Radio World®

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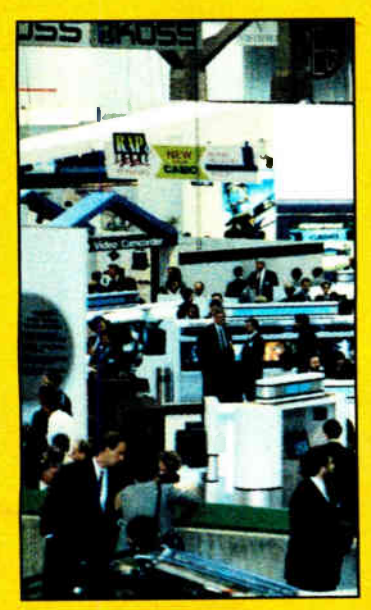
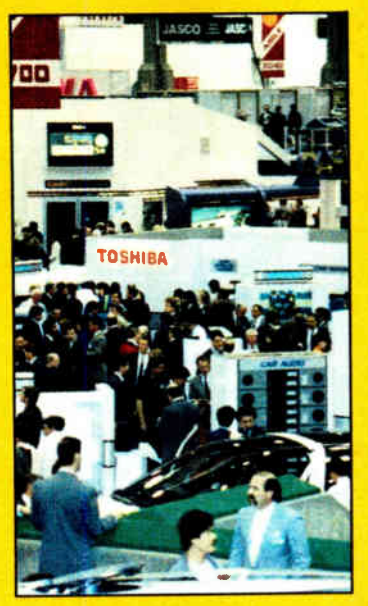
People, people, people. . . CES crowds previewed recordable CD players, among other technology. See our coverage, p. 8





NAB Endorses Eureka

by Judith Gross

NAPLES, Fla. NAB will endorse the Eureka 147 DAB technology for North American implementation, based on recommendations from the association's DAB Task Force, heard at the NAB Radio Board meeting here in late January.

NAB will also become the licensor of Eureka technology in a North American partnership between Eureka's proponents and the association's NAB Technologies subsidiary. The partnership plan, however, is subject to technical evaluation by the DAB Task Force Technical Advisory Group and other industry engineers, an NAB release stated.

The Radio Board had been urged by the DAB Task Force to act quickly to endorse Eureka 147 technology and to "control and manage" DAB implementation for the good of existing AM and FM stations.

Eleven-point proposal

An 11-point plan put before the Radio Board sought to identify and obtain spectrum; establish a technical DAB standard—most likely Eureka 147; develop a "reasonable" industry consensus; get FCC and congressional approval; minimize opposition and dislocations of existing stations; establish a DAB timetable and identify and minimize costs of the same; accommodate existing services and maintain current FCC regulatory treatment as broadcast entities; and to continue opposing satellite DAB systems.

In a pre-Board briefing, attended by dozens of radio and TV CEOs, engineers and NAB Board members, Radio Board Chairman David Hicks, DAB Task Force Chairman Alan Box, NAB Executive VP of Operations John Abel and Senior VP of Science & Technology Michael Rau presented an exhaustive look at DAB: its development, current status and plan for action.

Real and moving fast

Abel emphasized that the current status of DAB development shows that it is a reality and ready for implementation today. He pointed once again to the increasing demand for digital audio among consumers listening to CDs and now DAT, and named a list of competing DAB proponents vying for acceptance and FCC authorization to test systems.

Abel also cautioned that the FCC increasingly favors authorizing new technology and noted that international broadcast interests have rallied in support of satellite technology. He added that preparation time before the World Administrative Radio Conference in early 1992 is short and that NAB would need to have DAB policies in place if U.S. broadcasters' needs are to be met at WARC.

"One thing has been crystal clear ever since we first learned about DAB technology: the United States radio broadcasting industry is going to change," Abel said. In asking for support for NAB to manage and control it "on our time schedule" Abel went on to say that

(continued on page 7)

New DAB Plans Laid

NAPLES, Fla. Two additional DAB systems surfaced in the NAB DAB Task Force's presentation just prior to the Radio Board meeting here. One is an in-band FM-compatible system and the other uses multipoint distribution systems.

The in-band system has been in development by Gannett, Standford Research Institute and Corporate Computer Systems. It reportedly has the backing of several other large radio groups that have not formally announced their affiliation.

The Gannett plan is known as coded polyvector modulation, and involves placing a digital signal "under" an existing analog FM carrier. It also includes high speed digital subcarriers.

Its backers said existing FM transmitters and antennas can be used and that the cost of implementation is under $20,000.

The Gannett plan was informally presented to the NAB prior to the pre-Board briefing and also outlined to FCC staff, including Thomas Stanley of the Office of Science & Technology.

Another DAB plan has emerged from EMCEE Broadcast Products of White Haven, Pa., which reportedly demonstrated its system in Mexico City the same week the briefing took place.

The EMCEE plan uses two transmitters on 2647 and 2658 MHz along with Digital Cable Radio from General Instrument for a system the Task Force called "'wireless' digital cable radio." EMCEE said the system can provide 16 CD-quality stereo channels in 9.6 MHz in a home environment.

The Task Force briefing characterized the Gannett plan as similar to one proposed by John Leonard and Kintel which uses power multiplexing.

The Gannett plan was to be considered by the Radio Operators Caucus in a mid-February meeting on DAB.

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FCC Outlines DAB Issues

by Alex Zavistovich

WASHINGTON While most aspects of the digital audio broadcasting (DAB) issue are still unresolved, some FCC officials acknowledge that development of the technology is on the fast track.

At a Jan. 23 "brown bag" lunch, sponsored by the Consumer Assistance and Small Business Division of the FCC's Office of Public Affairs, the Commission's Leonard Kennedy and Bill Hassinger outlined concerns being weighed by the Commission regarding DAB.

Kennedy, the senior legal advisor to Commissioner Ervin Duggan, called the DAB issue "something of a moving target," in light of the variety of services currently proposed. He said the manner in which DAB is established, preferences or favored treatment, and regulatory structures all are being considered by the FCC.

Mass Media Bureau Assistant Chief Engineer Bill Hassinger made the most candid remarks regarding DAB development, although he prefaced his statements with the comment that they did not necessarily reflect Commission policy attitudes.

The manner in which DAB is established, preferences or favored treatment, and regulatory structures are all being considered by the FCC.

After noting the various delivery systems under consideration for DAB—terrestrial, satellite, hybrid, and compatible—Hassinger considered the question of a single service. He noted that society "might benefit from a mix of digital services," comparing the situation to a department store where a variety of products are carried under one roof.

Hassinger also said there was no practical or economic reason for a single standard for DAB. He suggested that a multimode selection system on receivers might be a way around the single standard question.

There are possible advantages to satellite delivery of DAB, he commented. Such a delivery system would pose no biological problems (ostensibly referring to the effects of RF radiation), would not affect air navigation equipment and would not interfere with existing service, according to Hassinger.

He acknowledged, however, that a disadvantage to satellite delivery is the potential loss of some aspect of service if all broadcasters were given the satellite option all at once. Hassinger suggested a compromise solution might be a hybrid system, with low power terrestrial delivery as a supplement to satellite.

Hassinger also addressed localism, saying, "I don't think localism should be used as an argument against new ways of doing things." Arguing against having a regional system "because it's not local" seems a "non-sequitur," he said.

Hassinger noted the importance of localism, but suggested that the defense of localism might already have "served its purpose."

Questioned as to a time frame for DAB development, Hassinger predicted it could come in the "reasonably near term," depending on the approach.

A terrestrial system may require "four, five, six years" for development, he speculated, while a satellite approach may come faster, perhaps "two to three years." Hassinger predicted that mobile satellite may move faster yet.

Kennedy added that "we don't have to solve every question before we can move" on DAB development.

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DAB Test Interference Unlikely

MSTV, WETA Criticism Answered by Strother

by John Gatski

WASHINGTON Strother Communications has responded to the Association for Maximum Service Television (MSTV) objections to its FCC request for experimental authority to test DAB systems in Boston and Washington.

Also, the firm has backed away from any commitment to test only the Eureka 147 DAB system, according to a recent amendment to its test authority filing. It instead proposes to test alternative systems, such as Stanford Telecommunications, and conduct tests on the Multipoint Distribution Services (MDS) band.

MSTV and Washington area PBS station WETA filed last minute objections to Strother's original request last December, citing interference potential during testing and an incomplete plan that lacks specific transmission sites.

MSTV also said that DAB testing on UHF spectrum is unnecessary because the band eventually will be used for High Definition Television (HDTV) and not DAB.

In response, Strother's consulting firm—du Treil, Lundin & Rackley—said there is little chance of interference and MSTV has made interference calculations that are beyond the worst case scenarios in the two cities. In its original filing, Strother asked for permission to test on Channel 14 and 40 in Washington and 15 and 32 in Boston.

Although there is "the slight potential for sound image interference" to WETA, it is unlikely since the experimental ERP would be less than low-powered TV operations, the firm said.

"Actual interference to WETA is extremely unlikely," the response said. "As pointed out in Strother's amendment, filters are available to eliminate any interference in cases such as those without affecting television reception."

Strother did not choose other Washington area UHF frequencies because of greater interference potential to TV stations near those channels, according to the firm's response.

The firm also addressed MSTV's contention that transmission tests in Boston could interfere with Channel 19 in that city.

The only way there could be interference to Channel 19 from DAB testing on Channel 15 is if it mixed with another strong signal from Channel 17, du Treil, Lundin & Rackley said.

"There are no authorized Channel 17 stations in the vicinity," the response added.

Finally, du Treil Lundin & Rackley

(continued on page 7)

DAB Spectrum Eyed

by Alan Carter

WASHINGTON Use of L-band spectrum for digital radio may come down to a battle between digital audio broadcasting (DAB) proponents and the Executive Branch of the federal government, which doesn't support accommodating frequency switches and guards the spectrum for military use.

This scenario is developing, according to comments filed at the FCC, as the U.S. prepares its position to take to the 1992 World Administrative Radio Conference (WARC).

In reply comments on the Commission's second Notice of Inquiry for WARC, DAB proponents are zeroing in on 1500 MHz as the best frequency for Broadcasting Satellite Service (sound) and a complementary terrestrial service.

But such an allocation would require the relocation of Aeronautical Mobile Telemetering service users—including the Air Force and private operations—to 2390-2450 MHz.

While the Commission does not believe there is a problem in shifting the telemetering service users to other frequencies, the Executive Branch said the action will have a negative effect on aeronautical test and telemetry operations.

Until the war in the Persian Gulf broke out, observers believed FCC and DAB proponents could facilitate the spectrum switch with political pressure on Capitol Hill. Now, that is doubtful.

"This issue has not been resolved," said FCC Deputy Chief for Spectrum Engineering William Torak.

The FCC is planning to issue a supplemental notice in March focusing on BSS (sound), Torak said.

DAB proponents said more space within the L-band is needed than the FCC proposed. The consensus appears to be 60 MHz, rather than 32 MHz, at 1470-1530 MHz.

"We're really not that concerned about the amount, but where it will be," Torak said. "I think it's about time we concentrate on where we are heading. We've got to have our act together within six or seven months."

To a degree, Satellite CD Radio addressed the debate. The DAB proponent maintained that the civilian sector managed by the Aerospace & Flight Test Radio Coordinating Council (AFTRCC) could meet its requirements in 48 MHz rather than its current 95 MHz.

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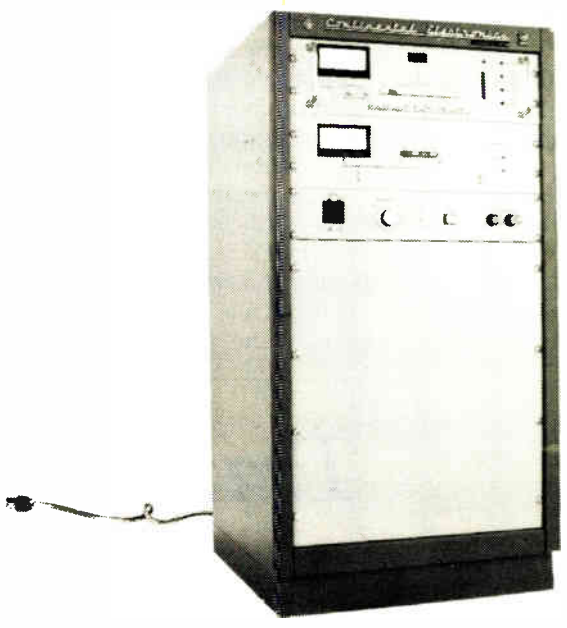

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The War, the Board & Bar Chat

by Judith Gross

FALLS CHURCH, Va. Here we are in a **war** and it's **business** as usual, unless you happen to have a **loved one** over there. It's pretty incredible how **little** such a serious happening has disrupted our **day-to-day lives**, isn't it?

