalizers; MIDI devices; synchronizer systems; tape duplication, cassette and reel-to-reel; tape machines, analog.

Circle (386)

See ad page 7

Telex Communications (922*)

New products _____

FMR-25 wireless mic system; 6120 XLP audiotape duplicator.

Product line _____

Microphones, studio and PA; microphones, wireless and RF; tape duplication, cassette and reel-to-reel.

Circle (387)

See ad page 33

3M Magnetic (512*)

Media Division

Product line _____

Recording tape, audio; recording tape, video.

Circle (388)

See ad page 15

360 Systems (1018*)

New products _____

R2000 and R4000 digital audio message repeater systems; 16x16 audio patchbay.

Product line _____

MIDI devices.

Circle (389)

TimeLine (1027*)

Product line _____

Synchronizer systems.

Circle (390)

Trident Audio USA (432*)

Product line _____

Consoles, recording and production; consoles, sound reinforcement.

Circle (391)

See ad page 9

27th Dimension (705)

New products _____

Platinum music library; Index sound effects and music software index; Hypercard sound effects software.

Product line _____

Computer software, studio applications; libraries, music production; libraries, sampled sounds; libraries, sound effects.

Circle (392)

See ad page 107

UREI (326*)

New products _____

7110 limiter/compressor. Amplifiers; de-

lays, analog and digital; equalizers; limiters/compressors; loudspeakers, studio monitoring; signal processors, other.

Circle (393)

Valley International (609)

New products _____

DDP-3, -5, -8 digital dynamics processors.

Product line _____

Equalizers; limiters/compressors; noise gates/expanders; noise reduction systems; signal processors, other.

Circle (394)

Veetronix/Reach (950)

Not available at press time.

Circle (395)

Versadyne International (1417)

Not available at press time.

Circle (396)

WaveFrame (646*)

New products _____

AudioFrame digital audio workstation.

Product line _____

Computer software, MIDI; computer software, studio applications; consoles, digital; consoles, recording and production; consoles, sound reinforcement; digital audio workstations; editing systems, digital; libraries, music production; libraries, sampled sounds, libraries, sound effects; reverb devices; sequencers; signal processors, other; sound samplers.

Circle (397)

Whirlwind (530)

Product line _____

Cable and connectors; patchbay and jack panels; transformers, audio.

Circle (398)

Wireworks (1401*)

New products _____

CQ series Star Quad cables; CF series super flexible cables.

Product line _____

Cable and connectors.

Circle (399)

Yamaha (Balboa Rm.*)

Product line _____

Amplifiers; consoles, recording and production; consoles, sound reinforcement; crossovers and frequency dividers; delays, analog and digital; equalizers; limiters/compressors; loudspeakers, component; loudspeakers, sound reinforcement; loudspeakers, studio monitoring; microphones, booms, stands and accessories; microphones, studio and PA; MIDI devices; reverb devices; signal processors, other; sound samplers; tape machines, cassette and cartridge.

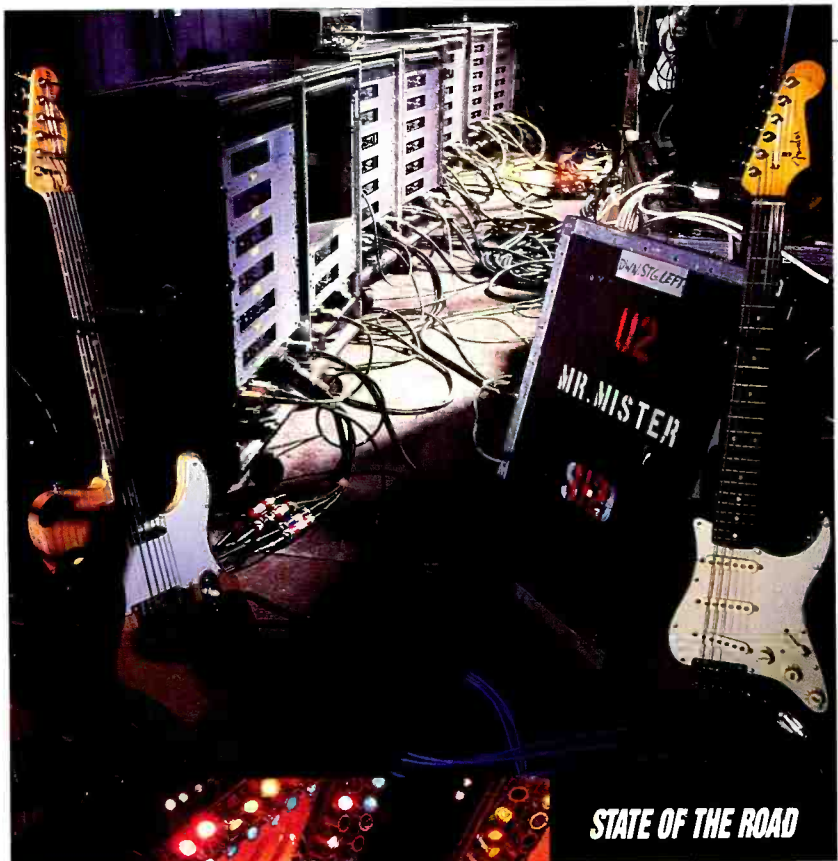
Circle (400)

See ad pages 34-35

Last-minute additions

- ADX Systems** (947)
Circle (410)
- American Helex Technology** (1214*)
Circle (411)
- Apogee Sound** (1032*)
Circle (411)
- Audiodevelopment** (1047)
Circle (413)
- Audix** (1030)
Circle (414)
- AVAC** (1044*)
Circle (415)
- Berklee College of Music** (443)
Circle (416)
- Cerwin Vega** (Wilshire Rm.*)
Circle (417)
- Conquest Sound** (917)
Circle (418)
- Court Acoustics** (Rm. 204)
Circle (419)
- Crystal Semiconductor** (1043*)
Circle (420)
- C-T Audio Marketing** (1205)
Circle (421)
- Diless Ltd.** (948)
Circle (422)
- EAW** (1218*)
Circle (423)
- Forat Electronics** (1049)
Circle (424)
- Harrison Systems** (308*)
Circle (425)
- Hybrid Arts** (1121*)
Circle (426) See ad page 41
- Kurzweil Music Systems** (1113*)
Circle (427)
- Monster Cable Products** (821)
Circle (428)
- Offbeat Systems** (846)
Circle (429)
- Optifile/A/V Technologies Int'l** (942*)
Circle (430)

Continued on page 88



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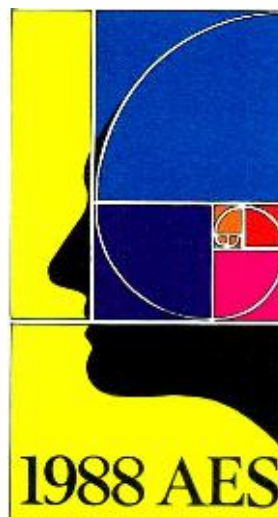
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Circle (54) on Rapid Facts Card

Product Directory



This directory lists exhibiting companies that manufacture equipment or offer services in 65 categories. To use the directory, find the appropriate category listed in boldface type. The companies are listed in alphabetical order.

To simplify things, similar product categories that were separate in past years have been combined. Product headings are intended as general product guidelines, and may not reflect what all companies manufacture. For example, not all companies listed under the "Limiters/compressors" category will manufacture both products.

Basic information on all exhibiting companies is contained in the Exhibitor Directory, and detailed information on many new products is contained in Product Preview.

Because of our press deadlines, last-minute exhibitors or AES booth changes may not be included. Check your convention program for additional information.

Acoustic design and construction

IQS (NA)
RPG Diffusor Systems (1405)

Acoustic treatment materials

Alpha Audio (604*)
RPG Diffusor Systems (1405)

Amplifiers

AB International Electronics (816)
API Audio Products (829*)
Ashly Audio (800)
BGW Systems (320)
Bryston Ltd. (1012*)

Crest Audio (909*)
Crown International (1209*)
FM Acoustics (740)
Fostex (500*)
Gentner Electronics (1048*)
Industrial Stength Industries (447)
Innovative Electronic Designs (343)
Ivie/Mark IV Co. (643)
JBL Professional (326*)
Meyer Sound Laboratories (Rm. 214A*)
Panasonic Industrial/Ramsa (Rm. 209)
Professional Audio Systems (737*)
QSC Audio Products (342*)
Renkus-Heinz (1404)
ROH (827)
Shure Brothers (107*)
Soundcraftsmen (1041)
Studer Revox America (218*)
Tannoy North America (912*)
UREI (326*)
Yamaha (Balboa Rm.*)

Cable and connectors

Audio-Technica (726*)
Beyer Dynamic (341)
Cal Switch (249*)
Connectronics (714)
FM Acoustics (740)
Fostex (500*)
Gotham Audio (412)
Industrial Stength Industries (447)
Marshall Electronics (1408)
Mosses & Mitchell (813*)
Neutrik USA (1403)
Pro Co Sound (639)
Whirlwind (530)
Wireworks (1401*)

Compact disc players

Gotham Audio (412)
Soundcraftsmen (1041)
Studer Revox America (218*)
Tascam (110*)

Computers, hardware and peripherals

Ariel (832)
Digidesign (544*)
Fairlight (400*)
Fostex (500*)
Innovative Electronic Designs (343)
IQS (NA)
Lyre (NA)
MicroAudio (1416)
Steinberg Digital Audio (932*)

Computer software, business

Bose (1216*)
Industrial Stength Industries (447)
Innovative Electronic Designs (343)

Computer software, MIDI

Digidesign (544*)
Fairlight (400*)
Industrial Stength Industries (447)
Lyre (NA)
MicroAudio (1416)
WaveFrame (646*)

Computer software, studio applications

Fairlight (400*)
Fostex (500*)
Gefen Systems (635)
Industrial Stength Industries (447)
IQS (NA)
Lyre (NA)
Marshall Electronic (712)
Oxmoor (632)
Sony (101*)
Soundmaster International (1420*)
Soundtracs (520*)
Steinberg Digital Audio (932*)
27th Dimension (705)
WaveFrame (646*)

**Consoles,
automation systems**

AMS/Calrec (722*)
API Audio Products (829*)
Clarity (1026)
CMX (3*)
JL Cooper Electronics (607)
Digital Creations (549*)
Fostex (500*)
Full Compass Systems (347)
Mitsubishi Pro Audio Group (121*)
Neve (300*)
Solid State Logic (612*)
Soundtracs (520*)
Studer Revox America (218*)

**Consoles,
digital**

AMS/Calrec (722*)
Analog Digital Synergy (1207*)
Audio Animation (645*)
Digital Automation/
Tape Automation (445)
Gotham Audio (412)
IMC/Akai (548*)
Neve (300*)
Solid State Logic (612*)
Sony (101*)
WaveFrame (646*)

**Consoles,
recording and production**

Allen & Heath (1406*)
Amek/TAC (818*)
AMS/Calrec (722*)
API Audio Products (829*)
Audio Developments (412*)
Audio Logic (826*)
Audio-Technica (726*)
Broadcast Electronics (851)
DDA (540*)
DOD Electronics (826*)
Euphonix (1000)
Focusrite US (1414*)
Fostex (500*)
Gentner Electronics (1048*)
Gotham Audio (412)
Industrial Strength Industries (447)
Mitsubishi Pro Audio Group (121*)
Neve (300*)
Panasonic/Ramsa (Rm. 209)
Professional Sound Corp. (847)
Sennheiser (808*)
Shep Associates (933)
Solid State Logic (612*)
Sony (101*)
Soundcraft (326*)
Soundtracs (520*)
Sound Workshop Professional Audio
Products (237*)

Studer Revox America (218*)
Tascam (110*)
Trident (432*)
WaveFrame (646*)
Yamaha (Balboa Rm.*)

**Consoles,
sound reinforcement**

Allen & Heath (1406*)
Amek/TAC (818*)
Audio Logic (826*)
DDA (540*)
DOD Electronics (826*)
Fostex (500*)
Industrial Strength Industries (447)
Neve (300*)
Panasonic/Ramsa (Rm. 209)
Professional Sound Corp. (847)
Soundcraft (326*)
Soundtracs (520*)
Tascam (110*)
Trident (432*)
WaveFrame (646*)
Yamaha (Balboa Rm.*)

**Crossovers
and frequency dividers**

Ashly Audio (800)
Audio Logic (826*)
Bryston Ltd. (1012*)
DOD Electronics (826*)

A · E · S · T · H · E · T · I · C · S

The new CSV Series speaker systems by Community complements the decor of the most discriminating contemporary commercial environment. CSV sound systems and floor monitors' built-in dynamic protection circuitry assures high reliability. Our simplified brackets guarantee ease of installation and offer the system designer a wide choice of mounting options. Also available are visually identical, specification-equivalent, optimally vented low frequency enclosures.



Community

Community Light & Sound, Inc.
333 East 5th Street
Chester, PA 19013
(215) 876-3400
tlx 834649 PhillyPA Cher

Circle (55) on Rapid Facts Card

*Crossovers and frequency
dividers, continued*

Fane Acoustics (1410)
FM Acoustics (740)
Fostex (500*)
Gold Line (339)
Industrial Strength Industries (447)
Ivie/Mark IV Co. (643)
Marshall Electronic (712)
Professional Audio Systems (737*)
QSC Audio Products (342*)
Yamaha (Balboa Rm.*)

Delays, analog and digital

AMS/Calrec (722*)
Applied Research & Technology (250)
Audio/Digital (248)
Audio Logic (826*)
DigiTech (826*)
DOD Electronics (826*)
Eventide (812*)
Full Compass Systems (347)
Gotham Audio (412)
IMC/Akai (548*)
Industrial Strength Industries (447)
JBL Professional (326*)
Klark-Teknik (540*)
Korg USA (Rm. 205)
Lexicon (418*)
Marshall Electronic (712)
Panasonic/Ramsa (Rm. 209)
Roland (Rm. 208)
UREI (326*)
Yamaha (Balboa Rm.*)

Digital audio workstations

AMS/Calrec (722*)
Ariel (832)
Digital Audio Research (Hillhurst Rm.)
E-mu Systems (Westwood Rm.)
Full Compass Systems (347)
Gotham Audio (412)
JVC (125*)
Korg USA (Rm. 205)
Lexicon (418*)
New England Digital (Rm. 216*)
Solid State Logic (612*)
Steinberg Digital Audio (932*)
Symetrix (630)
WaveFrame (646*)

Disc mastering systems

API Audio Products (829*)
Gotham Audio (412)
Neve (300*)
Optical Disc Corp. (640*)
Sontec Electronics (1004)

Editing systems, digital

Adams-Smith (600*)
Alpha Audio (604*)
AMS/Calrec (722*)
Ariel (832)
CMX (3*)
Fairlight (400*)
JVC (125*)

Lexicon (418*)
Sony (101*)
Soundmaster International (1420*)
Steinberg Digital Audio (932*)
Studer Revox America (218*)
WaveFrame (646*)

**Educational
courses and programs**

Bruel & Kjaer (239*)
Full Sail Center for the
Recording Arts (941)

Equalizers

Alesis (901*)
API Audio Products (829*)
Applied Research & Technology (250)
Ashly Audio (800)
Audio Logic (826*)
Beyer Dynamic (341)
DOD Electronics
Focusrite US (1414*)
Fostex (500*)
Full Compass Systems (347)
Gotham Audio (412)
IMC/Akai (548*)
Industrial Strength Industries (447)
Ivie/Mark IV Co. (643)
JBL Professional (326*)
Klark-Teknik (540*)
Marshall Electronic (712)
Meyer Sound Laboratories (Rm. 214A*)
MicroAudio (1416)
Orban Associates (327*)
Oxmoor (632)
Shep Associates (933)
Sontec Electronics (1004)
Soundcraftsmen (1041)
Symetrix (630)
Tascam (110*)
UREI (326*)
Valley International (609)
Yamaha (Balboa Rm.*)

Equipment cases

Korg USA (Rm. 205)
Shep Associates (933)
Star Case (637)

**Equipment
rental and leasing**

Eventide (812*)
Schoeps/Posthorn Recordings (1013)

Faders

Neve (300*)
Penny and Giles (813*)
Selco/Sifam (351)

Headphones and headsets

AKG Acoustics (312*)
Alesis (901*)
Audio-Technica (726*)
Beyer Dynamic (341)
Countryman Associates (926)
Fostex (500*)

Nady Systems (727)
ROH (827)
Sennheiser (808*)
Shure Brothers (107*)
Stanton Magnetics (426)

Intercom systems

Brainstorm Electronics (547)
Cetec Vega (706)
Full Compass Systems (347)
Gentner Electronics (1048*)
Nady Systems (727)
ROH (827)

