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Review-Tascam DA-88

Howard Schwartz-Studio B



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SERIES

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● Studio B with its new Synclavier, at Howard Schwartz Recording in New York City. See our interview story of Howard and Bill Cavanaugh beginning on page 14.

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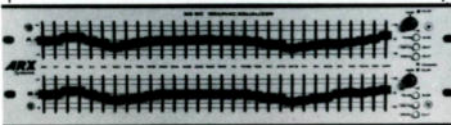
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● It hasn't been given a name yet, but the schedule is fixed for the **97th Audio Engineering Society's Convention**. It will be held November 10th through the 13th at **San Francisco's Moscone Convention Center**—the same venue of two years ago. Luckily, it was never rescheduled for the Los Angeles Convention Center, which was severely damaged in the recent LA earthquake. Latest information is that the building will probably be torn down and rebuilt.

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● SPARS has launched a Los Angeles chapter, modeled after the long-established New York chapter. The first meeting which took place on January 13th established, among other things, the 1994 Workstation Conference, which will take place May 21 and 22. It will take place at the Beverly Garland Holiday Inn Hotel in North Hollywood, California.

For more information contact Shirley Kaye, SPARS Executive Director at 1-800-771-7727.

● Argentina is the site for the "First Annual South American Pro Audio Expo". It will be held at the Sheraton Buenos Aires Hotel & Towers on May 25-27 1994. It is expected that Brazil, Chile, Paraguay and Uruguay will also supply eager visitors. **Studio Sound International** the sponsor/organizer. Contact Chris Adams at 914 993-0489 (FAX 914 328-8819) for more information. db

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Editorial

What Happened to the November/December 1993 Issue?

Good question.

In a sense, you are now holding it.

When we were preparing our November/December 1993 25th , getting all the material we needed for it took far longer than expected. The result was an issue that would have come out out in early January rather than the beginning of November as it should have .

This meant that the November/December issue would have reached you in March not very good! So, you are holding the January/February issue that is now on time, and there just isn't a November/December issue.

On another matter, we've begun some changes in the appearance of the magazine, but we will continue the editorial directions we are in. In March/April look for articles on the impact multi-media presentations will have on the future of audio.

In particular, this is still your magazine. So drop us a line anytime to tell us what you think.

Dear Subscriber:

You will receive all the issues you are entitled to. Our computers have been advanced. If you were scheduled to end with November / December, you will instead end with this issue. In all cases, one additional issue has been added to everyone . LZ

New From ELAR Booksource

New Ears: The Audio Career and Education Handbook by Mark Drews

The newly revised second edition of *New Ears: The Audio Career and Education Handbook* is designed to assist those interested in studying sound engineering, music recording and music technology. It is, in fact, a comprehensive reference to audio career and education options.

Author/editor Mark Drews is senior audio engineer at the Syracuse University School of Music and College of Visual and Performing Arts. An active recording engineer, musician, and video artist, Mark Drews was the recent recipient of a Fulbright Senior Research Fellowship to assist with the development of a graduate music recording program in Norway.

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Middle Tennessee State University's Department of Recording Industry

OVER THE PAST SEVERAL months, our university has been in the process of putting together an accreditation report for the Southern Association of Colleges and Schools (SACS). This accreditation is based upon a self evaluation document where all of the aspects of education here at Middle Tennessee State University are examined against a long series of statements to which we must conform. Typically this is dry stuff and tiresome to put together, but it has been enlightening from the per-

spective of telling us what it is that we must do as educators. The primary "must" statement upon which all other statements and evaluations are made is the education of our students.

Our department specializes in educating students about the recording industry. This alone makes the Department of Recording Industry somewhat unique. We are unique, not only in the subject matter that we teach, but invariably, in the methods whereby we impart knowledge about this industry. Unlike traditional acade-

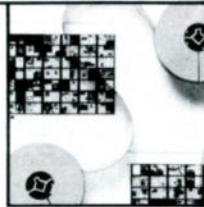
mia, we are teaching courses directly involved with pop culture and methods for the creation of the next pop culture icons. We also teach aspects of the industry which have no direct relation to pop culture or its creation. As the recording industry encompasses a great variety of recorded material, it also thrives upon the varied talents of a great number of practitioners. Additionally, we stress a hands-on approach that is viewed on occasion by other academics as belonging more to a trade school.

We are also a young department. When our program was initiated in 1973, the recording industry was by no means in its infancy, but it has certainly seen a lot of growth since then. To give you an idea, our first state-of-the-art recording facility was equipped with a 4-track recorder. (Remember that it was only five years previous to this that George Martin recorded the Beatles' *Sgt. Pepper* on these magnificent machines). 1973 also marked the year that link Floyd's *Dark Side Of The Moon* was released. New products displayed at the 1973 AES show included MCI's JH 100 series 24-track machine, a new SMPTE-based console automation system by Allison Research and a 4-bus console from an upstart company called Tascam.

Of special note, the October 1973 issue of **db magazine** featured an article on music recording education. In the article titled *What Is A Tonmeister?* author John Borwick detailed the curriculum offered by

Doug Mitchell is Assistant Professor, Department of Recording Industry, College of Mass Communication, Middle Tennessee State University, in Murfreesboro, TN 37132

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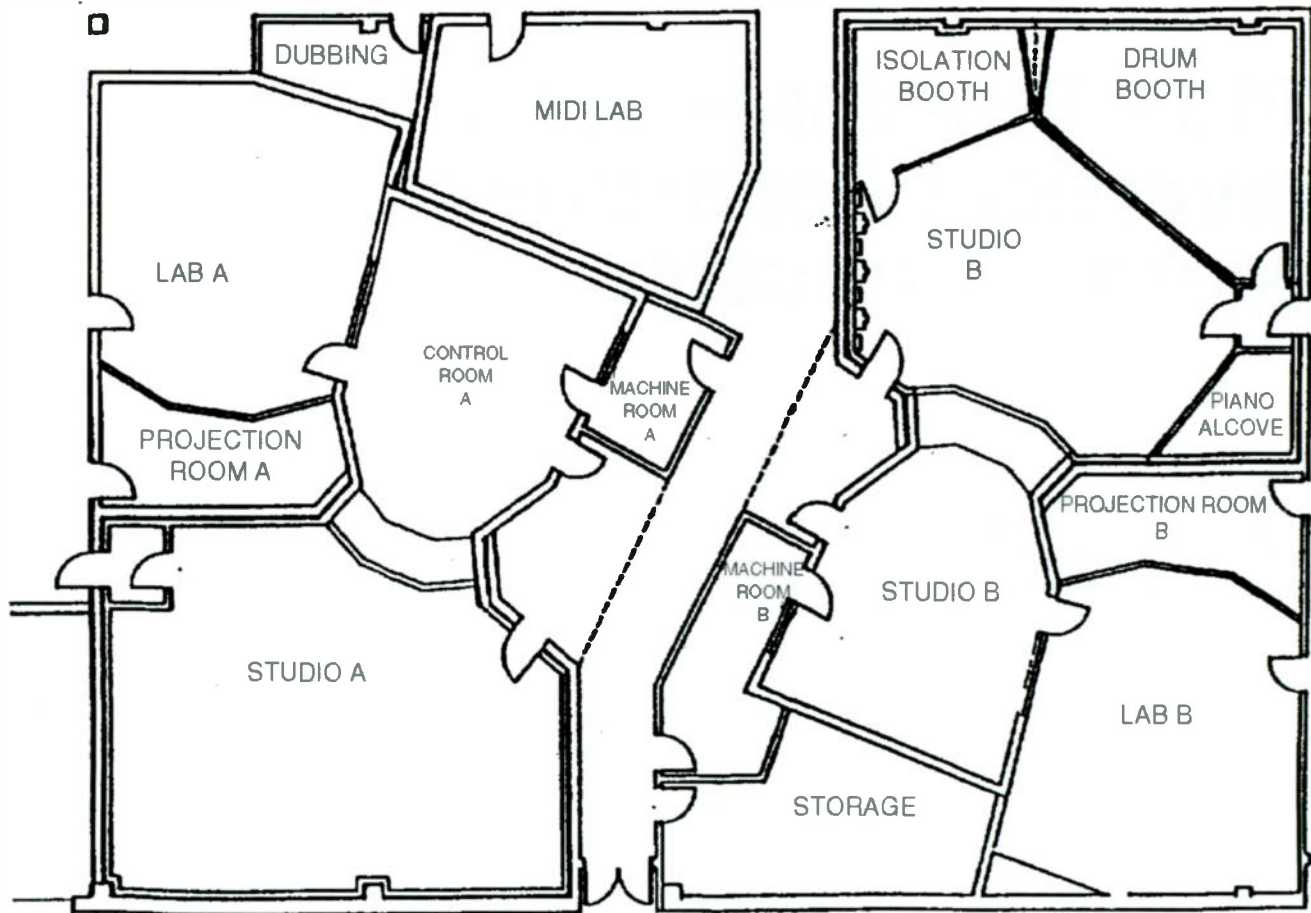


Figure 1. The studio floor plan.

his Department of Music at Surrey University in England. The Tonmeister (sound master) degree initially offered at Surrey in 1970 followed the development of Tonmeister programs in Europe.

Borwick quoted from a letter written by composer Arnold Schoenberg to the Chancellor of the University of Chicago in 1946 discussing the implementation of his idea for a Tonmeister or "sound man" program:

"Sound men will be trained in music, acoustics, physics, mechanics, and related fields to a degree enabling them to control and improve the sonority of recordings, radio broadcasts, and sound films..."

His training in the mechanical fields should help him to correct such acoustic shortcomings as, for example, missing basses, unclear harmony, shrill high notes, etc.

"This can be done and would mean a great advantage over present methods where engineers have no idea of music and musicians have no idea of the technique of mechanics."

The Department of Recording Industry at MTSU does not purport to be a Tonmeister program. In fact, unlike other recording programs, we are a department in the College of Mass Communication—not housed within a music department. However, many of our students have a musical background or simultaneously study music. One of the minors offered by the program is in music industry which requires course work in music theory and composition. To enroll in our tech courses students are required to take music theory or minimally take a course in musicianship for engineers. Additionally, our courses in MIDI instrumentation are cross-listed with the music department here on campus.

Like the industry we serve, our program has grown significantly over the past 20 years. Now our facilities boast both analog and digital 24-track machines, automated consoles, digital audio workstations, numerous MIDI stations and full complements of signal processing. As the technology to produce recordings has progressed, we

have attempted to remain viable as an educational institution. It is this viability as an educational institution that I wish to examine here. What is it about our program in particular and any program which teaches the principles of audio recording which will continue to make it viable as we proceed along in the second century the art?

We are entering our twentieth year as a department specializing in the education of students who are preparing to work in some aspect of the recording industry. Since we have already been in the process of evaluating ourselves and our ability to teach students what they should know about working in this sometimes crazy industry, I thought it might be a good idea to share some of these thoughts with you. Although we offer no guarantees to those students enrolled in our program, we would like to think that the education we are providing them does help in their search for employment in the recording industry.



Figure 2. The author working in the Department of Recording Industry Control Room B at the Otari Series 54.

To help me put together some of these ideas, I also spoke with some people in the industry who make hiring decisions. As a department, we have established a Recording Industry Advisory board which is helping us to plan for the future. In this article, we'll put together an informal review board to deter-

mine, first of all, what it is you will need to get a job at that studio or facility; and, secondly, if we are doing our job in educating those of you who wish to work effectively in the recording industry.

The participants in our mini review are studio owners and management people who are involved

in hiring decisions at their facilities. I spoke with Keith Hatschek, vice president of sales and marketing for Music Annex studios in Menlo Park, Fremont and San Francisco; Peter Buffet, composer and president of Independent Sound in Milwaukee; Barry Sanders, president of Sanctuary Sound in Nashville; and Bill Quinn, studio manager at Doppler studios in Atlanta.

My initial question to each of our review panelists was, "What are the things that you look for in someone whom you will hire to work for you?" The answers varied slightly, but there were some striking similarities in each of the responses. Each answer indicated that the personality or the psychological ability of the individual made a great impression:

Keith Hatschek: "The way I see engineering is that the job description is 50 percent technological 50 percent psychologist/den mother."

Peter Buffet: "Ultimately it's still going to be the personality of the individual that is what you're going to base it upon...it's a personality thing—how will they be able to deal with other people?"

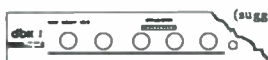
Bill Quinn: "I look for people skills—can this person get along with our staff and our customers—a recording engineer is really in some sort of marketing position all of the time so they have to be able to get along with our customers, understand what they want, speak their language and be pretty versatile because customers can be all types of people"

Barry Sanders: "The primary thing I look for when hiring someone is the attitude of the individual. This is based upon his or her willingness to serve and upon having an open minded-ness to learn and continue to learn."

In every case, personality—or the psychological ability of the individual to deal with other people, whether it be clients or other employees at the facility—was a major factor in the hiring decision. I found this to be interesting, but I also expected it. Obviously, each of these people is in a business which relies upon interpersonal relationships. Peter Buffet described the relationship even further: "Say ten people applied for a job and three had a degree and showed profi-

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Figure 3. Control Room A looking across the SSL 4000G Series console and beyond into the classroom lab.

ciency in audio concepts or music-oriented concepts which is something I would be more interested in, that would cut out a lot right there. But then it would come down to the personality, and would they be willing to follow someone around and clean up and reset the board and do some really basic stupid things for six months or more before they may ever get a chance to do what they really wanted to do. You have to be realistic with kids going to school—they are still going to get stuck doing something that they may not really want to be doing. You have this vision of what you want to do but you are stuck for two years trying to get there. For example, you want to put someone in a room and badger them to give them an idea of what types of things they will be ultimately subjected to.”

Keith Hatschek also elaborated the point: “if the singer is not getting that high note then you’ve gotta figure out a way to break the tension, relax the situation and make it easy for him or her to do it. That’s part of your job. It may not be in your job description, but it is in fact part of your job as a seasoned first engineer to make the environment right for the artist to get that best shot on tape. And those are the type of things that, quite honestly, generally do not get taught in a program because the only way to learn them is in the real world—by being a second engineer or by supporting another engineer and watching his or her style and seeing how they make

things happen or *don’t* make things happen...What this business is all about is having relationships with artists and producers.”

Interestingly enough, the responses of our panel would seem to indicate a major flaw in our educational program—we don’t teach any courses directly relating to personality development or psychology. However, the degree obtained by our graduates is a bachelor of science requiring general education courses in the liberal arts and may include subjects such as psychology and sociology. Another concept basic to the development of four-year programs such as the bachelor of science is that the graduate should be educated in a variety of subjects and, as a result, be a better rounded individual. Bill Quinn acknowledged this concept: “I prefer to see people with a four year college degree. It’s not necessary, but I have found that people with that kind of background have the potential to grow and that proves something.” The point was also reinforced by the observations of Keith Hatschek: “From our point of view, as potential employers, the degree is nice, it shows the person’s commitment, and the fact that they’ve gone through a program from which they’ve graduated and hopefully has given them some sort of a general background and overview...”

And while we have no specific courses relating to the psychology of recording engineers, we do place our students in “real world” record-

ing situations. Students who take our tech courses are required to produce recorded projects in our studios. Depending upon the course the student is taking at the time and the project they are working on, they may be functioning as a producer, as a first engineer or as a second. In all cases, the students are recording musicians, bands, choirs, ensembles, vocalists, Foley artists, orchestras—in short, they are working with other people to produce their projects. Much of the success or lack of success in their projects will be based upon their ability to work with people in much the same way as they would professionally.

But the message is clear, the first prerequisite of all of our panelists in determining whom they will hire is a basic ability to work with other people. Glenn Meadows, president of Masterfonics in Nashville, sits on our department’s industry advisory board He feels so strongly about this issue that, in a recent conversation with him, he suggested that our tech students supplement their degree in Recording Industry with a Dale Carnegie course in personality development.

Now, since we do specialize in teaching the technology of recording, I wanted to find out what our panelists required of potential employees with regard to technological training. Here the answers varied, but there were some overall similarities:

Bill Quinn: “I do look for an educational background in a couple of areas:

A technical aptitude—can this person learn how to operate the equipment we have or will have—are they smart enough to work this equipment we have now or the equipment we’ll have ten years from now?

The second thing I look for is some kind of a musical background—because we do record, mix and edit a lot of music, it helps to have somebody who has played an instrument or studied music.”

Peter Buffet: “The technical stuff is great and for me it has to be pretty up to the minute in terms of understanding SMPTE and sampling and MIDI which are pretty standard now. Obviously everyone’s used to particular pieces of



Figure 4. The MTSU Department of Recording Industry faculty in Control Room B. Front row: Bob Wood, Denise Parker, Juli Kryslur, Dorothy Campbell-Bell, Chris Maseleu, Doug Mitchell, Dave Thibodeau, Dale Brown, Rich Barnett, Dept Chair. Second row; Bob Griggs, Geoff Hull, Dan Pfeifer, Greg McCarn, Bob

equipment and again a facility owner is more interested in knowing a variety of stuff—more so than I need a person to be aware of.”

Barry Sanders: “On the technical side, I like to see someone who has a firm grasp of analog tape alignment procedures—especially if they are going to serve as a second engineer. As far as I can tell, this is simply not being taught by any of the recording programs out there. I really find it very helpful if they have at least a basic understanding of the magnetic recording process, then, at least, I can guide them through the process.

If I can hire someone who can come in here and align my machine before each session it frees up a lot of my time or the first engineer’s time to do other things.”

I think that as an educational program, we do tend to get caught up in all of the latest technology. Sometimes we look at other facilities or other educational programs and get a twinge of gear envy. But, if our job is to educate the students as so clearly stated in the accreditation document we’ve been working on, shouldn’t we be teaching them on the latest whiz bang pieces of gear? Evidently, this is not entirely necessary—Barry Sanders also clearly stated a point that all of the panelists agreed upon: “I’m less concerned that people coming to me know all the ins and outs of all the latest high-tech stuff. I find that it is much more

important that the potential employee has a general knowledge and have a basic technical aptitude. More than anything else, they must know audio signal flow. I feel that educational programs must address these things. In a sense, they must get back to the basics.”

In technological terms, we are able to comply with Barry’s request. We do teach our students the basic principles of audio recording. And we are able to go beyond the basics in many areas of audio production.

The feedback loop between professionals in the recording industry and our department works very well. With regard to analog tape machine alignment procedures, we have recently begun to re-emphasize these principles in all of our studio courses. As we have followed up on our graduates and interns, the need to know more about processes such as tape machine alignment has come up more than once in the past year. Armed with this information, we revamped this area of our courses.

The recording industry is, however, driven by technology. We can not escape this and it often presents those seeking employment in the industry with the classic dilemma of how to get a job without specific technical experience if the job alone is what will offer that experience. Perhaps this is one of the greatest highlights of our program:

we stress experience in recording technology. Our students are able to gain valuable experience in the tech courses that we teach. These courses are taught in our studios which do feature some of the latest advancements in analog, digital and MIDI-based recording technology. Each of our tech courses requires project-oriented output produced by the student in these facilities. Not only do our students learn the principles behind the pieces of gear in our studios—they are allotted studio time and must work on these pieces of gear to receive a grade.

INTERNSHIPS

But it is another aspect of the education we provide which may be of the greatest help to our graduates once they seek employment—the internship. At this point, our students are not required to intern, but internships are stressed as being perhaps the most valuable bit of experience the student may receive while they are here at school. Currently we provide internship possibilities for our students in studios and recording facilities all over the country. Our program also teaches administrative, A&R, business, and legal aspects of the recording industry. With our close proximity to Nashville, we are able to provide students training in these areas a great number of internship possibilities.

Again, each of our panelists agreed upon the value of internships:

Keith Hatschek: “...internships are the seasoning on the cake, so to speak, that allow a person to get a feel for the industry. The internship will tell the person most definitely where they want to end up in the industry. The internship provides a student with a focus—once having had one they want to know better what they want to do with their career. This is how you get out in the world and find out what’s right for you”.

It isn’t an uncommon occurrence that during the course of an internship a student realizes that perhaps they really are not cut out to do the type of work required of them in the profession they had been training for. But, this is part

of the education process and what better time to kind this out than while the education is still in process?