A few more prayers, a lot more listening to the **all-news** stations. Notice how even TV reports have turned pretty much into **radio voice-overs**? I'll stick with radio . . . it's a mite tough to watch TV **when you're driving**.

Take a good long look at that **silver-winged machine** in the picture on this page. It was probably one of the last **Eastern Airlines** planes that flew. It was the one I did **not** take to the **NAB Board meeting** in Florida (I finally figured these guys are on to something: Florida in January, eh?).

Anyway, I was scheduled to fly Eastern but the airline's **economic woes** put a damper on that. Now I'm beginning to think there's something weird about scheduling flights to **industry events**.

Remember when Braniff went belly up just before the **SBE show** in Kansas City? Guess what airline I **booked**? That's right. Think there's a cosmic message here?

Anyway, it got **real interesting** just before the Florida meet while the **DAB rhetoric** heated up to a frenzy. First the **engineers** that were going to go over to France to check out the **Eureka system** had to cancel the trip. Fears of **terrorism** overseas as a result of the war put the kibosh on that.

Then some radio folks started to react to the possibility that NAB **would endorse** or form some sort of liaison with **Eureka**. Now, there are a **lot of systems** being talked about out there. Some engineers would like to see them **checked out** before an endorsement is made—not an unreasonable request.

I'm all for prudence, but not **foot-dragging**, which is another matter entirely. One of the NAB's alternative plans called for **delaying the technology** by forming industry **advisory committees**, opening a **test center** and a **lab** to test DAB systems.

Sound familiar? I call this the **HDTV solution**. Guaranteed to slow down the process to a **tortoise-like crawl** while the hares and other critters whip on by.

Question is: Does the industry (or NAB representing the industry) **need** to act this strongly this quickly? I won't take sides.

I'll just point out some things I've noticed. The **satellite folks** are fairly strong-minded and gaining some **international support**. Some folks who are not broadcasters don't buy the "localism" argument but would like to see the industry move toward a **global** approach.

AM stereo is one example of what can happen to a service when a **technical standard is** not set and competing technologies are left to **founder**. It isn't just AM stereo that's foundering. It's taking **all of AM** along with it.

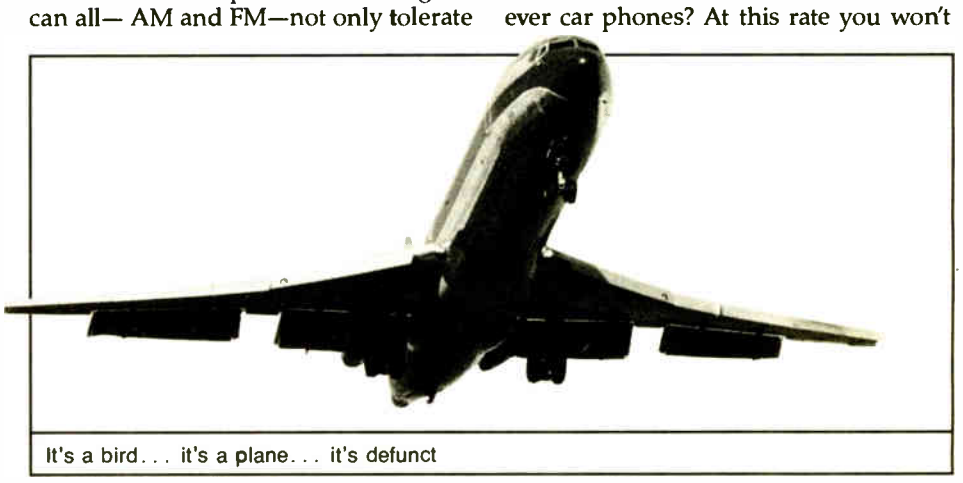
Eureka may not be the be-all **perfect technology** its proponents claim it is. Then there's that **nasty little question** of who's going to fork over **new spectrum** for a DAB service. But it does get kind of hard to argue with **$50 million in R&D**, especially when we spend virtually no money on it for this industry in this country.

Then there are all the **American vs. European** questions that come into play. The argument for an **American system** has even gotten louder since we began our missions in the Gulf.

I'm as **patriotic** as the next person. But we're talking about the **technology** here, not which side did you fight on in the war. Besides, **American research** played a very important role in Eureka development, especially the **data compression** work, much of which was begun by AT&T.

And oh yes. **If** the American argument is so **important**, where does that leave our current radio technology? **Marconi** was from Italy, **Heinrich Hertz** from Germany and **Michael Faraday** was British. Bet you wouldn't refuse to take a medicine that would **save your life** just because it was invented overseas. So enough of that talk.

Hope the **NAB** and the rest of the industry focus in on the **technical questions** and come up with something we can all— AM and FM—not only tolerate but prosper with.



It's a bird. . . it's a plane. . . it's defunct

What's clear is that the **rest of the electronics world** is not waiting for radio to get its act together.

Example: It was the end of the first long day at the **Winter CES**. I was sitting at the little bar in the back of the **Hilton casino**, listening to coins plink into slot machines, sipping on a rum and Diet Coke, playing with the phone numbers in my **Casio BOSS** and chatting with the guy on the next barstool.

He was an **electronics rep** from a small midwestern town, come to see the hottest **audio gizmos**. I smiled over at his wife. They were nursing sparkling waters.

"I never drink at these things," he said, "you can overdo it if you don't watch out." Remembering many **blurry NAB conventions** in this desert oasis, I agreed. I asked him about **digital radio broadcasting**—had he heard about radio's new revolution?

Yeah, he'd heard about it. But he was more **eager** to talk about the latest gadgets for your car. CD players with **programmable remote control**. DAT for the car. Infrared remote for everything. How about the **intelligent car**?

It warns would-be burglars to **leave the vicinity** immediately (then emits a cheerful, voice-synthesized "Thank you." What, you aren't going to tell me to "Have a nice day?") and finds you when you're lost, or helps you **find your way**.

How about **car faxes** and better-than-ever car phones? At this rate you won't have to **leave your vehicle** for anything except to visit the restrooms (gee, I hope they figure a solution to that one someday).

Radio? Yeah, he agreed it was probably losing audience. "But I don't have **any sympathy** for these stations," he added. "They did it to themselves. They won't improve their **signals**. They won't improve their **coverage**. Why should people keep listening when they've got CD and DAT?"

I finished the last of the rum and DC and gathered up my notepad to scout up some dinner. "Would it help if they **went digital**?" I asked.

That stopped him. He thought a moment before answering. "It'll help. But it better be **soon**."

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Data compression clarification

Dear **RW**,

In Mel Lambert's article "A Data Compression Overview" (Nov. 7, 1990), a couple of items need correction.

First, it is a virtue of transform-based coder systems that they do not rely on a "library of sound models" and their attendant potential for errors when a waveform is processed that does not fit the model. By performing an FFT or similar technique to transform audio samples into large numbers of bands (critical band theory suggests at least 24 are needed) in the frequency domain, full benefit can be realized of masking phenomena to ensure that quantizing errors fall below the threshold of perceptibility.

By way of historical account, sub-band designs employing ADPCM with relatively few bands are the class of coders that were originally based on speech modeling. Any limitations, however, are mitigated in sub-band systems that use large numbers of bands (greater than or equal to 24). In such cases, both transform-based and sub-band coders excel in signal transparency, but transform-based coders tend to be lower in complexity.

Second, while it is true that Dolby AC-2 coding generates 256 bands in the process of time-to-frequency domain conversion, they are then grouped into the 24 perceptually relevant bands dictated by critical band theory prior to further processing.

Kevinn Tam, Broadcast Tech. Mgr.
Dolby Laboratories Inc.
San Francisco, Calif.

Circumventing the forms form

Dear **RW**,

Good news! Believe it or not, it *is* still possible to obtain FCC forms without using Form 207 (*Guest Comment*, Dec. 12, 1990).

How? Simply submit a written request for the desired form(s) to the Office of Congressional and Public Affairs, Federal Communications Commission, 1919 M Street NW, Washington, D.C. 20554. Be sure to include the proper numerical designator(s) and the title of the form or forms as found in 47 CFR 73, 74, and elsewhere in the Rules. Always be sure to include your return address.

This procedure has worked well in the past. However, for the sake of prompt service in the future, it might be wise to delimit such method of form requests to imminently or occasionally necessary applications. Keeping an extra Form 207 on hand might not hurt, either!

Name withheld by request

Appeal for AM gear

Dear **RW**,

I'm a broadcast engineer and newsman who gets great pleasure out of experimenting with radio techniques on the "ham" bands. As an amateur radio operator, I have found hundreds of colleagues taking part in vintage AM activity on our shortwave, voice-only frequencies.

Our conversations not only air the war stories of broadcasting, but also revive the old story-telling feeling that used to be a vital part of family radio listening around the old console during the "golden age" of radio.

RW gets mentioned more than a few times, since our impression is that you also have a deep appreciation of the warm, inviting nature of AM. With that in mind I am prompted to ask for some support.

Many commercial stations are getting ride of 1960s and 1970s equipment as a part of upgrade projects. And while this gear might be obsolete at a broadcast station, those monoband AM processors, monaural mixers and older microphones remain great for out application!

The "ham" radio specialty we enjoy includes building and restoring AM equipment, including a "broadcast quality" audio chain to fully convey our voices. It makes for great listening, and answers a need some of us have to "run our own station" free of the sort of limitations we face at work.

I'd like to hear from other broadcast engineers who might have some equipment of an interest in joining us.

Paul S. Courson
WA3VJB
West Friendship, Md.

Editor's note: Broadcasters who might be interested in contributing any cast-off equipment for this worthy pursuit can write to Paul Courson at P.O. Box 73, West Friendship, Md. 21794-0073.

First Steps for DAB

The NAB Radio Board's decisions to endorse the Eureka 147 DAB system in North America and license the technology are positive steps toward ensuring that broadcasters can avail themselves of digital audio transmission technology in a manner that benefits the entire industry.

It's good that the association has become involved in the DAB issue so quickly. NAB's participation can speed the development of a standard for digital broadcasting. After all, AM stereo's arduous road toward implementation for lack of a single standard remains a painful memory.

Further, the NAB's endorsement of a DAB transmission scheme provides an underpinning for the important concept of localism in the medium. All existing AM and FM broadcasters can, with this action, be assured of a chance to participate in the new technology.

The NAB's intended licensing of Eureka will provide a measure of control that will benefit local broadcasters to the extent possible within the limits of the law. It is important, however, that the NAB treat its licensing responsibilities in an open, rather than exclusionary manner.

In this way, digital broadcasting will pose the greatest opportunities for forward-thinking companies to be in the vanguard of a new generation of transmission and studio equipment. The economic implications alone point to an exciting future for all facets of the industry.

And yet, the NAB must not forget the concerns of some that broadcasters shouldn't throw their support behind a system simply because it is the furthest along in development. A reasonable effort should be made—within a reasonable time frame—to review other DAB proposals, so there is no doubt that Eureka is the most appropriate system for implementation.

Why? Because in the final analysis, a digital audio broadcasting scheme needs uniform support from broadcasters, broadcast equipment manufacturers and receiver manufacturers if it is to grow into the powerful tool everyone hopes it will be. A good faith effort on the part of the NAB to allay concerns that they may be moving *too* quickly will solidify support for the association's decisions.

With a concensus from broadcasters and manufacturers, the NAB can urge the FCC for policy action without fear of contradiction. These steps toward implementing DAB will lead to great strides for the industry as a whole.

—RW

Memories of Lafayette

Dear RW,

I greatly enjoyed Al Peterson's article, "Lamenting Lafayette," (Dec. 26, 1990). I too was a Lafayette fan and customer for about 25 years, beginning in the mid '50s. As a young experimenter back then, I found I could get parts there either unavailable or very expensive elsewhere (e.g., miniature audio transformers, etc.).

I still have several pieces of the equipment: LT-80 FM tuner (vacuum state), which I acquired new in 1960 and which I am listening to as I write this (in use 40 hours per week for the past 13 years and still has all but one of the original tubes); another, later model FMT (solid state, early '70s); bulk eraser; and I purchased my Marantz 10B from them in 1967 because they gave me the best deal.