**Libraries,
music production**

Aircraft Music Library (1039)
Associated Production Music (444*)
Fairlight (400*)
Sound Ideas (633)
27th Dimension (705)
WaveFrame (646*)

**Libraries,
sampled sounds**

Korg USA (Rm. 205)
27th Dimension (705)
WaveFrame (646*)

**Libraries,
sound effects**

Associated Production Music (444*)
Gefen Systems (635)
Sound Ideas (633)
27th Dimension (705)
WaveFrame (646*)

Limiters/compressors

Alesis (901*)
API Audio Products (829*)
Ashly Audio (800)
Audio Developments (412*)
Audio Logic (826*)
Full Compass Systems (347)
dbx (NA)
DOD Electronics (826*)
Dorrrough Electronics (538)
Eventide (812*)
Focusrite US (1414*)
Fostex (500*)
Full Compass Systems (347)
Gold Line (339)
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Ivie/Mark IV Co. (643)
JBL Professional (326*)
Korg USA (Rm. 205)
Marshall Electronic (712)
Mitsubishi Pro Audio Group (121*)
Orban Associates (327*)
QSC Audio Products (342*)
Shure Brothers (107*)
Sontec Electronics (1004)
Symetrix (630)
UREI (326*)
Valley International (609)
Yamaha (Balboa Rm.*)

Loudspeakers, component

Cetec Gauss (708*)
Community Light & Sound (421)
Fostex (500*)
JBL Professional (326*)
Neutrik USA (1403)
Professional Audio Systems (737*)
Renkus-Heinz (1404)
Tannoy North America (912*)
Yamaha (Balboa Rm.*)

Loudspeakers, sound reinforcement

Audio-Technica (726*)
Bose (1216*)
Cetec Gauss (708*)
Community Light & Sound (421)
Fane Acoustics (1410)
Fostex (500*)
JBL Professional (326*)
Meyer Sound Laboratories (Rm. 214A*)
Panasonic/Ramsa (Rm. 209)
Professional Audio Systems (737*)
Renkus-Heinz (1404)
Tannoy North America (912*)
Yamaha (Balboa Rm.*)

Loudspeakers, studio monitoring

Cetec Gauss (708*)

Fane Acoustics (1410)
Fostex (500*)
Gotham Audio (412)
JBL Professional (326*)
Klark-Teknik (540*)
Meyer Sound Laboratories (Rm. 214A*)
Panasonic/Ramsa (Rm. 209)
Professional Audio Systems (737*)
Quested Monitoring Systems (1413)
Tannoy North America (912*)
UREI (326*)
Yamaha (Balboa Rm.*)

Maintenance, test and measuring equipment

ACO Pacific (331)
Amber Electro Design (527)
Ariel (832)
Audio Precision (841*)
BASF Information Systems (526*)
B&B Systems (938)
Bruel & Kjaer (239*)
Cal Switch (249*)
Cetec Gauss (708*)
dbx (NA)
Dorrugh Electronics (538)
Gold Line (339)
IQS (NA)
Ivie/Mark IV Co. (643)
Kenwood USA (850)
Klark-Teknik (540*)

MicroAudio (1416)
Neutrik USA (1403)
Optical Disc Corp. (640*)
ROH (827)
Sound Technology (840)

Metering devices

API Audio Products (829*)
Apogee Electronics (730)
Dorrugh Electronics (538)
Gold Line (339)
ROH (827)
Schoeps/Posthorn Recordings (1013)
Selco/Sifam (351)

Microphones, booms, stands and accessories

ACO Pacific (331)
AKG Acoustics (312*)
AMS/Calrec (722*)
Beyer Dynamic (341)
Cal Switch (249*)
Cetec Vega (706)
Countryman Associates (926)
Crown (1209*)
Fostex (500*)
Gold Line (339)
Gotham Audio (412)
IQS (NA)
Panasonic/Ramsa (Rm. 209)
Professional Sound Corp. (847)

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combining EQ.

Circle (56) on Rapid Facts Card

*Microphones, booms, stands
and accessories, continued*

Schoeps/Posthorn Recordings (1013)
Sennheiser (808*)
Shure Brothers (107*)
Stewart Electronics (744)
Yamaha (Balboa Rm.*)

**Microphones,
pre-amplifiers**

ACO Pacific (331)
AKG Acoustics (312*)
API Audio Products (829*)
Audio Developments (412*)
Beyer Dynamic (341)
Focusrite US (1414*)
Innovative Electronic Designs (343)
Professional Sound Corp. (847)
Schoeps/Posthorn Recordings (1013)
Shure Brothers (107*)
Sontec Electronics (1004)
Stewart Electronics (744)
Symetrix (630)

**Microphones,
studio and PA**

ACO Pacific (331)
AKG Acoustic (312*)
AMS/Calrec (722*)
Audio-Technica (726*)
Beyer Dynamic (341)
Bruel & Kjaer (239*)

Cetec Vega (706)
Countryman Associates (926)
Crown (1209*)
Fostex (500*)
Gold Line (339)
Gotham Audio (412)
Milab (540*)
Panasonic/Ramsa (Rm. 209)
Schoeps/Posthorn Recordings (1013)
Sennheiser (808*)
Shure Brothers (107*)
Telex Communications (922*)
Yamaha (Balboa Rm.*)

**Microphones,
wireless and RF**

ACO Pacific (331)
AKG Acoustics (312*)
Beyer Dynamic (341)
Cetec Vega (706)
Countryman Associates (926)
Nady Systems (727)
Samson Technologies (520*)
Sennheiser (808*)
Shure Brothers (107*)
Sony (101*)
Telex Communications (922*)

MIDI devices

Adams-Smith (600*)
AKG Acoustics (312*)
Clarity (1026)
JL Cooper Electronics (607)

DigiTech (826*)
Eventide (812*)
Fairlight (400*)
Fostex (500*)
IMC/Akai (548*)
Korg USA (Rm. 205)
Lexicon (418*)
MicroAudio (1416)
Roland Corp. US (Rm. 208)
Tascam (110*)
360 Systems (1018*)
Yamaha (Balboa Rm.*)

Noise gates/expanders

Alesis (901*)
Aphex Systems (913*)
API Audio Products (829*)
Ashly Audio (800)
Audio Logic (826*)
dbx (NA)
Eventide (812*)
Focusrite US (1414*)
Fostex (500*)
Gold Line (339)
Marshall Electronic (712)
Mitsubishi Pro Audio Group (121*)
Symetrix (630)
Valley International (609)

Noise reduction systems

ANT Telecommunications (333*)
Dolby Laboratories (322*)
dbx (NA)
Gold Line (339)
Gotham Audio (412)
Symetrix (630)
Valley International (609)

Patchbay and jack panels

API Audio Products (829*)
Audio Accessories (928)
Cal Switch (249*)
Gentner Electronics (1048*)
IMC/Akai (548*)
Korg USA (Rm. 205)
Marshall Electronics (1408)
Neutrik USA (1403)
Penny and Giles (813*)
Pro Co Sound (639)
Symetrix (630)
Whirlwind (530)

Pitch shifters

Alesis (901*)
AMS/Calrec (722*)
Applied Research & Technology (250)
DigiTech (826*)
Eventide (812*)
Lexicon (418*)

Phonograph cartridges

Audio-Technica (726*)
Gotham Audio (412)
Shure Brothers (107*)
Stanton Magnetics (426)

Phonograph turntables

Gotham Audio (412)

Recorders, hard disk



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Circle (57) on Rapid Facts Card

AMS/Calrec (722*)
Ariel (832)
Fairlight (400*)
Gentner Electronics (1048*)
Lexicon (418*)
Steinberg Digital Audio (932*)
Symetrix (630)

Racks and stands

Fostex (500*)
KABA (716*)
Korg USA (Rm. 205)
Marshall Electronics (1408)
Otari (114*)
Solid Support Industries (1006)
Star Case (637)

Recording tape, audio

Agfa-Gevaert (406*)
Ampex (212*)
BASF (526*)
Otari (114*)
Panasonic/Ramsa (Rm. 209)
Shape (NA)
3M (512*)

Recording tape, video

Agfa-Gevaert (406*)
Ampex (212*)
BASF (526*)
Otari (114*)
Shape (NA)
3M (512*)

Reverb devices

AKG Acoustics (312*)
Alesis (901*)
AMS/Calrec (722*)
Applied Research & Technology (250)
DigiTech (826*)
Eventide (812*)
Gotham Audio (412)
IMC/Akai (548*)
Industrial Strength Industries (447)
Klark-Teknik (540*)
Korg USA (Rm. 205)
Lexicon (418*)
Marshall Electronic (712)
Roland (Rm. 208)
WaveFrame (646*)
Yamaha (Balboa Rm.*)

Sequencers

Alesis (901*)
Fairlight (400*)
Korg USA (Rm. 205)
WaveFrame (646*)

Signal processors, other

Alesis (901*)
Aphex Systems (913*)
API Audio Products (829*)
Applied Research & Technology (250)
Ariel (832)
Ashly Audio (800)
Audio/Digital (248)

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Circle (58) on Rapid Facts Card

*Signal processors,
other, continued*

Audio Logic (826*)
BGW Systems (320)
Clarity (1026)
dbx (NA)
DigiTech (826*)
DOD Electronics (826*)
Dolby (322*)
Eventide (812*)
Focusrite US (1414*)
Fostex (500*)
Full Compass Systems (347)
IMC/Akai (548*)
Industrial Strength Industries (447)
Innovative Electronic Designs (343)
IQS (NA)
Ivie/Mark IV Co. (643)
Korg USA (Rm. 205)
Lexicon (418*)
Marshall Electronic (712)
MicroAudio (1416)
Musik Produktiv (746)
Orban Associates (327*)
QSC Audio Products (342*)
Renkus-Heinz (1404)
Roland (Rm. 208)
Sontec Electronics (1004)
Soundcraftsmen (1041)
Symetrix (630)
UREI (326*)
Valley International (609)
WaveFrame (646*)
Yamaha (Balboa Rm.*)

Sound samplers

AMS/Calrec (722*)
E-mu Systems (Westwood Rm.)
Fairlight (400*)
Gefen Systems (635)
IMC/Akai (548*)
Industrial Strength Industries (447)
Korg USA (Rm. 205)
Marshall Electronic (712)
Roland Corp. US (Rm. 208)
Shep Associates (933)
WaveFrame (646*)
Yamaha (Balboa Rm.*)

Synchronizer systems

Adams-Smith (600*)
Alpha Audio (604*)
Audio Kinetics (626*)
Cipher Digital (346*)
CMX (3*)
JL Cooper Electronics (607)
Editron USA (916*)
Fostex (500*)
Gotham Audio (412)
Howe Technologies (1051)
Otari (114*)
Soundmaster International (1420*)
Studer Revox America (218*)
Tascam (110*)
TimeLine (1027*)

Synthesizers and keyboards

E-mu Systems (Westwood Rm.)
Fairlight (400*)
IMC/Akai (548*)
Korg USA (Rm. 205)
Lyre (NA)
Roland Corp. US (Rm. 208)

Tape duplication, cassette and reel-to-reel

Agfa-Gavaert (406*)
American Multimedia/Concept Design (807*)
Ampex (212*)
Apex Machine Co. (449*)
Audico (611)
Audio Video Consultants (804*)
Cetec Gauss (708*)
Electro Sound (910*)
Heino Ilseman (707)
KABA (716*)
King Instrument (709*)
Magnefax International (450)
Otari (114*)
Tascam (110*)
Telex Communications (922*)

Tape machines, analog

Broadcast Electronics (851)
Fostex (500*)
Gotham Audio (412)
Otari (114*)
Studer Revox America (218*)
Tascam (110*)

Tape machines, cassette and cartridge

Audio Video Consultants (804*)
Broadcast Electronics (851)
Otari (114*)
Shape (NA)
Studer Revox America (218*)
Tascam (110*)
Yamaha (Balboa Rm.*)

Tape machines, digital

Fostex (500*)
Gotham Audio (412)
IMC/Akai (548*)
JVC (125*)
Mitsubishi Pro Audio Group (121*)
Otari (114*)
Panasonic/Ramsa (Rm. 209)
Sony (101*)
Studer Revox America (218*)

Tape machines, other

Mitsubishi Pro Audio Group (121*)
Panasonic/Ramsa (Rm. 209)
Studer Revox America (218*)

Tape machines, replacement heads

JRF Magnetic Sciences (337)
Saki Magnetics (340)

Transformers, audio

API Audio Products (829*)
Neutrik USA (1403)
Shure Brothers (107*)
Whirlwind (530)

Video equipment, all

Audico (611)
Cipher Digital (346*)
Digital Creations (549*)
JVC (125*)
Panasonic/Ramsa (Rm. 209)
Sony (101*)

Other products: Specialized digital components

Apogee Electronics (730)

This directory is current as of Sept. 1, 1988, and is compiled from information supplied by exhibiting companies as of that date. For changes and additions after Sept. 1, consult the official program at the convention.

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Circle (431)

Peavey Electronics (400*)
Circle (432)

Precision Monolithics (1206)
Circle (433)

Richmond Sound Design (742)
Circle (434)

SPARS (848)
Circle (435)

Summit Audio (1002)
Circle (436)

Swire Magnetics (936)
Circle (437)

TC Electronic (641)
Circle (438)

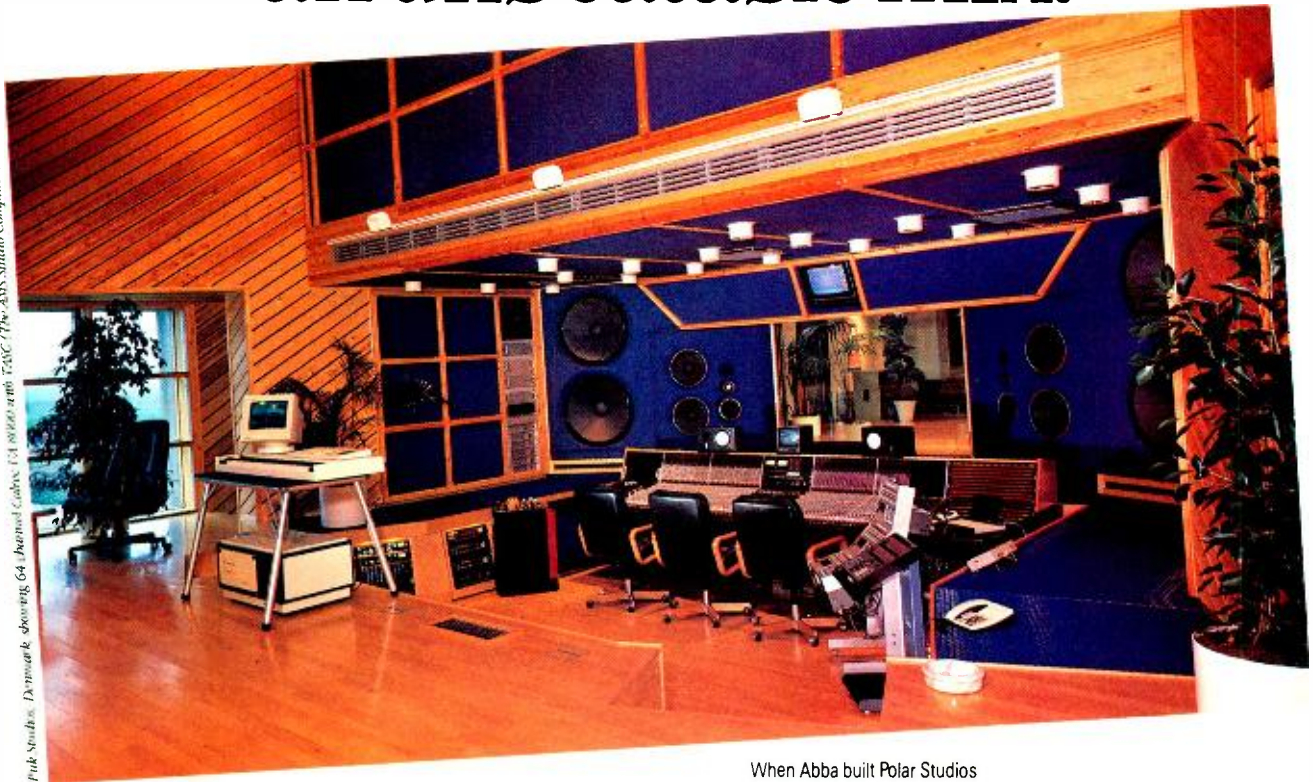
UltraAnalog (NA)
Circle (441)

**US Audio/
Div. of Whirlwind (532)**
Circle (439)

Westlake Audio (Rm. 203)
Circle (440)

This directory is current as of Sept. 1, 1988, and is compiled from information supplied by exhibiting companies as of that date. For changes and additions after Sept. 1, consult the official program at the convention.

The UA8000 with TASC an unbeatable mix.