And for those whose interest in the profession is stimulated even further by the internship, there are many potential long-range benefits. Although internships do not guarantee jobs, Bill Quinn pointed out one of the major benefits to those who participate in an internship program:

"We haven't designed our internship program to lead to hiring, people tend to stay here and we don't get much turnover, but internships have helped a lot of people make the contacts that have led to jobs elsewhere. A lot of assistant engineers around town were interns here or have picked up studio jobs at other studios, so it is a valuable experience but it's not a training thing".

Two members of our industry advisory board: Jimmy Bowen, President of Liberty Records and Tony Brown, President of MCA Records/Nashville stated that an internship is vital for students studying recording engineering.

And what of the future? In the midst of all the rapidly-changing technology will our students continue to be prepared to work in the industry? The answer is two-fold. As Barry Sanders and Bill Quinn stated, those who will be hired must have a desire to continue their education in all things audio. The second part of the answer lies with the educators—us. Like the professional practitioners in the recording industry, we must continue to educate ourselves.

...for those whose interest in the profession is stimulated even further by the internship, there are many potential long-range benefits.

The technology used to produce recordings continues to become more refined and, in some aspects,

more complex. As educators in this industry we can not isolate ourselves in ivory towers.

At the same time, we must not lose sight of the basics. Like Schoenberg stated in 1946, we must be able to teach students what methodology may be used to prevent acoustic shortcomings in mixes and in live sound applications.

And with regard to the accreditation we are now undertaking, we must continue to educate our students even if that education requires educating ourselves.

INTERVIEW WITH KEITH HATSCHEK 11/3/1993

The way I see engineering is that the job description is 50 percent technological 50 percent psychologist/den mother—if the singer is not getting that high note then you've gotta figure out a way to break the tension, relax the situation and make it easy for him or her to do it. That's part of your job as a seasoned first engineer to make the environment right for the artist to get that best shot on tape. And those are the type of things that, quite honestly, generally do not get taught in a program because the only way to learn them is in the real world—by being a second engineer or by supporting another engineer and watching his or her style and seeing how they make things happen or *don't* make things happen.

From our point of view, as potential employers, the degree is nice, it shows the person's commitment, and the fact that they've gone through a program from which they've graduated and hopefully has given them some sort of a general background and overview to not only the industry, but hopefully some technical areas if they're on the production side. But internships are the seasoning on the cake that allow a person to get a feel for the industry. The internship will tell the person most definitely where they want to end up in the industry. The internship provides a student with a focus—once having had one they want to know better what they want to do with their career. This is how you get out in the world and find out what's right for you. What this business is all about is having relationships with

artists and producers. We've got a pretty active internship program here. We support approximate twelve students at Menlo Park facility and four in the S.F. facility/year.

We're always looking for good people. The persons we've worked with on internships from the universities have been very helpful. They'll call us and say "this person is very special would you be willing to talk with them on the phone and let you determine if they'll work out for you"—they haven't sent us a cattle call.

INTERVIEW WITH BARRY SANDERS: PRESIDENT, SANCTUARY SOUND STUDIOS

The primary thing I look for when hiring someone is the attitude of the individual. This is based upon his or her willingness to serve and upon having an open minded-ness to learn and continue to learn.

On the technical side, I like to see someone who has a firm grasp of analog tape alignment procedures—especially if they are going to serve as a second engineer. As far as I can tell, this is simply not being taught by any of the recording programs out there. I really find it very helpful if they have at least a basic understanding of the magnetic recording process, then, at least, I can guide them through the process.

If I can hire someone who can come in here and align my machine before each session it frees up a lot of my time or the first engineer's time to do other things.

I'm less concerned that people coming to me know all the ins and outs of all the latest high tech stuff. I find that it is much more important that the potential employee has a general knowledge and have a basic technical aptitude. More than anything else, they must know audio signal flow.

I feel that educational programs must address these things. In a sense, they must get back to the basics.

Of all the interns and new hires I have had at this facility, I feel these three items have been the chief stumbling blocks to them:

- 1) They are totally awed by the console
- 2) They do not know how to get around on a patch bay
- 3) They do not know how to align an analog tape machine

INTERVIEW WITH PETER BUFFET 11/8/93

Ultimately it's still going to be the personality of the individual that is what you're going to base it upon. And I think that a lot of that can be taught at school as well. The technical stuff is great and for me that has to be pretty up to the minute in terms of understanding SMPTE and sampling and MIDI which are pretty standard now. Obviously everyone's used to particular pieces of equipment and again a facility owner is more interested in knowing a variety of stuff—more so than I need a person to be aware of.

But, boy for me it's got to be about 90 percent I would say being one of the hands on the ship (team player) as opposed to any particu-

lar technical thing. I think it's that classic mailroom scenario where somebody has to be willing, no matter how much they know, to start at the bottom and learn how any particular facility works. And that's pretty frustrating coming from a teaching standpoint,

I would think, or from a student's standpoint like, "Gee, you know I went to all this schooling and I still have to do this?" I think the psychology of dealing with people is extremely important to know. For example, you want to put someone in a room and badger them to give them an idea of what types of things they will be ultimately subjected to.

(Say we get to do the take over, we want it back, etc.)

There is no question that coming out of a school you can breathe easier. I know this person knows the basics and beyond, but now it's a personality thing—how will they be able to deal with other people?

Say ten people applied for a job and three had a degree and showed proficiency in audio concepts or music-oriented concepts which is something

A technical aptitude—can this person learn how to operate the equipment we have or will have...?

I would be more interested in, that would cut out a lot right there; but then it would come down to the personality and would they be willing to follow someone around and clean up and reset the board and do some really basic stupid things for six months or more before they may ever get a chance to do what they really wanted to do.

You have to be realistic with kids going to school—they are still going to get stuck doing something that they may not really want to be doing. You have this vision of what you want to do but you are stuck for two years trying to get there.

INTERVIEW WITH BILL QUINN—MANAGER, DOPPLER STUDIOS, ATLANTA GA 11/9/93

Traditionally I look for three things—and we usually hire at an entry level position so I'm not really looking for much experience.

I do look for an educational background in a couple areas:

A technical aptitude—can this person learn how to operate the equipment we have or will have—are they smart enough to work this equipment we have now or the equipment we'll have ten years from now?

The second thing I look for is some kind of a musical background—because we do record, mix and edit a lot of music, it helps to have somebody who has played an instrument or studied music.

The third thing I look for are people skills—can this person get along with our staff and our customers—a recording engineer is really in some sort of marketing position all of the time so they have to be able to get along with our customers, understand what they want, speak their language and be pretty versatile because customers can be all types of people.

I prefer to see people with a four year college degree it's not necessary, but I have found that people with that kind of background have the potential to grow and that proves something.

Internships:

We haven't designed our internship program to lead to hiring people, people tend to stay here and we don't get much turnover, but internships have helped a lot of people make the contacts that have lead to jobs elsewhere.

A lot of assistant engineers around town were interns here or have picked up studio jobs at other studios, so it is a valuable experience but it's not a training thing."

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The New Studio B, Howard Schwartz Recording

Howard Schwartz Recording has a new Synclavier room, something it never had before. So, with appointments with them in hand, I took the trip into Manhattan and sat down in this new room with Howard Schwartz and Bill Cavanaugh to get the reasons for this new operation.

AS WE SETTLED INTO THE STUDIO, with its equipment dominated by the Synclavier, I started my recorder and asked them both—*why Synclavier?*

Howard's response, "Well the reason the Synclavier is here has nothing to do with the Synclavier. OK, how do I explain this the right way? Howard Schwartz Recording has always been based on the people, and the people dictate what equipment I have. I went after a specific person, the opportunity for a certain person to come on board presented itself, he was a Synclavier user. Synclavier was going back into business as the Synclavier Company, and we decided to make the two things happen. We always liked the equipment al-

though we owned none because we didn't buy into the company during New England Digital's waning years. But with the opportunity of having an experienced, well-known operator come on board, and that he was a musician, as well, made the combination of the two things a 'natural'. It was a done deal from its initial offering. Does that answer your question?"

I then asked what does a fundamentally musical instrument, like the Synclavier do in Howard Schwartz Recording, that nothing else could do?

Howard's answer, "You're looking at it coming from one direction and I look at it coming from another direction. I look at it as a post-production tool that happens to have music attached to it, it was an evo-

lution to get to where it is, as opposed to a music tool that also does post production. We're in a post-production business. We don't necessarily create music here, we are musically oriented. But if someone said "Is Howard Schwartz Recording a music facility?", the answer is "sometimes"; or the answer could be "what do you want us to be?" What are we best known for? I think we're best known for post production and people. I look at the Synclavier Post Pro as a post pro Synclavier.

To me its a post production tool as opposed to a musical instrument that also posts. Mr. Cavanaugh may feel differently about it."

Bill Cavanaugh added, "Not really, I see the instrument as equal to both challenges and certainly from the standpoint of sheer power that is there the answer to any of the challenges, because the RAM side which is typically understood as the music side, (the Synclavier side as opposed to post pro side) is also a very powerful post-production tool in terms of designing sound effects. You can get to solutions extremely quickly because the systems are in essence two parallel systems that share the same core computer, or I should say the core computer talks to these two systems; so that which ever side of the system I decide to use, for either job, doing music you can certainly record onto the hard disk similarly you can fill a sequence up and use up all the voices you simply can dump a lot of those things to the hard disk side and then continue to work with—if you have a

Figure 1.. Bill Cavanaugh at the Synclavier. Post Pro.



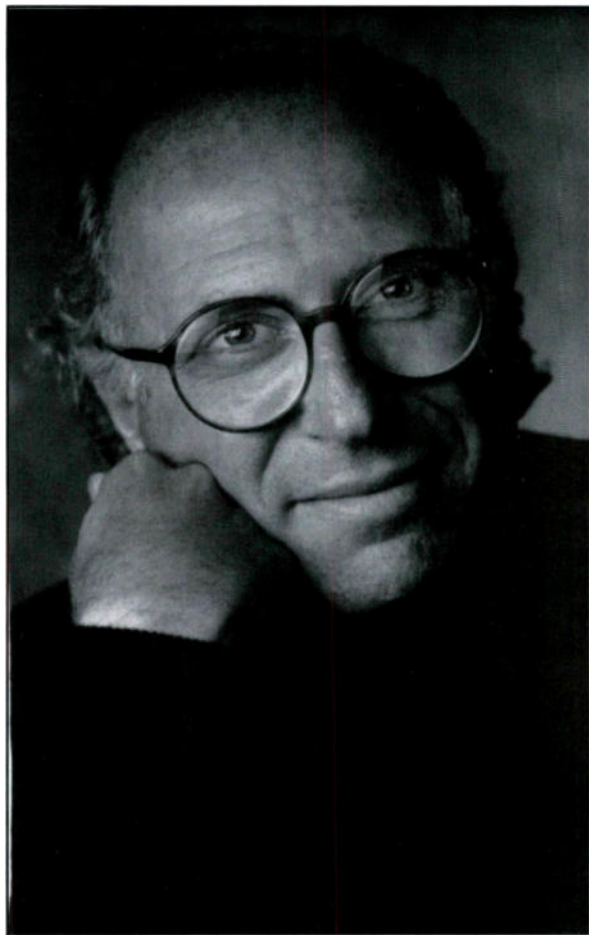
limited system. This one that we have is not very limited, it is a healthy-size system, you can go either way. A lot of time some of the things in post production may even involve something really simple such as taking someone's library music making a good edit maybe. What you can do with the musical side is you can take library music and cut it so that it has the ending they want and the beginning they want. The edit may be to time, but it may be a lumpy cut and it may be the easiest solution to simply put something new over the top such as an instrument, and you just listen to the music that's there and you grab a sound that's similar or if it only had a cymbal rolling over the top, or a string line, something you can just play over the top. You take the person's music that is written and just play another version of the line to make the edit smoother. You know it's a very quick solution."

Howard concluded, "An easy description of what the unit is—it's an event maker."

Now my question, is Synclavier really in a class by itself, or are there other products that can virtually do the same at this point?

Bill responded, "There's nothing inside of any one single system that shares the speed and power of this unit. You can get to any of these problems and solve them, but the issue would be what you're managing, in terms of numbers of lists, what kind of power you're bringing to bear in terms of the speed with which you can do something, in terms of set up. Because everything on this system is pretty much on the top level. This front keyboard, the interface itself it's a lot more complex than it appears to be with multiple key combinations that are intuitive on the top, you can have things happen very fast and in real time. You can sit there and change an effect extremely quickly while hearing it and you're not typing numbers. One of the things, the famous look of the Synclavier, is its data knob. If I want to take something like a cello sound (cello sound reproduced here) for me if I want to change something. There's one sample, an attack. Then I have another one here that's just a sustained sound, that happens at all speeds of the key ve-

Figure 2. Howard Schwartz, president of Howard Schwartz Recording.



locities. If I want to change one of these elements, take the other part of it, which is the sustained part and change the attack, I can do that real time very quickly. I can hear it as I'm doing it.

"Then things come off extremely fast, in an extremely fast manner. If I'm working with a sound effect, if I'm working with just a hard disk side I may need something, for instance I was doing these things for Burger King where they had a giant chicken, for me to sit and work with just a hard disk would have taken me hours to do what literally took me 30 seconds, and I went and found a single, heavy sounding footstep-like sound, and I put it onto the keyboard then I was playing multiple, like six, seven keys at a time and literally folding this thing in real time. Extremely quick, these steps were just huge."

Howard added, "Which you could only do on the musical instrument side of the post pro. There are other pieces that do music and post production but not with the ease that this one does."

Bill came back with, "It's really a question of the speed and the power. A lot of the systems that are

coming out now seem to me to be, a little more niche oriented, they're trying to nail certain jobs in the field. Someone said this thing will really do good dialogue editing, but I wouldn't try to do music editing with it, or this does great music editing but it's really clunky for dialogue editing. This system is one of the systems that has hit the peak in functionality, maybe not the technology, but as I was saying, it will approach any job. And it will approach any job with an interface that says to me, what do you want to talk? You want to talk in terms of time code? What do you want to talk, you want to talk measures and beats?

The whole thing will talk to me in terms of measures and beats, I'm reading that now, or do I want to talk in terms of feet and frames starting from an offset point, do I want to be able, with the same list lock to real time say to the film editor, this is it seven thousand feet whatever point this is and I'm going "Well, where the Hell is that?" I could go outside to a calculator and play that game. With this system I just go Bam! I hit it, and the list is right there. It converts it automat-

ically. Instantly, and I can work in that language."

I reminded Howard that he had once told me that he almost can't afford to do music and yet, here he is, in effect, getting back into music.

Howard's comeback, "No, you are putting words into my mouth. We're a service business. I'm not in the music business. I may in the near future be in the music business, who knows what's going to happen. No, I'm not in the music business, this is just an added service. There are other people in Howard Schwartz Recording that also do music, not necessarily on this piece of equipment. No piece of equipment is so important that the person who operates it takes a back seat to it. A piece of equipment is a piece of metal, the people put the stuff in. The person who has to create with this piece of equipment is all that counts to me. That's his tool. They're never on an equal footing here. We have the reputation of buying into all the great technologies, they fix this up, they've added some new things, there's new software to it. This is not the same piece of gear that was sold a year and a half ago.

"But a matured guy is sitting behind it. That's the thing we always push, the person who is operating this tool. His software is updated every day, because someone brings

in a new piece of work that he says 'Wow, I can do it this way, on this piece of gear.' This piece of gear can't do it for me, I can do it on that piece of gear. Make sure that you delineate that. Everybody counts much more than all the equipment that I have. I have gazillions of dollars worth of stuff, but the people are all that really count to me. Unfortunately, when people call up and say 'Do you have a this, and do you have a that?' I say 'Yes, we happen to have that, but I have the person to do the job that you want to get done. Why don't you let us add to that experience and this person can do that job that you want to do, but he happens to be working on another piece of equipment.' So that's my sales pitch.

"I love the new Synclavier Company, They've done a wonderful job for us. Conversely, we bought their first one, from the new company. The thing has been solid as a rock, we've had zero down time. This is far superior to the support that took place in the last few years of the other company. The thing gets plugged in and it works. And everybody who has owned one, and buys a new one, knows that it works even better than it did before.

"It's an important thing. We said that to them when we made the presentation. It was just great tim-

ing for us, Bill's availability and the equipment's availability happened within a period of like ninety days. So they were able to take the ashes and put it into this nice new company, I hope they are doing fine."

Bill added, "They're doing fine, they are selling systems. When I saw them at AES they told me they're selling systems. The old company did some things that probably angered a lot of people and put some systems out there that were not ready to be out there."

Howard continued, "They are still being repossessed because the guys that got them were laden with unbelievable debt because they were pushed into buying systems that were three hundred thousand dollars, and their business didn't warrant nine thousand dollars a month."

Bill then added, "They did some odd things, the old company did. This new company is actually made up of owners of the systems, It's an owners' consortium.

"I had worked with New England Digital for a year. They hired me away from Susan Ciani, doing commercials at the time, and they asked me if I would travel the world for them for a year and just literally collect data from users and owners and say what they like about it, what they didn't like about it, what should be changed. When I went around, I met a lot of the owners and a lot of the people who are now part of this group. However, I wouldn't want to say there is a cult following.

"Once you get to an understanding of the system and really get on the inside of knowing what it does, the hardware/software combination, which a lot of people don't have a clear idea, cause people look at it—they go 'it's a MIDI sampler, it's a hard disk' and it's not that. The difference is one of those kind of margins that's kind of like when you move from thirteen frames per second to seventeen frames per second and all of a sudden the nature of the beast changes, it's no longer flashing stills but there's a motion happening.

"The owners are kind of like this group of people who really understand the power of the system, the

Figure 3. Studio B at Howard Schwartz Recording.



beauty of the system and they get almost, I don't know how to say it, it's just this love for the system. So when the company went down these guys basically said 'you know, this thing can't die' because they understood what it was. It wasn't 'I could take and use the system until it's broken and then go buy a MIDI sampler and hard disk and do the same thing.' It's hard to explain when you look at it on the outside and not really work with it on a day-to-day basis.

"I've been around the system now eleven years from when it was just a little FM system, just a Synclavier. There's a love for it, again for the ability it has to solve just about any problem. You feel a lot more secure than say you were working just a hard disk and someone comes up to you, or just a RAM system, and comes up to you and says here's a problem, solve this

problem and there's a confidence knowing you have a major tool."

I then wanted to know what new business do you see coming in as a result of this new operation?

Howard jumped in with "We operate our business differently. We operate because of the people. It's a given that we have the top technology. Now everybody that is with me is a true artisan. So if someone calls up and says I have to do an industrial, I can give it to anybody without even giving it a second thought.

"If I need to do a mix of a high-definition show, I can give it to anybody. This never happened before, that kind of depth. Having Bill here, and happens he uses a Synclavier, so here's yet another system under my roof.

"We have the three main systems here. Files are not necessarily moved from system to system, but we can have a job move from room

to room seamlessly. We have a digital storage system that permits this. All our rooms are digital, there are no analog rooms."

I now asked if its entirely possible that a job can come in and you would assign different parts to different rooms?

Howard answered, "That's correct, I'm bidding on one such now. It's in two two-hour sessions that have to be worked on simultaneously, so we have to enlist all of our people on it.

"All that really counts in the control room is knowledge, personality, sales ability, talent, and not in any special order. The tools that one uses are just that: tools.

"You can get really bad recordings on great equipment, so what remains important to me are the people like Bill who bring these attributes to us."

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Tools Of The Trade

● F. Alton Everest, whose writings include *The Master Handbook of Acoustics*, *The Complete Handbook of Public Address Systems*, and *Handbook of Multi-Channel Recording*, and Ron Streicher, one of America's premier classical recording and sound reinforcement engineers and Secretary of the Audio Engineering Society, have collaborated to write a book that explains everything you ever wanted to know about stereo.

Chapter one, tells the history of stereo reproduction from the 1880s through the pioneering efforts of Fletcher and Blumlein and gives the reader a foundation in the subject.