As you may be aware, they were absorbed by Circuit City in the late '70s and the last store with the Lafayette name was closed within the past three or four years. End of an era!

Robert James Turner
Hopewell, Va.

Rooftop towers revisited

Dear **RW**,

Just read your article about the KIST tower ("Kissing KIST's Tower Goodbye," Jan. 9, 1991). We here at WLPA still have a rooftop tower smack in the center of downtown Lancaster, although it is not used for the AM now.

The best we can determine, the Blau Knox tower went up in the late 1930s. It is 218 feet tall, on top of a 103 foot building, for a total of 321 feet above ground. The top 30 to 40 feet is a pole. It is a four-sided tower with the base insulators about 20 feet apart. The tower was used for our AM up through February, 1988, when we put up a new AM tower with a real ground system on the northern edge of the city limits. It is still used for a receiving antenna for our RPU systems, and the local newspaper has a two-way/pager on it.

We naturally still have to keep it painted and lighted. The tower was almost taken down a year and a half ago, but the parent company decided not to spend the money at the time. Our lease on our downtown location is up in five years, and it is expected that the tower will be taken down by then. In fact, if anyone wants it, we will give it to them, as long as they take it down!

We believe that the AM has used it since it was erected, using other antennas before that. (We went on the air in 1922.) Our FM, WNCE, which went on the air in 1944, apparently also used it as its first tower site, and the local TV station, WGAL-TV8, also used it as its first tower site. Around that time the pole was added. In fact, they signed on using Channel 4, and two bays of the Channel 4 antenna are still pole-mounted up there (The local newspaper owned everything back then.)

I guess that there really aren't many of these around anymore. They will probably be extinct soon!

Edd Monskie
WLPA-AM/WNCE-FM
Lancaster, Pa.

Clarification

Information on Alpha Products in the Jan. 23, 1991 Buyers Guide should have been listed as follows: Contact Bob Maffei at 203-656-1806; FAX: 203-656-0756; or circle **Reader Service 121.**

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World Radio History

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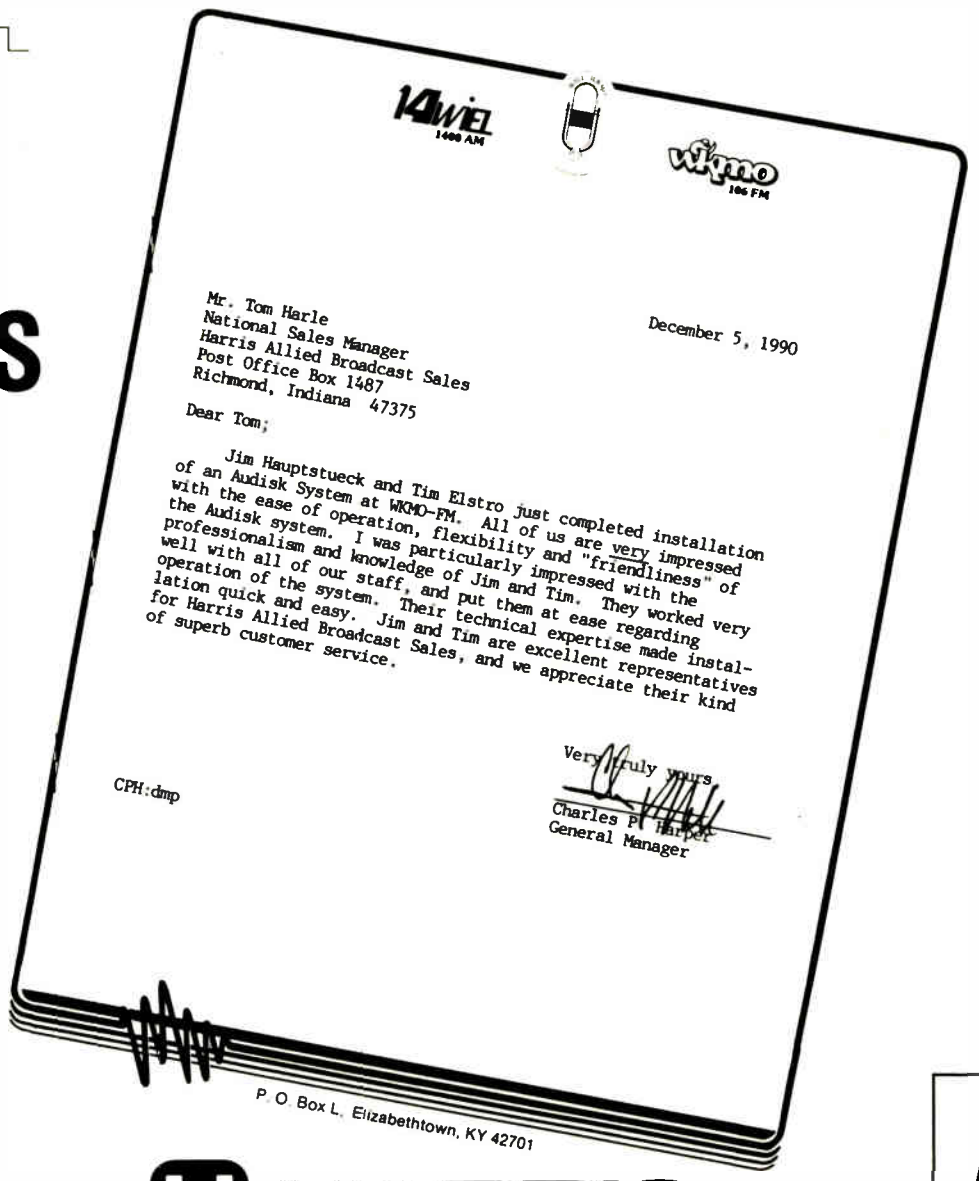

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World Radio History

Radio Board Embraces Eureka

(continued from page 1)
"proposals to keep the industry unchanged are simply not realistic."

Two other DAB alternatives that the Task Force had rejected were to prevent or prolong DAB development and implementation, or to do nothing and let it develop on its own.

Spectrum study

Rau summarized the results of the Task Force's spectrum study, which showed that 57 MHz of spectrum would be needed to accommodate all existing AM and FM stations under a three-class tiered system with "specially related mileage separations."

That result assumed station clusters, or "pods" that are 1.5 MHz wide and carry six program channels each, and a service definition of 90 percent coverage with only a 10 percent likelihood of interference—better than the current FM 50,50 curves. Stated benefits of Eureka 147 technology, such as CD-quality audio and multipath elimination, were also assumed in the study.

Rau noted that the 57 MHz the study concluded for terrestrial Eureka is less than the 60-70 MHz sought by satellite systems and also that when existing stations are further sub-divided into four classes, the spectrum needs increase.

He emphasized that the three classes chosen must be "specially related to each other" (integrally in multiples) or else "the spectrum needs to increase exponentially." He also noted that with uniform coverage from all stations (no classes of stations), the spectrum needs were greater, with 75 MHz needed to accommodate existing AMs and FMs.

Caucus opposition

Just prior to the Saturday briefing, a flurry of letters and phone calls were generated by members of the Radio Operators Caucus, an informal group of about 50 radio owners which has filed joint comments on DAB NOIs.

Opposition centered on fears that the NAB would too quickly attach itself to Eureka 147 technology when other systems have been proposed but not evaluated.

A second important point of contention came from stations—FM, mostly—concerned about increased competition if AMs and other FMs were given DAB allocations.

Sconnix Broadcasting's Randy Odeneal flew into Naples for the briefing and read a six-page letter which included technical criticisms ofthe Eureka system. The letter called Eureka 147 "a clumsy cellular type system which in its current form has already been overtaken by developments in digital audio rate reduction."

But Steve Edwards, engineering director of Canada's Rogers Broadcasting, was present to answer technical questions about Eureka, which was tested on-air in four Canadian cities this summer.

Edwards told Odeneal that "not one" of his technical criticisms of Eureka was factually correct, going on to dispel the remaining technical fears of most of those who cared to comment on the exchange after the meeting concluded.

Pros and cons

Additional discussion of the pros and cons of Eureka 147 and other systems was presented by Rau in his technical analysis in the briefing.

For the in-band compatible systems which have been proposed, Rau noted that while they are easy and inexpensive to implement in theory, none have undergone actual testing.

But he added his voice to other NAB staff and Board members who oppose in-band FM-compatible systems because they do not accommodate AM stations.

Rau conceded that Eureka 147 would mean additional spectrum requirements and that it may increase competition between AM and FM stations.

Exclusive arrangement

He also cautioned that NAB should not make the same mistake with DAB that it did with AM stereo. "We abdicated responsibility for choosing our own AM stereo future," in not supporting a standard and then seeking FCC approval, Rau commented.

In addition to endorsement of Eureka 147 and seeking to make it a technical standard for DAB, the Radio Board unaninously adopted a plan for a partnership with Eureka that would involve "owning the technology."

The so-called "licensor" arrangement came about with a letter of intent from the Eureka 147 partners "offering to enter negotiations that would culminate in an exclusive relationship between Eureka and NAB for rights to Eureka technology (at least in North America, if not throughout the world)," in the words of John Abel.

Final approval of the Eureka technology and review of the licensing agreement with Eureka will be referred to the Executive Committee, according to an NAB statement. Any resulting contract with Eureka will be referred to the NAB Board for approval.

Test Plan Defended

(continued from page 3)
countered MSTV's argument that IF beat interference could result in both proposed test areas, arguing that IF beat is not a problem with ERP levels as low as Strother proposes.

With regard to Strother's latest amendment to its test filing, the firm has contacted the Aerospace and Flight Test Radio Coordinating Council (AFTRCC) for possible testing in the 1435-1530 MHz band.

The MDS band testing depends on permission by stations on those frequencies, Strother noted.

The firm has contacted Shannondale Wireless, which operates MDS stations WHT629 on MDS Channel 1 (2150 to 2156 MHz) and WLK242 on Channel 2A (2156 MHz to 2160 MHz), 46 miles west of Washington, D.C. in the Martinsburg and Charles Town, West Virginia vicinities.

"Testing at 2100 MHz in addition to UHF should aid in establishing a practical upper frequency limit for DAB," Strother said of the firm's now-changed DAB testing agenda.

The FCC is still considering the Strother filings and the opposing comments of MSTV and WETA.

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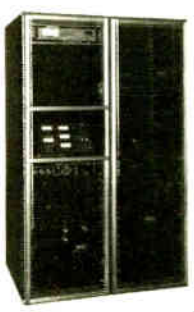

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DCC, CD Recorders Unveiled at Show

by John Gatski

LAS VEGAS Although tinged by recession this year, the 1991 Winter Consumer Electronics Show (CES) was immersed in new digital products, including the introduction of the much-anticipated Philips Digital Compact Cassette (DCC).

Show-goers also got a glimpse and demonstration of Kenwood's and Pioneer's write-once consumer and professional CD recorders.

Despite recent copyright controversy, DAT seemed to be everywhere, from car stereo units to professional portable recorders to DAT still picture recorders.

DCC, however, garnered much of the audio attention. This new format will play both the newly developed Philips DCC and standard analog cassettes. It has been touted as the replacement for the standard analog cassette.

In an audio session, Philips DCC spokesman Gerry Wirtz said DAT was built by engineers based on professional needs and the format is likely to stay expensive, despite what DAT manufacturers such as Sony have said.

Wirtz said DCC is considered a replacement for the analog cassette because it remains compatible with it, while providing digital capability.

DCC pulse coding scheme

Philips developed an entirely new pulse coding scheme for DCC. The scheme requires only four bits to equal 16-bit CD or DAT sound quality, according to Philips.

The process is called Precision Adaptive Pulse Coding (PASC) and takes into account how the ear hears certain sounds, rather than just reproducing the sound as it was recorded.

DCC continues to use linear track recording, which enables the tapes to be cheaply pre-recorded at high speed. DAT cannot be duplicated as fast, Wirtz pointed out.

DCC tape length will be limited to 60 minutes, and the tapes cannot be turned over. They will instead be auto-reversed to get to the unused half of the tape.

Philips spokesman Gerry Wirtz discusses the new Digital Compact Cassette at CES.

Wirtz said DCC was not eyed as a professional recording medium and little research was done to ascertain its multigenerational dub capability.

He noted, however, that the DCC recorders will be equipped with the company's Serial Copy Management System (SCMS), developed for DAT, that limits the number of tape-to-tape dubs. The technology was proposed and accepted last year by DAT manufacturers to try and alleviate copyright groups' fears about digital tape piracy.