Puk Studios, Denmark, showing Calrec UA 8000 with TASC (The AMS Studio Computer)

When Abba built Polar Studios in Stockholm, they thought they had taken quite a gamble by not making the usual choice of automated console. But word soon got around about the business they were attracting with the Calrec UA 8000.

When plans were being put together to build a 'no expense spared' studio complex in Denmark, members of the PUK team went to Sweden and spent time at Polar.

After exploring and listening to the Calrec console at Polar they knew a UA 8000 had to be the centre piece of their new studio.

When EMI Abbey Road heard rumours about the audio performance of the UA 8000, they did some in house tests. They were sufficiently impressed to send important members of their team to PUK Studios in Denmark. Just as history has been made at Abbey Road before, it is now being made on a Calrec UA 8000 with TASC (The AMS Studio Computer).

When MasterMix of Nashville decided to spend whatever it took to offer their clients the very best automated mix facility in America, they commissioned a survey and did some tests. On these results they sent their studio manager and chief engineer to spend some time at EMI Abbey Road. It didn't take them long to know they had found what they were looking for - and the competition didn't come close.

There are very few world class studios, Polar, PUK, EMI Abbey Road and MasterMix are amongst the few.

Take up our offer to have a closer look and find out why AMS and Calrec make the unbeatable mix.

The UA8000 with TASC - one of the AMS family.



Hard Disc Editor



Digitally Assignable Consoles



DMX/RMX Digital Audio Processors



Calrec Standard and SoundField Microphones



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AMS/Calrec. USA. 3827 Stone Way North, Seattle, WA 98103 USA Tel (206) 633 1956 Fax (206) 547 6890.



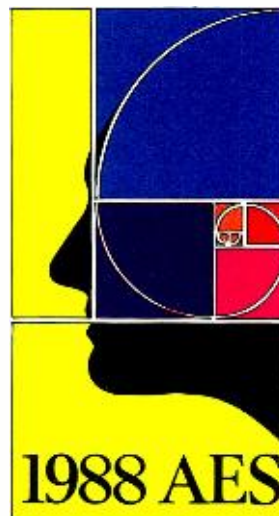
The Queen's Award for Export Achievement to Ederdeck Ltd 1984-85 and AMS Industries plc 1986. In July 1985 Ederdeck Ltd became AMS Industries plc.

Circle (59) on Rapid Facts Card

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Product Preview



Product Preview is the newest addition to RE/P's AES pre-show coverage, and is designed to give supplement the basic information supplied in the Exhibitor Listings.

When we asked exhibiting companies for show information, we also invited them to submit additional press releases of about 100 words concerning their new products and black-and-white product photos. This information is contained in Product Preview. Entries are arranged in alphabetical order, and each has been assigned a circle number. For more information, circle the appropriate number on the Rapid Facts Card.

The length of the entry is a direct result of amount of information each company sent in. In some cases, several products have been combined to make one entry. All pictures that RE/P received appear along with the entries.

Keep in mind that these are only a part of the products that will be introduced. For a variety of reasons, some companies chose to wait until the show to release any product information. Future editions of RE/P's New Products section will feature additional products that will debut in Los Angeles.

ACO Pacific introductions

ACO is introducing five products. The PS9200 is a precision microphone supply. Alternative is a family of Type 1 measurement microphones. The Acoustical Interface system converts conventional audio measurement equipment to acoustic measurement equipment. The PS9048 is a regulated portable battery supply for phantom power. The ACM48UP is a cardioid studio microphone.

Circle (450) on Rapid Facts Card

New features for Adams-Smith 2600

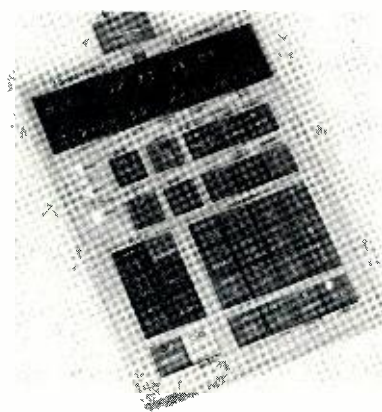
The audio-for-video editor has several new features. A MIDI port allows electronic musical instruments to be integrated into the editing and mixing process, and GPI outputs have been added, allowing carts, CDs and other non-time code devices to be controlled. A jog feature can control VTRs and the C:Sound display. ADR capability can also be added to any system, which includes a video streamer and looping, cuing and editing functions.

Circle (451) on Rapid Facts Card

Adams-Smith Zeta-Remote

The Zeta-Remote is an optional 3-transport autolocator-controller-editor for use with the Zeta-Three audio/video/MIDI synchronizer. The unit enhances small system operation and includes full transport control, 100-point autolocate and edit memories, programmable function keys music score location and tempo beeper.

Circle (452) on Rapid Facts Card



V.4 software for AKG ADR 68K

The software update provides MIDI-controllable parameter changes of all of the unit's functions via any MIDI controller or sequencer. Sampling time has been expanded to 32 seconds while retaining the resolution and sampling rate, and factory presets have been expanded to more than 150.

AKG is also offering a series of pre-programmed data cartridges called the Master MIDI ROM Cartridge, which makes available MIDI controller presets using common MIDI commands, such as Modulation Wheel, Pitch Wheel and Channel Pressure. The presets are designed as starting points for custom applications; V.4 software is required.

Circle (453) on Rapid Facts Card

AKG MicroMics

MicroMics are a series of small, lightweight prepolarized condenser microphones designed for instrumental pickup. The series consists of the following units: B9 9V battery pack; C401/B contact mic, for acoustic stringed instruments; C408/B mic, for percussion; C409/B, for wind instruments; and C410/B headset mic for use with the B9.

Circle (454) on Rapid Facts Card

Alesis Quadraverb

Quadraverb is a 16-bit simultaneous effects digital signal processor featuring reverb, delay, chorus, flange, pitch shift and parametric EQ. Features include touch sensitive parameter buttons; MIDI control of program parameters; sysex data storage capability, program naming capability and program advance footswitch jack. There are 100 programmable memory locations

with 90 factory programs, and the unit can run four effects at the same time.

Circle (455) on Rapid Facts Card

Additions to Alesis Micro Series

The new additions are the Micro EQ and Micro Cue Amp. The EQ is a 3-band parametric equalizer featuring continuous frequency control, boost/cut with a range of ± 15 dB and a 2-position bandwidth/Q switchable between octave and $\frac{1}{4}$ -octave curves. Micro Cue Amp features two L-R stereo inputs to accommodate four separate inputs, as well as one single jack input designed to accommodate a ring-tip sleeve type stereo jack.

Circle (456) on Rapid Facts Card

Allen & Heath introductions

A&H is introducing four products. The Scepter is a 12-channel/20-input rack-mount mixer. The Saber-16 is a 16-bus recording console with MIDI mute. Saber-PA is a live sound console with 32 mute presets and a 4-band EQ. The Sigma is a 24-bus in-line recording console.

Circle (457) on Rapid Facts Card

Alpha Audio Boss II

Like the original Boss system, Boss II is an automated audio editing system. Features include simultaneous multiple protocol communication, edit point determination by internal audio sample/playback, multi-channel MIDI capabilities, internal hard disk, expanded GPI and Track Select.

Circle (458) on Rapid Facts Card

Amber audio measurement system

The Total Solution Automated Audio Measurement package consists of the model 550 programmable audio measurement system, AudioCheck MS-DOS software program and the PC-8000 AT-compatible instrument controller. The system performs most types of audio measurements to state-of-the-art specifications. AudioCheck is a menu-driven program that performs a sequence of tests, controls the 5500, tests for conformance for user-defined limits and produces hard copy reports.

Circle (459) on Rapid Facts Card



Amber test instruments

Amber is also introducing several new test instruments, the 5100, 5200 and 5300 series. Similar to the 5500 system, the series satisfy the requirements for separate generator, level meter and distortion analyzer. Also new is the 3501 portable distortion and noise measuring set, designed for field and non-programmable applications.

Circle (460) on Rapid Facts Card

Amek Mozart console

Derived from the APC 1000, Mozart

uses an all-input approach, dispensing with in-line and split monitoring and using identical multi-purpose input channels. Initially available in a 56-input mainframe, the console features 32 buses, 12 aux returns and 16 aux send paths. An on-board grouping computer allows users to select channel switches to masters, with configurations saved to memory "pages." The Atari-based automation system controls 16 switches per input, including faders and channel mute.

Circle (461) on Rapid Facts Card

AES Show Debuts New 2/3/4 Channel Amplifier, Selectable 600/210 Power



The new model 300X4 MOSFET power amplifier from Soundcraftsmen will have its debut at the upcoming AES convention in Los Angeles, California. This new amplifier is a multi-channel design allowing the user to select either two-channel, three-channel or four-channel operation. It is ideal for the large recording studio needing very high power for their monitors—600 watts per channel (two-channel) at 8 ohms, or wishing to bi-amp their monitors—210 watts per channel (four-channel) at 8 ohms.

Or tri-amping using two of the 300X4's (each in the three-channel mode) to provide 600 watts per channel for woofers, 210 watts per channel for mid-range and 210 watts per channel for the high frequency drivers.

The new 300X4 has all the performance you've come to expect from Soundcraftsmen in a convenient, three-rack-space chassis. The 300X4 has two completely independent power supplies and two separate power transformers, sharing only a common power cord. Extremely accurate clipping indicators are included for each channel.

The new Soundcraftsmen 300X4 is completely protected against short circuits, open circuits and input overloads. Thermal protection is provided by Multi-Sensor Phase Control Regulation as well as two multi-speed cooling fans. The new amplifier is standard rack-mount, 19"W x 5 $\frac{1}{4}$ "H x 12"D, weighing 58 pounds.

Circle Reader Service Card # for
200-watt Amplifier Comparison Chart

PROFESSIONAL PRODUCTS by *Soundcraftsmen*

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Circle (60) on Rapid Facts Card

October 1988 *Recording Engineer/Producer* 91

AMS Logic 1

Initially configured for use with the AudioFile, the Logic 1 is an automated digital audio mixing console with a 32-bit floating-point architecture, guaranteeing an internal dynamic range of more than 1500dB. Linear motorized faders work in conjunction with the automation system and feature an armature driven up and down the length of a steel bar, resulting in a more natural feel. Logicator TM controls feature optical technology and can display a variety of automation information.

Circle (462) on Rapid Facts Card



ANT AC-27, E-111 noise reduction systems

ANT is introducing two products. The AC-27 replaces the AU-27 card in Sony BVH-2600 VTRs. According to the company, the replacement improves audio quality and reduces system noise. The E-111 is a mono system for broadcast remote pickup and mono recordings.

Circle (463) on Rapid Facts Card

Aphex Systems 120 distribution amp

The 120 is a servo-balanced distribution amp with a single high-impedance and four low-impedance outputs, all servo-balanced. The transformerless circuits are designed for wide, flat frequency response free from ringing or overshoot, making the unit ideal for distribution of time code as well as audio, according to the company. Each output has its own amplifier and level control, and the unit may be used alone or in pairs.

Circle (464) on Rapid Facts Card

API 550B EQ, 512B pre-amp

The 550B is identical to API's 550A circuit and fits into the standard API console slot. A fourth midrange band and 13 new frequencies have been added, and each band has seven frequency selections, ranging from 30Hz to 20kHz. All of the original 500A frequencies are still in their original positions, ensuring compatibility. The 512B mic-preamp features mic in and line

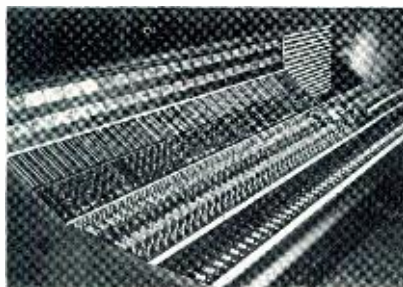
out from the rear connector (equivalent to EQ in/out), and mic in and a special high impedance 1/4-inch input on the front panel. Included is a gain control, mic pad, 48V power switch and mic/line switch/

Circle (466) on Rapid Facts Card

API 4032 console

The first new API console to be built in five years, the 4032 has 48 inputs with 32-channel metering and up to 14 effects send per channel, eight of which can be made into four separate stereo pairs. The monitoring section is completely separate, with two stereo cues or four mono cues, and has a 600-point patchbay and four separate headphone mixes. Use of API 2520 and Hardy 990 op-amps allow for various routing choices for different tonal qualities.

Circle (465) on Rapid Facts Card



Other API introductions

The 500VPR, -B4 and -HPR are a line of powered racks for the standard API EQ/compressor/mic pre line, each featuring a variety of slots and connections. All three feature high-quality regulated power supplies. Additional products API is introducing include the 550A, the original all-discrete API equalizer; the 560B, a 10-band graphic EQ with the 2520 op-amp; and the 525B, a motorized rotary compressor/gate.

Circle (467) on Rapid Facts Card

Apogee Electronics Mastering Box

Mastering Box is an A/D converter that converts to standard serial digital formats and interfaces. The box replaces and bypasses the internal analog front end of digital recording equipment, which the company says improves audio quality and allows low-cost digital storage such as R-DAT to be as good high-end formats. Sampling frequencies are selectable between 48kHz and 44.1/44.05kHz. Selectable digital output formats are AES/EBU, EDIF-1 and -2, PD, and Sony/Philips (DAT).

Circle (468) on Rapid Facts Card

Apogee Electronics model 1000 modules

The modules are internally mounting sonic enhancement modules for the Sony 1000ES DAT recorder and EIAJ format processors, improving the sonic performance of both. They replace analog input circuitry, anti-aliasing filters and digital analog output. According to the company, adding the module to the Sony machine improves the sonic performance and adds professional input and output levels without degrading input and output circuitry contained in the 2500 DAT machine.

Circle (469) on Rapid Facts Card

ART signal processors, EQ

Applied Research and Technology is introducing three signal processing units. The model 330 Multiverb is a 20-bit digital multiple effects processor that can run four effects simultaneously and is fully programmable. The ProVerb 200 has more than 120 reverb variations and 80 studio effects combinations. The PD3-1000 is an alignment delay system, with one input and three outputs, with up to one full second of delay on each output.

Circle (470) on Rapid Facts Card

Ariel SYSid measuring system

Standing for system identification, SYSid is an acoustic measuring system for IBM PCs and compatibles consisting of a single-card Data Acquisition Processor and SYSid software. The system stimulates the device under test, using a chirp, impulse or tone. It then records, averages and analyzes the response, and displays the results. Two independent channels can be measured simultaneously, allowing for impedance and ratiometric measurements.

Circle (471) on Rapid Facts Card

Ariel DSP boards

The DSP-C25 comes with the Texas Instruments' most powerful DSP chip, while the PC-56 contains Motorola's DSP56001 chip. Both have zero-wait state RAM for full speed operation and optional 14-bit analog I/O. They can be used alone as high-speed co-processors, and on-board digital or analog I/O allows them to be used as complete DSP systems. The C25 uses a single PC slot, while the PC-56 uses a short slot. Memory expansion options are available.

Circle (472) on Rapid Facts Card



Ashly Audio half-rack components

Ashly is introducing seven half-rack products: the CL-100 compressor/limiter; SG-100 noise gate; XR-100 electronic crossover; MP-100 microphone/line pre-amplifier; HP-100 headphone amp; PQ-100 parametric EQ; and PA-100 40W mono amp.

Circle (473) on Rapid Facts Card

Ashly crossovers

The company is introducing four 24dB/octave crossovers. The XR-2000 is a stereo 3-way/4-mono 2-way unit. The XR-1000 is a mono 3-way/stereo 2-way unit. The XR-3000 is a mono 4-way, and the XR-4000 is a stereo 4-way.

Circle (474) on Rapid Facts Card

Other Ashly introductions

Other products Ashly is introducing include the PA-200, a 40W-per-channel stereo amplifier; the CG-85, a limiter/compressor with gated release; and the SG-34 and -35 4-channel noise gates.

Circle (475) on Rapid Facts Card

APM music, effects libraries

Associated Production Music is introducing five effects and music libraries. "Broadcast One" is an 18-CD set of production music for broadcasters featuring full-length underscore and 3- and 60-second versions. "Sound FX—The Library" contains 25 CD of digitally recorded sound effects using several micing techniques. The "Sonoton" music library contains more than 200 albums and 20 CDs. "Bruton Gold Classics" contains famous passages from well-known classical works. "Coombe International" is a library of re-recorded hits (sound alike) of the most popular songs of the past 40 years. The company is also introducing an audio-for-video facility that provides full scoring and editing services for audio-for-video and film projects.