The next few chapters explain how stereo information is conveyed, how it interfaces with the human auditory system, and philosophical and pragmatic approaches to recording and reproducing stereo. There are five chapters addressing various microphone techniques for recording stereo, ranging from a binaural head through spaced omnis to every combination of two or more microphones arranged in arrays that would make Rube Goldberg proud. There are even chapters about combinations of differing techniques that get the job done with the least bother.

There is a chapter devoted only to the audibility of reflections and comb filters and how they affect the stereo perception. There is another on auditory spaciousness and one on pseudo stereo and some of the techniques used to generate stereo from mono, with evaluations of each method. Finally there are chapters addressing surround sound systems, from Disney's 1939 *Fantasound* in the film *Fantasia* to the most current systems on the market, and a chapter on optimizing both listening and recording environments.

The Appendix addresses Blumlein's system and reproduces his complete patent. The reference section is

a complete bibliography of almost everything ever written on the subject, and the glossary will keep you ahead of the new words generated almost daily, between engineer-speak, government doublespeak and acronyms, all of which make it almost impossible for persons of one discipline to converse with others.

The operative word for this book is thorough! It approaches every aspect of the subject with an explanation that is guaranteed to leave the reader completely knowledgeable. The tables and diagrams are simple and easily understandable, leaving little doubt about the message the authors wanted to communicate.

This book will help the professional recordist make important decisions about how he or she will approach a recording or reinforcement project: It covers where the microphones will be placed; how speakers will be selected and placed for playback; acoustic design for the playback environment; which stereo technique is proper for each project; how the sound will be mixed; which recording media will be used; and how mixdown and editing will be approached.

It is a given that every professional who reads this book will never approach stereo recording and reproduction the same again. Even someone who has been successfully recording for decades will suddenly realize what it is they have been doing right (or wrong) and why it had the effect it did.

For people who are serious amateurs or audiophiles, this book will help them understand the intricacies of stereo, and by so doing will allow them to enjoy their systems even more, and allow them to be even more knowledgeable in their criticism of those who record for a living.

The New Stereo Soundbook, F. Alton Everest and Ron Streicher, McGraw Hill-Tab Books No.3789 Paperback \$18.95.



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Editorial Redux

When we were preparing our November/December 1993 25th, getting all the material we needed for it took far longer than expected. The result was an issue that would have come out in early January, rather than the beginning of November as it should have.

This meant that the November/December issue would have reached you in March not very good! So, you are holding the January/February issue that is now on time, and there just isn't a November/December issue.

On another matter, we've begun some changes in the appearance of the magazine, but we will continue the editorial directions we are in.

In March/April look for articles on the impact that new multi-media presentations will have on the future of audio.

Remember this is still *your* magazine. So drop us a line anytime to tell us what you think.

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David Moran wrote in the *BAS Speaker*: ". . . the raves are all true. The sound the 4S delivers to the eardrum is bizarrely detailed . . . and utterly smooth, with hall-shudder bass."

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Sony Classical Productions' Editing and Post-Production Complex, New York

Sony Classical places a great deal of emphasis on the caliber of its producers and engineering staff that bring classical music to an appreciative audience. "This 'Team Spirit' is what sets us apart from the other labels," concedes Christian Constantinov, Sony Classical's V.P. and General Manager of Audio Operations. "I have always been of the opinion that it isn't necessarily the technology that's important although it goes without saying that we obviously make use of the highest quality microphones, digital recorders and linear monitoring systems. But, more than that, we feel that it is the people here at Sony Classical that make our releases so successful with listeners around the world."

The Sony Classical Production team, headquartered in New York City, includes:

Lisa Maldonado, Production Coordinator, who recently joined the label from Atlantic Studios, New York; *Gina Sylvester*, Studio Manager, who has joined the label from Hit Factory Studios, New York; *Mark Betts*, Chief Engineer, who joined from Power Station, New York, a year ago; and *David Smith*, Recording Director, who joined the organization four years ago from Editel and A&R Recording.

"Each of these individuals," Christian Constantinov offers, "possesses a wide depth of practical experience with recording and production techniques. Our current team has taken some five years to assemble, and represents a formidable array of talented producers, recording engineers, editors and technicians. Each of them has strong opinions on classical recording techniques, which is healthy in today's market.

"As is to be expected, we evaluate every new technical development as it becomes available. But we

Paul Adams is a New York-based recording engineer and free-lance writer.

also determine if the device or process is appropriate to our application. The majority of Sony Classical's material is recorded very simply.

We might use a pair of high-quality microphones above the orchestra or soloist, connected via short cables to precision 20-bit analog-to-digital converters—which ensure faithful capture of every musical nuance and subtlety—and thence to our highly modified Twin-DASH reel-to-reel data recorders. During CD mastering, we normally use custom developed hard-disk editing systems, the final 16-bit master tape being prepared through Sony Corporation's SuperBit Mapping down-conversion systems, which ensures virtual 20-bit resolution through to the home listener.

"We remain convinced that Sony Classical has a definitive edge over the competition. Our proprietary use of 20-bit conversion techniques throughout the entire CD mastering process, coupled with SuperBit Mapping, ensures a perfect translation from performance arena to the listening environment.

The additional detail that can be extracted by using 20-bit recording and editing is dramatic, and very pleasing. SuperBit Mapping provides uncompromised and unpar-

alleled 16-bit replay quality from Compact Disc.

"In addition, two or three times a month the Sony Classical staff gathers in one of our production rooms for evaluation and listening tests of new recording techniques and technologies, or to analyze the work of other labels.

In a very positive sense, these sessions which are often standing-room only allow all of us to develop and continuously refine our critical listening skills."

"GRAMOPHONE" ENGINEERING AWARD

In recognition of the label's outstanding attention to detail, and appreciation of the vital synergy between technical and artistic sensibilities, Sony Classical (and Sony Classical-Hamburg P.O.P. engineer Marcus Herzog) recently received an important award from Gramophone Magazine. Since their inauguration in 1977, Gramophone Awards have paid tribute to each year's outstanding releases. Over 200 recordings have now been honored by what has become one of the most important events in the classical record industry's year. Receiving this year's Engineering Award was a Sony Classical recording of Debussy's "Le martyre de Saint Sébastien,"

with the London Symphony Orchestra and Chorus, conducted by Michael Tilson Thomas, with soloists Ann Murray and Nathalie Stutzmann.

According to "Gramophone" audio editor, Ivor Humphreys, "[Le martyre de Saint Sébastien]" is a recording which exhibits that all-too-rare combination of focus and space, the soloists, strings, wind, brass and chorus set in marvelous perspective relative to one another 'using' the acoustic in the most natural way. It is a remarkable achievement."

SCP FACILITY TOUR

Studio 1 at Sony Classical Productions was designed to handle front-line digital mixing, editing, and archival re-issues. Equipment includes a Harmonia Mundi [now Daniel Weiss Engineering—Ed.] Ibis digital mixing console equipped with GML automation. A total of 24, 20-bit inputs route to two simultaneous, 20-bit noise-shaped outputs. DCS 900B A-to-D converters are also available. A Sonic Solutions four-channel, 20-bit system handles sample-accurate editing. Recorders include a Sony Classical 24-channel, 20-bit multi-track (based on PCM-3348 48-track transport); Sony K-1183 two-channel, 20-bit machines; and a Studer Cello 4/3/2/1 analog tape machine. Outboards include Lexicon 480L and 300 digital reverbs. Monitoring is via a B & W 801 Matrix 3 system.

The facility's various 20-bit multi-track and two-track machines are based on Twin-DASH and DASH-X recording formats. A 20-bit permutation of the familiar DASH-M format, DASH-X comprises an extensively modified 16-bit PCM-3402 open-reel machine that sacrifices some of the redundancy of 15 in/sec DASH-M (Twin-DASH), in exchange for the ability to record the extra bits. DASH-X tapes are not compatible with stock DASH-M tapes; the machine also requires a 20-bit outboard A/D and D/A converter package.

The result is a dynamic-range capability that exceeds 105 dB, plus a sonic footprint characterized by excellent low-level resolution and an almost total absence of the kinds of



Figure 1. A Daniel Weiss Digital Console dominates this mix room at New York City's Sony Classical suites.

sonic artifacts most often cited by critics of digital audio.

Studio 2 handles 24-track 16-bit editing and two-track 20-bit editing.

Production equipment includes a Sonic Solutions 8-channel 20-bit editing system; a Sony DAE 3000 24-track editing system; Sony PCM-3324A 16-bit recorders; Apogee 20-bit D-to-A converters; a Studer 961 monitoring console; B & W 801 and ProAc monitoring systems.

Studio 3 is used for 20-bit editing, de-noise/de-crackle operations, and 16-bit editing. Equipment includes a Sonic Solutions four-channel, 20-bit editing system with de-clicking and de-crackling options; a Sony K-1183 20-bit, two-track; a Sony DAE-3000 16-bit digital editor; a Studer 961 monitoring console; and a B & W 801 monitor system.

Studio 4 is used for preparing CD masters and approval copies. Here, PCM-1630 U-Matic Plant Copies are made via SuperBit

Figure 2. The Sony Classical production team: Left to right—David Smith, Recording Director; Christian Constantinov, VP and General Manager of Audio Operations (seated); Mark Betts, Chief Engineer; and Lisa Maldonado, Production Coordinator.



Mapping; engineers then computer check each U-Matic master tape, and make DAT/analog cassette copies. Sony's proprietary, computer-based SBM technique accurately re-dithers the 20-bit data stream, and re-shapes the noise floor mastered signals for CD manufacture. The differences 20-bit SuperBit Mapping and conventional 16-bit CD releases are described as "profound;" according to staff at Sony Classical Productions, SBM material retains "clear, clean transients, with ultra-linear detailing of every musical nuance."

By comparison, conventional 16-bit digital recorders and workstations very seldom offer much better than 14/15-bit resolution, simply because of randomization in the least significant bits, and inaccuracies in the conversion, recording, recovery and editing and conversion processes.

In essence, SuperBit Mapping relocates the noise energy that results from the 20- to 16-bit process. Instead of residing in a part of the audio spectrum to which our hearing is most sensitive the mid-band region the SBM Processor filters, noise-shapes and shifts it to the high-frequency sections, where it will be inaudible. The end result is the equivalent of 20-bit audio replay quality from 16-bit Compact Discs.

Even analog recordings from Sony Classical's extensive tape archives benefit from 20-bit A-to-D conversion and SuperBit Mapping prior to CD manufacture. Starting with unedited master tapes—virtually all classical sessions until the early Eighties were recorded to duplicate analog tape decks, to provide backup copies—Sony Classical's remix producers use 20-bit digital audio workstations or reel-to-reel digital recorders to re-conform the original material to match that of the original vinyl release. After 20-bit editing, the material may be processed within the digital domain, and then output via SuperBit Mapping to 16-bit for CD release.

Studio 5 is used for archival reissues and 20-bit digital mixing, using a Harmonia Mundi [Daniel Weiss Engineering]

Ibis digital mixing console, equipped with eight, 20-bit inputs, routing to two, 20-bit noise shaped



Figure 3. For a recent Emanuel AX recital of works by Beethoven and Brahms, stereo mixes being recorded on 20-bit two-track Sony PCM-3344 Twin-DASH recorders, with a greater than 105 dB dynamic range.

outputs. Also available are a Sony K-1183 20-bit, two-track; DCS 900B A-to-D converters; Lexicon 480L and 300 digital reverbs; a Studer/Cello 4/3/2/1 analog deck; and a B & W 801 monitor system.

Studio 6 handles front line mixing and mix-to-picture sessions. Production equipment Rupert Neve-Amek Mozart RN-MZ mixing console, equipped with 40 inputs and 32 group buses, plus its Massenburg Moving Fader Auto-

tion. Recorders include a Sony PCM-3348 48-track; a Sony K-1183 20-bit two-track; a Sony Classical 20-bit, 24-channel multi-track; and a Studer A-827 8/16/24-track analog machine.

A Sony DAE-3000 digital editor is linked to an Adams Smith five-machine editing system. Video decks include Sony BVU-950 U-Matic machines (NTSC and PAL formats), Sony BVW-75 Beta-SP

Figure 4. A break during rehearsals for the recording of Verdi's Don Carlo with conductor James Levine and producer Michel Glotz at New York's Manhattan Center. Note the full chorus and soloists located on rear stage.



machines (NTSC/PAL), and a Sony DVR-28 D-2 DVTR.



Subjective Evaluation of Analog-To-Digital Converters

by David Smith,

Recording Director, Sony Classical Productions, New York.

Anyone that needs to record program material with a wide dynamic range shares a common burden when it comes to selecting recording equipment. Jazz and classical music, in particular, place high demands on every element of the recording chain, and force engineering staff to search out the best technology. During the past half decade great strides have been made by manufacturers of A-to-D converters; such developments have radically improved the sonic capabilities of Compact Disc, for example.

To discuss in print the subjective evaluation of A-to-D converters exposes any writer to tremendous risk. Analysis techniques rely on the our ability to hear and listen, an ability that is neither objective nor uniform from individual to individual. The subjective evaluation of converters by listening is necessary, however, since conventional measurements correlate only approximately with sound quality.

A-to-D converters are tested during manufacture for gain, offset, integral linearity (the flatness of the entire transfer characteristic), differential linearity (uniform step size especially around zero volts), lack of missing codes (all 65,536 of them are present in 16-bit systems), plus harmonic distortion. Currently, such tests are based on split-domain techniques, whereby the excitation of the converter is done in analog domain, and the measurements are performed in the digital domain (usually via some variant of Fourier analysis).

Prior to the ready availability of measurement computers, tests of A-to-D converters were carried out entirely in the analog domain using a reference D-to-A converter. This approach parallels our subjective tools, in that listening tests will also require a very good D-to-A converter. The better the converter, the better the chances of re-

solving small details that differentiate one A-to-D from another. But suffice it to say that our one listening DAC will be used to compare the outputs of several A-to-D converters, and that it should have no large obvious measurable faults.

With the increasing popularity of 20-bit recording, the attempt to keep up with the rigors of A-to-D conversion has led to a preponderance of so called "gain-ranging" devices, converters that stack two 17-bit devices on top of each other to make a converter that measures 19-bits high. The point at which these two converters meet can be a source of sonic headaches. The simple fact that the devices must "fit" together means that they must be fairly well matched; a rare facet of reality.

Moving beyond analog tape as a source makes any shortcomings inherent in present day conversion technology become more apparent.

While the approach here is to use two devices that are relatively inexpensive, one area that may be impacted the most is the ability to resolve low-level detail. Nowhere will the idea of listening to live, low-level signals be put to greater effectiveness than while evaluating this new breed of converters, even though measurements show them to be amazing. Don't believe everything you read.

WELL-RECORDED ANALOG SOURCE MATERIAL


A good place to start is with properly-recorded analog source material, observing the differences between the tape machine's output and the output of our ADC-DAC combination. Listen for changes in overall timbre (tonal quality), distortion, changes in instrumental balance, and a partial disappearance of low-level detail. If the sys-

tem passes through this test unscathed, you probably have the beginnings of a good converter. A word of caution: You have not exercised the entire range of the converter. One of this country's most respected classical record producers first performed this test in front of the high-end hi-fi press. Representatives of both "Stereophile" and "The Absolute Sound" were unable to tell the difference between the analog tapes and the digits.

Needless to say neither magazine went back and said that 16-bit, linearly quantized digital audio was perfect. Quite the contrary. Analog magnetic tape is "biased" toward the digitalization process playing to many of its strengths; the dynamic range of the signal is some 10-20 dBs below that of a correctly implemented digital system. The analog signal is partially compressed, especially at the frequency extremes. Analog's background noise also dithers the digital system well beyond its optimal point, further improving low-level performance.

Moving beyond analog tape as a source makes any shortcomings inherent in present day conversion technology become more apparent. Provided that they are located in a large, quiet studio with few microphones, a jazz trio or quartet constitute a good test bed.

Particularly if the ensemble contains finely detailed percussion instruments, riveted cymbals or a snare drum played with brushes. A symphony orchestra in a quiet hall, and minimally mic'ed, will also serve the evaluation purposes well, because it poses similar acoustical hurdles that, as yet, no digital audio system has been able to overcome.

Now switch between the input and output of the ADC-DAC pair while listening to reverberation trails, low-level ambiance, the sizzle of a cymbal touched with a brush, the shimmer of a bell tree, the sound of the pads on the keys of an oboe touching the body of the instrument, or the air around quiet massed violins. All of these accents will be diminished or missing completely, depending on both the ADC and the DAC being evaluated. 

The Tascam DA-88

8-Channel Digital Recorder

Question. What do you get when you cross an analog-ite with a Tascam DA-88? Answer: A convert or a user friendly view of Tascam's DA-88



● Objectivity! That's the goal of a reviewer, not whether it's a good or bad review, but obtaining true objectivity. My initial fear in taking this assignment was that I had been tainted by so many analog-heads. Everything I had heard about digital recording was negative. I'm sure you've heard it as well. It sounds so sterile. What you put in is what you get out. There's no soul to digital recording. Vocals don't have any warmth. Guitars track too brittle. Blah, blah, blah, blah, blah, blah. I was beginning to wonder if all these wonderful little nuances were true or if they were created by a jealous few, who were unable to obtain, afford or break out of the analog habit.

I must admit, digital recording has been available for a while now, and I hadn't tried it. Maybe I'm a little guilty of being jealous. It's hard to say, but this little intro.. into the digital world should answer some, if not all my questions.

The box is big and it's heavy. My anticipation builds as I rush up the stairs to my studio to rip open the box and begin my education into the technological breakthrough of the century. I open the box to find a plastic bag covered, well-designed but weighty DA-88 and an owners manual. It appeared to me that something was missing. I'm used to opening the box and finding a nice thick owner's manual and as just as thick a user's guide to spend the next twelve months thumbing through, learning how to get a headache. Much to my chagrin, the DA-88 did not come with a selection of fat, information filled guides in three languages, but simply an owners manual of basic instruction and a section on feature location; a measly twenty-five pages. That wouldn't induce a small headache let alone a migraine. This didn't seem right, so I called the Tascam User Hot Line. Sure enough, the technical advisor informed me that the owner's manual was

all it came with and I was going to have to venture into the cold, dark reality of digital recording....alone!

TESTING

So I carefully dove in, head first. I had two recording projects that I was about to begin working on, one a solo instrumental guitarist and the other a song-writing duo and put the DA-88 to the test. I was already steeped in analog 8-track and I was anxious to see the differences, the pro's, the cons, the advantages and the disadvantages of digital recording versus what I become quite comfortably accustomed to....analog.

The format used, unlike its competitors, is Hi-8 video tape. This format will provide you with a little longer recording time. I made inquiries with a number of technical advisors and no one really had a good answer as to which format was better. It was much like; do you like vanilla or chocolate. With Hi-8 video, you may run into an initial problem. That being where you live. Initially, I had some difficulty in locating a store in my area that carried this format. Don't worry about stuffing the wrong type of tape in the machine and having the machine experience some type of failure or foul-up. The machine won't accept any impostors. Once I located the correct type of tape (Hi-8 Video MP), I was able to get the machine up and running without a problem.

I didn't have the outside link (SY-88 cable link which hooks up an outside source to the recorder without wasting a track for subcodes) for my computer, so I had to spend a track to get my sequencer to fire. I run three keyboards and a drum machine through my computer. Once I print my subcode track to the DA-88, everything else turned out to be business as usual. My first effort was flaw free. I had to track a basic acoustic guitar song with two open mics and then a vo-

cal, two keyboard tracks, an electric guitar track and a bass track. I found the acoustic to be as warm as almost anything I've recorded except I had to use a little more eq than I am used to using. The bass went direct and sounded great. We doubled the vocals and ended up with a tight mix that was easily bounced down for availability of additional tracks. After hearing the first set of bounces, I began to feel like I was starting to understand the need for digital recording. Bounced tracks never sounded so good. So clear. So absolutely quiet. For this reason alone, I was upset that I had not got my hands on this machine sooner. I've got some tracks that I've bounced that sound like I'm standing next to the ocean there's so much hiss. (it's also possible that engineering was never one of my strongest suits). That's another reason to look into this machine. Although, you do have to be careful to put down clean, clear recordings, as long as you do, your bounces will sound as though you were a true professional.