High-end prices

Although Philips was sketchy on DCC's predicted retail prices, Wirtz said they initially will be similar to high-end analog recorder/player prices for home, portable and auto models.

Tandy also had a Philips-based DCC prototype at the show, and other audio companies are reportedly interested in DCC as well. Some speculation exists, however, that DAT manufacturers may not be keen on the new product.

Some audio press observers who heard DCC demonstrations were impressed with its fidelity and said they could not tell the difference between similar musical pieces played on DCC and CD. (Philips said its private demo schedule was too busy to allow **RW** to audition the product).

Others said they were cautious about what they heard because the listening tests were done under test conditions orchestrated by Philips.

One audio expert said more will be known about DCC's sound quality when it can be evaluated in a more neutral environment.

CD recording at home?

CD recorders garnered almost as much attention as DCC, but their role in the market remains unclear, based on company comments.

Both Kenwood and Pioneer had write once-CD recorder prototypes at the show. Kenwood had two units at the show. The $38,000, three-piece professional unit is being marked to overseas professionals and is expected to be

(continued on page 10)

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World Radio History

NRSC Forms DAB Study Group

DAB Technical Concern Dominates CES Session

by John Gatski

LAS VEGAS The National Radio Systems Committee (NRSC) has created a DAB study group to gather technical information on proposed DAB systems and related technologies, such as spectrum compression.

The action was taken at the Winter Consumer Electronics Show here Jan. 11.

The study group was formed, in part, to address concerns about the technical feasibility of DAB. Also, some attending the meeting reportedly voiced their opinion about whether a push toward selection of a DAB system is moving too fast.

Although RW and other trade press have been barred from attending NRSC meetings since 1989, accounts of the Jan. 11 NRSC meeting revealed questions about the European consortium's Eureka 147 DAB system and other digital systems.

A Blaupunkt representative reportedly said that Eureka broadcasting tests in 1989 revealed that auto receivers had a difficult time receiving digital broadcasts when the vehicle exceeded 60 mph on the Autobahn highway in Germany. The problem was attributed to the Doppler Effect, he said.

The Blaupunkt representative also read a letter stating that Swedish Radio had issued an opinion last summer stating that four DAB compression systems—including MUSICAM and ASPEC and two Japanese systems—were not suitable for broadcast use at that time, meeting observers noted.

As a result of these and other DAB technical questions, the NRSC decided to form the study group, which will be informational only, according to NAB Staff Engineer Stan Salek and study group co-convener Al Resnick, who is engineering director for ABC Radio.

The other co-convener is consultant Bart Locanthi, who has been conducting independent evaluations of perceptual encoding techniques of several DAB systems.

National Public Radio (NPR) Senior Engineer Mike Starling said the study group's formation will enable the NRSC to study "legitimate issues that need further exploration."

Although some doubt may have been raised about DAB at the NRSC meeting, Resnick said some of the questions about Eureka and other DAB systems need to be put into perspective.

For example, he noted, any Doppler Effect problems mentioned by the Blaupunkt spokesman "rest inside the receiver" and not on the transmission end.

As for the Swedish Radio letter that questions the viability of current DAB systems, Resnick said other parties have tested the systems, such as Canada, and believe they work well.

There is a feeling by some engineers that Eureka is emerging as the odds-on favorite before it can be evaluated thoroughly, according to some meeting participants.

The study group's formation will enable the NRSC to study "legitimate issues that need further exploration."

NPR Senior Engineer Mike Starling

RDS Bidding Open

by John Gatski

LAS VEGAS The National Radio Systems Committee (NRSC) has begun to accept standard proposals for an automatic format selection system for U.S. radio, and the most likely candidate is the European-developed Radio Data System (RDS).

The NRSC Radio Broadcast Data Systems (RBDS) subcommittee will accept proposals until Feb. 28, according to the NRSC. The group made its decision at the NRSC meeting here during the Winter Consumer Electronics Show.

The RDS service is being promoted as means for car radios to automatically select desired formats, display messages and station call letters, and possibly allow for a new emergency alert system.

The digital subcarrier-based RDS also could be used to alert a driver or home listener of a traffic alert, a major feature that attracted Europe to the technology.

Although the NRSC is accepting proposals from anyone, the RBDS subgroup has only the European (RDS) version for consideration currently, according to NAB Staff Engineer Stan Salek.

"We are not aware of any other systems being developed, but you have to make the good faith effort to do this (adoption process)," Salek said.

Because there is only one system, the adoption process could be short, he added.

In other NRSC action, it was announced that consultant John Bisset will conduct the NRSC-approved FM receiver tests to assess whether processing affects receiver performance. Bisset has been allocated up to $5,000 to conduct the tests and is scheduled to complete them by late March.

A report on his findings is likely during the NAB spring show in Las Vegas, Salek added.

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World Radio History

Recordable CDs Demonstrated

by Judith Gross

LAS VEGAS Two companies showed up at the Winter Consumer Electronics Show (CES) here with versions of their recordable, write-once compact disc hardware, but neither one was quite ready for market.

Kenwood showed two prototypes of a CD recorder it plans to market for professional and, eventually, consumer use. One version consisted of a digital converter, an encoder which writes on the CD and a playback unit, all controlled by a PC.

The second prototype, dubbed project LZ-13, put all components into a compact unit. Until software configurations are complete, however, the all-in-one unit will not be manufactured or marketed.

The second company which showed an "industrial prototype" write-once CD unit was Pioneer. Denon, which had unveiled a write-once CD device at a small trade show in Canada, did not bring its unit to the CES.

Kenwood's LZ-13 CD recorder prototype may be targeted for the professional and consumer markets.

Similar techniques

Like the Denon write-once CD, the Pioneer and Kenwood units use a disc with a special metal coating for the recording process. A laser burns bumps, or "pits" onto the disc which become the digital audio information.

The record unit also places a temporary table of contents information onto the disc with each segment recorded. At that stage, the disc can only be played in the special record/play machine each of the three companies has developed.

Once the user decides the disc is complete, a permanent table of contents is recorded and the disc can be played in any CD playback unit.

The discs run about 63 minutes currently, but are expected to be produced soon in 74-minute versions. Kenwood and Denon have both priced the discs at around $40, but a Pioneer spokesman said the gold-coated discs used for its write-once process cost "about $10 to $15."

The cost of the hardware is uncertain at this early stage of development. Denon has quoted a $30,000 price tag for its CD recorder, while Kenwood said the cost of its component, PC-controlled machine would run about $38,000 with the all-in-one unit coming in under that.

Do they work?

At the Kenwood booth, curious visitors were invited to record a segment on a CD and hear it played back, with good results. Kenwood has also included a feature which provides a 30- or 60-second segment of the disc to record onto.

In Pioneer's booth, listeners could hear playback of music recorded onto the write-once disc from a vinyl album, but no actual recording was demonstrated.

A Kenwood spokesman said the recordable CD has generated a lot of interest from radio stations but also will be targeted to the consumer market. Kenwood expects to begin shipping its component CD recorder in about two months.

Pioneer had no specific marketing plans or target date for its CD recorder, but company literature shows that the consumer market is firmly in its future plans.

Denon, meanwhile, anticipated having its CD recorder at the NAB show to be held here in April.

For more information on the CD recorders, contact Denon at 201-575-7810, Pioneer at 213-835-6177 and Kenwood at 213-639-9000.

New Products at CES

(continued from page 8)

shipped to American professionals by early spring. The LZ-13 is an unpriced, one-piece unit that may be targeted toward consumers and/or professionals (see accompanying story).

Despite numerous DAT products at CES, there is still an uncertainty about the controversial product, which may be hindered even more by DCC's introduction. The subject was discussed extensively during CES sessions.

During a digital outlook session, congressional aids said SCMS requirement legislation is unlikely to be acted upon because of the recently filed music publishers' suit against Sony. The electronics giant imported the first SCMS-equipped DAT recorders into the U.S. last summer.

Congressional staffers also noted that Congress is not inclined to take up imposition of a royalty tax on blank DAT tapes, despite pressure to do so while the Sony suit is pending.

Digital Audio Broadcasting (DAB) became a widely discussed topic at several CES sessions. DAB is still in an experimental stage in Europe, Canada and to a lesser extent in the U.S., but high expectations have been generated about its potential.

During one session, NAB Executive VP of Operations John Abel said DAB will have a positive impact on consumer audio as well as the professional manufacturing sector because of the need for receivers.

Abel said DAB could become reality in the U.S. by the mid-to-late 1990s and to succeed, it must be terrestrially based, accommodating current AM and FM broadcasters.

NAB will be hosting a demonstration of the Europe-developed Eureka 147 DAB system at its spring convention here in April. Although Abel said the demonstration is not an endorsement of Eureka, he emphasized that it is further along in development than other systems.

Receiver manufacturer representatives were in attendance at the DAB sessions, but so far they have little to report on DAB receiver design because it is so early in the process.

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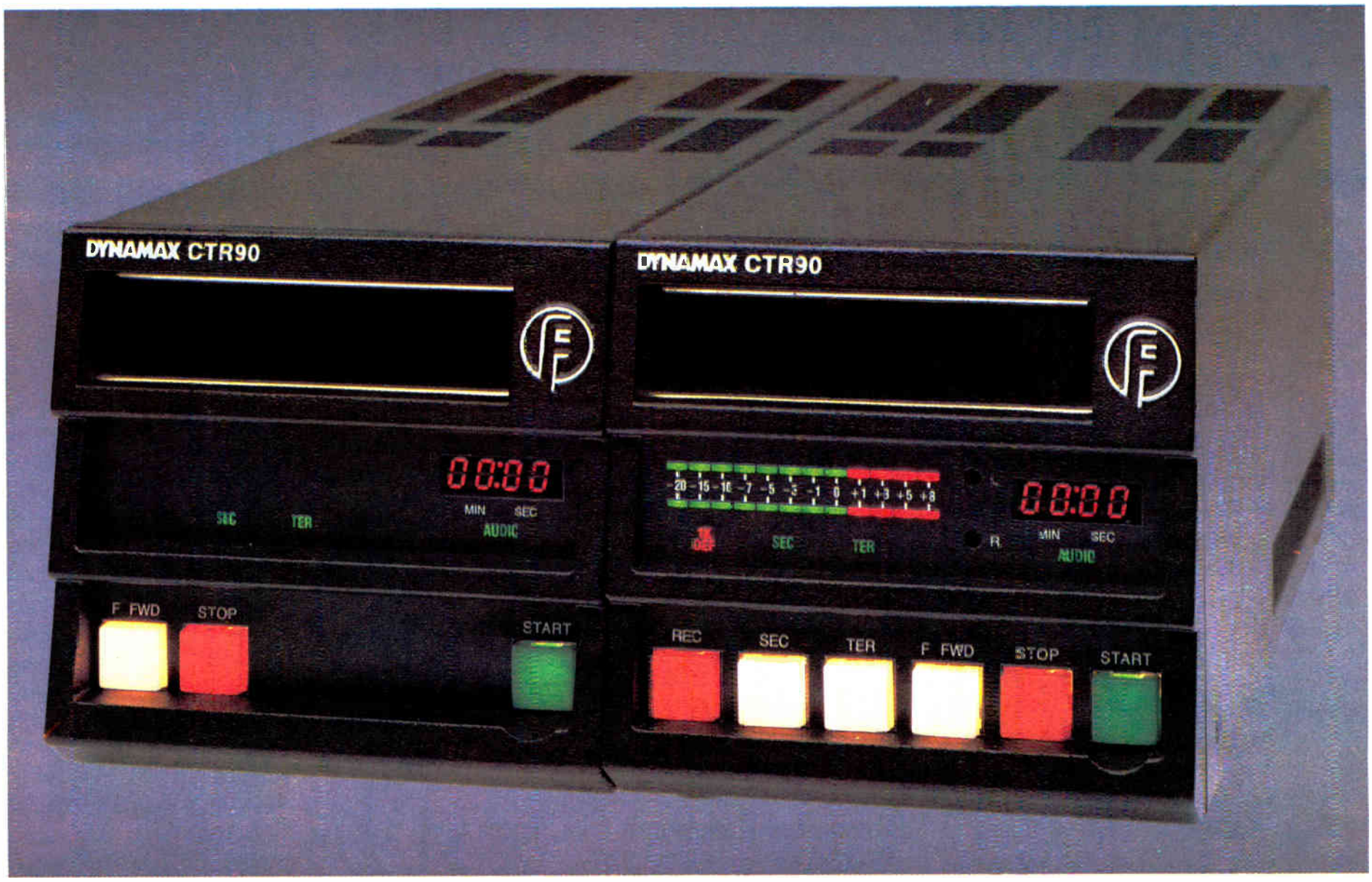
World Radio History



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World Radio History

Four FM Translators in Action

by Howard L. Enstrom

MOUNT DORA, Fla. In this month's installment of *Low Power Lowdown*, we'll look at examples of conforming translator systems located east of the Mississippi River.