Circle (476) on Rapid Facts Card

Audio Animation Muse console

Designed for CD mastering and digital tape preparation, Muse is a fully digital automated console that uses proprietary technology to provide real-time 24-bit processing. EQ and dynamic range control is implemented through conventional pots or through a high-resolution color monitor on which users may design the desired EQ or DRC curves. Each band of the 5-band EQ offers more than 1,000 settings for Q, center frequency, cut and boost. Because the console's sampling rate is automatically driven by the source, allowing a sampling rate of up to 100kHz, EQ interface problems are minimized.

Circle (477) on Rapid Facts Card

Audio/Digital PAD-300/18

The PAD-3000/18 delay system features a 18-bit sampling and a dynamic range of at least 105dB. Features include one audio input and three audio output, RS-422 ports, front-panel bypass control via gold contact relays, and sophisticated failure detection and reset/bypass control. A rear barrier strip allows for page control of up to 18 pages, and are also accessible via the RS-422 ports.

Circle (479) on Rapid Facts Card

Audio Developments microphone amp

The ADO66-11 2-channel microphone amp is the latest addition to the company's Port-a-Flex range. Developed to meet the increased interest in M-S recording techniques, the unit has inputs for two stereo powered microphones with comprehensive monitoring facilities.

Circle (478) on Rapid Facts Card

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You've spent more than you wanted on a really good condenser mic and it doesn't deliver. The problem is that it probably isn't getting enough power. Many boards just can't deliver a true 48v to the mic.

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Circle (61) on Rapid Facts Card

Audio Kinetics ESBUS system

The system consists of four parts. The ESI.11 is a 1U rack-mounting synchronizer/generator/emulator that can be bused to form an ESBUS LAN of up to 255 machines. ES Eclipse is a 16-machine programmable edit controller with off-line facilities. ES Penta is a 5-machine overdub controller optimized for studio work. ES SSU is a self-contained system services unit that provides an EBU/SMPTE bus with auxiliary features required within a machine control network.

Circle (480) on Rapid Facts Card



Audio Logic SC 131

The SC 131 is a cut-only, single-channel graphic EQ with 31 bands selectable in -10dB or -20dB of cut. Features include accurate frequency centers, variable frequency high-pass and low-pass filters with an in/out switch and an input level control. Three types of connections are available: Cannon XLR, barrier strip and ¼-inch tip-ring-sleeve phone jacks.

Circle (481) on Rapid Facts Card



Audio Logic room delay

The R1 DI is a single-input, single-output digital room delay, capable of 0 to 320ms of delay time in 5ms DIP-switch increments. Input and output level controls are accessible through the panel via screw-driver adjustable potentiometers. An LED indicates headroom. Sampling rate is 50kHz with 16-bit linear PCM conversion for a dynamic range of more than than 92dB.

Circle (482) on Rapid Facts Card



Audio Logic SC 610 mixer

Occupying 1U of rack space, the SC 610 is a 6-input, 1-output mixer. Four inputs are dedicated mic inputs, and two additional inputs may be switch-selected to accepted either a mic or line level input. Each input has a switchable low-cut filter and gain trim pot, and all mic inputs have phantom power. Also available is the SC 611 expansion module, which allows six additional inputs to be cascaded to the SC 610.

Circle (483) on Rapid Facts Card



Audio Precision DSP module

An addition to the System One audio test system's audio analysis capability, the DSP module adds harmonic analysis, spectrum analysis and digital audio device analysis in any mixture of digital and analog domains.

Circle (484) on Rapid Facts Card

Audio-Technica microphones

The AT4051 cardioid is part of a new series of transformerless, externally polarized mics with interchangeable head capsules. Polar pattern changes are accomplished by replacing the element with the AT4049 omnidirectional capsule or the 4053 hypercardioid capsule. The AT4031 is a unidirectional designed for studio and live use. The mic is engineered for low self-noise and high output, and has an SPL of 140dB.

Circle (485) on Rapid Facts Card



Audio-Technica ATUS AL60

The AL60 is an outdoor 2-way omnidirectional speaker in an ABS weather-resistant housing, making it suitable for broad-arc indoor/outdoor coverage. The dual-driver system comes with one 6-inch cone woofer and a 1½-inch tweeter. The

unit features a 70.7V transformer, with selectable taps of 2W, 4W, 8W and 15W. It can be mounted to a flat surface at any angle with an attached bracket or pipe-mounted from the bottom.

Circle (486) on Rapid Facts Card



Audio-Technica 900 series

Three models are available in the series of professional stereophones. Models ATH909 and -911 are open-back designs, allowing users to hear outside sounds while monitoring program material. The ATH910 has a closed-back design that allows on-mic operation at high monitor levels without feedback. All feature 96dB sensitivity, 4-24Ω matching impedance, 30Ω actual impedance and 20Hz-20kHz frequency response.

Circle (487) on Rapid Facts Card



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BASF calibration mechanism

The 52149 calibration mechanism is a calibration tool milled from German silver alloy for use as a reference standard for cassette housings. The tool contains a 12.5kHz tape for azimuth alignment of cassette playback heads. Accuracy is within a tolerance of 5m of verticality to the support plane of the cassette.

Circle (488) on Rapid Facts Card

BASF Chrome Super tape

Chrome Super is available in 8,200-foot pancakes of C60 tape, and the company says it is audiophile-quality tape for high speed and real-time duplication. The tape has +3dB more low frequency S/N and +2.5dB more high frequency S/N than conventional chrome tape.

Circle (489) on Rapid Facts Card

B&B Systems AM-2HR

The AM-2HR is an audio test system with an X/Y CRT display that gives a complete "picture" of the stereo audio signal. The system has graticle calibration, which allows accurate determination of signal level, and can verify the percentage of an out-of-phase signal condition. Also included is a built-in power amplifier with a front-panel input select switch for L+R or stereo signals, with the power amplifier output via the front-panel headphone or rear-panel speaker outputs.

Circle (490) on Rapid Facts Card

B&B AM-3B audio phase monitor

The AM-3B is a CRT-based real-time stereo audio phase monitor, with threshold levels for L, R, L+R and aux inputs. Dual sets of A/B selectable inputs are also included. The unit has an internal speaker/headphone power amp, with line inputs, and is 3U high.

Circle (491) on Rapid Facts Card

Bose SpeakerCAD

The SpeakerCAD graphic program, the second member of the company's Sound System Software family, simulates the physical characteristics of speakers, speaker arrays and speaker environments. The program uses graphics specifically designed for sound system designers, communicates directly with the Bose Modeler Design program and is designed to run on the Macintosh.

Circle (493) on Rapid Facts Card

Brainstorm Electronics studio accessories

Brainstorm is introducing three products. Two infrared remote controls include

the TB-4 Communicator, a 4-function unit for the console's talkback, and a 14-function generic system. Also available are a modification kit for Trident consoles' talkback that enables remote switching and an interface for MIC JH-24 recorders that allows simultaneous use of the autolocator and a synchronizer.

Circle (494) on Rapid Facts Card

Beyer Dynamic introductions

Microphones the company is introducing include the MCE 86, a condenser shotgun mic; the SHM 10 miniature hypercardioid gooseneck mic; the SHM 420 cardioid gooseneck mic; the SHM 422 low-profile acoustical boundary layer mic; the S186 wireless hand-held mic; and the TS186 wireless bodypack lavalier mic. The Tour Group mics are vocal and instrument mics for live sound use and combine sonic quality with ruggedness and roadworthiness, something the company says it has not been associated with in the past. The series consists of five models: the M69, -88, 300, -500 and -380. Monitoring headphones being introduced include the OT 770 Pro, a sealed cup version, and the OT 990 Pro, an open-ear version.

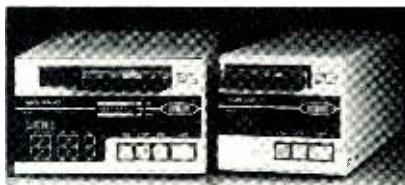
Circle (492) on Rapid Facts Card



Broadcast Electronics Phase Trak 90

Based on the PT-90 playback unit, the Phase Trak 90 is a playback/record stereo cart machine. New features include automatic tape analysis with a "learn" mode, a built-in splice finder and test oscillator, optional high/low level sensing, LED metering of left and right channel, and a 4-record cue circuits, including an FSK encoder.

Circle (495) on Rapid Facts Card



Broadcast Electronics Mix Track 90

The modular, on-air console comes in a 12- or 18-channel mainframe and can be custom-built to specific requirements. Available modules include mic and line inputs, VCA gain control, Penny & Giles linear faders, control room and studio monitor, source remote control and studio remote. The automatic Source Sequencer function allows users to program a series of events and automatically activate them with one switch.

Circle (496) on Rapid Facts Card



Bruel & Kjael digital filter analyzers

Types 2123 and 2133 are digital filter analyzers, the 2123 being a single-channel analyzer while the 2133 is a dual-channel analyzer. Both analyzers perform fractional analysis selected from 1/1, 1/3, 1/12 or 1/24-octave. User programming is in standard engineering English, allowing custom measurement and display setups. Disks are PC-DOS-compatible, and an IEEE 488 bus is included.

Circle (497) on Rapid Facts Card



B&K laser velocity transducer set

Type 3544 is designed to be used to make calibrated measurements on loudspeaker diaphragms or musical instrument structures. When combined with one of B&K's Modal Analysis systems, the dynamic behavior of the structure can be visualized, and resonances and damping can be investigated. The set is portable, and connects directly to any standard B&K measurement system.

Circle (499) on Rapid Facts Card

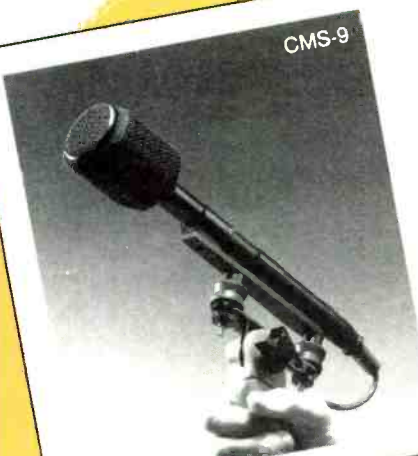
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A pointed attack on noise.

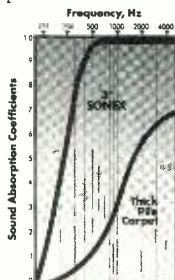


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Circle (63) on Rapid Facts Card

B&K head and torso simulator

Type 4128 is designed for measurement on electroacoustic systems for talking, listening or both. The unit represents the geometry of a medium adult head and torso. Ear and mouth simulators are included, and a second ear is available. Applications include headphones, sound systems, concert hall acoustics, automobile sound and communications, telephones, communications headsets and binaural soundfield research.

Circle (498) on Rapid Facts Card



Cetec Gauss duplicating system, test equipment

Cetec Gauss is introducing two products. The model 2480 high-speed cassette duplicating system, part of the 2400 series, features a combined master and loop bin that operates at up to 480ips. The Series 1100 line of test equipment features a composite generator and tape system analyzer used for duplicating system alignment and in-process quality control testing.

Circle (500) on Rapid Facts Card

Cetec Vega Ranger 2

Ranger 2 is a true dual-receiver diversity wireless microphone system. Incorporating CVX audio processing, the systems are configured around the R-98 true-diversity receiver. The 2-B system includes the T-93 bodypack transmitter, which contains a miniature 4-pin XLR connector that accepts most electret lavalier mics. The 2-HA system includes the T-96 handheld

transmitter, which contains an AT ATM31 element. The 2-HV system uses the T-94 transmitter, which contains a Vega K4 condenser element.

Circle (501) on Rapid Facts Card



Cetec Vega PRO 2

Pro 2 is a true-diversity system that uses the company's DYNEX II audio processor. The R-32 true-diversity receiver has GaAsFET front end and 11 poles of IF filtering. Included in the system is the T-37 bodypack transmitter, the T-36 transmitter with an E-V BK-1 condenser element and the T-39 transmitter, with a Shure SM96 element.

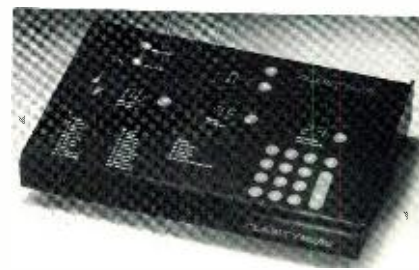
Circle (502) on Rapid Facts Card



Clarity XLV automation interface

Using MIDI as the automation protocol, XLV allows control of all parameters of the Lexicon 224XL and 480L, AMS rmx-16 and Quantec QRS. The unit has eight channels of MIDI to control voltage conversion, and also has RS-422 I/O ports for the Lexicon units, and RS-232 I/O for the AMS and Quantec units. Software has been updated to include Quantec control for the first time. Lexicon automation now includes LARC faders and switches, and the AMS implementation has been enhanced.

Circle (503) on Rapid Facts Card



New features for CMX CASS I

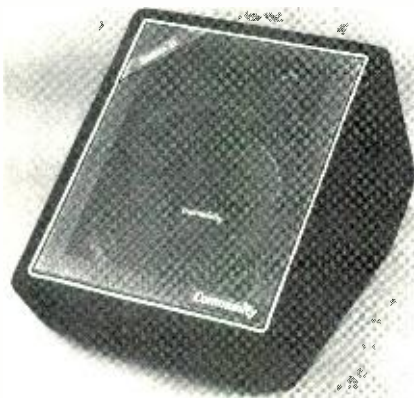
CMX is introducing three new features for the CASS I. The Gismo Control addition controls machines, marks in and out points and performs jog and shuttle. Track Select is for use on up to 48 tracks on the recording machine through software. CMX I² control allows a variety of VTRs through the CMX I².

Circle (504) on Rapid Facts Card

Community CS Series II loudspeakers

The series is comprised of nine models, ranging from the portable CS25 to the full-range CS70. According to the company, the series delivers sonic accuracy and power in affordable enclosures.

Circle (505) on Rapid Facts Card



JL Cooper PPS-100

The PPS-100 is a SMPTE event generator and SMPTE/MIDI synchronizer that converts SMPTE-to-MIDI sync with Song Position Pointer. It will stripe to all SMPTE formats, and time is shown on an LCD. The unit also generates MIDI Time Code, DIN sync, Direct Time Lock and PPQN sync. The Event Generator may be programmed in real-time or off-line.

Circle (506) on Rapid Facts Card

Software revision for JL Cooper MSB Plus

Several new features have been added to the 8x8 MIDI switching box. Software revision 2.0 contains programmable program change manager, program advance mode using the Panic Button footswitch jack and the ability to initiate a syssex dump from the front panel. Up to eight program changes can now be sent out of the output ports for each of the unit's 64 patches.

Circle (507) on Rapid Facts Card

JL Cooper Mix Mate

Mix Mate is a low-cost automation package for 8-track studios that inserts between the board's insert points or between the tape deck and mixer. Features include

SMPTE of FSK reader/striper, dbx VCAs, fader and mute controls, memory and Control Smarts. Mix Mate can also act as a slave device to software packages.

Circle (508) on Rapid Facts Card

Countryman microphones

The first of two product introductions is the TV-H wireless microphone, which is a highly directional lavalier for use with wireless transmitters. The unit features exceptionally low handling noise, according to the company. The Isomax headset microphone is a hypercardioid microphone combined with a headset mount. It is designed for recording and sound reinforcement purposes.

Circle (509) on Rapid Facts Card

Crest 7001 amp

The 7001 is a 2U version of the company's 8001 amplifier, and is rated at 550W per channel at 8Ω and 810W per channel at 4Ω. The amp is capable of swinging 83V RMS per channel, and peak power of 3,200W per channel is available at 2Ω. Proprietary circuits include Instantaneous Gain Modulation, impedance sensing, Auto-Ramp signal control and an RMS Clip Limiter.

Circle (510) on Rapid Facts Card

dbx 563X NR system

The 563X is a single-ended noise reduction system that reduces steady hiss from any source by 40dB. The unit contains one channel of 1-step (decode only) noise reduction. Applications include tape playback of analog tapes being transferred to CD, instrument and PA hiss elimination, tape duplication. Two units may be used together for stereo applications.

Circle (511) on Rapid Facts Card

DDA Q Series console

The Q Series is based largely on DDA's S Series and incorporates an increased range on the mid-EQ sections, changes in the aux structure and output modules, and individual 8-bus routing. The main use is for sound reinforcement, although the console is suitable for multi-track recording, the company says. Each input module has eight bus assigns, eight aux buses and a direct output with level control. The console is also available with PA or matrix outputs, with the latter incorporating an aux return with full 3-band EQ.

Circle (512) on Rapid Facts Card

Atari software from Digidesign

Both packages were created by C-Lab Software, a West German company, and are distributed by Digidesign. Creator is a sequencing program that allows users to load a sequence while another is playing,

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record on-screen operations like tempo changes and mutes along with the music and real-time quantizing. Notator is a sequencing/notation software. Features include display of single tracks or whole 32-stave scores; simultaneous display of all note values from 1/1 to 1/64, including every type of triplet, and flexibility in setting time signatures, key signatures, clefs and transpositions.