**We doubled the vocals
and ended up with a
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bounced down for avail-
ability of additional
tracks.**

After tracking for the first night, I was beginning to realize that the differences were more subtle than I had been led to believe. I hadn't felt that overwhelming loss of warmth that so many detractors of digital had warned. I did take a little more care concerning mic placement and I was oddly more aware of a small hum that came about and made sure to repair the problem before committing anything to tape. One pit-fall that you will overcome with time is the peak meters. They peg out at the top which is also + 0 dB. I've become so accustomed to seeing a change in color than a small LED peak. Mostly, it's a matter of preference. With a little practice it wasn't so much difficult as it was awkward. A small minus among so many positives.

The follow up night to this was far more successful. I had the song writing duo in and it was much simpler than the previous night. They played live with the drum machine. Tracks went down quickly and quietly. I did notice that you have to show restraint when tracking vocals concerning compression. The slightest overuse makes the vocal come out garbled and choked. The same goes for the bass. I'm not exactly sure why, but things tended to sound better unaffected than affected. I don't use a lot of compression, but I had a singer who wouldn't stand in the same spot for two seconds.

Mixing has never been one of my fortes. I like using effects. Sometimes to the point of overuse. I definitely need help when it comes down to the final mix. With the DA-88, it actually helped me restrain myself from overuse. The tracks were crystal clear and with the exception of a little reverb here and there, I felt that everything was recorded well enough to avoid the old habits.

SUMMARY

This is a well conceived and designed machine. A great deal of thought, research, design and practical recording application has been put into this deck and every bit of it shows. Anyone familiar with Tascam's analog recording equipment will quickly feel at home with this machine. The layout of the DA-88 is similar in features yet it provides all the additional features pertinent to digital in a logical and practical fashion. The transport is quick and accurate, although I found the shuttle knob to be a little hard to grab. It was a little flat. This was a tough machine to slag. From a recording standpoint, you won't find a better machine for the dollar.

One final note; watch out all you analog-ites, there's a digital machine out there with your name on it.....and also Tascam's!!

DA-88 SPECIFICATIONS

The DA-88 is an eight-track digital recorder that utilizes a rugged compact 8 mm cassette transport that records on Hi-8 tape. Recording time is up to 100 minutes on standard 120 tapes. It records at either 44.1 kHz or 48 kHz with a variable pitch of +/- 6 percent. at each sampling rate. Front panel controls include: FF/REW, STOP, PLAY, a single-button IN/OUT record functions, and a shuttle knob for easy tape locating. Fast-forward or rewind time of a complete tape is 80 seconds. The 8-digit LED time display shows absolute time in hrs, min, sec and frames; it also shows memo times, pitch change, SMPTE T/C and SMPTE offset.

Up to 16 DA-88 units may be locked together via simple 15-pin D-sub connector between each unit, giving a total of 128 audio channels. Word sync I/O utilizes two BNC connectors and digital I/O uses a 25-pin D-sub connector for track copying from one machine to another. The digital I/O port supports both external AES/EBU and S/DIF/II digital interfaces.

The optional SY-88 Synchronization Board easily plugs into the rear of the recorder and provides SMPTE synchronization for a master or slave. Time code is located on a sub-code channel and does not use an audio channel. The board also provides an RS-422 port, video sync and MIDI machine control. Only one SY-88 is required when in multiple locked system.

The RC-848 remote controller directly controls up to six units for 48 total tracks. In addition to standard punch IN/OUT and transport operations. Using a ten-key pad, you can set locate times and pre- or post-control times when locating and looping. db

Suggested Prices—DA-88\$4499.00; RC-848\$1,499.00

The Tube Sound and Tube Emulators

ARE TUBES MAGIC? IS THERE really a difference between tubes and transistors? Some hear the warmth and appreciate the full body of the tube sound, and others deride the thought. Is the magic of the tube sound more than mere nostalgia? A recording engineer, Russell O. Hamm, could hear the difference. Determined to find and explain the difference, he began testing microphone preamplifiers of various technologies. His famous paper, "Tubes Versus Transistors—Is There an Audible Difference?" [1], shows that the harmonic structures in overdrive conditions for different technologies are quite different, almost like fingerprints.

More recently, an electronics engineer, Eric Pritchard, started down the circuitous path to bring the two worlds together and to give solid state the character of tubes. The elusive tube sound has finally succumbed to an intensive research and development program that has produced solid-state tube emulators and tube emulator circuits [2]. The effort began nearly seven years ago with the search for a solid state guitar amplifier that sounded like tubes. After snaking through myths and theories, the research turned to emulating the tubes, both triodes and pentodes.

Russell Hamm's work provided a test and an independent source of data to correlate the operation of the triode tube emulator.

Eric K. Pritchard is president of Deja Vu Audio, Berkeley Springs, WV 25411

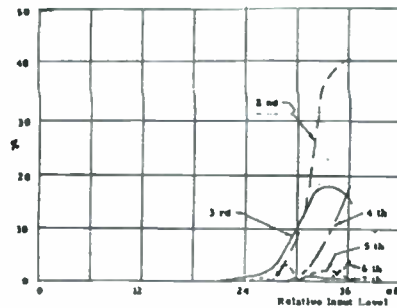


Figure 1. Distortion components for two-stage triode amplifier.

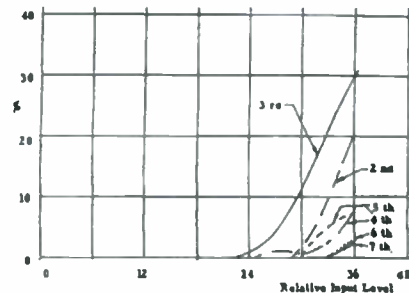


Figure 2. Distortion components for two-stage pentode amplifier.

TUBES AND THE TUBE SOUND

In retrospect, the tube has many technically superior aspects, it is fairly linear, its operational parameters do not vary badly, at least for tubes of yesteryear.

It operates reasonably without feedback. Its gain-bandwidth product is not low, about 8 MHz for a 12AX7 in a generic audio stage, compared with 3 MHz for typical audio operational amplifiers. Tube parameters do not vary as badly as semiconductor parameters.

They do not have the widely varying input voltage threshold of FETs. Tubes, in fact, may be the most natural amplifier. Unfortunately, they are large, they are fragile, they are microphonic, they drift, they burn out, they are

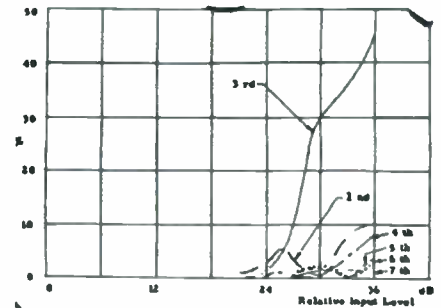


Figure 3. Distortion components for multi-stage capacitor-coupled transistor amplifier.

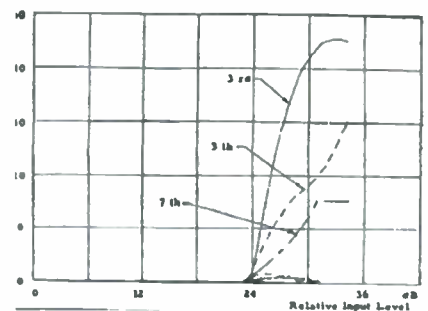


Figure 4. Distortion components for multistage transformer-coupled transistor amplifier.

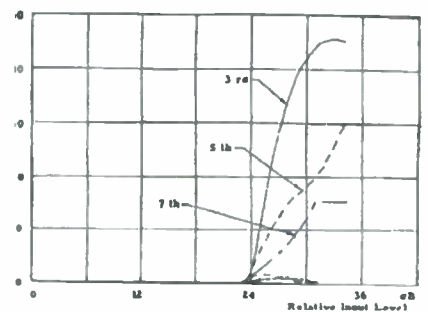


Figure 5. Distortion components for monolithic operational amplifier with hybrid output stage.

nearly obsolete, and they are rapidly becoming unavailable.

The tube sound has been so elusive that many consider it to be mysterious and beyond the capa-

bility of modern instrumentation. This is partly true. The tube sound is often more subtle than the oscilloscope display. Low level harmonics are not visible, but are audible. Distortion meters do not consider individual harmonics, but our ears do. Standard audio tests do not tell the whole story.

Russell Hamm moved beyond the Total Harmonic Distortion measurement and developed a test that separated different types of microphone preamplifiers: triode, pentode, transistor, and operational amplifier. This test measured and plotted the percentage of each harmonic as a function of overdrive.

The harmonic character of these preamplifiers, *Figures 1 through 5* [1], are quite different, virtual fingerprints of the various technologies and their respective circuits. The triode curves, *Figure 1*, show significant second harmonic generated by the bias shifting in the coupling capacitor created by grid conduction. The pentode curves, *Figure 2*, show the grid conduction delayed by the plate load curve going through the saturation region well below the knee into the high plate resistance region. The semiconductor preamp curves, *Figures 3 through 5*, show no equivalence to grid conduction. The operational amplifier, *Figure 5*, shows the rapid rise in distortion created by high gains and substantial feedback.

The second harmonic provides punch in contrast to the blanket of the third harmonic [1]. Consequently, these *Figures* show that the triode, *Figure 1* initially provides a blanketed punch that fades into a lot of punch. The pentode is primarily blanketed with a little punch. Semiconductors vary from quite blanketed to completely blanketed.

The next remarkable feature is the generation or rather the lack of high order harmonics. The high order harmonics, especially odd ones, put a discordant edge on the signal. A prime source of high order harmonics is feedback. Although feedback corrects for amplifier errors, it also attempts to correct for power supply limits. The feedback slams the output against the power supply rails and creates sharp corners that translate into high harmonics.

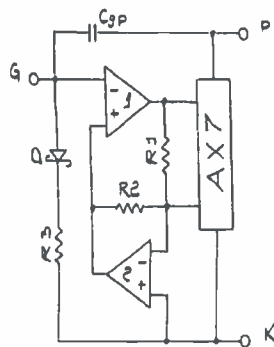


Figure 6. Complete Tube Emulator for a 12AX7.

This is quite evident in operational amplifier based preamplifier, *Figure 5*. A transistor amplifier patent, in an attempt to sound like tubes, has reduced the extent of feedback to avoid these problems [6]. Tubes, being more natural amplifiers, need less feedback and consequently do not generate as much of these high, harsh, discordant harmonics.

Tubes, particularly triodes produce significant second harmonics, *Figure 1*. The second harmonic has two sources: the non-linearity of tube characteristics and the interaction of the coupling capacitor and the grid-to-cathode diode [7]. The non-linear characteristics are the plate resistance and the gain. The plate resistance and the gain produce harmonics at all signal levels. These harmonics are superseded by those created by the interaction of the coupling capacitor, grid-to-cathode diode, and clipping. The grid-to-cathode diode charges the coupling capacitor when the grid conducts. The resulting change in charge creates an offset that shifts the bias from quiescent conditions. This bias shift alters the duty cycle of the resulting waveform. A duty cycle which is not 50-50 produces even harmonics. The two harmonic sources plus the low feedback combine to produce harmonics that occur over a wide range of input. This range is far wider than found in typical transistor or semiconductor designs. By comparison then, they distort too fast.

The grid conduction plus the unique plate characteristics give triodes the soft clip characteristic. Triode plate resistance is unique because the plate current sweeps upward with increasing plate volt-

age. Other devices, pentodes and all semiconductors, have a sharply rising current in the saturation region that then bends over into a constant current region. The triode plate characteristic insures that for moderate-to-high impedance circuits the grid conduction always limits the negative excursion of the plate for any reasonable load line. This contrasts with pentodes and semi-conductors which saturate for small loads. This is evident in the pentode preamplifier which has the second harmonic rising substantially later than it rises in the triode preamplifier.

THE TRIODE TUBE EMULATOR

The full triode emulation circuit, shown in *Figure 6*, has all of the needed features: grid, plate, and cathode terminals, grid-to-cathode conduction, grid-to-plate capacitance, gain, and the non-linear networks. The gain is created by two operational amplifiers such as the dual op amp, OPA2604. This operational amplifier has a sufficient gain-bandwidth product, about 10 MHz, to simulate audio tube circuits. The grid terminal drives the negative input of the first op amp to produce the needed inversion, while the second op amp creates the feedback for the first. R1 determines the proportion of distortion in the voltage gain. R2 then determines the voltage gain.

The choice of voltage gains is limited by the selection of the grid conduction components. The grid drive circuit cannot produce so much grid-to-cathode voltage that the first operational amplifier goes into negative saturation, yet a large output voltage swing is desirable. Thus, there is an engineering choice between the diode voltage drop, the power supply voltage, and the gain.

The reason why the tube emulator does not behave as its operational amplifier is that operational amplifier is kept out of negative saturation by the grid-to-cathode diode and the positive saturation effects are not transmitted by an output resistance that becomes effectively infinite. Of course, this requires that the tube emulator plate supply be at or below the op amp saturation level.

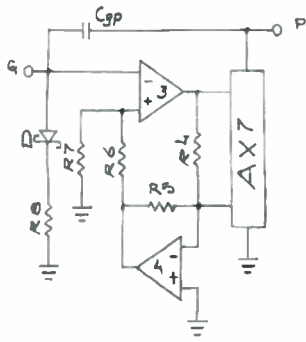


Figure 7. Low-Noise Tube Emulator for a 12AX7.

The low-noise implementation, shown in Figure 7, is viable for flat response stages. A difference between these circuits is the feedback connection between the two operational amplifiers is attenuated by R6 and R7 so that the noise of the second op amp is also attenuated. This circuit drops the noise from 3 dB over a single operational amplifier to about 1 dB higher. The restriction is that the cathode terminal is grounded. This corresponds to a cathode bypass capacitor large enough to bypass the lowest frequency of interest. This does not upset the bias since this arrangement corresponds to a bias of about 1.3 volts on a 12AX7.

The non-inverting implementation, shown in Figure 8, is also viable for flat response stage. Since the amplifier is non-inverting, the diode network must have the opposite polarity and the circuit cannot use the input-to-output capacitor.

The output characteristics of the tube emulator, shown in Figure 9, are similar to the plate characteristics of a 12AX7 triode. The output characteristics are quite ac-

Figure 8. Non-Inverting Tube Emulator.

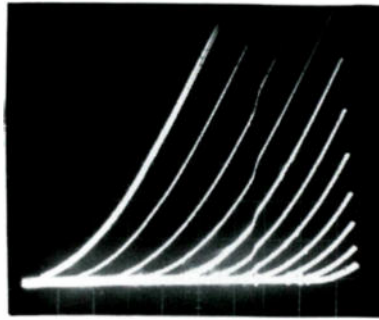
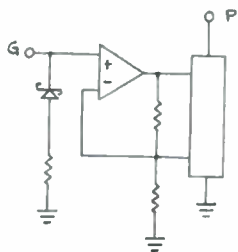


Figure 9. Output (plate) characteristics of a 12AX7 triode tube emulator.

Horz: 5 volts / div,
Vert: 0.5 milliamps / div,
Step: .05 volts.

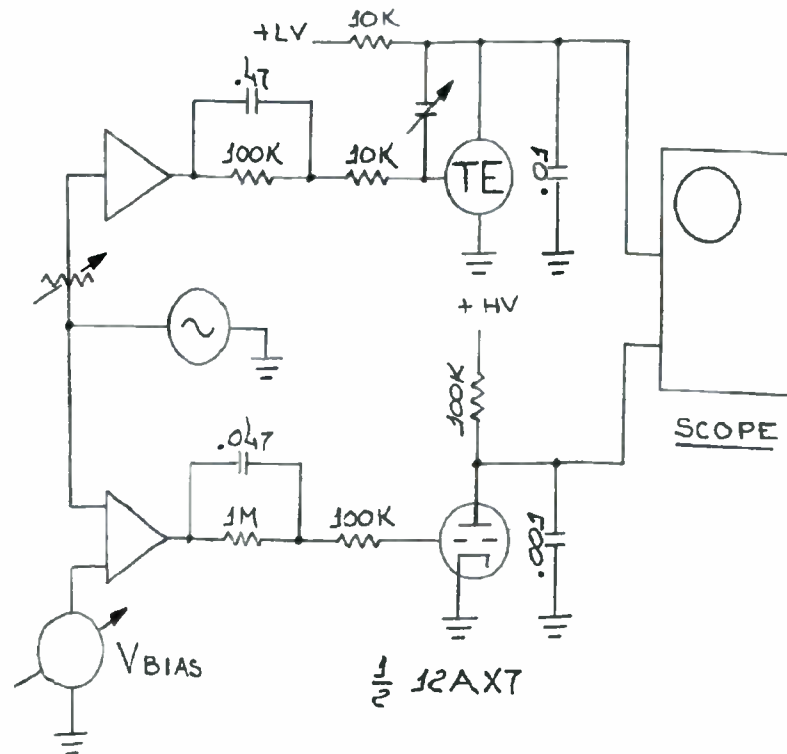


Figure 10. Comparison Tester for 12AX7 versus a Tube Emulator.

curate around normal load lines. The inaccuracy in the region of simultaneous low currents and low voltages is not important since the emulator is not operated there. These characteristics do not resemble the current limited characteristics of pentodes nor any semiconductor.

A tube emulator was operated alongside a 12AX7 to compare output waveforms, see Figure 10. After adjusting the tube bias, the input and output gains and the emulator grid-to-plate capacitance, the waveforms for a variety

of input levels and frequencies show a good match at various overdrives, frequencies and loads, see Figures 11-20. A close examination of these figures show slight differences in the curvature in some portions of some of the waveforms. This is reflected in slight differences in harmonic levels.

Harmonic analysis showed that the tube emulator erred in the direction of a more ideal tube, slightly more rounded waveforms and consequently less intense high order harmonics.

THE TUBE EMULATOR MICROPHONE PREAMPLIFIER

The complete tube emulator of Figure 6 was used to build a microphone preamplifier, Figure 21, to compare harmonic structures against Russell Hamm's findings. The preamplifier is a paraphrase of a generic two-stage triode amplifier. The circuit topology is the same except for the cathode follower is replaced by a unity gain buffer. The impedances are lowered by a factor of 10 so that the

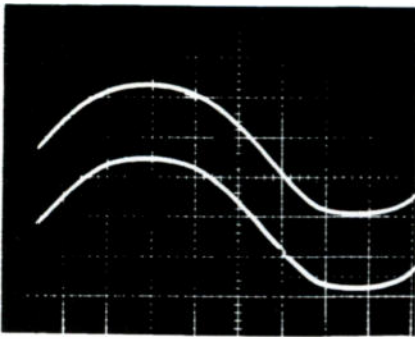


Figure 11. Output Waveform Comparison with tube at +5

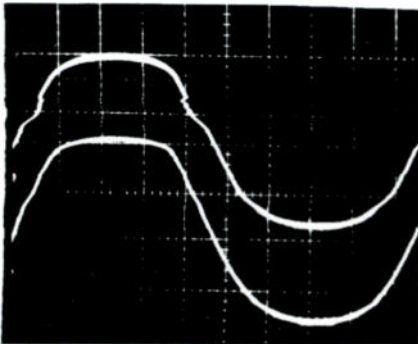


Figure 12. Output Waveform Comparison with tube at +8.

parts. The biasing, however, is lower than proportional simply because that is the character of the tube emulators. After finding the appropriate biasing, the tube emulator tested like Russell Hamm's generic two-stage triode preamplifier. It did not correlate with the pentode, transistor, or operational amplifier based preamps.

The test designed by Russell Hamm is simple. The harmonic percentage for harmonics 2 through 7 are plotted against overdrive. The input level that creates 1 percent third harmonic distortion becomes the 24 dB reference level. The result for the tube emulator microphone preamplifier is shown in Figure 22. The third har-

Figure 18. Output Waveform Comparison with reactive load.