Each example will show bottom line cost per square mile of coverage, assuming flat terrain, antenna HAAT as center of radiation, circular polarization and no interference protection. Costs are for basic components using TTC translators and amplifiers, Cablewave antennas, and an Andrew Heliax transmission line.

Non-metric references

Receive antenna, line and incidentals such as connectors, surge protectors, miscellaneous hardware and installation costs are excluded. Predicted contour distances are the same as for vertical or horizontal polarization, where translator power output would be half that shown for circularly polarized antennas. Coverage contours are predicted, from F(50,50) curves; 60 dBu=1.0 mV/m (1,000 μV/m), and 34 dBu=50 μV/m. We'll use non-metric references.

Example #1: The antenna is an ECFM-2 two-bay omnidirectional (Gain −0.46 dBd, power gain G 0.90) mounted at 150 feet. We need an ERP of 100 W to put the 1,000 μV/m contour at the legal limit of 4.35 miles from site, so the antenna must be driven with 223 W.

With 175 feet of 1/2-inch line, 76 percent efficient, line input is 294 W, using an XL10FM translator and XL300A-FM amplifier. The 1,000 μV/m signal contour at 4.35 miles encompasses an area of 59 square miles. The 50 μV/m contour at 19 miles encompasses an area of 1,134 square miles. With equipment costs at $13,000, the 50 μV/m coverage area costs $11.46 per square mile.

Example #2: What happens when we use an ECFM-4 four-bay antenna? Antenna gain now is 2.90 dBd, power gain 1.95, and we want 102 W at antenna input. Using the same line, we need 132 W of power from the equipment.

Instead of using the more expensive translator and 300 W amplifier, we'll use 7/8-inch line for 86 percent efficiency, and a straight 100 W translator. While

LOW POWER LOWDOWN

running at rated output puts only 86 W at antenna input, and the ERP is but 84 W, let's see what it will do. After all, higher power does render diminishing returns.

The 1,000 μV/m contour is 4.1 miles from site, encompassing an area of 53 square miles. The 50 μV/m contour is 18.2 miles from site; the area is 1,040 square miles. Equipment cost is $14,270, so for the 50 μV/m contour area, cost per square mile is $13.72.

Mounted at 300 feet

Example #3: Back to an ECFM-2, two antenna bays, but mounted at 300 feet. We use a dual 10 W translator with outputs combined. With 20 W into a 325-foot 7/8-inch line with an efficiency of 76 power into the antenna is 15.2 W, so the ERP is 6.84 W. The 1,000 μV/m contour is 3.1 miles from site, encompassing an area of 30 square miles.

The 50 μV/m contour is 14.1 miles, for an area of 625 square miles. With equipment cost of $8,135, coverage within the 50 μV/m contour is 13.01 per square mile.

Example #4: Let's add two more bays to make up an ECFM-4 with four antenna bays. At 300 feet, with the same equipment and line, the ERP increases to 14.82 W. The 1,000 μV/m contour is 3.7 miles out, covering an area of 43 square miles. Distance to the 34 μV/m contour is 16.8 miles, for an area of 887 square miles. The equipment cost is $9,600, so cost per square mile is $10.82.

There could, of course, be an endless number of illustrations using combinations of equipment and antenna heights to show cost-effect figures. But these four examples show how that factor can vary. Example 2 appears to be the best, at $10.82 per square mile of coverage. Perhaps, the differences are due, in part, to cost of equipment not operating at rated output.

There is another cost the four illustrations do not account for: fixed operating costs in connection with leased tower space. This cost usually is proportional to height and the amount of vertical footage used.

System planners also need to consider the possibility of increased repair costs of higher, more complex antenna arrays, especially in regions where harsh weather conditions may cause ice, wind and lightning damage. Over the years, after seeing the pitted hardware at set screw points on highest antennas, I'd rather let someone else furnish the topmost antenna to serve as a lightning shield.

Very high antennas have longer transmission lines, and power losses can run high. The only way to cut such losses is to spend the money for more efficient, but more expensive line. With the FCC allowing up to 250 W ERP, depending on terrain conditions and service objectives, best cost efficiency may suggest lower antennas, provided that reasonable line-of-sight prevails.

Of course, height can be a factor in causing interference to protected contours of other services, which is why directional antennas are so useful. If caused interference is a consideration for directional radiation, obviously the site location is very important. We would want a pattern null toward the protected service, not toward the area of service. As a general rule, the best sites are centrally located within the population density to be served.

Next month, we'll examine systems west of the Mississippi River, upon which the FCC unfairly drew a magic marker to divide a nation's FM translator service.

■ ■ ■

Howard Enstrom is president of FM Technology Associates Inc. He can be reached at 904-383-3682; or by FAX: 904-383-4077.

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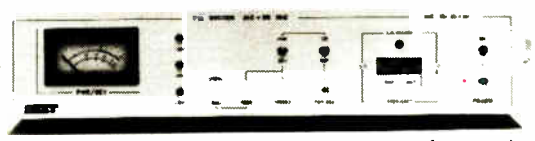

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World Radio History

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Circle 53 On Reader Service Card

World Radio History

Klystrons, Tubes and Downlinks

This is the last of a 12-part series called Amplifier Fundamentals. *Northern Virginia Community College will offer 1.2 continuing education units to registered students who successfully complete the course and an examination mailed at its conclusion.*

by Ed Montgomery

Part XII of XII

ANNANDALE, Va. Solid state amplifiers cannot produce the power output that vacuum tubes are capable of. To date, bipolar and field effect transistors do not have the voltage or current necessary to produce the thousands of watts necessary for broadcast service applications.

Completely solid state transmitters employ a series of lower power transistor amplifiers that have their outputs combined together to get the desired transmitter power. Field effect transistors are used because their interelectrode capacitance is less than a bipolar transistor.

High power amplification of frequencies above the VHF band are carried out with very special vacuum tubes. Satellite communications, with frequencies above 1 GHz, employ klystrons and traveling wave tubes (TWT). As the operating frequency of the transmitter increases, the wavelength of the radio signal decreases.

The transit time necessary for the electrons to pass from the cathode to the anode becomes significant. Traditional construction of vacuum tubes will not work. Vacuum tubes operating at these frequencies must have very small interelectrode spacing.

Figure 1 is an illustration of how a klystron operates. Electrons are advanced off of the cathode by the anode and then further advanced to the collector.

Similarly to how a cathode ray tube works, focusing magnets around the tube confine (or "focus") the electron movement into a beam as it travels through the tube. As the beam travels through the tube, it passes a series of cavities. The radio signal is introduced into a cavity resonator, creating a field of energy that will retard or advance the electron beam velocity.

Ultimately, a series of pulses are produced. As the beam passes through additional cavities, energy is built up by further bunching of the electrons in the beam. This increases amplification. Figure 1 illustrates a four-cavity klystron. The output is taken off the final cavity, yielding a signal gain of 40 dB to 60 dB.

Figure 2 illustrates a helix traveling-wave-tube. Somewhat similar in design to a klystron, the cavity resonators have been replaced with a helix or coil of wire surrounding the beam. The signal traveling the helix moves at a velocity that is slower than the generated beam. When the RF signal is applied to the helix, it interacts with the beam current, slowing it down.

As the beam slows down, it gives off energy to the helix, resulting in this signal being made larger. This is a basic principle of induction that is taking place. The traveling wave tube has an operating frequency between 300 MHz and 50 GHz and offers a gain of 50 dB or greater.

The klystron and TWT are used in the high power amplification necessary for UHF television and uplinks forwarding the signal to communications satellites 22,500 miles above the equator. The satellite reamplifies the signal and transmits it back to earth. TWTs or klystrons are used to perform this on board the spacecraft.

Figure 1.

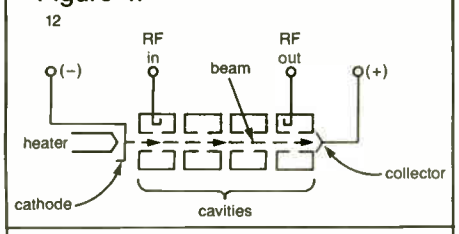

Figure 2.

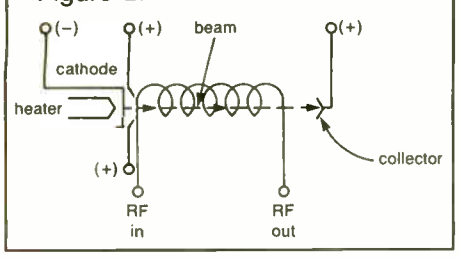

Figure 3.

noise factor dB	temperature K
.1	6.75
.5	35.39
1.0	75.09
1.5	119.64
2.0	169.62

Electrical energy is supplied by batteries recharged by solar panels.

On the receiving side of satellite communications is the downlink, consisting of some type of parabolic receiving antenna. The antenna itself is a form of amplification; its size defines the gain it can produce.

The foci or focus point of the parabola is where the signal is received. In general, the larger the parabola, the greater the antenna's gain or amplification. At this point, a low-noise amplifier (LNA) is employed to prepare the received signal for demodulation.

The purpose of this amplifier is to separate the satellite's extremely weak microwave signal from all other forms of radiated energy. The noise of a microwave system often is expressed in degrees of temperature on the Kelvin scale. This is used because whenever electrons move in any substance, noise will be created.

No noise is therefore established at absolute zero or −276 degrees Celsius. Active devices usually have a noise temperature that is different from the temperature of the location where they are operating. Figure 3 is an illustration of the relationship between the noise factor in decibels and the noise temperature.

Low noise amplifiers contain very sensitive devices and normally are sealed by the manufacturer only to be repaired or replaced by it or by the organization providing the satellite service. There are few downlink locations where the proper test equipment or tools are available to repair these devices. In most cases, they should not be tampered with.

Another amplifier that can be used is an LNB or low noise block converter. This system amplifies the satellite signal and converts it to the intermediate frequency of the receiver. Both the LNA and LNB contain surface mounted active and passive components, reducing stray signal radiation when operating at such high frequencies.

This concludes the Amplifier Fundamentals Course. If you have registered for the course, Northern Virginia Community College will mail you a test no later than March 15. Complete the test and return the answer sheet by April 15, 1991. Certificates of completion will be mailed to you by June 1, 1991.

■ ■ ■

Ed Montgomery is an electronics teacher in the Fairfax County school system. He has taught broadcast engineering at Northern Virginia Community College and worked as a broadcast engineer for several radio stations. He can be reached at 703-971-6881.

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World Radio History

An Effective D&A PC Program

by Barry Mishkind

TUSCON, Ariz. This is about one of those neat little programs that everyone should have in his or her computer.

The calculation of direction and azimuth (D&A) between two points can be desirable for any number of reasons. It may be to file an STL or RPU application to the FCC, to determine spacing between sites when seeking locate potential transmitter locations, or even to simply determine the angle for an RPU antenna alignment from a remote.

Using such programs has indeed saved me a lot of time and paper calculation. And who really remembers all that trig anyway?

But the part that always annoyed me was that each time I ran the program, I'd have to re-enter the same studio or transmitter coordinates. With my big fingers, it seemed I'd hit a wrong key and slow matters down even further.

The computer version of D&A takes the standard distance and azimuth calculations from the Rules and adds a preset selection of sites to reduce mistakes and repetitive typing.

How it works

The first time you start D&A, you'll be prompted to enter your station call or other designation and sets of coordinates for insertion into the program. Then, as you run the program, you'll be able to select the use of any of these sets of coordinates as either the transmit or receive location.

If you have already entered preset coordinates, the program comes right up to the entry screen.

The program automatically dates the run, and then asks for a label for the report so you can identify the calculations easily at a later time.

KEYBOARD CONNECTION

After you enter the relevant information, the program calculates the distance in miles and kilometers as well as the angle of transmission, displaying to the screen. You also have the choice of requesting a printout of the information from your printer.