Circle (513) on Rapid Facts Card

Digidesign editing, automation software packages

Sound Designer Universal, the waveform editing/DSP software for the Macintosh and Atari, has been combined into one package that supports more than 30 samplers. The software's features include crossfade looping, FFT-based frequency analysis, editing accuracy up to 1/50,000th of a second and a Digital Mixer. Q-Sheet A/V is an enhanced version of the company's SMPTE/MIDI automation software for the Macintosh. New features include the ability to import CMX-format edit decision lists, repeat events within fixed start and stop times and an "Align Events" function that allows start and stop alignment of multiple events.

Circle (514) on Rapid Facts Card

DigiDesign Turbosynth, DSP card

Sound Accelerator, a DSP card for the Macintosh, is designed to enhance the computer's sound editing and synthesis capabilities. The card provides CD-quality playback of individual sounds directly from the Mac, and performs most DSP applications in real time. Compatible with the card is Tubosynth, a graphically oriented modular synthesis and sample processing program. Sounds can be created using icons on the Mac screen. Ten different sound processing modules allow users to add effects such as delay and waveshaping.

Circle (515) on Rapid Facts Card

Digital Automation KSd series

The KSd-48/96 is a digital audio mixer with digital input and out, with all functions performed on a personal computer and mouse. Digital effects are selected from a menu and shown in a large window on the screen. They can be displayed as conventional effects or drawn as graphs on the screen. Digital I/O uses the Sony 1610 format, with other formats available, and the 48/96-channel architecture can be expanded to 192/284 channels.

Circle (516) on Rapid Facts Card

Digital Creations Diskmix update

Diskmix Moving Faders has been given a new hardware upgrade, a 68000-based system processor, and version 3.0 of the Diskmix software. As a result, the system speed is faster, storage resolution is higher and user control is quicker. The system is time code-driven and will store an unlimited number of mixes on hard disk. No active components are used in the audio chain, eliminating sonic degradation associated with VCA automation systems, the company says.

Circle (517) on Rapid Facts Card

DigiTech IPS-33 pitch shifter

The digitally based unit is capable of producing up to two notes other than the original input note in a true harmonic pattern, according to the company. When told that the key that is being played and the harmony type, the unit can maintain a true harmony. The two shifted notes may be independently set from an octave above to an octave below the original note. Up to 99 user-definable presets are available and can be recalled via MIDI. A total of 41 pre-defined harmony types may have up to 16 user-defined harmonies.

Circle (518) on Rapid Facts Card



Electro Sound duplication kits

Electro Sound is introducing two products. The 80:1 master speed kit has redesigned EQ circuits and high-output amplifiers. The slow rate is 10 times faster than previous amplifiers, which provides increased duplicating speeds and better quality cassettes than current-standard 64:1 systems. The 80:1 slave speed kit includes ceramic coated capstan sleeves, an improved dancer arm assembly and a 4-memory bank EQ/record board with improved signal electronics and automatic recall of four tape grade types.

Circle (519) on Rapid Facts Card

E-mu Emulator Three Rack

The EIII Rack is a rack-mount version of the Emulator Three, containing all the features without the keyboard. It is available with 4MB or or 8MB of RAM.

Circle (520) on Rapid Facts Card

Accessories for E-mu EIII

Four accessories are being introduced for the EIII. The HD 300 is a 300MB rack-mountable hard disk storage system that will load a 4MB bank of 16-bit sound in

less than nine seconds. It also comes with 10 banks of factory sounds. The following sounds have been released: stereo steel drums, stereo French Horns, stereo synth combo, Flauto Bonita, vintage synths and ambient dance club. The EIII Tutorial is an advanced applications guide covering a guided tour of the EIII, interfacing, sampling, sequencing, preset templates and application notes. Software revision 1.21 adds new features, including a digital delay and ping pong modes, a scrub wheel for moving about in sample data, Stack Mode to trigger up to 16 channels from one key, sequencer enhancements and MIDI/SMPTE implementation.

Circle (521) on Rapid Facts Card



Euphonix Crescendo console

Crescendo is an automated, SMPTE-based console offering real time recording of all console functions, including fades, mutes, EQ and signal routing. Mix data are internally stored, allowing rapid access to edit points and recall of console settings. The console interfaces to a personal computer to enable viewing, editing and disk storage of mix files. An expandable frame accommodates eight to 64 inputs and accepts mono or stereo sources without needing separate modules.

Circle (522) on Rapid Facts Card

Eventide H3000-B

The Ultra-Harmonizer features an AutoTime Squeeze Time compression/expansion interface. This allows any frequency-controllable variable speed tape machine to be controlled by the H3000-B to shorten or lengthen an audio source. Other features include a Function Generator to create sound effects such as siren, helicopter, windstorm and thunderbolt, or assign sweeps to flanges and chorus. It can also be used for autopanning. The unit comes with 90 factory programs, 50 user-storable presets and full MIDI implementation.

Circle (523) on Rapid Facts Card



Fairlight Waveform Supervisor

According to the company, Waveform Supervisor is its most important development since the introduction of the Series III. The package introduces the 68020 co-processor into the hardware architecture, and allows the Series III to be used with more power software pages, run faster and be more efficient. For new Series III, the package is an option. For existing units, the upgrade is a factory-authorized retrofit that includes complete servicing and system recalibration.

Circle (524) on Rapid Facts Card

Fairlight storage drives for the Series III

The 380MB ESDI hard drive is available with or without the Waveform Supervisor upgrade. The drive offers twice the storage capacity of 190MB SCSI drives and faster performance. If installed with Waveform Supervisor, the drive can store up to six tracks in conjunction with the Multitrack DR capability. Also being introduced is an 800MB WORM optical drive, available in both internal and external versions. Capacity is 400MB per side, and one disk provides about two hours of 16-bit digital sounds. All WORM drives are supplied with a disk containing the entire Series III core sound library.

Circle (525) on Rapid Facts Card

Fairlight WRAM cards, sampling cards

With the installation of Waveform Supervisor, WRAM cards are available in 2MB and 4MB configurations, to a maximum of 28MB of Waveform RAM. As with other upgrades, there is an upgrade/trade-in path for existing owners. The stereo digital sampling card is based on the AES/EBU 48K data standard, and is especially suited for use with the Sony Pro-DAT machines. Available as an additional piggyback card is a stereo analog sampling card featuring Apogee anti-aliasing filters.

Circle (526) on Rapid Facts Card

Fane Acoustics Court Series

Fane has introduced three systems as part of the series. The Hiflex is rated at 200W and features a pair of 10-inch drivers in a ported reflex enclosure. The Miniflex is a 100W system with a two 6-inch speaker configuration. The Powerflex is the largest system, rated at 300W with a single 12-inch driver with a titanium horn driver for mids and highs.

Circle (527) on Rapid Facts Card

Fane Acoustics System 1000

System 1000 is a 1,000W 4-way configuration consisting of two 15-inch drives in a folded horn bass bin. It is complemented by a "high bin" consisting of a single

12-inch drive, a 4-inch titanium diaphragm compression driver, a pair of HF bullets and a 3-way crossover. Multiple systems can be stacked if needed. To be used in conjunction with the System 1000 if needed is the Sub Bass 1000, a folded horn bin that houses a 24-inch subwoofer.

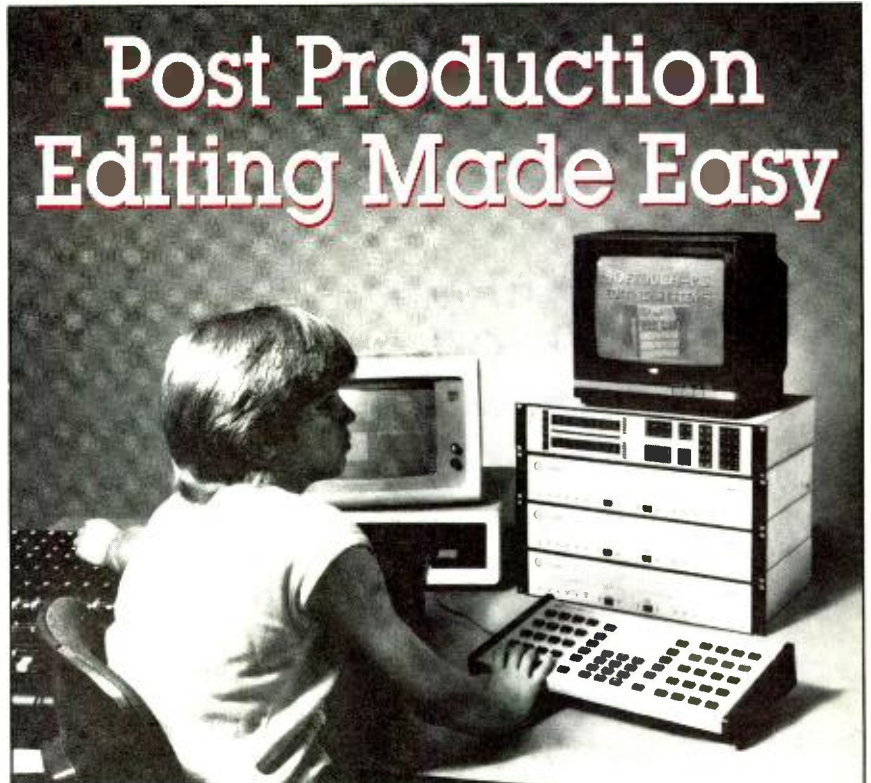
Circle (528) on Rapid Facts Card

Fostex introductions

Fostex is introducing three products. The Digital Master Recorder is a profes-

sional R-DAT deck with time code read/write capability for all transport speeds and functions, and off-tape monitoring. The RM-1200 is a close-field monitor system with a 12-inch low-frequency unit and a large-element RP high-frequency tweeter. The 4020 Event Controller features eight relay-closure outputs, plus time code and MID trigger capability.

Circle (529) on Rapid Facts Card

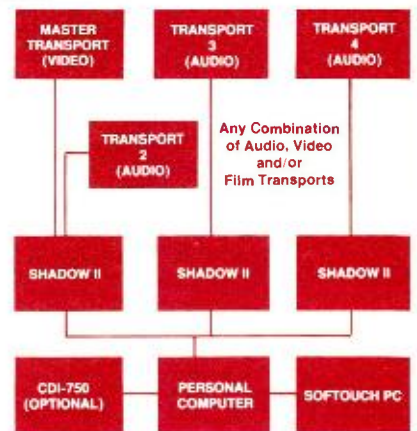


The *Softtouch-PC/Shadow II* Editing System makes post production audio and video editing simple. It's the ultimate in production flexibility for all types of edits. Plus it's affordable—\$2,195 for the *Softtouch-PC* and \$3,395 for the *Shadow II*.

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Full Compass Systems Psychologist mixers

The Psychologist series of remote controlled matrix mixers are plug-in cards that allow expansion from a 4x4 stereo to a 32x32 mono system. Miniature controllers, one per output, communicate with a master CPU via an RS-232 line, and the unit can be computer-controlled. Option cards allow for all-call input and local fan in/out of remotes. Fan in/out boxes allow multiple remotes to be connected to one RS-232 line.

Circle (530) on Rapid Facts Card

Full Sail course for Synclavier

Designed in conjunction with New England Digital, Full Sail now offers courses in beginning and advanced Synclavier and Direct-to-Disk operation. The courses will be directed by Richard Head, owner of Song Bird Digital, a Nashville-based independent NED dealer for the Southeast and an expert Synclavier user. Classes will run six days a week for two weeks, with 48% of the time devoted to small lab groups for on-line training. The curriculum has been developed with NED and will be updated quarterly.

Circle (531) on Rapid Facts Card

Full Sail video/ film program

The Video and Film Production Comprehensive Program is a 32-week course covering all phases of television and video recording. It is designed in a modular format and features instruction in these areas: television production, post-production, lighting and special effects, make-up and special effects, set design and construction and special effects, creative writing, recording engineering, Synclavier and Direct-to-Disk audio, music business and working with talent. Students are required to produce and direct a final project and will receive six weeks of on-the-job training.

Circle (532) on Rapid Facts Card

Gefen Systems sound effects products

The company is introducing the BBC sound effects library is on compact disc, featuring new digital stereo recordings. Also new is a Macintosh-compatible database software program to search, browse, locate and print sound effects and production music tracks from commercially produced CD libraries. The software comes with all the CD library listings for the libraries that users already own.

Circle (533) on Rapid Facts Card

Gentner patch panels, wiring terminations

The company is introducing pre-wired audio patch panels, custom-wired to specific applications. They are wired to the user's specifications using any type of bay-front, jack or termination. Also new is Easyterm, a rack-mount wiring termination that uses easy punch-down connections. The termination allows for a high density of connections, organized installations and easy access to equipment.

Circle (534) on Rapid Facts Card

Gentner telephone accessories

The EFT-3000 is a 3-line telephone bandwidth extender that provides high quality audio over telephones for remote broadcast or productions. Digital Hybrid interfaces a telephone line to audio equipment for such applications as teleconferencing, broadcast shows and interviews.

Circle (535) on Rapid Facts Card

Gentner routers, switchers

The RDA is a routing distribution amplifier. Users can select any combination of eight inputs to any of 28 outputs. Program Switchers are passive routing switchers that provides instant switching of sources with no amplifiers or loads of any kind on the signal. Stereo and mono models are available.

Circle (536) on Rapid Facts Card

Other Gentner products

Gentner is also introducing the following products:

The IC-20, an intercom station for radio stations and studios. Each station can talk to every other station. Multiple, simultaneous access and party line conversation is possible.

Silence Sensor, which monitors unattended audio feeds and provides outputs on "silence" and user-defined "time-out." Relay closure is provided on time-out to start backup sources.

A headset/speaker amplifier that provides six channels with 2W per channel output capability. Direct and master inputs are provided.

A combination remote mixer than provides four mic/line channels and four headset connections in one box. It is designed for remote broadcasts and portable mixing requirements.

A studio timer that measures elapsed time in seconds. It can be reset directly or remotely.

Digisound, which provides digital audio storage on hard disk. It stores stereo and mono audio and can be controlled directly or with computer or automation systems. Storage capability can be expanded.

Circle (537) on Rapid Facts Card

Gold Line PBM-1 mic

The mic is a pyramid boundary mic that is designed to receive sounds the same way as the human ear. Signals are received from both the direct and reflected paths at the same time. Mic capabilities are expanded by a flat frequency response without equalization, better ambient pickup and greater clarity at a distance, according to the company.

Circle (538) on Rapid Facts Card

Gold Line 6-channel headphone systems

The HPA-1 and -2 are stereo headphone amps with a mic input to allow the control room to communicate the all channels. Features include individual stereo level controls, electronically balanced master inputs and overall master level control. Each headphone amp has its own separate input that independently bypasses the master stereo inputs, which allows any combination of master stereo program or separate programs for custom monitor mixing. The HPA-1 comes without talkback, while the HPA-2 comes with talkback.

Circle (539) on Rapid Facts Card

Gold Line HPA Jr.

The HPA Jr. is a portable single-channel stereo headphone amp that can be attached to a belt for portability. It is powered by two 9V batteries and is designed for studio, ENG, and TV and broadcast applications.

Circle (540) on Rapid Facts Card

ISI introductions

Industrial Strength Industries is introducing seven products. Wendel Jr. is a digital sampling drum machine with 50kHz sampling frequency, plug-in sound cartridges and flexible triggering modes. The R16 is a programmable stereo digital effects processor with 31 preset effects and 60 user-modifiable memories, MIDI control and an LCD window. The PM-1600 and -800 are 16- and 8-input stereo mixers, with built-in power amplifiers, 4-band EQ section and two effects sends per channel. The P700 is a stereo power amplifier rated at 400W per channel, with a built-in electronic crossover. The CN40 is an electronic crossover selectable for stereo 2/3-way or mono 4/5-way operation, with digital readout of crossover frequencies. The PE30 is a 4-band mono parametric EQ.

Circle (541) on Rapid Facts Card

IED ambient analysis system

Innovative Electronic Designs' model 540 is an ambient analysis system designed to solve background noise problems, and is expandable from four chan-

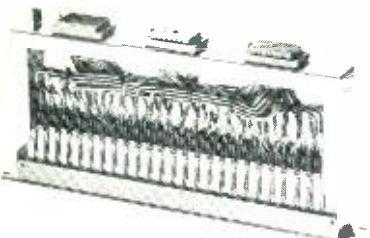
PATCH-BAY PRODUCTS



- 1/4" Long-frame and Mini Telephone Jacks



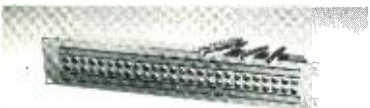
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Circle (67) on Rapid Facts Card

joint development program between K-T's acoustic division and Munro Associates. The linear phase active monitor is based upon a compact 2-way bass reflex acoustic system with integrated electronic filtering and professional standard amplification. The monitor eliminates system component interfacing problems and image shifting because of phase anomalies using maximum phase linearity design and matched electromechanical components.