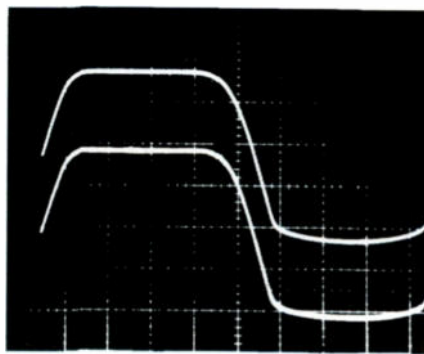
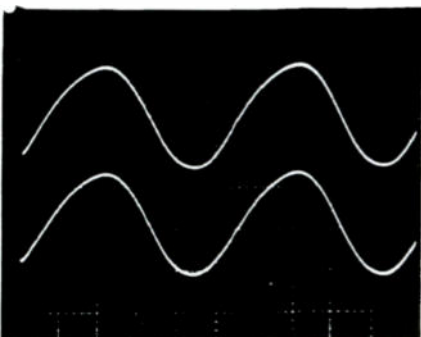


Figure 13. Output Waveform Comparison with tube at +14

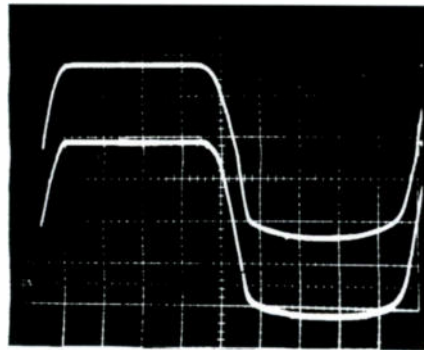


Figure 14. Output Waveform Comparison with tube at +17.

monic rises first. The second harmonic rises from a lower level at the same time, then overtakes and dominates. The fourth rises about 4 decibels later than the second. The remaining harmonics remain below 5 percent, at least for 12 decibels of overdrive. This matches the description by Russell Hamm for a triode preamplifier: "The outstanding characteristic is the dominance of the second harmonic followed closely by the third. The fourth harmonic rises 3-4 dB later, running parallel to the third. The fifth, sixth, and seventh remain below 5 percent out to the 12 dB overload point." [1]. The harmonic percentage curves for the tube

Figure 19. Output Waveform Comparison with reactive load.

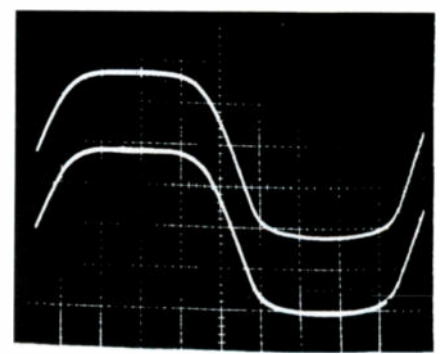
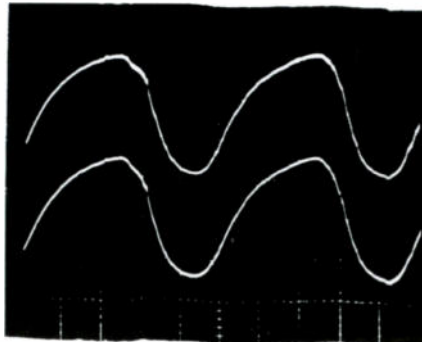


Figure 15. Output Waveform Comparison with tube at +11

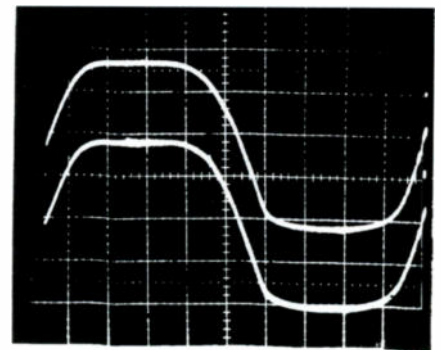


Figure 16. Output Waveform Comparison with tube at +11.

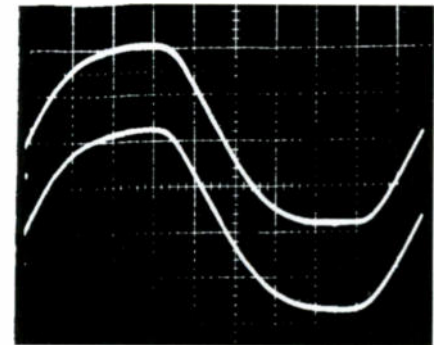
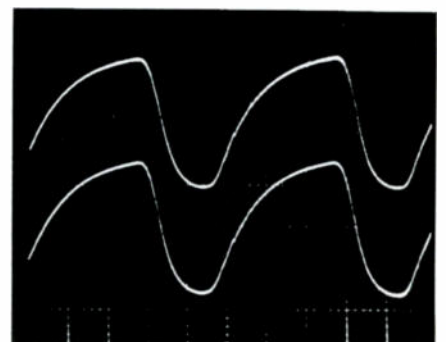


Figure 17. Output Waveform Comparison with tube at +11.

emulator and for the triode amplifiers are quite different from the curves for amplifiers made with pentodes, Figure 2, for transistors,

Figure 20. Output Waveform Comparison with reactive load.



Figures 3 and 4, and operational amplifiers, Figure 5. These amplifiers show a dominate third harmonic and smaller or zero even harmonic levels. Although the pentode is a tube, the second harmonic generation is delayed and smaller, certainly not dominate. The solid state examples, Figures 3 through 5, also show a faster rise in the third harmonic. The operational amplifier version, Figure 5, has significant, rapidly rising fifth and seventh harmonics as well.

Russell Hamm did not specify which microphone preamplifiers he tested. Consequently, the only similarity between the Russell Hamm test amplifier and the source for the paraphrase of the tube emulator microphone preamplifier was that they both had two triode stages and two-stage triode amplifiers tended to be designed similarly. However, the inherent tube character is evident in both.

The good emulation of tube microphone preamplifiers by a tube emulator preamplifier indicates that many of the professional recording classics may be re-created with tube emulators because they use two-stage preamplifiers. For example, a generic two-stage amplifier is used in Pultec equalizers and Teletronics limiter/compressors as well as microphone preamplifiers.

Just as Russell Hamm pointed to the need for tube based components [1], the tube emulator has application wherever overloads are likely: microphone preamplifiers, limiters, compressors, equalizers, and power amplifiers.

Tube emulators allow designers to easily create synergistic combinations of solid state and tube characteristics.

A Side Bar

TUBE EMULATOR DEVELOPMENT

The triode tube emulator became the first because it could be tested independently, outside of a guitar amplifier, against published data. The second tube emulator with its application specific components emulate a power output stage. They translate the output of a tube emulator phase splitter to drive power MOSFETs so that they behave approximately as either 6L6s or EL34s. The third tube emulator

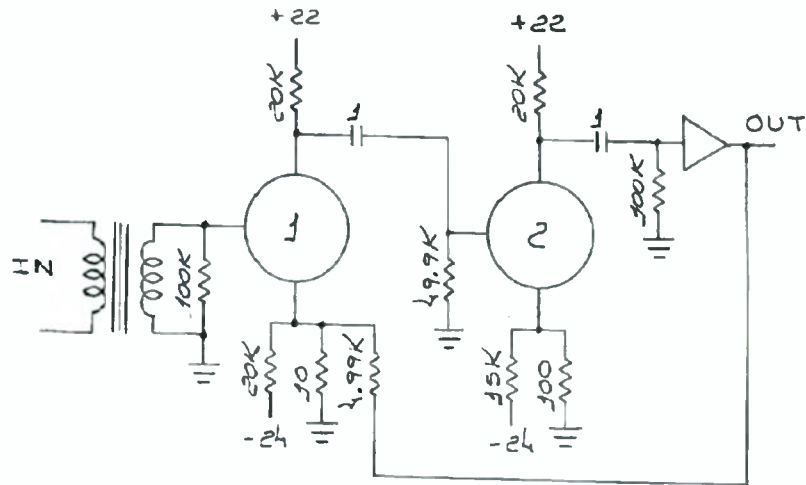


Figure 21. A microphone preamplifier using triode tube emulators.

is a low-cost triode emulator that has only the absolutely necessary essence of tube characteristics.

Additionally, the tube emulator is being built into Neumann U67 housings in a variety of circuit topologies: Neumann U67, Neumann M49, and AKG C12.

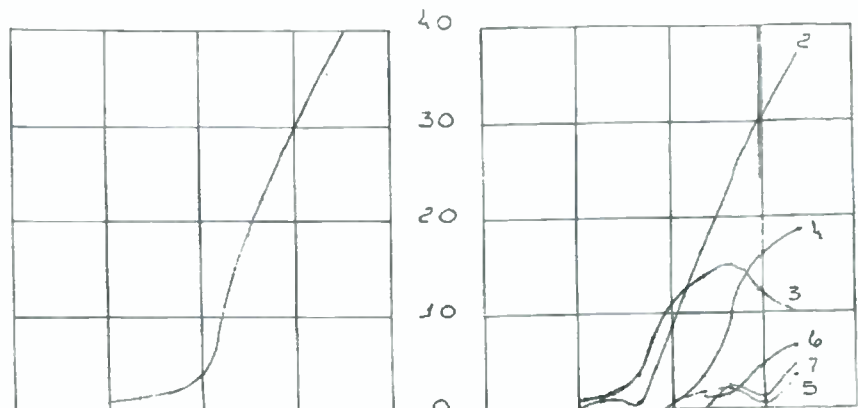
The triode tube emulator is a combination of non-linear networks built into an epoxy encapsulated hybrid SIP and application specific components. This SIP has 15 pins on 0.1 inch centers along its entire length and is 0.71 inches

high and about 0.125 inches thick. The application specific components provide the gain elements and the grid conduction components. Figures 6 through 8 show various tube emulator circuits.

TUBE EMULATOR PRODUCT DEVELOPMENT

The triode and output stage tube emulators have been used in a proof-of-concept prototype guitar amplifiers. These amplifiers, a 111 watt and an 11 watt, have been received very well. The general concept and the overall tone has been accepted as tubes. The low-cost emulator has also worked quite well in its prototype guitar amplifier. The guitar amplifier makes a good test platform for the emulators because the guitar exercises the emulators in all regions.

Figure 22. At left THD and at right harmonic distortion components for the tube emulator preamplifier.



The triode emulators have been used in microphone preamp prototypes. This preamp has the synergistic quality of dual chains, one tube emulator and the other standard solid state. This provides the user with the rich, warm tube sound or the clean, transparent solid state sound and the flick of a switch.

Additionally, the tube emulator is being built into Neumann U67 housings in a variety of circuit topologies: Neumann U67, Neumann M49, and AKG C12.

A Side Bar

THE TUBE MARKET

The reason for creating the tube emulator is the declining supply and quality of tubes. Although some believe that the tube supply will prevail and continue to make high quality tubes, others differ. Hartley Peavey of Peavey Electronics: "It's just a matter of time before these countries catch up to the west, and stop making cheap but reliable tubes. This is why so many companies, including Peavey, are working feverishly to create the solid state equivalent of a tube amp." [3] Paul Meisenzahl of Yamaha: "One of the big concerns for most customers is the availability of replacement tubes. No one wants to invest good money in an amp and then have to go through all sorts of trouble when the tube burns out in six months or a year." [3] Cathy Duncan of Seymour Duncan: "We do extensive computer testing on all the tubes we receive, and we send most back to the vendor." [3]

The tube market is constantly being eroded by the advance of solid state technology. New semiconductors are replacing tubes constantly.

Although tubes are available from former Communist Block countries, their solid state revolution should occur faster since the technology is now available from the West.

The latest threat is the flat video display that will replace picture tubes shortly. The picture tube is 50 to 80 percent of tube markets [4,5]. Although tubes are available from former Communist Block countries, their solid state revolution should occur faster since the technology is now available from the West.

The audio or receiving tube market has been in decline for years. The U.S. Department of Commerce Bureau of Census found that the receiving tube market dropped from \$39.8 million in 1986 to \$21.6 million in 1991.[3] This market segment is so small the Census is likely to stop collecting this data. The Electronic Industry Association reports a drop in imported receiving tubes from \$8.3 million in 1985 to \$2.67 million in 1991.[4] The receiving tubes of all types imported in 1991 numbered less than 0.77 million units [4]. This is very low. By comparison, large semiconductor manufactures do not consider manufacturing less than a million units of a single type per year.

The ever increasing capability of semiconductors is a continuing threat to the tube market. The only growth area in the tube industry has been the cathode ray or picture

tube. Census data shows an increase from \$911 million in 1986 to \$1.415 billion in 1991. But this market is also under attack from advancing technology, the flat video display. These replacements for picture tubes will appear in television sets in two or three years. The tube industry will lose a substantial portion of its market.

The loss of the video display market plus the expected semiconductor revolution in the former Communist Block countries will accelerate the decline of audio tubes through a chain reaction. Fewer tubes will require less metal. The foundries will impose minimums, charge higher prices, and ship inferior material. Tube prices will go up and the quality will go down. Then more semiconductors will be used, etc.

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db

NEW PRODUCTS

DOUBLE BARREL SHOTGUN

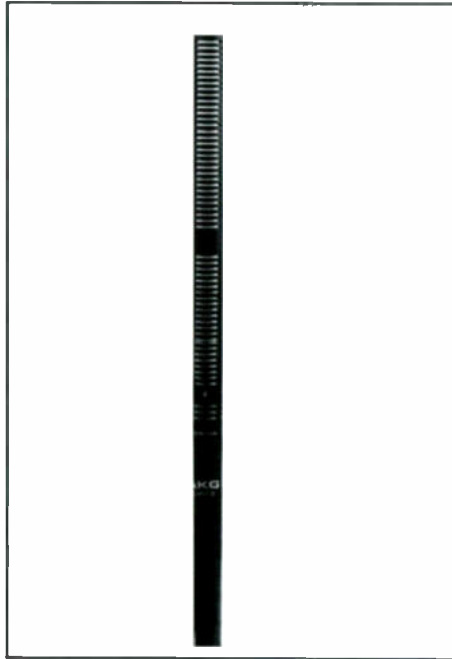
● The new CK68/ULS incorporates a divisible interference tube that permits a single mic to be formed for different applications while still retaining the same audio quality. The mic works in conjunction with this company's C460/B preamp. In its full-length configuration it is ideal for medium-distance recording and front-of-stage reinforcement. Removing the front of the tube turns the mic into a short shotgun. The unit is a combined pressure gradient and interference mic with a directional/ultra-directional polar pattern.

Mfr: AKG Acoustics Inc.

Price: \$649.00; C460/B

preamp—\$459.00

Circle 60 on Reader Service Card



PANCAKE HANDLE

● This simple tool makes the job of handling large diameter audio and video pancakes. The Handygrip is simply inserted into the plastic support hub and the handle pressed, locking the two-part grip firmly in place. Even the heaviest pancakes can be carried safely without touching the tape. It reduces the danger of dust and dirt contact on the pancake, eliminating finger prints and prevents slippage of outer tape windings. It is adaptable to all pancake hubs for both audio and video. Ask for part number 52169.

Mfr: BASF

Price: to be announced

Circle 61 on Reader Service Card



AUTO MIC MIXER

● AT-MX341 is an automatic microphone mixer with a microprocessor-controlled automatic-switching four-channel mic mixer. The SmartMixer features two modes of operations to which each mic can be independently switched via front panel priority pre-select switches. With the priority switch down, only one microphone at a time is allowed to be on. When a microphone is active, it activates a lockout control bus keeping every other mic connected to that bus silent until the person finished speaking. Microphone switching is fast and quiet, allowing meetings to be completely interactive. With the priority switches up, the mics are disconnected from the control bus, this tells each mic to come on independently when its input sound level tells it to turn on and allows all of the mic to be heard at once. Mic attenuation is factory-set at 8 dB but can be internally adjusted between 6 and 20 dB.

Mfr: Audio Technica, US, Inc.

Price: not available

Circle 62 on Reader Service Card



SINGLE RACK-SPACE AMP

● PM125 is conservatively rated at 60W per channel into 4 ohms, and frequency response is virtually flat from 20 Hz to 20 kHz with less than 0.01 percent THD. Input connectors are balanced TRS 1/4in. jacks, while outputs are 5-way binding posts. The rear panel incorporates an 11-detent input level control, and an output mode switch for normal, bridged mono or dual mono operation. Protection against short circuit, thermal overload SOA current limiting into abnormal loads, clipping eliminator circuit (defeatable) front-panel resettable circuit breaker, and output muting relays for on/off transient suppression are all included.

Mfr: Carver Professional

Price: \$498.00

Circle 63 on Reader Service Card



LOW-PRINT MASTERING

● 908 Mastering Tape was introduced at the recent AES Show in New York. 908 comes from the same family of high-performance 808. It, however, offers a 3 dB improvement in signal-to-print and has been specifically designed to work on Nagra analog recorders and features a 1.5 mil thickness with a signal to noise ratio 73.5 dB. Users will find the new 908 provides a mirror image of the original with no pre-and post-print echoes. High compliance of bias compatibility with current industry standards for Nagra records is claimed. Both 3M and Nagra will provide machine setup information for the new tape so users can optimize their machines.

Mfr: 3M Company

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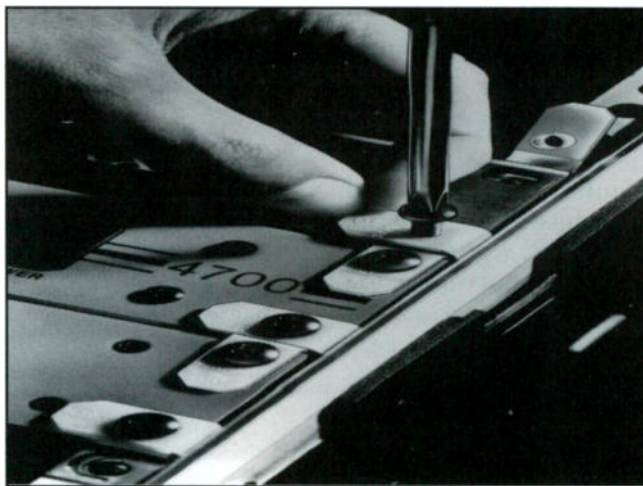
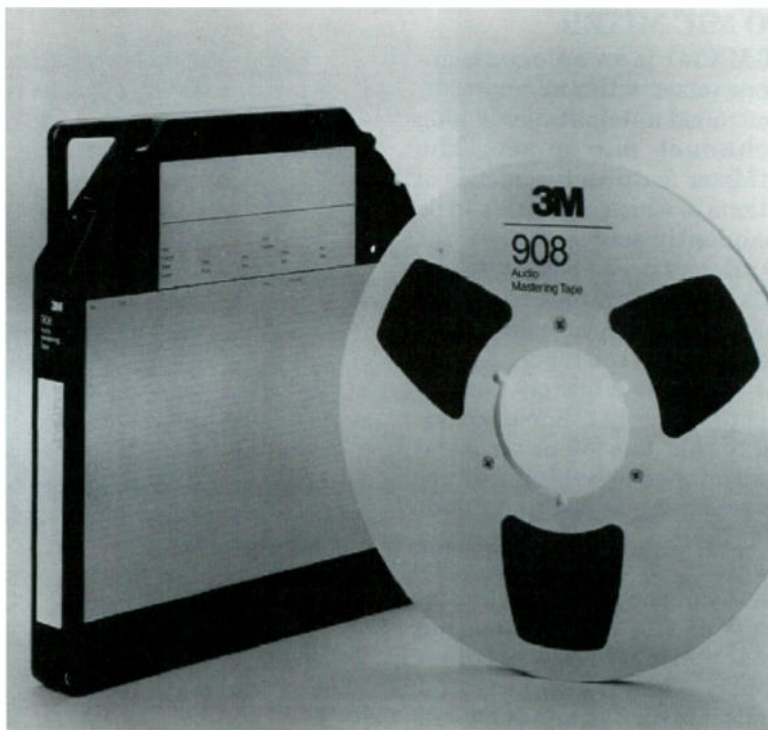
MINIMIZE RACK GROUNDLOOPS

● A buzzing or humming rack-mount system can drive both the musician and sound man crazy on stage or in the studio. Now there are Humfrees, an injection-molded mounting device that electrically isolates each rack mount unit from each other and from the rack rails. Installation can usually be done without taking the rack apart, just remove the mounting screws, pull the unit out slightly, install the Humfrees as shown in the illustration. The manufacturer calls them "like shoulder washers on steroids". They provide stable mounting, eliminate front-panel scarring, enhance mechanical shock resistance and reduce ground-loop related problems, all the while also eliminating the risk of electrical shock. A set of Humfrees installs two single space units (a total of eight mounting holes).