When the station goes out to do a remote, D&A can be called up quickly to give an angle for the RPU transmitter, so anyone with a compass can aim it quickly.

Another use might be to determine the length of an STL or RPU path, to see whether you have enough signal to reach to the receive point.

To get a copy of Q&A for your PC or MS-DOS computer, all I ask is that you send a diskette, either 5 or 3 size and $5.00 for postage and handling, to 2033 S. Augusta Pl., Tucson , AZ 85710. Upon request, I'd also be happy to include last year's program, COVPRED (see **RW**, Feb. 21, 1990).

Dealing with a taxing season

While it's still almost two months off, April 15 looms as the yearly deadline for filing our tax returns with Uncle Sam.

As long as you have your computer turned on, why not consider letting it do your taxes for you? Some of the software packages available are quite good, even for the complexities caused by a contract engineer's finances.

Packages available include Parson's Technology's "Personal Tax Manager™," Meca's "Andrew Tobias' TaxCut™," Chipsoft's "Tax Cut™" and DacEasy's "Sylvia Porter's Rapid Tax™." Each walks you through your return, asking questions interactively, so you can be complete and accurate.

In fact, a couple of times, the programs asked questions that sent me back to my records to find something, resulting in a further deduction. Doing your taxes this way allows you to move slowly and not worry about the CPA's clock ticking away.

Your state taxes can also be done with add-ons to these packages. However, which states are available varies widely. TaxCut can provide the ten largest states only; TurboTax offers 44 state programs. Check carefully before you buy.

Other features naturally vary from package to package. For instance, if you are interested in filing your return electronically to get a faster refund, that's built into Rapid Tax and Personal Tax Preparer and is available with TaxCut at extra charge.

Several packages can import data directly from money manager programs, like Intuit's "Quicken™," Meca's "Managing Your Money," Parson's "Money Counts™," and others.

Obviously, the complexity of your return and state tax situation determines what package is best for you. For example, Personal Tax Preparer has its focus on the federal return only. However, don't get the idea that Personal Tax Preparer is a stripped program; it supports over 90 forms and worksheets, has internal calculators, pop-up speadsheets, etc.

Perhaps most importantly, all of these packages answer the critical question: "How do I know that I have software that incorporates the *final* and *correct* income tax laws for the year?" They do this by you sending final, updated versions to you after the tax laws are set for the year. Even if a retailer sells you an older version, you will be udated quickly. That brings peace of mind.

Support policies vary by manufacturer. Most have free telephone support. Rapid Tax has three pay plans ranging from a 900 number to a membership plan (which includes, among other benefits, enhanced telephone service). TurboTax has a toll free 800 FAX number where you can send problems. Answers are sent back overnight.

And several packages go further to develop customer loyalty and provide discounts on next year's tax program and/or state tax handling. Rapid Tax also has a nice surprise in the box; included at no extra charge is DacEasy Light, a personal money manager you can use to keep your records for the next year, even printing out your checks.

Of course, if you're at all uneasy about how good these programs can be, go ahead, take your finished return to a tax accountant for review. It won't take him long to look it over and in most cases, you'll save more on his fees than you spent for the cost of the software. TurboTax even has a referral service to direct you to a nearby accountant familiar with their program.

Tax time is never fun. But using your computer to keep track of detail and calculation can make things easier. Finding extra deductions and saving money make it all worthwhile.

■ ■ ■

Barry Mishkind is a consultant and contract engineer in Tucson. He can be reached at 602-296-3797, or on FidoNet 1:300/11.

BBS Notice

A great deal of activity is happening on the various BBS networks around the country. Among the topics recently discussed are:

- The recent FCC inspection sweeps and stations that repeatedly operate outside the rules.
- STL reception problems.
- Broadcast tape cartridges.
- Problems in CE-GM communication.
- The Top 10 reasons why gas prices went up.
- A lot of broadcast history and call letter trivia.

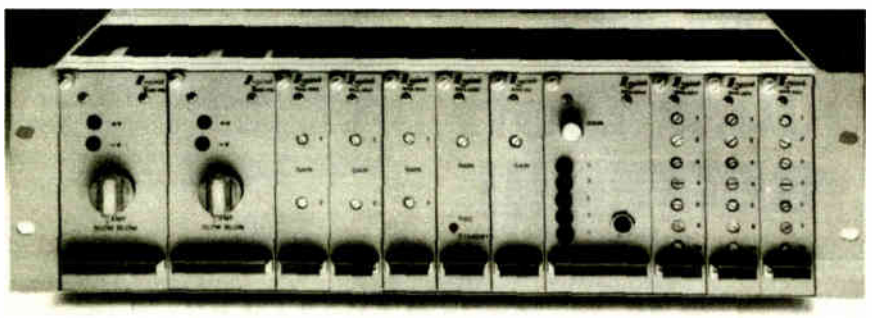
Sound interesting? Then check in with one of the Echoes that we list here in **RW**, and join the conversation.

★★★

Here are a couple of changes you may want to note:

- Second Opinion in Milwaukee, has a new number: 1-414-873-7807.
- A BBS in South Bend, Ind., has recently begun broadcast-oriented features on Radio Daze: 1-219-256-2255.

NEED A LOT OF OUTPUTS?



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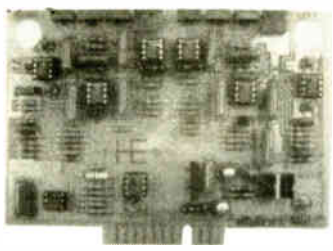

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World Radio History

The Inside Track on Off-Air Monitoring

House Monitors Don't Have to Be a Headache

by Tom Vernon

HARRISBURG, Po. While the need for quality off-air monitoring in the control room is well understood, house monitor systems often are a source of confusion at many stations.

STATION SKETCHES

This month, we'll look at how to fabricate this other important source of signal distribution.

A house monitor system requires a reliable source of off-air audio. Your best bet is a fixed tuned receiver with a good outside antenna. Consumer-grade tuners are easily tampered with, and the analog types can drift off frequency. If the modulation monitor feeds the house monitor system, it will subject the entire station to periods of silence and ear splitting tones whenever the modulation monitor is calibrated.

Figure 1.

W power output	Impedance tap for 70.7 V line
5	1,000
10	500
15	333
20	250
25	200
30	166
40	125
50	100
60	83
80	62.5
100	50

A listing of output powers and their corresponding impedance taps for 70.7 V. All figures are derived from the formula Z=5,000/W.

Constant voltage output

The amplifier employed must be configured for a constant voltage output system, and have a suitable power rating for the number of speakers being driven. For a small system with a half-dozen speakers, an amp with 20 W to 30 W RMS should do nicely. Don't be fooled by output specifications listing music, power or peak power. When in doubt, check a transistor or tube manual for specifications of the output devices.

The most common arrangements for house monitor systems are 70.7 V and 25 V. Sometimes these cause confusion, since we're taught to match impedance in ohms and 70.7 V transformers have their windings specified in watts. As we shall see, there is logic to this system.

The source impedance of a transformer may be calculated as follows:

$$Z = E^2/W, \text{ where}$$

Z=impedance
E=voltage
W=watts

For a 70.7 volt system, it looks like this:

$$Z = \frac{70.7 \times 70.7}{W}$$

Rounding off the voltage figure:

$$Z = \frac{5000}{W}$$

Thus, for a 20 W amplifier, we would have an impedance (Z) of 250 ohms. The flexibility of a constant voltage system comes from the many ways that we can split up this 250 ohm load.

Figure 2 illustrates a simple system with four 5 W speakers, and shows its equivalent circuit. Referring back to Figure 1, 5 W corresponds to 1,000 ohms. Four paralleled 1,000 ohm transformers present a load of 250 ohms to the amplifier.

Different power level

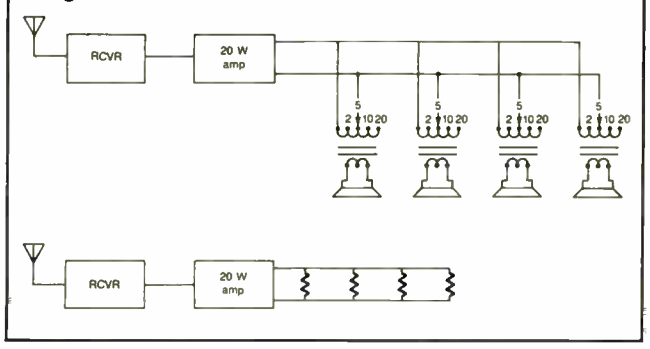
Often, it's desirable to have speakers with a different power level in different rooms, depending on room size, ambient noise, etc. In this case, transformers are selected with varying power levels.

To summarize, each speaker must have its own line matching transformers and all transformers are connected in parallel to the amplifier. The sum of the transformer primary power ratings must equal the output power of the amplifier—no more, no less.

It's often necessary to have individual volume controls for each speaker location. There are two ways to do this: with a 10 ohm pot connected as a voltage divider between transformer secondary and speaker, and with an 8 ohm T or L pad. The voltage divider scheme mismatches the transformer somewhat at its extremes of rotation; T or L pads soon become scratchy and intermittent and end up being a maintenance chore.

House monitor systems often are neglected in favor of higher priority projects. With care in planning and installation, however, the house monitor can reliably deliver your off-air signal throughout the station, and need not be a source of constant aggravation.

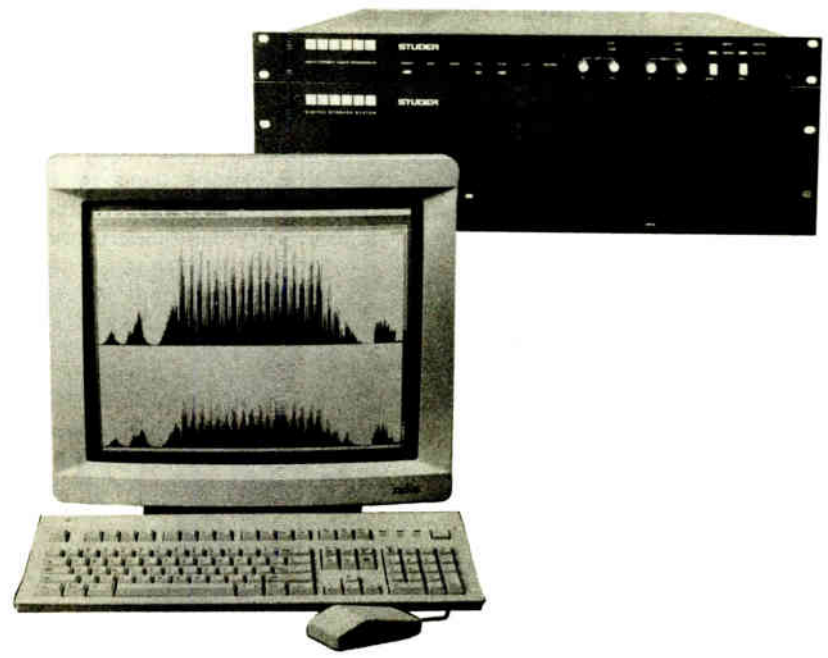
Figure 2.



■ ■ ■

Tom Vernon divides his time among broadcast consulting, computers and instructional technology. He can be reached at 717-367-1151.

The Cost Of Going Digital...



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Circle 79 On Reader Service Card

World Radio History

DAB Service by Wireless Cable

by Steve Crowley

WASHINGTON DAB could be on the air in 1991 if the plans of some wireless cable operators work out.

Wireless cable often is used instead of regular cable television to send multiple channels of video programming. The major difference is that it is over the air.

The term is a generic expression encompassing several distinct services: Multipoint Distribution Service (MDS), Multichannel Multipoint Distribution Service (MMDS) and Private Operational Fixed Service (POFS). Channels in the Instructional Television Fixed Service (ITFS) can be leased for MDS-type use on a part-time basis.

Special microwave equipment

It is necessary to install special microwave equipment for reception of the signals, because wireless cable uses frequencies in the 2,000 MHz to 3,000 MHz region, higher than those used by standard television sets.

Typically, a downconverter is used to change the microwave frequency to one that can be used by the TV receiver. Though wireless cable normally is used to provide video services, some operators now are using wireless cable for analog audio services, such as Muzak. With analog techniques, they are able to fit five analog audio channels into 4 MHz of bandwidth. DAB is seen as the next step.

CONSULTANTS CORNER

Transmission hardware is no big problem. Existing MMDS transmitters can be used with minor modifications, though it is necessary to receive FCC type-acceptance for audio-only operation of a television transmitter.