Circle (547) on Rapid Facts Card

Korg M1 workstation

The M1 is a digital synthesizer/sequencer that features 4MB of multi-sampled, 16-bit PCM, ROM-based sounds. The unit's Separate Component Synthesis allows users to combine separate sound components of pitched or non-pitched sound to create new voices. Additive Harmonic Synthesis allows the combination of two Digital Wave Generators, which are shaped in real time by a variable digital filter using a high-speed, 16-bit LSI processor.

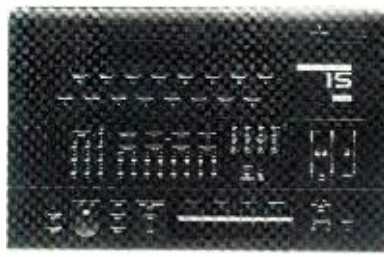
Circle (548) on Rapid Facts Card



Korg S1 production workstation

The S1 combines a 16-bit sampler/drum machine and a 16-track/16-channel MIDI/SMPTE multitrack sequencer into one package. It contains 1MB of 16-bit ROM-based sounds and 512k of user-definable RAM. The sampler/drum machine is controlled by a 16-bit CPU with access to more than 120,000 notes of storage. Data and samples can be stored on 3.5-inch disks with a capacity of 1.4 megabytes.

Circle (549) on Rapid Facts Card



Korg Q1 MIDI control center

The Q1 is a 16-track/16-channel MIDI/SMPTE multitrack sequencer that acts as a MIDI production center. Two mergable MIDI Ins can record data onto any channel of the 16 tracks. Two separate MIDI channels and two pairs of parallel MIDI outputs are available, allowing users to ad-

dress up to 32 channels. Users using only 12 channels can divide them up into six and six, so the MIDI line does not get clogged with data.

Circle (550) on Rapid Facts Card



Lyre FDSS Studio

According to the company, FDSS Studio is the first commercially available true additive synthesizer/resynthesizer, providing multi-timbral capacities with real-time control of performance parameters. Sounds have up to 128 harmonics, with individual control on amplitude and frequency envelopes, plus individual detuning. The basic unit has 128 harmonics, eight outputs/one mix, expandable to 1,024 harmonics. The system runs with an IBM-PC or compatible with an MPU-401 interface and a mouse.

Circle (551) on Rapid Facts Card

Lyre FDSOft

FDSOft V1.05 is the software-only version of FDSS studio, for use with samplers and PCs. It supports the MIDI Sample Dump Standard, in addition to E-mu Emax, Ensoniq Mirage, Roland S10 and Akai S900. The additive software also does resynthesis.

Circle (552) on Rapid Facts Card

Meyer power amplifiers

The company is introducing two amplifiers. The first is a 2U amp rated a 300W per channel steady state at 4Ω (600W per channel peak), and the second is a 3U amp rated at 300W continuous per channel into 2Ω, 4Ω or 8Ω (600W peak). The amps accept Meyer processor boards for control of Meyer loudspeakers. A rack can be configured with a master processor amp controlling slave amps. Other features include temperature-controlled clipping, output short indicators, ISO inputs, overvoltage indicators, voltage and current sense on each channel, and a 4-range ac selector.

Circle (554) on Rapid Facts Card

MicroAudio EQs

MicroAudio is introducing six equalizers. The POD 2.1 is a dual 28-band 1/3-octave, the POD 2.2 is a dual 28-band 1/3-octave with eight user-recallable EQ curves, and the POD 2.2R is a model 2.2 with a remote

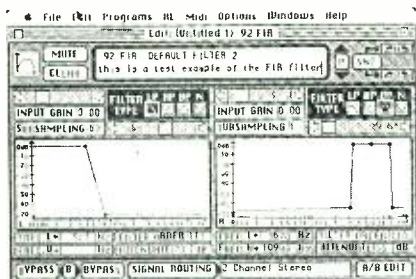
with eight user-recallable EQ curves, and the POD 2.2R is a model 2.2 with a remote control retrieval switch. The POD 3.1 is a dual 14-band unit (10 1/2-octave, four 1-octave), the 3.2 is a dual 14-band with eight user-recallable EQ curves, and the 3.2R is a remote version of the 3.2. All units are tamper-proof single-rack slave equalizers.

Circle (555) on Rapid Facts Card

Marshall Electronic XLC

Designed to be used with the Quantec 32-bit SL digital signal processor, the XLC is a Macintosh controller/librarian/compiler that changes that function of the XL and adds several features and effects. All editing and effects creation is done on the Macintosh, with up to 30 effects simultaneously on the screen. Libraries from past sessions can be automatically loaded in bulk, or effects may be cut and pasted to built special libraries. Effects include reverb and room simulation, with such features as air density, EQ of more than 3200dB/octave with zero group delay error, special effects and graphic EQ.

Circle (553) on Rapid Facts Card



Musik Produktiv Hitec Audio Mark III

The Mark III is a variable processor designed for use with full-range cabinets from various manufacturers, including Electro-Voice, Cerwin Vega, Turbosound, Community and Ramsa. Plug-in modules change the processor parameters to match the various cabinets. The unit is designed for 2- and 3-way cabinets. With 2-ways, the unused third way is connected to a separate output, allowing a sub-bass cabinet to be added to improve the LF response. The output of the full-range amplifier is used and the signal is divided in the same frequency bands as the cabinet's passive crossover.

Circle (558) on Rapid Facts Card

Mitsubishi X-880 multitrack

The updated version of the X-850 32-track digital multitrack, the 880 is fully compatible with the 800 and 850. LSI electronic technology is used for reliability and results in a smaller, lighter unit, the company says. External sync, sampling frequency and the operating mode of the

playback servo are displayed on the main unit and the autolocator. The autolocator layouts and functions have also been changed for easier use. An optional chase synchronizer is included, which has ±2ms accuracy for precise editing and phase coherent 64-channel operation.

Circle (556) on Rapid Facts Card



Mosses & Mitchell pre-wired jackfields

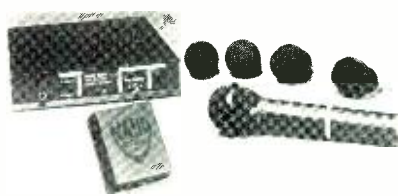
The pre-wired jackfields come in two configurations: two rows in a 1U panel containing a maximum of 26 1/4-inch jacks per row, complete with designation strips; and three rows in a 2U panel, also containing a maximum of 26 1/4-inch jacks per row. All versions of normalling can be provided, including half-normalling and full.

Circle (557) on Rapid Facts Card

Nady wireless systems

Nady is introducing two systems. The 1200 VHF wireless system includes true diversity reception and a redesigned hand-held transmitter that allows users to switch between most mic elements on the market. Companding circuitry gives the system a dynamic range of 120dB. The 650 VHF system is also a true diversity system that features newly developed filtering circuitry that allows up to 10 units to function together. Mic and line outputs are included, and the unit can be powered by 110V or 230V ac current.

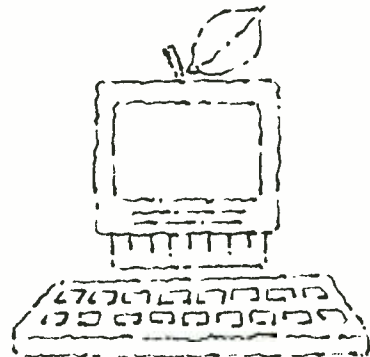
Circle (559) on Rapid Facts Card



Nady IR 300 system

The IR 300 is an infrared transmission hearing-assistance system designed for coverage of large areas such as theaters, churches, lecture halls and auditoriums.

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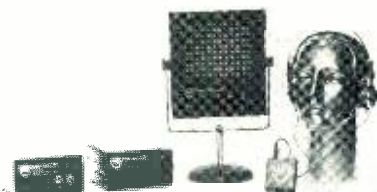


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Circle (68) on Rapid Facts Card

The transmitting system consists of an IRCU 300 power supply/control unit, IRT 300 infrared emitters and optional IRCU 301 repeater units. The system operates with an FM-modulated infrared light on a 95kHz carrier standard, with an optional 250kHz carrier frequency. Modulators are designed with built-in pre-emphasis, and receivers have matching de-emphasis.

Circle (560) on Rapid Facts Card



Neve introductions

New products from Neve include the V60 console for music recording and post-production with Necam 96 automation; the Digital Transfer Console for CD preparation; the Prism Series, rackmount EQ units derived from the V Series console, incorporating a 4-band parametric EQ, comprehensive dynamics and mic pre-amp; and the 8232, a multitrack console.

Circle (564) on Rapid Facts Card

Neutrik XLR connectors

The FX/MX-HD series are water-resistant, dust-resistant and corrosion-free variations of the company's X series XLR latching cable connectors. The connector has an external rubber jacket as well as internal O rings, ensuring moisture protection. The NC3FX-S rotary on/off switch features a red rotary switch ring, which clearly indicates the on/off positions. When turning the switch off, pins 2 and 3 are simultaneously shorted, eliminating electrical pops and clicks.

Circle (561) on Rapid Facts Card

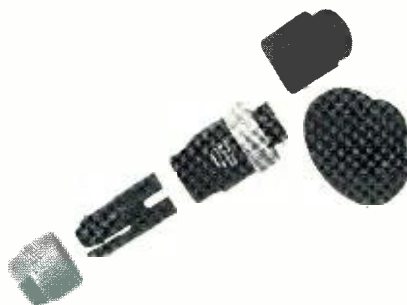


Neutrik Speakon connectors

The system consists of the NL4MP, the chassis receptacle, and the NL4FC, the cable connector. The connector features a positive bayonet-lock, touch-proof connec-

tor retention method, which allows current to flow only after the dynamic locking action takes place. Rated to carry a current of 30A per contact, the system is available in 4-contact and 8-contact versions.

Circle (562) on Rapid Facts Card



Neutrik Bantams, frame plugs, locking jack connectors

The all-metal Bantam plugs employ Optilloy, an advanced hard plating material formulation, on all contacts, with a service life of more than 10,000 insertions. The 1/4-inch frame plugs feature a shell of solid brass, finished with a baked-on black or red plastic powder coating. Contact surfaces are plated with Optilloy. The Latching Phone Jack are spring-loaded and insulated to affect dynamic latching for contact security. The units are made with all 1/4-inch, 2- or 3-pole phone plugs.

Circle (563) on Rapid Facts Card



NED updates for PostPro, Synclavier

New England Digital's digital audio post-production system has several new features, including a remote controller/autolocator/editor interface, Apple Macintosh II high resolution graphics workstation, MaxTrax track expansion option, time compression and other DSP software. A new generation of the Synclavier will be introduced, including 96 voices, 64Mbytes

of RAM, enhanced sampling fidelity and a high-resolution graphics workstation.

Circle (565) on Rapid Facts Card



ODC 533 CD analyzer

Optical Disc Corporation's 533 performs real-time specification analysis during disc mastering. It is designed to be attached to the mastering system for checking the master, or to any CD player for checking stampers or replicas. The 533 displays full screen tables or graphs of a large number of error signals, as well as a printout of the results. The system consists of a PC board that is installed in an IBM PC/compatible and software.

Circle (566) on Rapid Facts Card

Orban 642B, 787A

The 642B is a parametric EQ/notch filter that features a dual 4-band/mono 8-band operation, tunable HP and LP filters, vernier fine-turning on the frequency control and improved specs over its predecessor, the 622B. Special frequency variations for sound contracting and forensic work are available. The 787A is a programmable multi-function mic- or line-level processor that stores and recalls parametric EQ, compression, gating and de-essing parameters. Optional MIDI and RS-232 interfaces allow access to 99 memory registers.

Circle (567) on Rapid Facts Card

Otari MTR-100A mastering recorder

The MTR-100A is a digitally controlled, pinchrollerless analog 24-track mastering recorder. It features fully automated alignment of all record and reproduce parameters, including level, bias, HF, MF and LF record EQ, phase compensation, HF and LF repro EQ and repro level. The VU meter display can be remotely configured and

swings up for easy viewing during manual alignment, and also provides access to the optional Dolby SR card cage.

Circle (568) on Rapid Facts Card



Otari MX-55 recorders

The MX-55 series features two versions. The MX-55TM is a 2-track version with center-track time code. The MX-55NM is

a two-track with overbridge design. The transport features a dc quartz PPL capstan motor with user-selectable speed pairs of 15/7.5ips or 7.5/3.75 ips. Optional accessories include editing scissors, tape marker, fader-start, remote control, autolocator and a special voice editing module for high-speed pitch editing without pitch error.

Circle (569) on Rapid Facts Card



Oxmoor DCA-2

The DCA-2 is a 1U, 2-channel digital control attenuator that provides audio attenuation in 1.5dB steps, including a 90dB "off" position. Other features include front-panel gain controls, key-switch lockout, independent preset and priority level controls. The unit is designed to work with the RC-16 or RC-2 remote control.

Circle (570) on Rapid Facts Card

Oxmoor remote controls

The RC-16 utilizes a shaft encoders that translates knob movements into a string of digital pulses to control audio levels through the DCA-2 digital control attenuator. Visual level position is accomplished by using LEDs that replace a pointer. The RC-2 features a barrier strip for connection of push-button-styled enclosures of up, down, preset and priority functions of the DCA-2. An external switch closure provides a digital pulse to actuate the DCA-2's preset function.

Circle (571) on Rapid Facts Card

Oxmoor buffer amp, programmable EQ

The company's 4x4 is a 4-channel buffer/mixer/distribution amplifier. Any of

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Circle (70) on Rapid Facts Card

four outputs can be assigned to any or all of the four outputs. Two independent mixing buses enable signals to be mixed before or after the gain stages. The DEQ-29 is a 1/3-octave programmable equalizer without a physical control panel. EQ is adjusted by using the company's TWEEQ software and an Apple Macintosh. Sixteen equalizers can be controlled by a single computer. The computer is required only during the EQ process; up to eight curves can be stored in the DEQ's non-volatile memory.

Circle (572) on Rapid Facts Card

Panasonic SL-4300, -4700 compact disc players

The SL-4300 is a single-tray player with an access time of less than one second. A 10-key keypad allows up to 20 tracks to be selected in advance. A dedicated rear-panel socket allows multiple players to be connected together for automated series play. The SL-4700 has a removable magazine that holds up to six CDs. Up to 36 "steps" can be programmed, either to a single disc or across all six. Both are designed to be rack-mounted.

Circle (574) on Rapid Facts Card



Panasonic SV-250, -3500 R-DAT recorders

The SV-250 is a portable recorder that weighs 3.2 pounds and can be powered from a rechargeable battery pack, external dc supplies or main power. XL-type mic connectors are included, as well as peak-level metering, headphone monitoring and switched 14dB mic attenuation. Maximum recording time with battery pack is 2.2 hours. The studio-version SV-3500 has record sampling frequencies of 32kHz and 48kHz, and replay sampling frequencies of 32kHz, 44.1kHz and 48kHz. Analog and IEC digital interface inputs/outputs are included.

Circle (573) on Rapid Facts Card

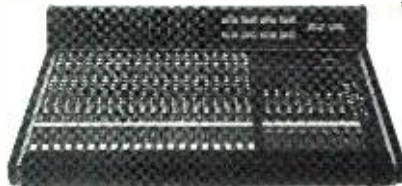


Panasonic/Ramsa WRT820B console

The WRT820B is an 8-bus console designed to optimize its functions at each stage of the recording process. Flexible routing and switching allows up to 48 in-

puts and eight addressable aux sends. To enhance audio performance, high-speed op-amps are used at the critical gain stages throughout the console's circuitry. New MRP 300,000-operation faders deliver smooth and accurate operation. Full-function LED and VU metering is provided.

Circle (575) on Rapid Facts Card



van den Bergh boom poles from PSC

Distributed by Professional Sound Corp., the microphone boom poles are designed to extend further from a reduced size, making them easier to store. A 1-turn locking system provides a positive lock without undue effort. On longer models, marking rings allow returning to a predetermined length. Accessories to enable central cable threading are optional.

Circle (576) on Rapid Facts Card

Sonosax SX-PR mixer from PSC

The SX-PR is a modular stereo sound mixer available in two, four or six inputs and is powered by three C batteries or NiCads. Accessories such as an M-S matrix and a HF transmitter or receiver are planned for the near future.