Mfr: Dana B. Goods

Price: \$4.99 set

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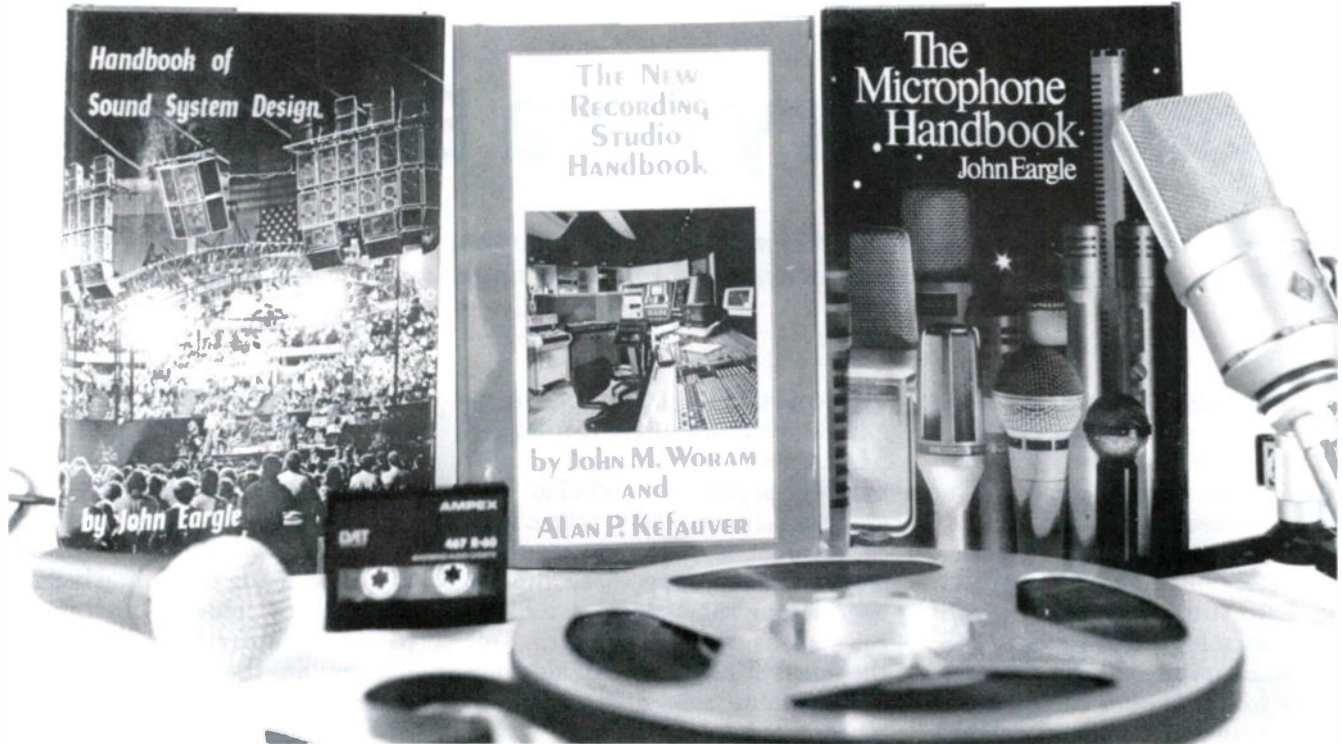


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Tape Ministry on a Budget

An active tape ministry is an essential part of many churches today as a form of teaching and information. Here's how one para-church organization maintains a growing, thriving, and budget-minded tape ministry.

CHARISMATIC RENEWAL SERVICES of Long Island (CRS) and Charism, its teaching ministry, provide a regular schedule of conferences, workshops and rallies for the diocese of Rockville Center, New York. The CRS tape ministry, which started as a local ministry in 1973 now has a mailing list of over 7,000 names world-wide, a catalogue of over 200 current talks and at least that many in older archived talks. Everything is done in house, from the initial recording to mailing out the completed vinyl jacketed sets.

A typical workshop day will consist of one or two main talks and a series of smaller group talks. For the main talks a cassette recorder and lavalier mic may be placed at the podium, or a feed from the sound system may feed a cassette recorder directly. The first method gives the speaker the ability to stop and start tape as they see fit, while the second configuration gives the flexibility of recording from any stage mic, and allows for signal processing. Using the sound system feed also allows the engineer to monitor the record signal.

For the smaller groups, a cassette recorder and mic are placed in each session. Speakers are briefed about recording and playback procedures on the cassette machines. They are asked to prepare their talks to fit within the

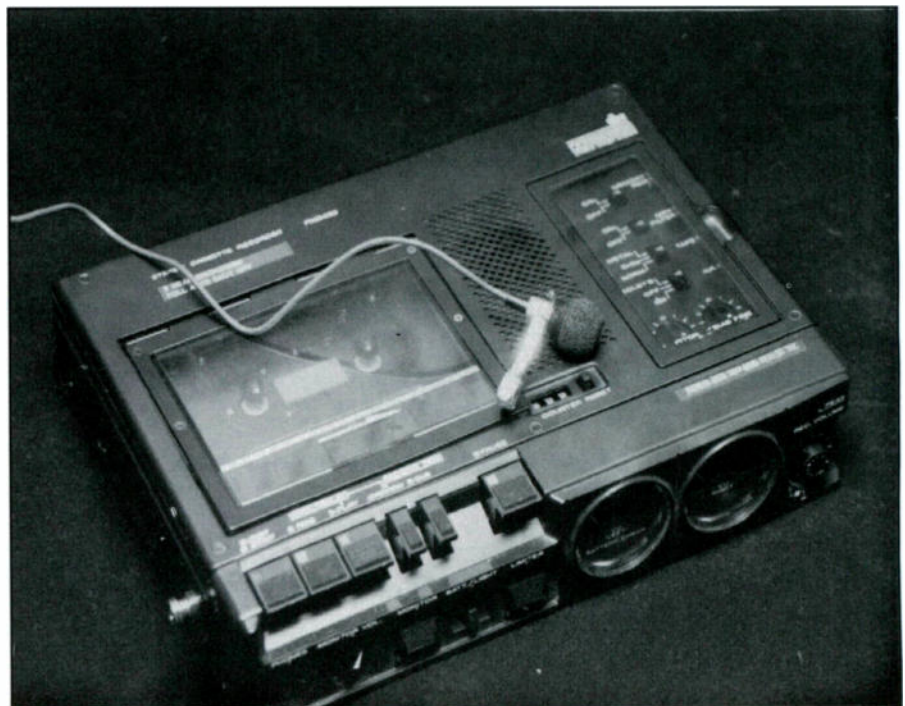
time constraints of the tape, usually 30 or 45 minutes. If a longer talk is planned or a question and answer period is included the speaker is instructed to plan a logical break at 30 or 45 minutes. This allows for the tape to be flipped over having side 2 begin at a natural spot as opposed to cutting off the speaker at the end of side one or beginning side 2 in mid-sentence.

CRS has a number of Marantz portable cassette recorders at their disposal ranging from the larger style PMD220 to the more current and smaller PMD221's and 430's (see Figure 1). Recording is done on a high-quality, high-bias cassette. A volunteer or staff member will set up each machine instructing the speaker as to proper on-mic

technique and setting record levels. The limiter of each deck is engaged to prevent overmodulation. This is preferable to the automatic level control (ALC) found on less expensive, consumer recorders. The ALC tends to pump whenever the speaker pauses, which results in a very noisy recording. The limiter, on the other hand, just keeps the hotter signals in check.

Most of the micing chores are handled by EV RE 10's and 635's, with one or two units being fed by lavaliers. While the tendency for a budget-minded ministry is to purchase inexpensive microphones or rely on the built-in condenser mic on the cassette recorder, a little research should be done in order to have a supply of microphones to fit a range of situations. The Electro-

Figure 1. One of CRS's Marantz portable cassette machines.



Joe Ciccarello is the Music Director for a 500-member church, the Christen Victory Center in Hempstead NY. He has a Masters of Art in Communication from Regent University.

Voice RE 10 is a very durable cardioid mic with a relatively flat response and a fairly wide pickup pattern. Treated properly it will last forever and will give good results. Its cousin, the 635A is also very durable and is omnidirectional. It is good to have one available for question and answer periods and where two or more people are giving a talk. Avoid high impedance microphones. Fluorescent lighting and other stray RF signals will wreak havoc with them, creating hums and buzzes that can ruin a recording.

Likewise, try to avoid unidirectional and hypercardioid mics. They can be wonderful stage mics, but their narrow pattern dictates that the speaker talk right into the mic. If the speaker should turn his/her head slightly, the drop in level would be significant.

In order to maintain uniformity and consistency, an intro is pre-recorded on to each master cassette ahead of time. A typical intro would be "Charismatic Renewal Services of Long Island presents the series..... Talk number..... The speaker is.....".

The speaker's talk is then recorded right after this intro. In the weeks that follow a workshop or rally, the CRS staff will review all the tapes for clarity and consistency, choosing to edit only if a major error or malfunction occurs on tape. A trailer is then recorded onto the approved master usually

instructing the listener to flip the tape in order to hear the completion of the talk. The completed tapes are then dubbed onto DAT for safekeeping while the master is used for dubbing purposes.

Rosemary Murello, a CRS staff member who handles the tape ministry along with Martha Sweeney, explained what happens when an order for a set of tapes is processed:

"All the titles for our current library are in our computer database. These have been printed onto cassette labels and are kept on hand to expedite the process. We first label the cassettes and place them into one of three Telex dubbers, each of which holds one master and three slave cassettes."

When dubbing is completed, multi-cassette talks are boxed in an appropriate-sized cassette jacket or single tape requests are put in a soft vinyl cassette case. A cover card complete with graphics is printed out from the office computer and inserted in the face sleeve of the jacket.

From there the order is packaged and mailed out. Once a year CRS will send a current catalogue to their mailing list and one is also sent with every order.

LOW TECH? DEFINITELY. EFFICIENT? VERY. SUCCESSFUL?

Not financially, but very successful from a ministry point of view. Having wrestled with a jammed tape or two during her tenure at CRS, Rosemary stresses the need to clean the Telex heads frequently. A broken machine may take up to a month to repair which would set order processing back considerably. "Frequent head cleaning and a gentle touch when loading and unloading tapes have been significant factors in decreasing Telex breakdowns," she states.

The idea to use DAT as an archive storage media was decided upon several years ago by the former director of CRS, Reverend Chris Aridas. Some of the older master tapes were beginning to wear out from constant dubbing and occasionally a master would jam in a dubber and be ruined, and new talks and topics were being added every year. DAT was chosen because it was cost effective and the small size of the tape made it easy to store. At present CRS has about 180 hours of talks on DAT tape, made up mostly of recent talks and some older material. The office uses a Casio DA-2 for their DAT (see Figure 2). This early portable unit has been very reliable even though it lacks the bells and whistles of some of the more expensive and newer units available today

Steven Benthall, CRS's current director, states,

"We operate on a real shoestring budget. Our tape ministry functions in such a way that it just about breaks even. Using good quality decks in the field and recording onto a quality master cassette have resulted in many fine teaching tapes."

So take heart, ye who would tape. With a decent cassette recorder and microphone, and a couple of staff members or volunteers, your church will be able to save those great talks, teachings, and homilies. They can be heard again and again for years to come. db

Figure 2. The DAT master machine, a Casio DA-2.



Single Microphone Recording

A WELL ORGANIZED AND WELL rehearsed church choir can touch the soul of a congregation and bring its members to a deeper awareness of the presence of God. Such is the case with the forty voice choir of First Presbyterian Church of Huntington, Long Island. Under the direction of Mr. Andrew Householder, this choir fills the church with some of the most beautiful sounds on earth.

This is only part of what makes Old First Church special. The church was founded in 1658 and has been at its present site since 1715. It served as a British barracks in 1777, and was torn down so its timbers could be used for the construction of a fort in 1782. The present building was erected in 1784.

Unlike many modern churches that incorporate electronic sound reinforcement into their construction, Old First Church was designed well before the electric light bulb in such a way that a pastor's message of salvation could be heard in every pew with just the right amount of reverberation. The same principle holds true for the choir loft and pipe organ located at the rear of the church. Music from the organ and choir is reinforced by the gently arched ceiling and car-

ried throughout the church. The sound is rich, and naturally reverberant. When Householder wanted to record these beautiful sounds, he contacted Ray Nostrand, vintage audio buff and student of acoustics.

There are several problems that come into play in this recording situation. The choir loft is not very large. The pipes for the organ are immediately behind it. A typical multitrack situation would call for recording the organ and then playing it back through a monitor system and overdubbing the choir. This overdubbing could be accomplished on location via remote truck or by renting the equipment necessary and setting up the mics, wires, console, recorders, etc. right in the church. Of course, this

means the recording would not be a "live" worship service, but rather, a performance. What Householder wanted to record was the actual Easter morning service and an Advent service. Any mics placed near the choir would pick up the overpowering sound of the organ and reduce the choir to little more than background noise. Nostrand had just the solution for this situation.

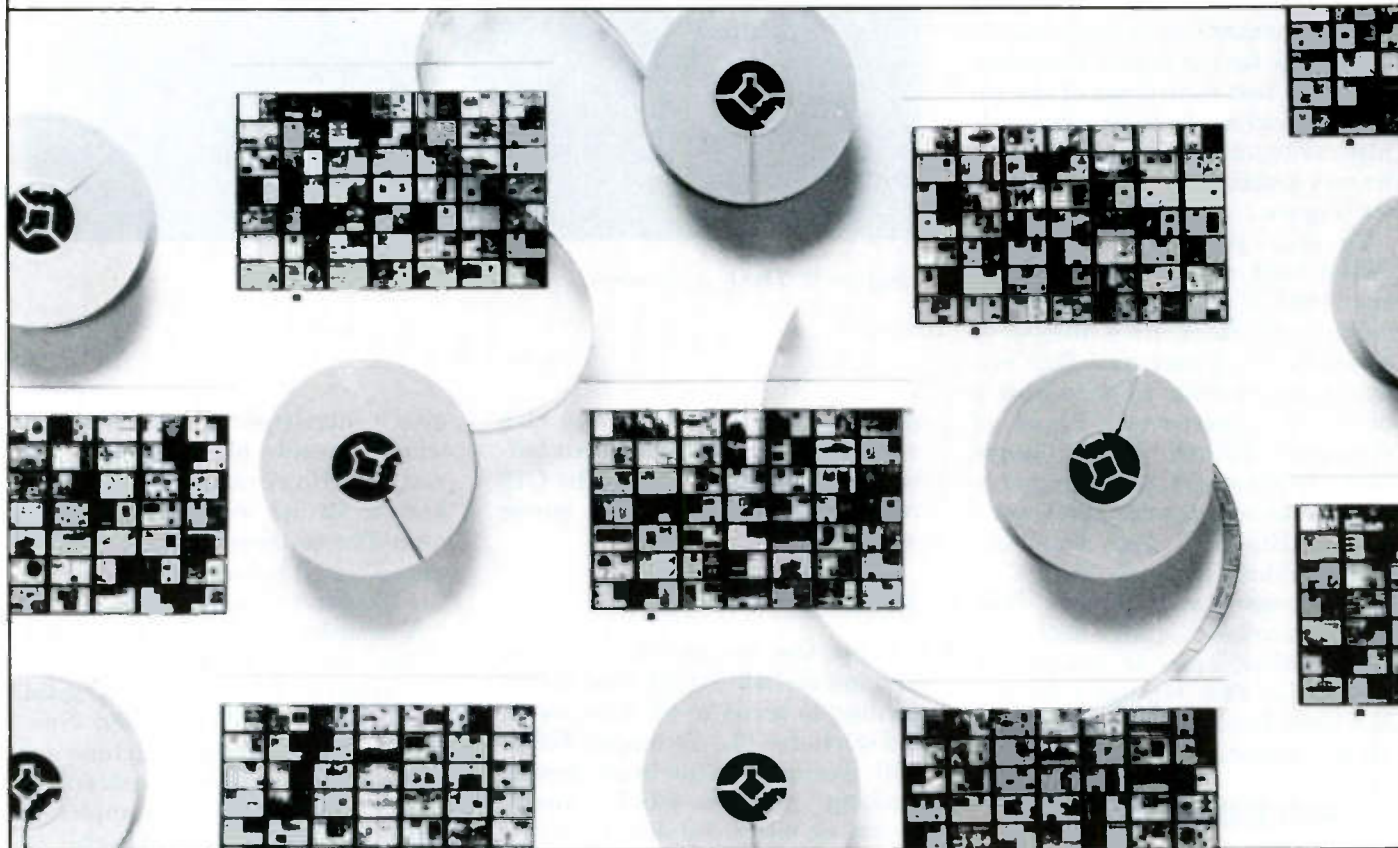
Nostrand is a firm believer in monophonic, single mic recording. His years of ear training and live recordings have given him the ability to find the "sweet spot" of a room or outdoor bandshell, place a mic, and record music that has depth, clarity, and excellent frequency characteristics. While many recording engineers rely on mathematical formulas and fre-

Figure 1. The choir mic is all set.



John Bontempi is an Assistant Professor of Communication Arts at New York Institute of Technology in Old Westbury, where he is coordinator of the Radio and Audio Recording curriculum. He has produced several independent Gospel albums and is an active songwriter.

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quency analyzers, Nostrand trusts his ears. This is not to discount the value of technology, but sometimes a simple back-to-basics approach works very well.

Nostrand listened to the choir rehearse and determined that the mic should be suspended in mid air about thirty feet in front of the organ pipes and twenty feet from the front of the choir loft rail. The mic also needed to be a few feet lower than the choir rail. This enabled the choir, standing on risers, to act as a baffle for the organ. Nostrand did a few test recordings of the rehearsal and made some minor adjustments until he got the balance he was looking for. The mic was all set (Figure 1).

By now you may be asking, "What kind of mic is going to give that kind of response from thirty feet away?" There are a number of adequate condenser mics that can do the job, ranging in price from a couple of hundred to a couple of thousand dollars. For a single event recording it would probably be wise to rent a mic. The Crown PZM, AKG 414, and Neumann U87, are three likely choices.

Some years ago Charles Nostrand, musician, audio buff, and Ray's father, came to possess an AKG C12. This vintage tube mic has been Ray's workhorse for single mic recording.

SOMETHING OLD

The C12 is not small by any standards. It consists of four components all housed in metal cases. (Figure 2) First there is the mic head. It is about a foot long and one and one half inches in diameter. It contains the multi-pattern element, the tube, and its circuitry.

Next there is a box that selects the pattern. Omnidirectional, bidirectional, cardioid, and unidirectional patterns are selectable. This is accomplished by varying the phase in the dual elements located in the mic head so that it will either accept or reject sound waves approaching the back or sides of the mic. Following that is an "L" pad control box. This enables the user to adjust the impedance of the mic to any console or recording situation.

The whole set up is fed by a



Figure 2. The C-12 system.

power supply about the size of a shoe box. You can forget about batteries or phantom power. The C12 requires 110 volts as its power source.

SOMETHING NEW

Given the vintage status of the mic you probably think that the recording is going to be done on an old warhorse like an Ampex 600 or 300. Not quite. This huge, power-sucking and incredibly sweet-sounding mic is fed directly into a Sony MD1 minidisc recorder. All the sound, all the majesty, the ambience, the grandeur, gets encoded and stored on a piece of plastic a little larger than a matchbook.