To generate the DAB signal, the operators intend to use hardware already developed for digital cable radio. This equipment can compress 10 CD-quality audio channels into 6 MHz of bandwidth. Receivers would be modifications of existing decoding hardware.

Wireless cable frequencies aren't good for mobile reception because of the increasing attenuation and signal strength variability that occurs at higher frequencies. Wireless cable DAB is envisioned, initially at least, as being a point-to-multipoint service using fixed receive antennas.

Wireless cable DAB operators are getting an added boost as a result of new rules the FCC has adopted to make the service more competitive with cable television. Wireless cable services are governed by three different sets of rules: Part 21 applies to MDS and MMDS channels; Part 94 to OFS channels; and Part 74 to ITFS channels.

The new rules are part of an effort by the FCC toward a unified regulatory framework.

Removed limitations

Previously, a single operator could not acquire a license for more than one group of four MMDS channels, nor could it acquire a license for more than one OFS channel in a market; the FCC has removed these limitations.

The Commission also has reduced some programming restrictions. For example, educational institutions operating ITFS stations have been permitted to lease their channels to wireless cable operators subject to a minimum number of hours of educational programming during the first two years of operations; this is being relaxed.

ITFS licensees also have able to recapture, at any time, channel capacity leased to wireless cable operators; this provision has been eliminated, increasing the incentive for parties to lease ITFS channels.

As well, technical rules have been changed to improve service provided by wireless cable system operators. Power limits have been increased to 2,000 W Effective Isotopically Radiated Power (EIRP) for non-directional antennas and 8,000 W EIRP for directional antennas. These increased limits are subject to the requirement that interference protection standards be observed.

On-frequency boosters will be permitted to help overcome shadowing effects caused by buildings, hills, or other obstructions. Boosters are limited in use to filling shaded areas within a protected service area, and may not be used to extend service beyond a protected service area.

The FCC's rules are being amended to allow MDS licensees to use low power auxiliary stations on the same basis with cable operators and other program producers. Low power auxiliary stations are used for wireless microphones, cueing controls and similar program production applications. The Commission also is allowing MDS licensees access to the cable television relay service (CARS) spectrum on an equal basis with cable systems. This will be useful to wireless cable operators for studio-transmitter links and operation of remote pickup stations.

All these rule changes make wireless cable a more viable option for DAB.

■ ■ ■

Steve Crowley is a consulting engineer with Washington-based consulting firm du Treil, Lundin & Rackley Inc. Reach him at 202-223-6700; FAX: 202-466-2042.

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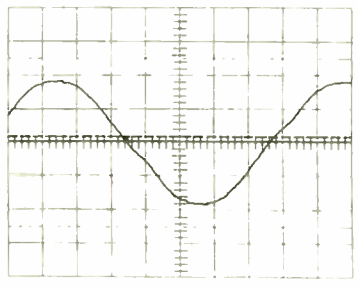

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011	033	055	077	099	121	143
012	034	056	078	100	122	144
013	035	057	079	101	123	145
014	036	058	080	102	124	146
015	037	059	081	103	125	147
016	038	060	082	104	126	148
017	039	061	083	105	127	149
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020	042	064	086	108	130	152
021	043	065	087	109	131	153
022	044	066	088	110	132	154

World Radio History

FROM THE TRENCHES

by Alan Peterson

Fires Spark Action

Dear Alex,

By the time this gets to you, things will pretty much be back to normal, following a boiler fire in our building during Christmas week.

The place got stunk up when a boiler in the basement went "doink" and ignited a quantity of #4 fuel oil, sending smoke up the elevator shaft and through the HVAC system. The master alarm did its job; residents in our building got out and we had about 20 minutes before we had to bail out, too.

Overall, we did it by the book. Police and fire were notified right away, we hit the phones to tell our PD and news director (who fanned out calls to other staffers), the halls were checked for anyone wandering and when things were fully secured, FM talent Susanna Palmer and I made our announcements and got the hell out of there.

Our CE reminded us of the responsibility to kill the transmitters if we couldn't control them (remember the Class 3 test?), but we were back in within a reasonable amount of time.

Damage? Greasy soot everywhere. Since the stuff is mostly carbon, all our studios were connected through Danbury's biggest surface-mount resistor ever. We did have a cart deck blow a regulator and everything had to be cleaned out and wiped down, but it could've been worse.

What *do* you do in a fire? Bob Collins, programming VP for a four-station chain in Massachusetts, told me of a call he got once when an antenna changeover relay hung up and began to cook . . . "Bob, the place is beginning to fill up with smoke; what should I do?" Amazing, eh?

I asked Ed Bench, CE at KMJM (formerly KCFM) in St. Louis, what kind of plan he has in place. Ed's a 40-year vet with the right ideas—the old KCFM plant went up in a big fire on midnight, Jan. 13, 1961. First priority, Ed?

"Get the people out, first and foremost. Since we've got the Fire Department right across the street, they help out with regular fire and disaster drills for the whole staff. I'm present at jock meetings, and occasionally I'll pose a hypothetical situation so the air talent know what to do—confidently."

Ed's solution to equipment hit by smoke damage is simple and elegant. Run it through the dishwasher.

"The hottest water, the strongest soap you can find. Take off covers and all moving parts and run 'er through. Dry it out for a couple of weeks and everything should work right. It's faster than solvents and it doesn't strip colorcodes off of components." (A word of caution: Some modern gear may not be able to handle this, especially CD machines).

Jefferson-Pilot's Tom Giglio has a great advantage. WSTR is on the 14th floor of one of Atlanta's safest buildings—armed with sprinklers, alarm system and escape stairwells with forward positive air pressure. In a disaster, Tom says he can scoop up an armload of gear on his way out, unrack an STL and be back on the air in less than two hours from the hotel next door.

Ed Bench got KCFM back on by cannibalizing intact parts from the fire and throwing together a functioning transmitter, which he wired into the old tower site.

In any disaster—especially an earthquake or a gas leak—cutting the power is important in preventing further devastation. The National Electrical Code provides an interesting safeguard Ed pointed out: no more than six breakers in a panel without a main breaker.

Whatever the original intent, this provides a maximum speed in killing the juice. Get this—run past the panel with your arm held up in an Arsenio Hall position and *Bam*. All six deactivated at once.

In larger facilities, subpanels mounted in strategic areas can isolate power in vulnerable parts of the physical plant while maintaining operations elsewhere.

These are guys who've thought things out beautifully, Alex. I can only hope their examples help avert problems elsewhere, or at least inspire CEs to make plans. While our boiler fire made our place smell like a bus station, other stations may not be so lucky.

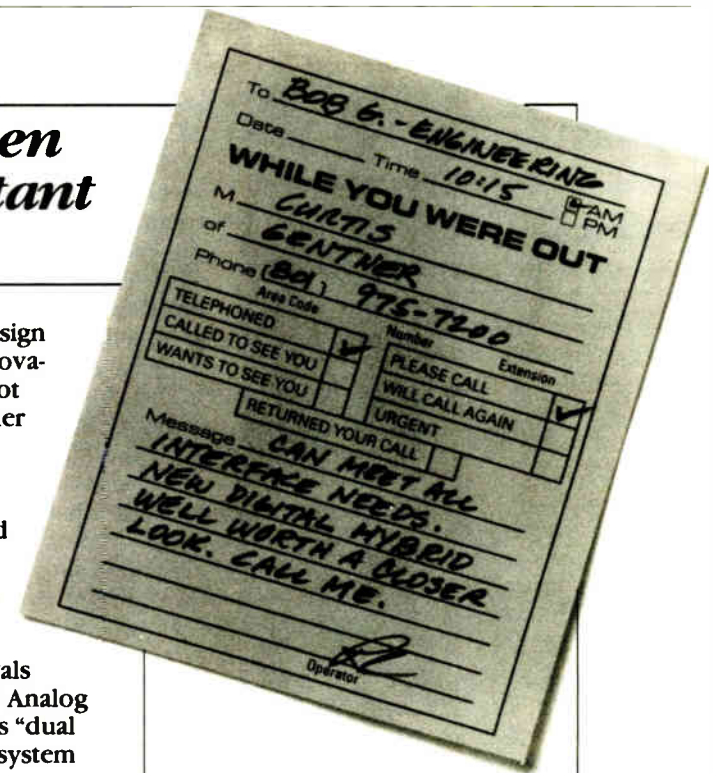
Having a hot signal is great, but having a fire ain't.

With Soot Underfoot,
—Al

Al's grandfather Mandus was a firefighter in Hillburn, N.Y. Legend has it he drove his engine down the mountain on two wheels to save the town tavern. Al's career isn't as colorful but write him anyway c/o **RW.**

Telephone Interface Products

Finally, just what you've been looking for, a really important phone message.



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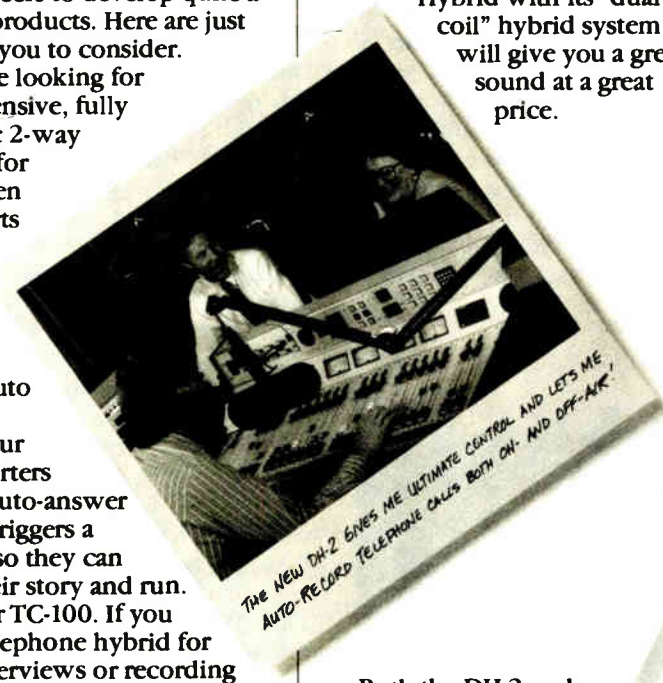

Thanks to some real design and manufacturing innovations, we've packed a lot more features into higher performing packages. With 16 bit processing and 2X oversampling, the DH-2 Digital Hybrid gives you auto-nulling, full digital separation of "send" and "receive" signals and a sound quality that rivals analog. The new SPH-5 Analog Hybrid with its "dual coil" hybrid system will give you a great sound at a great price.

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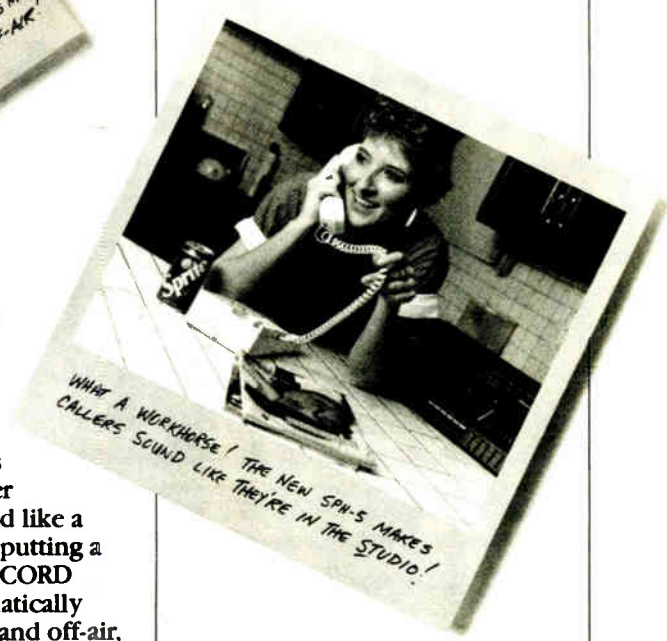

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World Radio History

WORKBENCH

Live-Assists In Sync

by John Bisset

FAIRFAX, Va. We begin this month's column with a submission from Jim Wenstrom, CE for Wynne Broadcasting in Oregon.

Jim's station has a daypart or two where they operate live or live-assist. As with many such stations, the time will come when the talent is unable to attend its own show in person, so they record their intros and reprogram the automation so you can't tell if it's live or Memorex—that is, unless the voice tracks get out of sync with the music being played.