Circle (577) on Rapid Facts Card

PSC sound cart, stereo matrix decoder

The SC-4 is a lightweight sound cart designed for field production. It has two adjustable shelves, four boom holders, four cable hangers and a power bus. An additional top shelf can be used for a wireless receiver or portable recorder. The MS-2 is an M-S stereo matrix decoder that provides location recordists with a sum and difference matrix, which "decodes" discrete M and S signals to stereo and mono, as well as reformatting X-Y signals to M-S. It can also be used in post-production.

Circle (578) on Rapid Facts Card

PSC power supplies

The MP-12T and MP-48P are portable power supplies for 12V AB (T) and 48V phantom-powered microphones. Both use 9V and 22.5V batteries, and battery life is up to 60 hours with alkalines. The MP-48PH-Stereo power supply is designed to be used with the Neumann 190i stereo

microphone, and uses six Duracell 9V batteries.

Circle (579) on Rapid Facts Card

QSC 1100 amplifier

Part of the Series One, the 1100 is a 1U unit that delivers 65W per channel at 4Ω and 50W per channel at 8Ω. Passive cooling and toroidal transformers allow for quiet operations. XLR, barrier strip and 1/4-inch ring/tip/sleeve inputs allow for a variety of inputs. QSC's Output Averaging Circuit protects the amplifier from indefinite short circuits without false triggering into reactive loads. The high efficiency output circuit uses case-grounded output transistors, yielding a 25% improvement in thermal transfer.

Circle (580) on Rapid Facts Card

Renkus-Heinz Smart Systems processors

For use with the Smart Speaker Systems, the processors include the X-22 (2-channel biamp) and the X-31 (3-channel triamp). Both include front panel plug-in modules that provide EQ, crossover, time correction, relative gain settings and protection functions. Other features include Sense Fail detection circuitry and Spectrum Power Transfer, which protects against excursion and thermal damage to all drivers.

Circle (581) on Rapid Facts Card



Renkus-Heinz Coax 60, 90

The Coax 60 is a coaxial mid-frequency and high-frequency horn and driver assembly. Coverage angles are 60°x40°, and frequency range is 250Hz to 17kHz. The Coax 90 is similar to the Coax 60 except for the coverage angles, which are 90°x40°.

Circle (582) on Rapid Facts Card

ROH universal power supply

The 3030PS Party Line Power Supply is designed to provide phantom power to ROH's 303 Party Line Stations, and to provide programmable interface ports for direct connection to other brands of party line or conference-style intercom systems. The power supply is capable of driving up to 40 headset or speaker/mic intercom stations on each of its two channels. Both channels may be combined for single-channel operation, doubling the capacity.

Circle (583) on Rapid Facts Card

ROH ARMS7000 routing switcher

The PC-controlled ARMS7000 allows in-

put signals to be mixed, in any combination, and assigned to any output. The switcher is available in mono, stereo or a combination of both and can handle 16x16 outputs to more than 1,000 inputs and outputs. Programmable relays may be included for tallies and remote control of external devices. More than 100 presets can be saved and be assigned up to six priority levels.

Circle (584) on Rapid Facts Card

Samson SR-22, Stage 2 wireless systems

The SR-22 is a true-diversity wireless receiver available with all standard transmitters from the company's Stage 2 series. The receiver is standard with dbx noise reduction and is available on the same standard frequencies as the Stage 2 non-diversity receiver. An optional rack-mounting adapter is available. Like the SR-22, the Stage 2 comes with dbx noise reduction, and the belt-pack transmitters offer lavalier mics from Sony and Sennheiser. Hand-held transmitters are available with Shure and Electro-Voice cartridges.

Circle (585) on Rapid Facts Card

Schoeps VMS 52 UB

The unit is a portable microphone pre-amp/phantom supply/M-S matrix featuring dual mic pre-amps with switchable gain and LF filtering. It is designed for field use by film and video crews, or as a high-quality input to PCM/DAT recorders for location music recording. Also featured is 48V phantom power on XLR-3F mic inputs, RF-filtered M-S active matrix, adjustable, with separate inputs.

Circle (586) on Rapid Facts Card

Sennheiser MD 518

The 518 is a handheld dynamic microphone designed for sound reinforcement or high sound pressure audio signals, including vocals and percussion.

Circle (587) on Rapid Facts Card

Shape compact, R-DAT cassettes

The Reel-to-Reel Mark 10 audio cassette offers a lower torque rating, which reduces noise and improves uniform RPMs to eliminate distortion. The centering ring in each flange reduces surface contact from hubs to washers, eliminating the need for waved washers and reducing the chance of tape damage. The company is also introducing a bidirectional audio box, which allows the cassette to be inserted either way, and an R-DAT cassette.

Circle (588) on Rapid Facts Card

Shep Associates SE1, -2, -6

The SE1 is a 4-band parametric equalizer with logic switching. The SE2 is a power supply ($\pm 15V$, +24V, +12V and +48V). The SE6 is a 19-inch 6U rack-fitted unit with LXRs and multiway connectors, for remote switching of equalizer selections. The rack holds 10 equalizers, and comes with a wired remote control box.

Circle (589) on Rapid Facts Card

Sontec introductions

Sontec Electronics is introducing three products. The MES-450 is a programmable equalization system. The BW-2X3 is a 3-band FM broadcast level controller. The MEP-250EX is a 2-channel parametric equalizer.

Circle (592) on Rapid Facts Card

Shure SM99 gooseneck mic

For gooseneck-mount applications, the SM99 features a 1cm condenser element

Circle (71) on Rapid Facts Card

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Circle (72) on Rapid Facts Card

and an on-board pre-amplifier. The mic exhibits a symmetrical supercardioid polar pattern for excellent isolation and maximum gain before feedback. It comes with a pop filter that makes it suitable for speech and musical pickup.

Circle (590) on Rapid Facts Card



Shure W15HT wireless mic transmitter

The W15HT is available in two versions, the W15HT/58, supplied with an SM58 dynamic mic element, and the W15HT/87, supplied with an SM87 condenser element. Both heads may be interchanged with any W15HT transmitter. The W15HT transmitter operates at a single, crystal-controlled frequency in the VHF band between 166MHz and 216MHz. A total of 15 frequencies are available; other frequencies may be specially ordered from the company.

Circle (591) on Rapid Facts Card



Sony digital multitracks

Sony is introducing two multitrack recorders. The PCM-3348 is a DASH-format 48-channel 1/4-inch machine, that provides one hour of recording on a 14-inch reel. Features include a built-in VCLK/con-

sole interface and a built-in synchronizer for the PCM-3328/-3324/3324A. The PCM 3324A is a successor to the 3324 and includes digital filtering, 2-channel AES/EBU input/output and reduced power consumption. The 3324 also has a software upgrade, the RM-KIT 3310, which features remote crossfade control, remote varispeed control, enhanced electronic editing and repeat automatic punch-in and -out rehearsal.

Circle (593) on Rapid Facts Card

Sony analog multitracks

The APR-24 is a 24-track 2-inch machine designed for audio sweetening and studio recording. Features include built-in chase synchronizer, time code reader/generator, video reference, resolve capability and Processor Assisted Alignment. The APR-5003V 2-track is a successor to the APR-5003. New features include video reference with resolve capability and serial interface to the Sony BVE-900 and -9000 editing systems. Applications are for video post, film audio production and music recording.

Circle (594) on Rapid Facts Card

Sony MXP-3056VF console

The console incorporates features of the MXP-3000 series plus stereo echo returns, improved cuing facilities and enhanced automation user interface. The 56 input and output channels are split by a center control section that allows the user to easily interface with two multitrack machines. Applications are for audio sweetening, film post and music recording.

Circle (595) on Rapid Facts Card

Sony WRR-28 wireless system

The unit is a compact and lightweight wireless mic that is 1/3 the size and weight of the WRR-27. It can be fitted into a Beta-cam recorder, making it suited for ENG applications. Switchable operating frequencies is a new feature. Also available is the WRR-28 UHF transmitter.

Circle (596) on Rapid Facts Card

Sound Ideas ambience library

The "New Ambience Series 3000" is a 12-CD set containing more than 200 digitally recorded long ambience sounds. Each recording is a minimum of four minutes long, eliminating the need to expand the effect duration so often. Sounds include room tone, country effects and city ambiances.

Circle (600) on Rapid Facts Card

Sound Ideas music production library

The Sound Ideas Music Production Library is now on compact disc, contain-

ing original music themes for audio visuals, and broadcast, film and commercial applications. Each theme is accompanied by a 30- and 60-second bed, and an alternate mix or rhythm track when appropriate. The library is contained on 25 volumes, with 210 original themes and 715 total music tracks.

Circle (601) on Rapid Facts Card



Soundcraft 6000 console

The 6000 features a split bus architecture based on the company's 500 and 600 controls. A newly designed pre-amp for each input module accepts 68dB of continuously variable gain and a low noise floor, regardless of setting, without the need for a switchable pad. The console is capable of up to 24 buses and can be expanded up to 32-track monitoring. Other features include a 4-band semi-parametric EQ and a phase-reversal switch to reverse polarity on individual input modules.

Circle (597) on Rapid Facts Card



Soundcraftsmen CD750 compact disc player

The 750 features a Differential/Com-pander circuit that allows either full dynamic range or dynamic compression with low signal expansion for applications where the full dynamic range cannot be used. A Spectral Gradient circuit enhances CD listening without harsh or hard HF

characteristics. Both circuits can be bypassed. The player comes with a full-function direct access remote control.

Circle (598) on Rapid Facts Card

Soundcraftsmen 300X4 power amp

The MOSFET amp has a multi-channel design that allows users to select either 2-, 3- or 4-channel operation. It is designed for studios needing high monitor power—600W per channel (2-channel mode) at 8Ω, or biamped at 210W per channel (2-channel mode) at 8Ω. The unit has two independent power supplies and two separate power transformers, sharing only a common power cord. Clipping indicators are included for each channel. Thermal protection is provided by Multi-Sensor Phase Control Regulation, as well as by two multi-speed cooling fans.

Circle (599) on Rapid Facts Card

New version of Soundmaster editing system

Version 5 of the Soundmaster Integrated Audio Editing system incorporates Syncro, an exclusive programmable machine controller, and Smart Sync. New features include Shutl, a programmable keyboard

and shuttle control, disk-based user-programmable sequence keys, shuttle GOTOs on capable machines, ES bus interfaces, video EDL download, time code synthesis, feet-frame data entry and conversion, up to eight machines on one screen, edit list comments and powerful setup screen enhancements.

Circle (602) on Rapid Facts Card

Sound Workshop custom consoles

Sound Workshop's custom console division's film and video post consoles are based on a series of internally modular designs that allow for the integration of custom computer packages for ease of use. Custom EQs, featuring graphic or high/low-pass filter sections, with local or remote control, may be fitted as needed. Digital Creations' Diskmix and VCA-based automation systems are available.

Circle (605) on Rapid Facts Card

New module for Sound Workshop Series 34C console

The 34C is now available with the Dual Mix Path input module, which features two line inputs in addition to the mic input. Any pair may be brought into the mix bus

at the same time, with independent level and panning control. This doubles the number of available returns in any given frame size, and solves the problem of users who have too many line returns and not enough inputs.

Circle (606) on Rapid Facts Card

Soundtracs introductions

Soundtracs is introducing seven products: the IL3632 in-line 32-bus production console; Tracmix fader automation system; the CMX 32-12-24-2 SMPTE-controlled recording console; the MRX32 32-8-16-2 recording console, the MX32 32-8 sound reinforcement console; the PC24 MIDI-controlled in-line recording console; and the FME24 24-4-8-2 dubbing/video post-production console.

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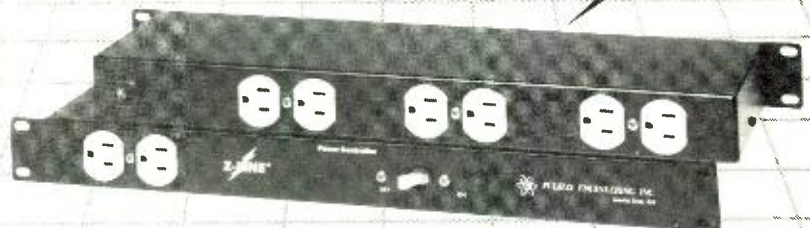
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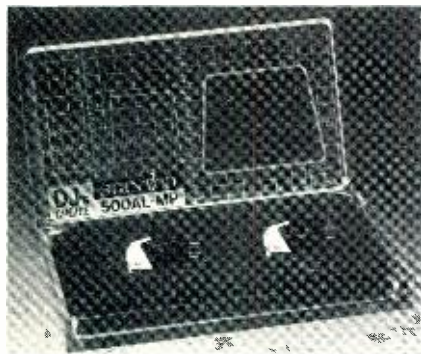
Circle (74) on Rapid Facts Card

October 1988 *Recording Engineer/Producer* 111

Stanton phono cartridges

The 500AL-MP contains a matched pair of 500A1 phono cartridges for professional DJ applications. Each pair of cartridges are selected according to exact specifications, according to the company, and a performance specifications chart is included with the pair. The company is also introducing a match pair of replacement styli, model D5107A1-MP, the 890 AL, a back-cuing cartridge, and a headphone with boom mic.

Circle (607) on Rapid Facts Card



Sound Technology 2000A

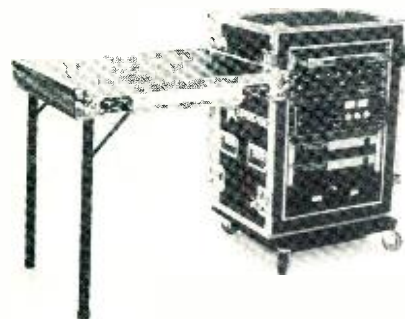
The 2000A is an external computer-controlled audio test system, including GPIB, RS-232 and Centronics interfaces. The system also includes IBM PC and compatibles menu-driven software.

Circle (603) on Rapid Facts Card

Star Case Case Legs

Case Legs is an option for Star rack case lids. A pair of Ultimate Support aluminum legs are fitted onto the lid, allowing it to be used as a work surface. The lid is then removed, the legs extended and the lid latched to the side of the case. The option is added to the cases at the time of construction.

Circle (608) on Rapid Facts Card



Steinberg Digital Audio Computer Controlled Recorder

The CCR is an all-digital record and

playback device with a 360MB hard disk that allows for 30 minutes of stereo recording. The basic version comes with AES/EBU inputs/outputs; the optional A/D D/A converter module has 16-bit linear resolution and 32kHz, 44.1kHz and 48kHz sampling rates. Editing is done from a Macintosh and is non-destructive. The system is housed in a rack-mount unit with two independent channels for record/playback. Units can be stacked for a maximum of 16 mono or eight stereo channels.

Circle (609) on Rapid Facts Card

Stewart HDA-4 distribution amp

The HDA-4 is a 4-channel headphone distribution amp, providing up to 2W of output per channel, 4W per headset, regardless of the impedance of the headphones. It is designed to be connected to the headphone output (cue) of a mixer. A master level control and individual level controls are provided. A stereo/mono switch combines left and right signals, and a stereo-through jack allows multiple units to be daisy-chained.

Circle (610) on Rapid Facts Card



Stewart PM-6 phantom power supply

The PM-6 is a 6-channel 48V phantom power supply, capable of delivering up to 10mA of +48V dc to mics, direct boxes and other equipment requiring phantom power. The unit features short-circuit protection for each channel, isolated outputs, individual regulation of each channel, and very low noise and crosstalk. The unit can be rack-mounted from the front or rear.

Circle (611) on Rapid Facts Card



Studer DE 4003

The DE 4003 is a digital audio electronic editing system for CD tape mastering with digital 2-channel D820X twin-DASH machines. The system allows two playback machines, one of which may be analog. On the recording D820X machine, off-tape editing monitoring is standard mode. The machines are fast-reacting, according to the company, and have intelligent operating modes for efficient editing.

Circle (614) on Rapid Facts Card

Studer A730 CD player

The professional model features Auto-cue, which determines and stores both

start and end of modulation. A disc recognition feature has dynamic non-volatile memory for storage of up to 100 CDs. Directly accessible cue memory stores up to three start cue points for each CD, and the machine can play 3-inch CDs without an adapter. Other features include a cue wheel for frame-accurate cuing in two selectable speeds, start and end review, balanced digital and analog output and status alarm outputs.

Circle (615) on Rapid Facts Card



Studer ReVox C270 recorders

The C270 Series consists of 2-, 4- and 8-channel versions. The 270 is a 1/4-inch 2-channel recorder for broadcast, on-air and production use. The 274 is a 1/4-inch 4-channel recorder, and the 287 a 1/2-inch 8-channel recorder, for multitrack and post-production applications. Standard features include Dolby HX Pro, seamless and gapless punch-in and punch-out, integral scrape-flutter head assembly, constant tape tension on both spooling motors, 1-hand cuing under full servo control and modular audio electronics.