The Sony MD1 uses a special magneto/optical head to encode binary pits onto the disc. The discs are relatively inexpensive and can be re-recorded up to a million times. In order to conserve disc space, the MD1 employs a logic that permits it to reject certain frequencies not critical to the recorded signal. This is combined with a time compression circuit that further conserves disc space. The sampling rate of the MD1 is 32 kHz. What all this technical information boils down to is that the MD1 is clean. Some audiophiles say it's too clean. Its rejection circuitry and limited sampling rate

give it a crisp sound that is somewhat devoid of richness and warmth. However, the C12 mic is known for its warmth and richness. The two teamed together produced a well balanced recording of the Old First Church Choir

A recorder that would produce a richer sound at a comparable price would be the Tascam DA 30-Digital Audio Tape (DAT) recorder. Nostrand has used this machine on several occasions with extremely good results. The DA 30 samples at 32, 44.1 and 48 kHz, and is able to reproduce the richness and warmth to a greater degree than the minidisc.

The DA 30 is a professional machine and is easily rented for those single event recordings, whereas the MD1 is a consumer machine and might be harder to find as a rental. The DAT format is widely accepted for dubbing onto cassettes, whereas the MD1 disc would have to be mastered onto a DAT or 2-track tape or cassette master, bringing the end result another generation from the original.

Recording a church choir does not have to be a complicated or expensive affair. All you really need is a decent microphone, a DAT recorder or MD1 minidisc recorder, and most importantly, a good set of ears.

db

db Buyer's Guide

Compressor/Limiters, Noise Gates, Noise Reduction Equipment, Miscellaneous

On the pages that follow, we present this issue's Buyer's Guide. The information contained is supplied by the respective manufacturers. Further, if a manufacturer that you seek is not listed, the chances are strong that, as many times as we tried, we could not get information from them.

COMPRESSORS/LIMITERS

ALESIS STUDIO ELECTRONICS

The Micro LimiteR features full stereo; soft-kneed limiter/compressor with unique attack and decay characteristics; Input, Release and Output controls, as well as an in/out switch and 20 kHz bandwidth.

Dimensions: 1.75 in. x 6.3 in. x 6.25 in.

Weight: 1.5 lbs..

Price: \$149.00

APHEX SYSTEMS LTD.

The Model 320 Compellor is a compressor/leveler/peak limiter featuring dual mono/stereo operation, leveling speed and peak limiter switchable on front panel; servo balanced inputs and outputs; operates at -10 dBv, +4 and +8 dBu.

Dimensions: 1.75 in. x 19 in. x 10 in.

Price: \$1,350.00

The Model 651 Expressor is a single channel compressor/limiter with a high-frequency expander. Features full function compressor with control of threshold, ratio, attack and release. Special HFX allows for dynamic "decompression" of selectable high frequency range.

Dimensions: 1.75 in. x 19 in. x 9 in.

Price: \$495.00

The Model 720 Dominator II is a precision multiband peak limiter. Stereo peak limiter is used as final protection in audio chain; absolute peak ceiling with no over shoot; adjustable ceiling level; density; release time; servo balanced inputs and outputs.

Dimensions: 1.75 in. x 19 in. x 9 in.

Price: \$1,350.00

ARX SYSTEMS See our ad on page 2

The Quadcomp features four compressor/limiters with variable ratio threshold and output gain in the one package. With full LED gain reduction metering and balanced inputs and outputs.

Dimensions: 1.75 in. x 19 in. x 6 in.

Weight: 5 lbs.

Price: \$799.00

The Afterburner features two channels of compressor/limiter with variable ratio and threshold and output gain. The Afterburner can be switched into "Mono" mode allowing separate Dynamics control of low and high frequencies. Also features balanced inputs and outputs on jacks and XLRs.

Dimensions: 1.75 in. x 19 in. x 6 in.

Weight: 5 lbs.

Price: \$599.00

DDP-1 is a dual channel dynamic processor with gate, compressor and peak limiter, Features include in/out level metering, separate gain reduction metering, sidechain inserts, and balanced inputs and outputs on XLR and jack connectors.

Dimensions: 1.75 in. x 19 in. x 6 in.

Weight: 5 lbs.

Price: \$799.00

BROOKE SIREN SYSTEMS, A DIVISION OF AKG ACOUSTICS, INC.

The DPR-402 two-channel compressor/limiter features high-frequency de-esser and wide band de-esser with peak limiting; adjustable speed; dynamics program manipulation; and full LED metering for both input and output.

Dimensions: 1.75 in. x 19 in. x 9 in.

Weight: 9 lbs.

Price: \$1,339.00

The DPR-404 four-channel compressor features a de-esser with high frequency de-essing. Each channel includes threshold control; below threshold metering; ratio control; gain reduction meter; clip LED; gain control and linking.

Dimensions: 1.75 in. x 19 in. x 11 in.

Weight: 8 lbs. 2 oz.

Price: \$1,399.00

dbx, A DIVISION OF AKG ACOUSTICS, INC.

The 160XT features a dual display system that monitors true RMS input or output levels with a 19 LED display while simultaneously monitoring gain reduction over a 40 dB range. Choice of OverEasy or classic hard-knee compression.

Dimensions: 1.75 in. x 19 in. x 9.25 in.

Weight: 6.5 lbs.

Price: \$459.00

The 163X features OverEasy compression action with key operating parameters integrated and controlled by a single slide control. Designed for operation at nominal studio levels from -30 dBu to +10 dBu.

Dimensions: 1.75 in. x 19 in. x 9.25 in.

Weight: 2.5 lbs.

Price: \$169.00

The 166 is a dual-channel compressor with an expander gate before each compressor. The combination of noise gate, OverEasy compressor and PeakStop limiting provides complete control of the input dynamics.

Dimensions: 1.75 in. x 19 in. x 8 in.

Weight: 6.5 lbs.

Price: \$629.00

DOD/DIGITECH/AUDIO LOGIC

The Audio Logic 266 compressor/limiter/gate features program dependent attack and release times for the compressor/limiter; feed forward gain control; side chain input and outputs; stereo link; and direct input to output bypass.

Dimensions: 1.75 in. x 17 in. x 6 in.

Price: \$500.00

The Audio Logic 660 compressor/limiter/gate features feed forward gain control; side chain input and outputs; stereo link; variable attack time; variable release time; and -40 dBu to +20 dBu compressor threshold control.

Dimensions: 1.75 in. x 17 in. x 6 in.

Price: \$340.00

FURMAN SOUND, INC.

The Model LC-X expander/compressor/limiter also includes a de-esser and hard limiter. Controls include three threshold; two ratio; attack, release; and output. Features switchable LED meter; side chain jacks; bypass switch; de-ess button; stereo interconnect; and on/off transient muting. Dimensions: 1.75 in. x 19 in. x 8 in.

Weight: 7 lbs.

Price: \$369.00

The Model LC-6 stereo limiter/compressor/gate is a two-channel unit that may be switched for stereo operation. Controls include input, output, compress, threshold, gate threshold, attack, release and ratio. Includes LED meters and side chain jacks; ground lift switch. Dimensions: 1.75 in. x 19 in. x 8 in.

Weight: 7 lbs.

Price: \$439.00

The Model LC-3A limiter/compressor includes input, output, attack, release and ratio controls. Has LED meter to indicate gain reduction; overload and power indicators; side chain jacks; de-ess button; ground lift switch; optional balanced configuration.

Dimensions: 1.75 in. x 19 in. x 8 in.

Weight: 7 lbs.

Price: \$269.00

JBL PROFESSIONAL

Model 7110 is a single channel limiter/compressor for both peak and average gain reduction. Features Smart Slope compression circuitry; "Automatic Preset" feature; input/output/gain reduction metering in single rack space chassis.

Price: \$495.00

Model 7112 is a dual channel limiter/compressor for both peak and average gain reduction. Features Smart Slope compression circuitry; "Automatic Preset" feature; input/output/gain reduction metering; and selectable "link" for multi-unit chaining.

Price: to be announced

Model 7122 is a dual channel frequency selectable limiter/compressor/expander that provides both peak and average gain reduction; Smart Slope compression circuitry; "Automatic Preset" feature; input/output/gain reduction metering; and selectable "link" for multi-unit chaining.

Price: to be announced

Model LA-4 Electro-Optical Attenuator compressor/limiter features selectable compression ratios; full VU metering; input overload indicator; and simple stereo coupling. Rack-mountable alone or in pairs in two rack spaces.

Price: \$730.00

The 1176LN is a single channel peak limiter with selectable compression ratios; adjustable attack and release times; balanced input and transformer-balanced output; standard 19 in. rack mount in two spaces.

Price: \$830.00

The 1178 is a dual channel peak limiter with selectable compression ratios; adjustable attack and release times; balanced input and transformer-balanced output; standard 19 in. rack mount in two rack spaces.

Price: \$1,390.00

The Model 562 Feedback Suppressor has a single channel, with five independently adjustable notch filters; high and low cut end filters; protective peak clipper; headroom indicator; bypass option and single rack space chassis.

Price: \$890.00

LT SOUND

Model CLX-2 is a feed-forward compressor/limiter incorporating the Allison EGC-101 VCA. Features include simultaneous operation of both compressor and limiter.

Dimensions: 1.75 in. x 19 in. x 7.25 in.

Weight: 8 lbs.

Price: \$995.00

Model ACC-2 is similar to the CLX-2, but incorporates an expander as well. An outboard oscillator is included for tremolo and stereo panning.

Dimensions: 3.5 in. x 19 in. x 7.25 in.

Weight: 11 lbs.

Price: \$1,250.00

Model SL-2 is a stereo limiter/expander with features including simultaneous limiting and expansion functions, de-essing and stereo or independent operation.

Dimensions: 1.75 in. x 19 in. x 7.25 in.

Weight: 7 lbs.

Price: \$395.00

ORBAN, A DIVISION OF AKG ACOUSTICS, INC.

The 412A controls interact to simplify and speed setup, and to prevent errors. Peak limiting and compressor functions are cross-coupled to eliminate potential pumping and modulation effects.

Dimensions: 1.75 in. x 19 in. x 5.3 in.

Weight: 5 lbs.

Price: \$525.00

The 414A is a stereo/dual version of 412A.

Dimensions: 3.5 in. x 19 in. x 5.3 in.

Price: \$800.00

The 422A features adjustable attack/release time and compression ratio. Selectable linear or exponential release time characteristic; defeatable release gate with adjustable threshold causes gain to move slowly toward user-adjustable value during pauses, preventing noise rush-up, pumping and breathing.

Dimensions: 3.5 in. x 19 in. x 10 in.

Weight: 10 lbs.

Price: \$680.00

The 424A is a dual/stereo version of the 422A.

Dimensions: 3.5 in. x 19 in. x 10 in.

Weight: 10 lbs.

Price: \$1,150.00

The 464A rides gain and limits peaks. Provides input attenuator, gate threshold, release time and shape, pre-emphasis,

output level, AGC rate and RF limiting—all can be tailored to a specific installation/application.

Dimensions: 1.75 in. x 19 in. x 9.625 in.

Weight: 8 lbs.

Price: \$1,200.00

PEAVEY ELECTRONICS CORPORATION/AUDIO MEDIA RESEARCH

The CDS 2 dual channel compressor/limiter/de-esser features compression ratio control; switchable attack/release time; "soft knee" type compression; side chain capability; stereo/mono operation.

Dimensions: 1.75 in. x 19 in. x 8 in.

Weight: 6 lbs.

Price: \$249.99

RANE CORPORATION

The FPL Program Limiter from the Flex Series in the HR format provides four independent channels of servo-lock limiting. Each channel independently switchable to AutoSlave mode, which links the side chains of all selected channels.

Dimensions: 1.75 in. x 8.5 in. x 8 in.

Weight: 4 lbs.

Price: not available

ROCKTRON CORPORATION

The Model 360 features compression, peak limiting and Hush II noise reduction; stereo master; unbalanced 1/4 in. jacks; and gain reduction metering.

Dimensions: 19 in. single rack space

Price: \$569.00

The Model 321 features compression; peak limiting; stereo master; unbalanced 1/4 in. jacks; and gain reduction metering.

Dimensions: 19 in. single rack space

Price: \$499.00

Model 300A features peak limiting ratio; attack; release and threshold controls; Hush II noise reduction; gain reduction metering; side chain input and output.

Dimensions: 19 in. single space

Price: \$419.00

Model 300G is foot switchable; features peak limiting ratio; attack; release and threshold controls; Hush II noise reduction; gain reduction metering and sidechain input and output.

Dimensions: 19 in. single space

Model 311 is a mono compressor/expander with input gain switch; slave/master switch; is foot switchable; and has gain reduction metering.

Dimensions: 19 in. single space

The Model CE2 is a compressor/expander with mono; stereo strappable gain reduction metering and a clip indicator.

Dimensions: 1/2 rack

Price: \$219.00

RSP TECHNOLOGIES

The Model 2200 features multiband compression; leveling; peak limiting; Hush noise reduction; 1/4 balanced/unbalanced and XLR I/O; stereo master; and crossover point of 500 Hz or 2 kHz.

Dimensions: 19 in. single rack space

Price: \$899.00

SOUNDTECH

The ST200CL compressor/limiter features stereo/mono; compressor on/off switches; gain reduction meter; variable gate; threshold; compression ratio; attack; release; input/output levels; balanced XLR/unbalanced 1/4 in. inputs/outputs.

Dimensions: 1.75 in. x 19 in. x 7 in.

Weight: 6 lbs.

Price: \$349.90

SYMETRIX

Model 425 Dual compressor/limiter/expander offers two-channels of integrated dynamics processing for simultaneous compression, limiting and downward expansion. Program-intensive release times ensure smooth, natural sound.

Dimensions: 1.75 in. x 19 in. x 7.25 in.

Weight 8 lbs.

Price: 579.00

Model 501 Peak/RMS compressor/limiter includes separate processors for simultaneous compression and Infinity:1 peak limiting. It provides absolute overload protection. Balanced and unbalanced ins/outs make interfacing easy.

Dimensions: 1.75 in. x 19 in. x 4.5 in.

Weight: 7 lbs.

Price: \$349.00

Model 501-01 is the same as the 501, but with transformer-coupled outputs.

Dimensions: 1.75 in. x 19 in. x 4.5 in.

Weight: 7 lbs.

Price: \$349.00

Model 525 dual gated compressor/limiter is a two-channel or true stereo device with program-controlled attack and release times. The compressor/limiter governs levels, while the expander/gate eliminates "breathing" and extraneous noise. Has side chain accessibility.

Dimensions: 1.75 in. x 19 in. x 4.5 in.

Weight: 7 lbs.

Price: \$539.00

Model SX208 stereo compressor/limiter is easy to use with straightforward controls. Program-driven attack and release times help produce wide dynamic range and low distortion. Balanced and unbalanced signal connections make setup fast.

Dimensions: 1.5 in. x 8.2 in. x 6 in.

Weight: 5 lbs.

Price: \$299.00

NOISE GATES

ALESIS STUDIO ELECTRONICS

The Micro Gate features keyable stereo in, stereo out, noise gate with Threshold, Delay and Rate controls; smooth, quiet operation; 20 kHz bandwidth; In/Out switch.

Dimensions: 1.75 in. x 6.3 in. x 6.25 in.

Weight: 1.5 lbs.

Price: \$149.00

APHEX SYSTEMS LTD.

Model 622 An updated version of the 612, the 622 Expander/Gate feature Logic Assisted Gate circuitry which combines sophisticated level detection with logic-generated voltage control, assuring positive, stable response regardless of attack time. New enhancements include front-panel headphone jacks, steeper voltage-controlled filters on key input with 24 dB per octave slopes and a dynamic range better than 20 bit digital.

Dimensions: 1.75 in. x 19 in. x 9 in.

Price: \$795.00

ARX SYSTEMS See our ad on page 6.

The Sixgate offers six channels of independent noise gating with variable threshold; attenuation and release times; balanced jack in and out; and LED indication of operating status as well as a hardwire bypass. Other features also available.

Dimensions: 1.75 in. x 19 in. x 6 in.

Weight: 5 lbs.

Price: \$649.00

AUDIO MEDIA RESEARCH

The NGT 2 dual channel noise gate features side chain input and insert capability; synch trigger outputs; complete parameter control; bypass switches; variable attack/release time.

Dimensions: 1.75 in. x 11 in. x 8 in.

Weight: 6 lbs.

Price: \$199.99

The NGT 4000 is a four-channel VCA-based noise gate/downward expander with complete control of threshold; attack; release; hold-off time; attenuation; gain trim; and side chain frequency contour; side chain signal shaping or processing; and electronically balanced inputs/outputs.

Price: \$299.00

BROOKE SIREN SYSTEMS, A DIVISION OF AKG ACOUSTICS, INC.

The DPR-502 features two channels with key filters; an internal/external key source; key listening; gating or ducking; peak and average active window metering; threshold control; range control; gate profile section; auto attack mode switch; and auto dynamic enhancement.

Dimensions: 1.75 in. x 19 in. x 9 in.

Weight: 10 lbs.

Price: \$1,359.00

The DPR-504 four-channel noise gate features a parametric key filter; key filter listening; simultaneous key level; threshold metering with average and peak metering; gate status LED; release/hold switch (hold tracks proportionally with release times); attack; switchable auto/fast.

Dimensions: 1.75 in. x 19 in. x 9 in.

Weight: 11 lbs. 10 oz.

Price: \$1,359.00

dbx, A DIVISION OF AKG ACOUSTICS, INC.

The 363X features two channels with separate threshold; hold and release controls plus key monitor; key engage; stereo couple and bypass for stereo or dual independent operation. Allows removal of unwanted background sounds.

Dimensions: 1.75 in. x 8.5 in. x 7.25 in.

Weight: 2.5 lbs.

Price: \$269.00

The 904 uses dbx's OverEasy action for smooth onset of gating. Attenuation limit, attack and release rates, and threshold are all adjustable. Also features programmed latch mode.

Dimensions: 5.25 in. x 1.5 in. x 9.5 in.

Weight: 0.75 lbs.

Price: \$499.00

DOD/DIGITECH/AUDIO LOGIC

The Audio Logic 440 Quad Noise Gate features -60 dBu to +20 dBu threshold; 0 dB to 90 dB attenuation; 50 microsecond to 50 millisecond attack time; 50 millisecond to 5 second release time; feed-forward gain control; and separate key input for each channel.

Dimensions: 1.75 in. x 17 in. x 6 in.

Price: \$400.00

FURMAN SOUND, INC.

The Model QN-44 quad noise gate features threshold; attack; release; and depth controls with "channel on" indicator. Key input jacks are provided for special effects. Features extremely low noise and distortion.

Dimensions: 1.75 in. x 19 in. x 8 in.

Weight: 7 lbs.

Price: \$429.00

PEAVEY ELECTRONICS CORPORATION

The GateKeeper has five channels with automatic dedicated gate. Each channel has adjustable gate threshold and adjustable release time; threshold adjustable 10 dBv to constant on; electronically differential input, S.E. output.

Dimensions: 1.75 in. x 19 in. x 9.25 in.

Weight: 7 lbs.

Price: \$299.99

SYMETRIX INC.

Model 564E is a four-channel expander/gate with professional features like "frequency-conscious" operation. A unique rotary control turns each channel into a gate or downward expander with a twist of the knob.

Dimensions: 1.75 in. x 19 in. x 10 in.

Weight: 11 lbs.

Price: \$989.00

NOISE REDUCTION EQUIPMENT

AUDIO MEDIA RESEARCH

The Q Factor features two bypass switches; three dual concentric controls per module for precision adjustment of threshold and slope, plus attenuation of dynamic low pass filters and downward expanders. Electronically balanced inputs/outputs; two noise reduction systems in one chassis.

Price: \$349.99

dbx, A DIVISION OF AKG ACOUSTICS, INC.

The 140X has two-channel Type II Noise Reduction. Patented RMS detection makes the system virtually immune to phase shift-related tracking problems. Tailoring of detector bandwidth prevents mistracking on broadcast quality media with limited high and low-end frequency response.

Dimensions: 1.75 in. x 8.5 in. x 7.25 in.

Weight: 6.5 lbs.

Price: \$319.00

The 150X features two channels each of encode and decode electronics in a single package. Industry standard Type-I NR, compatible with all earlier Type-I systems.

Dimensions: 1.75 in. x 8.5 in. x 7.25 in.

Weight: 2.5 lbs.