Circle (613) on Rapid Facts Card



Studer A807 multitracks

The company is introducing two recorders to the 807 series. The A807 VUK 2-track is designed for console mounting

with overbridge metering. The A807 4-track is available only in the high-speed version with overbridge metering. Both models feature three speeds, servo-controlled capstan motor, servo-controlled electronics, Dolby HX Pro, tape shuttle controller and a variety of control ports, including RS-232.

Circle (612) on Rapid Facts Card



**Symetrix 111
adaptive hybrid**

The 111 is a digital telephone interface

for radio and television that matches phone lines of any impedance to create the best possible trans-hybrid loss under all conditions. Because it uses no tones or noise bursts, the unit achieves and maintains the null inaudibly. It may be used as a stand-alone unit or in conjunction with any telephone system. Host audio may be input at either mic or line level, balanced or unbalanced. The caller audio output signal is available either balanced or unbalanced, at line level or mic level. Standard RJ-11 modular connectors are used.

Circle (616) on Rapid Facts Card

**Symetrix Digital
Processor Recorder**

The system is a hard disk-based random access recorder that allows all audio manipulation in the digital realm. A user-provided Macintosh serves as the front end, and application software is loaded through the computer. Initial configurations are 2-in/4-out, and 4-in/8-out, with up to eight discrete tracks available. Users may customize systems by purchasing optional software packages for specific jobs.

Circle (617) on Rapid Facts Card

Telex FMR-25 wireless system

The series consists of two receivers and two transmitters. The FMR-25 is a single-antenna system, while the FMR-25T is a true-diversity type. Both are half the size of the Telex FMR-50, allowing four to be placed side-by-side in a 19-inch rack. The WT-25 belt-pack transmitter features a standby mode, allowing the mic to be turned off without popping. The WT-25's miniature condenser lapel mic is permanently attached to prevent loss or inadvertent disconnection. The HT-100 ProStar is a hand-held mic with a wide selection of element types to choose from. All components are compatible with the company's other wireless systems.

Circle (618) on Rapid Facts Card



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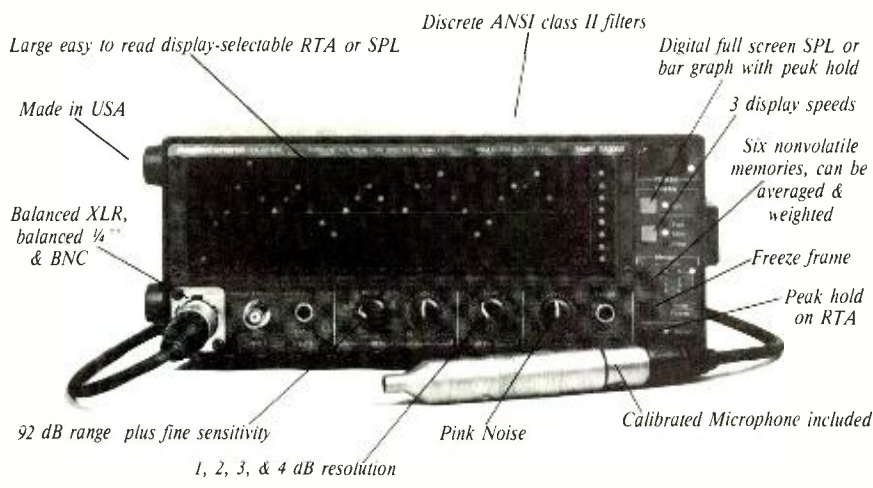
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Circle (76) on Rapid Facts Card

Telex tape duplicator

The 6120 XLP operates as an 8:1 speed ratio, and users can duplicate directly from 15ips open reel master tapes for greater quality and convenience. The duplicator uses a newly developed XL Life record head, constructed of uniform, one-mil HyMu laminations with a hard glass insulation between each layer, which yields longer head life and higher efficiency. Other features include unlimited expandability, choice of track formats, peak-reading LEDs and 1-button operation.

Circle (619) on Rapid Facts Card



360 Systems R2000, -4000

The units are new versions of the company's Permanent Playback digital audio message repeater. Additional features for the R2000 include opto-isolated inputs and outputs for the control and status signals and adjustable timer that automatically re-triggers any reproducer card. Each reproducer card can run off its own internal clock, or one of four external clocks providing a 5kHz, 7.5kHz, 10kHz or 15kHz, in mono or stereo. Each reproducer card provides programmable Flag and Cascade functions. The R4000 is an economical version of the system.

Circle (621) on Rapid Facts Card

360 Systems audio patchbay

The programmable unit is a 16x16, MIDI-controllable audio matrix switcher that controls routing of up to 16 separate audio paths and sends patch maps to external MIDI devices. All inputs and outputs are 1/4-inch phone jacks, and any input may be used to drive single or multiple outputs. Patch configurations are stored in non-volatile memory, and may be recalled using either front panel controls or remote MIDI patch changes. The system is designed for automating audio routing, control of external effects and automated muting, EQ and level changes via fader or bus reassignment in real time.

Circle (622) on Rapid Facts Card

Tannoy PBM-8 monitor

The PBM-8 is a close-field monitor that contains an 8-inch poly cone mid-bass transducer that utilizes an efficient long-throw high-power voice coil. LF are controlled by a tuned port located on the rear of the loudspeaker. HF are provided by a 1-inch ferro-fluid cooled polyamide dome tweeter. Transducers and crossover as-

semblies are housed in a high-density, particle wrap cabinet, designed to minimize unwanted cabinet resonance and HF reflection.

Circle (620) on Rapid Facts Card



UREI 7110 limiter/compressor

The 7110 now offers Smart-Slope compression ratios, adjustable from 1.5:1 through infinity:1, and permits independent settings for limiting threshold, attack and release times, and output level. The gain control action can be continuously varied between either peak or average detectors, giving users a choice of either mode, or a mix of both, for versatility.

Circle (623) on Rapid Facts Card



Valley International Digital Dynamics Processor

The DDP is a multiband digital audio signal processor operating on a 16-bit linear PCM format. Typical configuration is the 3-band DDP-3, although an 5-band (DDP-5) and 8-band (DDP-8) versions are available. Each of the unit's band processing cards is a stereo pair consisting of a digital filter and a digital dynamics processor. The dynamics section is capable of adding gain to low-level signals and reducing gain in high-level signals. An expander reduces the noise floor level that occurs as a result of the compression.

Circle (624) on Rapid Facts Card



WaveFrame AudioFrame

The digital audio workstation is available with some recent upgrades. A variety of functional modules allow users to perform sampling, synthesis, mixing, sig-

nal processing recording and editing. Modular design allows user to leverage the system's initial purchase and expand it as needed, lowering costs. User interface is integrated under Microsoft Windows, and resources can be shared using the IBM Token Ring Network.

Circle (625) on Rapid Facts Card

Wireworks cables

The CQ series/Star Quad cables come in a 4-conductor configuration and high-shield density, which reduces hum and noise to less than 10% than that of conventional 2-conductor mic cables, according to the company. The CF Series Super Flexible 2-conductor mic cables are constructed to reject hum and noise and remain flexible in sub-zero environments.

Circle (626) on Rapid Facts Card

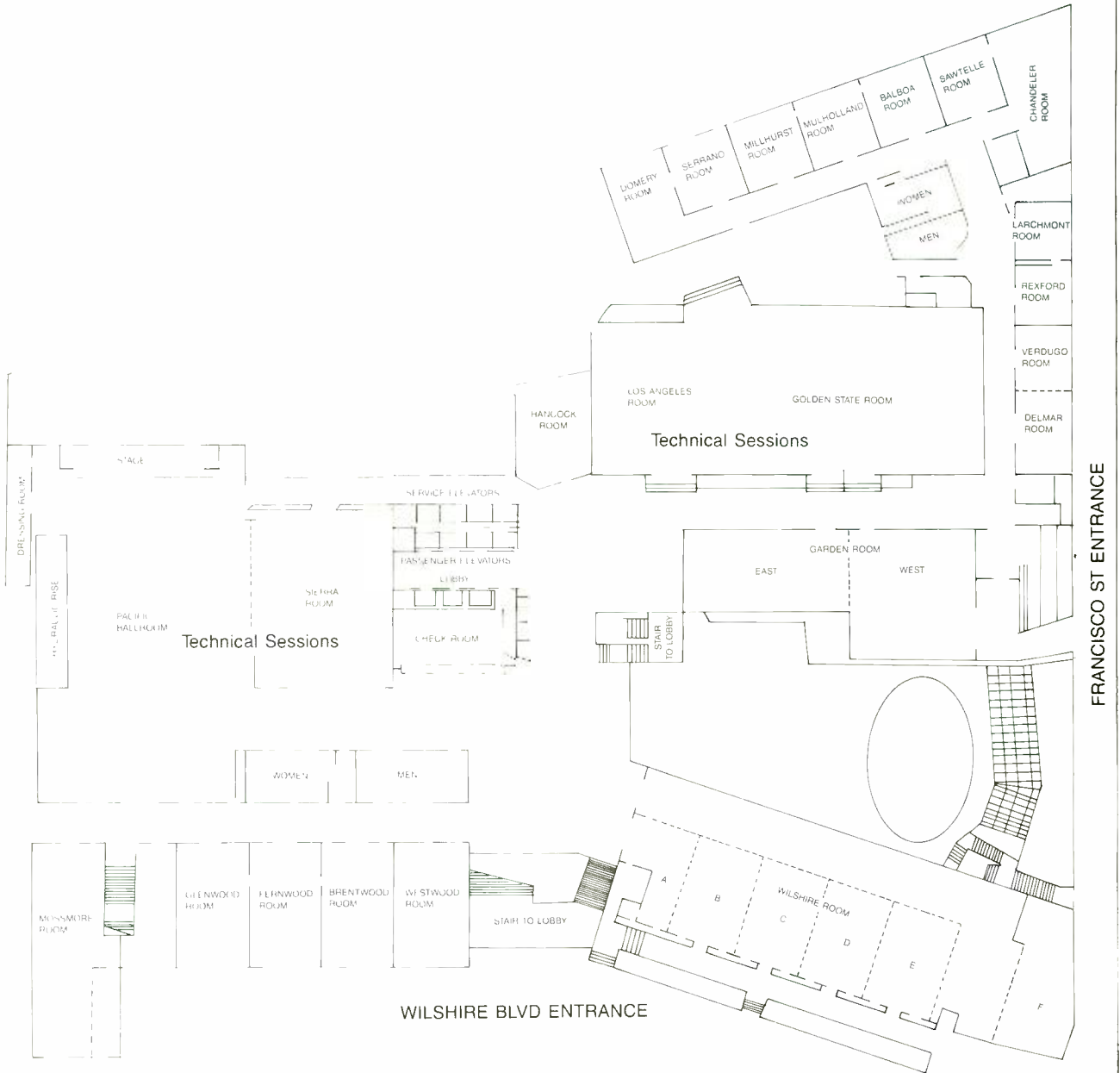


This directory is current as of Sept. 1, 1988, and is compiled from information supplied by exhibiting companies as of that date. It is not all-inclusive; many other new products will be introduced in addition to the ones detailed here. Additionally, some details among products may be changed according to manufacturers' wishes. See New Products in future issues for additional AES new products. For product information on the products detailed here, circle the appropriate circle number on the Rapid Facts Card in the back of this issue.

RE/P

Continued from page 58

Hilton Demo Rooms



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- Cerwin-Vega (Wilshire Rooms B-D)
- Digital Audio Research (Hillhurst Room)
- E-mu Systems (Westwood Room)
- Real World Research (Fernwood Room)
- Yamaha (Balboa, Sawtelle, Chandler, Larchmont rooms)

The map, exhibitor listed and RE/P issue advertisers are current as of Sept. 1, 1988. Product deadlines did not permit the inclusion of later information. Check your show program for updated information.



STUDIO UPDATE

Studio News

Northeast

Odyssey Sound Studio (Long Branch, NJ) has installed a Soundcraft TS-12 console along with a Sony JH-24 24-track machine with Dolby SR noise reduction. 350 Chelsea Ave., Long Branch, NJ 07740; 201-870-3554.

Omega Recording Studios (Rockville, MD) has purchased an Apple Mac II with a 380Mb hard disk to Studio D. Also purchased were two Sony PCM-2500 R-DAT machines for digital mixdown. 5609 Fishers Lane, Rockville, MD 20852; 301-946-4686.

Susquehanna Sound Recording Studio (Northumberland, PA) has taken delivery of a Sony PCM 2500 R-DAT recorder, Dolby 361 SR units and an Emulator II+ sampling keyboard. Scott Berger has been appointed studio manager, and Bret Alex-

ander has been appointed chief engineer. 48 A St., Northumberland, PA 17857; 717-473-9733.

Southeast

Musiplex (Atlanta) has acquired Lamping Audio, a pro audio equipment and instrument maintenance and repair company, and has been renamed Musiplex Audio. The company will be headed by Gregg Lamping and will continue to provide technical support and maintenance to studios, radio and TV stations, A/V firms and sound companies in the Southeast and Midwest. 2091 Faulkner Road NE, Atlanta, GA 30324; 404-321-2701.

Midwest

Producers Color Service (Southfield, MI) has upgraded its offline editing suite. New equipment includes a CMX 330A editing system, Sony BVU 950 SP playback machines, Grass Valley 100 switcher, Soundcraft 200 BVE console, Otari MTR-10

¼-inch tape machine, Pioneer LDV 6000A videodisc players and a Bosch Compositor for electronic titling. 24242 Northwestern Highway, Southfield, MI 48075-2583; 313-352-5353.

Southwest

Omega Audio and Productions (Dallas) has introduced Voicenet, an all-digital satellite voice recording service that links Omega's facilities to 15 studios located in New York, Los Angeles, Boston and London. The studio anticipates that the new service will complement its existing audio post for film and video services. 8036 Aviation Place, Dallas, TX 75235; 214-350-9066.

Southern California

Interlok Studios (Hollywood) has added a Sony BVH-3100 1-inch video recorder. The facility has also leased additional space at the Crossroads of the World complex to build a second audio post room.

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1522 Crossroads of the World, Hollywood, CA 90028; 213-469-3986.

Craig Harris Music (North Hollywood) has added a two-gigabyte optical disk drive to its Synclavier. Each removable disk holds more than five hours of audio that allows instant access to more than 20,000 samples. *Box 110, North Hollywood, CA 91603-0110; 818-508-8000.*

Bossa Nova Hotel (San Fernando) has added a Mitsubishi X-850 digital multitrack and a Mitsubishi Superstar console with Compumix automation. Also new are Westlake BBSM-15 studio monitors and a variety of outboard gear. *452 Newton St., San Fernando, CA 91340; 213-361-4976.*

Northern California

Pacific Video Resources (San Francisco) has added Cece Hugo to its staff as director of marketing and client services. *2339 Third St., M-4, San Francisco, CA 94107; 415-864-5679.*

CD Studios (San Francisco) has named Janet Start Krick as studio manager. Gary Hobish, the former studio manager, is now the chief engineer, concentrating on equipment upgrades, maintenance, and session engineering and production. *1230 Grant Ave., Suite 531, San Francisco, CA 94133; 415-285-3348.*

Northwest

Steve Lawson Productions (Seattle) has added a satellite receiver at its facility, allowing satellite services between Seattle, New York and Los Angeles. *Sixth and Battery Building, 2322 Sixth Ave., Seattle, WA 98121; 206-443-1500.*

Canada

Comfort Sound Recording Studio (Toronto) has named Coby Luke and Rhonda Bruce to its engineer staff. *26 Soho St., Suite 390, Toronto, Ontario, M5T 1Z7 Canada; 416-593-7992.*

Manufacturer announcements

DDA has received AMR 24 console orders from Marcus Music, Matthew Fisher, Mole Studios and Rod Gammons.

Solid State Logic has received console orders from Real World, Wiltshire, 4080 G Series; Excalibur Studios, Milan, Italy, 4056 G Series; Metalworks, Mississauga, Ontario, 4056 G Series; Arco Studios, Munich, 4056 G Series; Little Mountain, Vancouver, British Columbia, 4056 G Series; Church Studios, London/Los Angeles, two 4056 G Series; Southern Tracks, Atlanta, 4040 E Series; Tokyo Broadcasting Systems, Tokyo, 3032 G Series; Disney-MGM Studios, Orlando, FL, 6040 E Series; and Swedish Television, Gothenburg, 6044 E Series.

FM Acoustics has installed six FM 1000 power amplifiers for main monitoring at Toshiba/EMI Studios, Tokyo.



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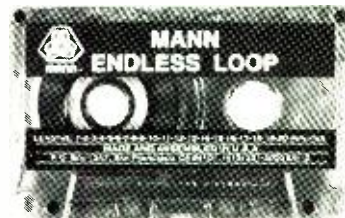
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