Price: \$319.00

The 911 incorporates one channel of encode and one channel of decode circuitry in the dbx Type-I format. Type-I provides as much as 40 dB of noise reduction for typical wide bandwidth media operating at 15 ips or faster.

Dimensions: 5.25 in. x 1.5 in. x 9.5 in.

Weight: 0.75 lbs.

Price: \$239.00

The 563X reduces the steady-state hiss created by analog tape, guitar signal processors, samplers, digital keyboards and sound effect tapes discriminates between unwanted hiss and desired high frequency signals on sound effect tapes. Stereo strappable.

Dimensions: 1.75 in. x 8.5 in. x 7.25 in.

Weight: 2.5 lbs.

Price: \$229.00

DOLBY LABORATORIES INC.

The Model 422 Reference Encoder/Decoder provides four channels of Dolby B-, C- and S-type noise reduction in a 1-U high frame. Contains signal generator providing calibration tones corresponding to selected NR type. Features include overall frequency response of 20 Hz to 15 kHz 1 dB, encode-decode at any level. Electronically balanced input circuits and electronically balanced and floating output circuits.

Dimensions: 1.75 in. x 19 in. x 10.2 in.

Weight: 13 lbs.

Price: not available

The XP SR Series features up to 24 channels of Dolby SR (Cat. No. 431 modules); individual channel bypass; uncal controls and Auto Compare circuitry. Interchange with Cat. No. 331 modules for Dolby A-type noise reduction. Also features overall frequency response of 20 Hz to 20 kHz, 1 dB, encode-decode at any level.

Dimensions: the card frame is 8.75 in. x 19 in. x 18.25 in.; the PS3 power supply is 3.5 in. x 19 in. x 18.75 in.

Weight: the XP 8 is 28 lbs.; the XP 16 is 40 lbs.; and the PS3 is 30 lbs.

Prices: the XP 8 is \$11,790.00; the XP 16 is \$17,800.00; the XP 24 is \$22,500.00 the No. 431 Module is \$925.00; and the No. 280 Module is \$900.00.

The MT Series features up to 24 channels of switchable Dolby SR and A-type noise reduction; software-controlled automatic alignment; flexible assignment of any number of channels to separate groups for multi-machine use; electronically balanced/floating input and output stages and Auto Compare circuitry; overall frequency response of 20 Hz to 20 kHz, 1 dB; and encode-decode at any level.

Dimensions: the card frame, which accommodates up to 24 Cat. No. 445 modules, is 8.75 in. x 19 in. x 19 in.; the PS4 power supply/control unit is 3.5 in. x 19 in. x 19 in.

Weight: 31 lbs.

Prices: \$29,775.00; the MT 8 is \$14,225.00; the MT 16 is \$22,015.00; and the Cat. No. 445 is \$1,240.00.

Model 363 features two-channel switchable Dolby SR and a Dolby A-type noise reduction unit with two channels in a 1-U high frame; automatic record/play changeover; built-in Dolby noise/tone generators; auto-compare test facility and transformerless balanced input and output circuits. Basic specifications include overall frequency response of 20 Hz to 20 kHz 1 dB; encode-decode at any level. Available in three versions: Model 363—SR/A (Cat. No. 300) with switchable Dolby SR and Dolby A-type; Model 363—SR (Cat. No. 350) SR only and Model 363—A (Cat. No. 450) A-type only.

Dimensions: 1.75 in. x 19 in. x 10.2 in.

Weight: 14 lbs.

Price: \$2,995.00

Model DP501/DP502 Audio Coding Units provide audio at 128 kbits/sec. per channel. Ideal for transmission systems requiring both high audio signal transparency and low, spectrum-efficient data rates. Includes Data rate of 128 kbits/sec. per channel; frequency response of 20 Hz to 15 kHz 0.2 dB; dynamic range greater than 90 dB.

Dimensions: 1.75 in. x 19 in. x 10 in.

Price: \$2,990.00

Model SDU4 is designed for reference monitoring of Dolby Stereo or Dolby Surround program material. Accepts two-track matrix-encoded signal as its input and generates four output signals: left, center, right and surround. Overall frequency response is 20 to 20 kHz 1 dB (L, C and R); 100 Hz to 7 kHz 3 dB (surround output).

Dimensions: 1.75 in. x 0.875 in. x 10.25 in.

Weight: 11 lbs.

Price: \$2,200.00

PACKBURN ELECTRONICS INC.

The Model 323A Audio Noise Processor has three processors plus other features for optimum noise reduction from all types of disk recordings.

Dimensions: 7 in. x 19 in. x 10 in.

Weight: 18 lbs.

Price: \$2,650.00

ROCKTRON CORPORATION

The Hush 8x features eight separate channels of single-ended noise reduction; single rack space; -10 or +4 operation; fast/slow release; balanced or unbalanced four stereo master/slave switches.

Dimensions: 19 in. single space

Price: \$799.00

The Pro Hush is MIDI programmable single-ended noise reduction; two channels; 60 dB of noise reduction; complete MIDI control.

Dimensions: 19 in. single space

Price: \$749.00

The Hush IICX is stereo and features 60 dB of noise reduction; stereo master; slow/fast release; threshold and sensitivity adjustments; gain reduction and bandwidth filter metering.

Dimensions: 19 in. single space

Price: \$439.00

The Hush IIBX is mono, featuring 60 dB of noise reduction; gain reduction and bandwidth filter metering.

Dimensions: 19 in. single space

Price: \$329.00

The Hush IIX has 50 dB of noise reduction; slow/fast release; -10, +4 reference switch; gain reduction and bandwidth filter metering.

Dimensions: 1/2 rack single space

Price: \$219.00

The 180A encode/decode tape noise reduction unit features an eight channel encode/decode system; operates at 15 ips to 30 ips; has headroom of +20 dB for use with either +4 dB or -10 dB tape machines.

Dimensions: 19 in. single space

Price: \$799.00

RSP TECHNOLOGIES

The Hush 2000 features multiband single-ended noise reduction with variable expander, release and ratio; filter has variable sensitivity and release; has stereo link; stereo link balanced 1/4 in. and XLR.

Dimensions: 19 in. single space

Price: \$799.00

SYMETRIX INC.

Model 511A is a two-channel or true stereo single-ended noise reduction system. Its dynamic high-frequency filter and downward expander reduce hum, hiss, RF buzz and other noise by up to 30 dB, anywhere in the signal chain.

Dimensions: 1.75 in. x 19 in. x 7 in.

Weight: 9 lbs.

Price: \$599.00

MISCELLANEOUS

APHEX SYSTEMS LTD.

Model 250 Aural Exciter Type III is a professional signal enhancer with adjustable harmonics mixing, timbre. Features servo-balanced in/out; relay bypass; and dual NR modes.

Dimensions: 1.75 in. x 19 in. x 9 in.

Price: \$995.00

Model 104 Aural Exciter Type C² with Big Bottom is a simpler more-affordable Aural Exhiter with circuitry to enhance and extend low frequencies the way the Aural Exciter enhances high frequencies. There is no increase in peak output.

Dimensions: 1.75 in x 19 in x 4.25 in.

Price: \$439.00

ARX SYSTEMS See our ad on page 2.

DI-1 is a stand-alone direct box with gain control, plus phantom, battery or dc power pack options, massive headroom, easy battery changing, rugged road worthy casing.

Dimensions: 2 in. x 4 in. x 5 in.

Weight: 2 lbs.

Price: under \$200.00

DI-2 is identical to DI-1 above but stereo. Weight is about the same, and price will be only a little bit more.

The DI-6s is six active direct boxes, a 6:1 line mixer and a 1:6 splitter in one RU, with multiple balanced outputs, individual ground lifts, master volume and headphone output.

Dimensions: 1.75 in. x 19 in. x 6 in.

Weight: 5 lbs.

Price: \$549.00

AUDIO MEDIA RESEARCH

The CDS 2000 is a two-channel VCA-based compressor/de-esser/limiter/expander. Features independent control of compressor, limiter, de-esser and downward expander threshold; also side chain signal shaping or processing. Electronically balanced inputs/outputs.

Price: to be announced

BROOKE SIREN SYSTEMS, A DIVISION OF AKG ACOUSTICS, INC.

The FDS-310 Sweepable Frequency Dividing System is a two-way stereo or three-way mono, sweepable crossover system built around 24 dB/octave Linkwitz-Riley filters. Internal jumpers change all frequency ranges down in divisions of 10.

Dimensions: 1.75 in. x 19 in. x 8.5 in.

Weight: 7 lbs.

Price: \$659.00

The FDS-360 Integrated Frequency Dividing and Limiting System features separate MID filter frequency band limiting; polarity switching; up to 360 degrees of phase correction; auto muting circuit; mono low linking; LEDs for limiting, signal, mutes and modes status; and interchangeable frequency cards.

Dimensions: 1.75 in. x 19 in. x 9 in.

Weight: 9 lbs.

Price: \$1,529.00

The TCS-803 Multi Tap Time Corrector is a mono triple-tap digital delay line designed for applications in which full range audio programs have to be delayed for multiple speaker installations.

Dimensions: 1.75 in. x 19 in. x 9 in.

Weight: 10 lbs.

Price: \$1,695.00

The TCS-804 Dual Time Corrector is a two-channel dual-tap or single-channel quad-tap digital delay line designed for critical speaker systems displacement and "Delay towers" distance correction in large arenas.

Dimensions: 1.75 in. x 19 in. x 9 in.

Weight: 10 lbs. 5.2 oz.

Price: \$2,995.00

The AR-130 Phase Check System frequency range can be selected to match that of the equipment being tested. Detector unit can be connected directly to microphone cable or power amplifier outputs.

Dimensions: 3.94 in. x 2.95 in. 1.5 in.

Weight: 10.6 lbs. excluding batteries

Price: \$635.00

dbx, A DIVISION OF AKG ACOUSTICS, INC.

The 263X De-Esser is designed to provide control of problem "ess-filled" vocals. Single-slider action sets the exact amount of sibilance reduction by ear, with visual confirmation from LEDs.

Dimensions: 1.75 in. x 8.5 in. x 7.25 in.

Weight: 2.5 lbs.

Price: \$169.00

The 902 De-Esser uses patented dbx sibilance detection circuitry. By comparing the RMS energy of signals above and below a user-selected crossover point, the 902 detects undesirable sibilance regardless of level.

Dimensions: 5.25 in. x 1.5 in. x 9.5 in.

Weight: 0.75 lbs.

Price: \$449.00

JBL PROFESSIONAL

The 7942 features 1 in/2 out Digital Delay line; ten microsecond to four second resolution; eighteen bit sigma-delta technology with 64X over sampled converters; precision calibrated attenuators; and "lockout" protection circuitry.

Price: to be announced

The 7944 is a 2 in/4 out Digital Delay line with ten microsecond to four second resolution; eighteen bit sigma-delta technology with 64X over sampled converters; 422 based remote capability; digital output bit stream (AES/EBU) expansion; precision calibrated attenuators; and "lockout" protection circuitry.

Price: to be announced

PACHBURN ELECTRONICS

Model 323A is a single-ended Audio Noise Suppressor applicable to all sound medial prior to Dolby and digital. Three processors suppress impulse noises and hiss. The unit also incorporates conveniences for processing 78s, 45s LPs.

Dimensions: 7 in. x 18 in. x 10 in.

Price: 2,650.00

ORBAN, A DIVISION OF AKG ACOUSTICS, INC.

The 222A Stereo Enhancer detects/enhances psycho acoustic directional cues present in stereo program material. Increases brightness, impact and definition of music, with no increase in sensitivity to vertical tracing distortion during disc playback.

Dimensions: 1.75 in. x 19 in. x 10.5 in.

Weight: 6.75 lbs.

Price: \$975.00

The 245F Stereo Synthesizer creates a pseudo-stereo effect from any mono source. Total mono/stereo compatibility. Saves tracks in multi-track recording situations. Allows for stereo cart transfers with no phasing problems.

Dimensions: 1.75 in. x 19 in. x 9.625 in.

Weight: 7 lbs.

Price: \$445.00

The 275A automatic stereo synthesizer works by detecting absence of audio on one channel, or presence of mono in both channels. Smooth cross-fading between true and synthesized stereo; automatic detection and correction of polarity-reversed stereo inputs.

Dimensions: 1.75 in. x 19 in. x 9.625 in.

Weight: 12 lbs.

Price: \$2,400.00

The 536A De-Esser features two channels of effective, inaudible de-essing over a 15 dB input range; dual-LED gain reduction metering; dynamic range typically 105 dB; very low distortion, effective RF suppression.

Dimensions: 1.75 in. x 19 in. x 5.75 in.

Weight: 5 lbs.

Price: \$650.00

RANE CORPORATION

The DC 24 Dynamic Controller consists of a stereo servo-lock limiter; stereo compressor and stereo expander/noise gate. Also included are a 24 dB/octave crossover, three-pin balanced inputs and outputs, side chain access, slave switch, bypass and gain reduction metering.

Dimensions: 1.75 in. x 19 in. x 5.3 in.

Weight: 5 lbs.

Price: \$549.00

ROCKTRON CORPORATION

The Intellifex features 24 bit 164X's over sampling; 100 dB dynamic range; complete MIDI control; 1.5 sec. delay; 8-tap chorus; reverb; 4-voice pitch shift; ducking; mixing functions; and digital Hush.

Dimensions: 19 in. single space

Price: \$1,149.00

The RX20 is a stereo exciter/imager; Hush II; frequency/phase mode; mix; 1/4 in. unbalanced I/O; input process metering.

Dimensions: 19 in. single rack space

Price: not available

The S212 line mixer has twelve channels. Each channel has level; pan; bass; and treble.

Dimensions: 19 in. single space

Price: not available

RSP TECHNOLOGIES

The 2400 features a multiband enhancer; Hush II; unique sum/difference mode; high and low mix; phase/frequency mode; balanced/unbalanced 1/4 in. and XLR I/O; and input process metering.

Dimensions: 19 in. single rack space

Price: not available

SYMETRIX INC.

Model 528 Voice Processor will enhance mic and line levels. Includes a preamp; de-esser; compressor/limiter; downward expander; 3-band parametric EQ and +48 V phantom power for condenser mics.

Dimensions: 1.75 in. x 19 in. x 7.5 in.

Weight: 9 lbs.

Price: \$679.00

Model SX206 Multi-Dynamics Processor can operate in compressor/limiter; gate; downward expander; ducker or slave mode. Manual attack and release controls are dynamically sensitive thanks to unique active integrators.

Dimensions: 1.5 in. x 8.2 in. x 6 in.

Weight: 5 lbs.

Price: \$329.00

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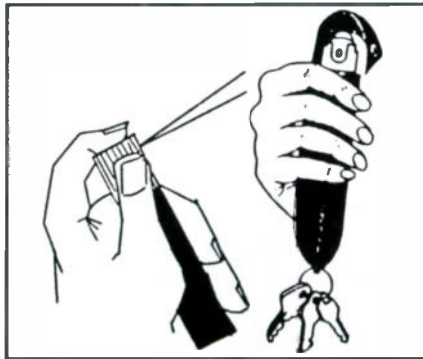
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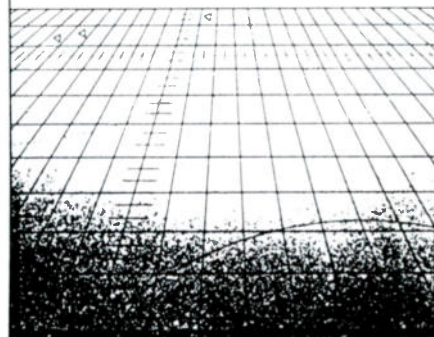
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PEOPLE, PLACES & HAPPENINGS

● According to a release that crossed our desk recently is one that tells us that the music industry is booming, and one of the areas that is showing the most substantial growth is that of women-owned companies and highly-placed women executives. Women are entering the music industry in record numbers and participating on all levels in the making of music. A new trade organization has been formed. Called **WOMEN IN MUSIC**, is open to any woman who is actively involved in the music industry. They expect to host their first convention this spring in Atlanta, Georgia. Why Atlanta? First, it's got excellent facilities, second, it's the headquarters of the new organization. **For all information, write or call WOMEN IN MUSIC 710 Lake View Ave N.E., Atlanta GA. 404 315-9818.**

● Changes at **Otari**: According to **Jack Soma**, president of **Otari Corporation**, **John Carey**, VP of Sales And Marketing has left after twelve years to join **E-mu Systems**. **James Goodman** has been promoted to Marketing Manager and **Lee Pomerantz** has been promoted to National Sales Manager. **James Goodman** has been with Otari since 1986, starting as Regional Sales Manager, and **Lee Pomerantz** came to Otari as a result of the acquisition of **Sound Workshop** in 1989. In the release, **Jack Soma** added, "with the introduction of the new Concept I console and continued strong sales for recorders, business has improved over last year. James and Lee are both dynamic and seasoned managers, with over twenty-five years of industry experience between them. I am confident that with these changes, our success will continue."

● The **Second International Symposium on Digital Audio Broadcasting (DAB) The Sound of 2000** will take place March 14-17 at the Sheraton Centre Hotel and Towers in Toronto, Canada. Join over 400 international representatives from the broadcasting world at this prestigious event. The

Symposium format will include plenary and parallel sessions with over fifty leading experts on such topics as programming opportunities and challenges, transition scenarios, value-added services and system technology and standards. The parallel sessions will be divided into technical and non-technical sessions focusing on key issues for managers, programmers as well as engineers. The symposium will also feature a Trade Show highlighting the latest in equipment to support the implementation of DAB. **For information contact: DAB Symposium '94, 126 York St., #4401, Ottawa, Ontario Canada K1N 5T5. Telephone them at : 613594-8226 or fax them at: 613565-2173.**

● **SBE, the Society of Broadcast Engineers** has announced that their 1994 Engineering Conference will be held in Los Angeles October 12-15, 1994. In conjunction with the NAB, SBE will hold the conference and exhibition at the Los Angeles Convention Center. Full registration to the SBE Conference will include entrance to the exhibits. Beginning in 1995, SBE will also work with NAB to present the entire NAB Engineering Conference each Spring. If you are planning to attend the NAB Spring Convention in Las Vegas this March 21-24, your SBE membership card will get you in at the NAB members rate. **For details, contact the SBE, 8445 Keystone Crossing, Ste 140, Indianapolis IN.**

● **Dolby Laboratories** recently made organizational changes that include the promotion of three managers to vice president. **Bill Mead**, formerly Director of Marketing and Sales is now Vice President Film Marketing. He continues in charge of Dolby cinema equipment marketing in the U.S., and Dolby professional audio product distributors in Japan and Korea. Marketing of Dolby professional audio products in the Western Hemisphere as well as sales administration responsibilities have passed to **David Watts**, Vice President, Technical Marketing. Addi-

tional promotions in Dolby's west and east coast office will enable closer working relationships with studios in these key production centers. **David Gray**, as well as managing Dolby's Los Angeles facility, now has both technical and managerial responsibility for all film dubbing activities in the LA as Vice President, Hollywood Film Production. Similarly, **Michael Di Cosimo** is now Vice President, East Coast Division, with responsibility for all tasks related to film dubbing the New York area, as well as managing the New York office and personnel

● Word from **Rank Video Services America**, based in Los Angeles tells of the promotion of **Mary Ann Fialkowski** to the position of Vice President Marketing and Business Development. She was formerly Vice President of Business Development. In her new position she will report directly to President and Chief Executive Officer **David C. Cuyler**. In making the announcement he commented that this change will strengthen strategic relationships with the company's existing customer base while developing new business areas.

● **Audio-Technica U.S.** has been reorganized. The new president is **Mr. Kazuo Matsushita**, the new Executive Vice president is **Philip J. Cajka**, and **Kenneth Reichel** is now Executive Vice President, Marketing. Other promotions include **Fred Nichols** as Senior Vice President, **Jacquelynn Hebrock** is Vice President, Product Development, and **Dan Slagle**, Vice President, Operations.

● **Bill Ford** has been appointed national sales manager for professional products at **Carver Corporation**. His seventeen year career in music and professional audio includes experience as a studio engineer, record producer, and road manager. In recent years he has held key sales and marketing positions at **Otari**, **Turbosound** and **TOA**.

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