To prevent such an embarrassing situation, Jim devised a scheme using DTMF "touch" tones. Although the tones are easy to generate, decoding and latching is another story, until Jim found the SS1-202p single chip DTMF tone decoder.

The chip uses a single 5 V supply, and several can be ganged together using a common crystal. The inputs need no pre-conditioning, and the chip decodes all 16 DTMF pairs giving a BCD output. Jim then fed the output into a CMOS 4514, which would latch and display the information.

This chip is a latching decoder. It decodes the BCD information and then will latch the output until the next tone is received. When a tone is received, the BCD information is decoded and one of the 16 outputs goes high. These outputs are tied to a resistor and LEDs mounted on the front panel of the automation.

Now, when the live jock can't be around for his show, he records his intros on cart, and after he sec-tones each track, he pushes a 1, 2, 3, 4, 5 or 6 on the touchtone keypad. (The six numbers represent the number of currents an hour, Jim adds).

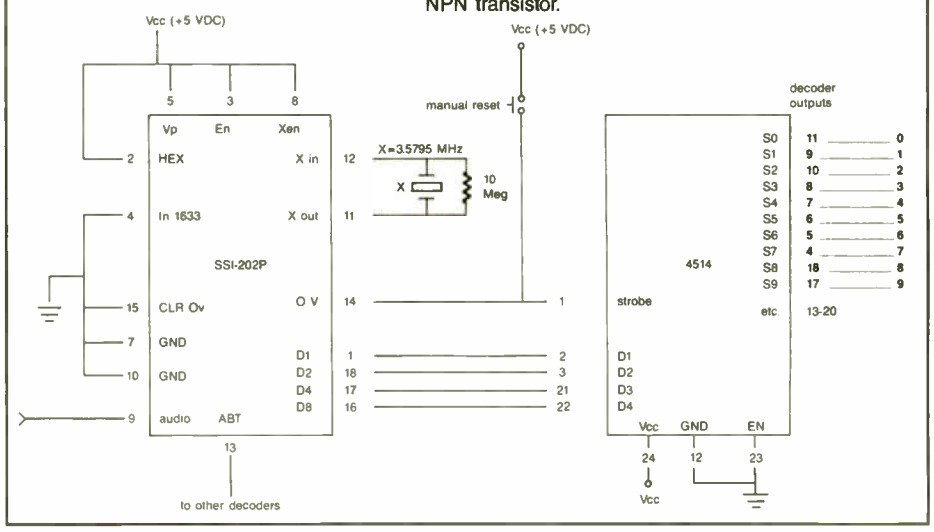
From the control room, the board op, or whoever is minding the automation, can see which current was just intro'd, depending on which light is illuminated. By comparing the light that is lit to the "current" format clock, it's easy to see whether the voice tracks are out of sync.

For example, if the operator sees the number 4 light lit, and it's only 10 minutes past the hour, and the format clock shows only one current has really played, something obviously is wrong. Since the DTMF tones are recorded after the sec tone, they are not broadcast.

The schematic for Jim's "Intro Sync Alarm" is shown in Figure 1. Jim recently modified the system to add an aural alarm. This alarm utilized an unused number or touchtone symbol to alert the staff to change the "currents" tape. When it's time to change tapes, or the "live" show is over, the number 9 is pushed. When decoded, it sounds the alarm and a reset button clears the 4514.

Figure 1.

Note: Outputs are active HIGH, TIE TO LED's with resistors to ground for each indicator. For alarm output, drive with NPN transistor.



Jim's "Intro Sync Alarm" has made small market life halfway normal again. Jim Wenstrom is CE for KFLS/KKRB in Klamath Falls, Ore. He can be reached at 503-882-4656.

★★★

Mark Persons, a well-known technical consultant in Minnesota, writes to tell about an RF efficiency problem that can be traced to fault lights. For engineers who service the Harris MW-l/lA series of AM transmitters, if the RF efficiency is low and there is no readily apparent reason, take a look at the transmitter's fault lights—DS-l through DS-12.

These are the lights that tell when a module is defective. Mark recently worked on a transmitter that had one of these lights burned out. Under normal operation, the lights will be dark or glow a little, indicating a small imbalance condition between the 12 output modules.

One of the output modules in the transmitter had failed; its fault light should have lit at full intensity. In this case, it did, then promptly burned out. Since there is no metering for each individual module, you must trust the lights or use an oscilloscope to look at the RF output at the top of each module.

If you choose the latter method of testing, Mark urges caution. There are several hundred volts, along with high current in addition to the RF on each module. The oscilloscope should show a square wave with tilt and ringing. The peak-to-peak voltage should be equal to the transmitter PA voltage.

The square wave frequency will be the transmitter's RF frequency. The amplitude of the waveform will vary with modulation. You will want to look at all modules, one at a time, to see which one or ones look different than the rest.

Take a look at the square wave duty cycle—it should be 50 percent. If it is not, then you almost certainly have mismatched transistors in that module. Keep this maintenance tip with your transmitter manual—it's been Mark's experience that a properly adjusted MW-1A transmitter will develop one bad output module a year on average.

To contact Mark Persons, call 218-829-1326 in Brainerd, Minn.

★★★

If you are using your oscilloscope to make those MW-1A measurements, you may give a moment's thought to the scope probes. Even if you don't, Tektronix has, and it has published a free Probe Primer. This 38-page booklet is a thorough study in the use of scope probes, how to select them and even why they are used.

This booklet is great for both the beginning and experienced engineer. Some of the pictures and drawings simplify what some electronic texts take pages to explain. If you'd like a copy of the "ABCs of Probes," published by the Measurement and Accessory Products Division of Tektronix, circle **Reader Service Number 77,** or contact the national marketing center in Beaverton, Ore., at 1-800-426-220, extension 510.

★★★

We wrap up this month's column with a cheap center punch for marking concrete. The tip is provided by Murray State University CE Larry Albert.

Having to work with a slim engineering supplies budget, Larry comes up with some unique ways to solve problems. Marking concrete before drilling required an expensive center punch to keep the masonry bit from wandering, but for Larry, the problem was finding the center punch. His solution—use a masonry nail.

These round nails will make enough of a mark in the concrete to keep the bit from wandering, but won't put a hole in your engineering budget. Larry can be reached at 502-762-4664. Murray State University is located in Murray, Ken.

■ ■ ■

John Bissett recently left Delta Electronics to concentrate on Multiphase Consulting, a contract engineering company. He can be reached at 703-379-1665.

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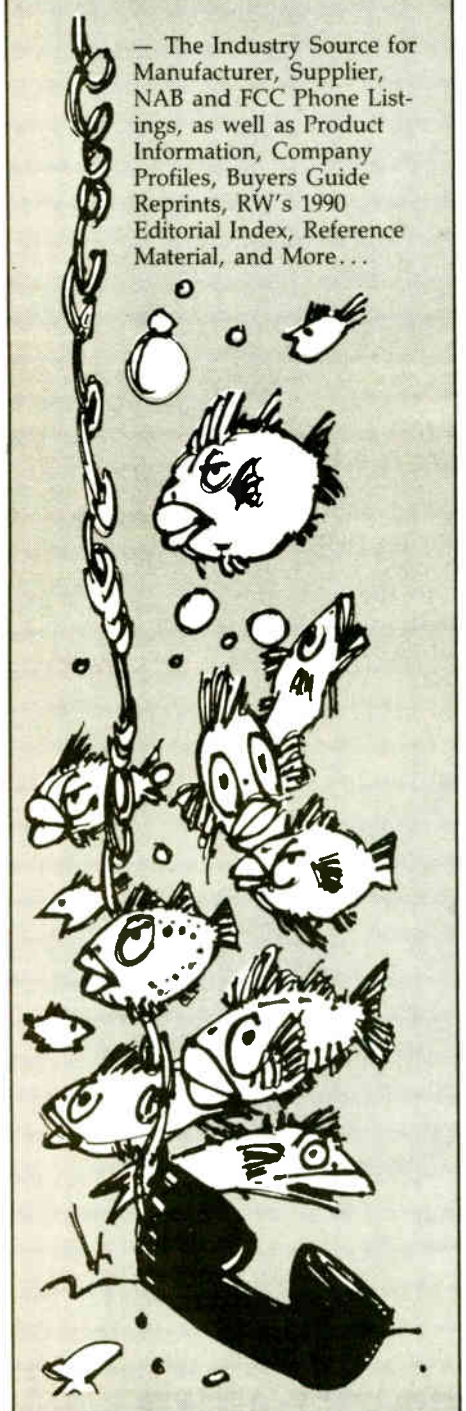

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World Radio History

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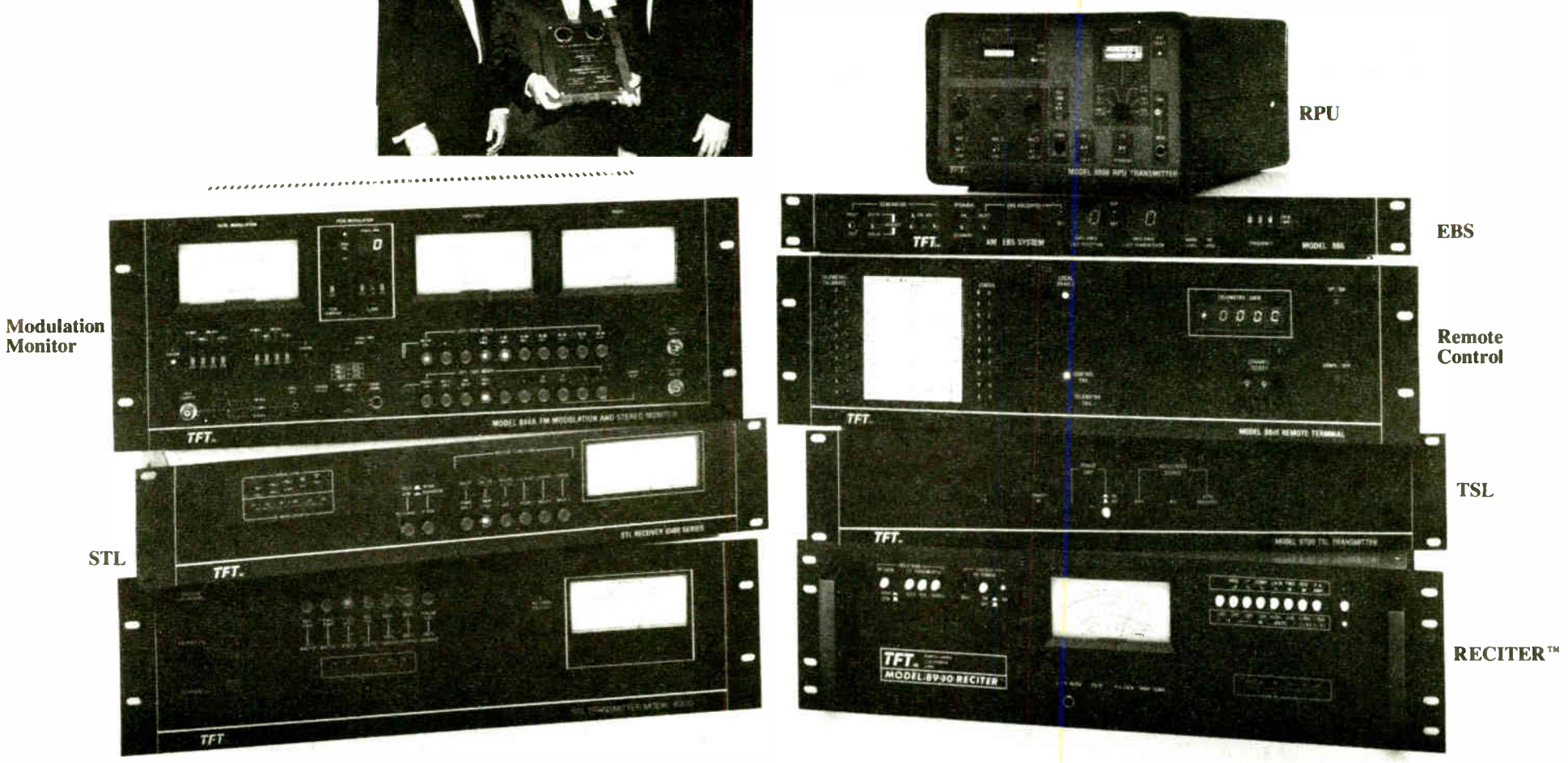

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Sound Quality for 20 Years

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World Radio History

Panasonic

Date: January 23, 1991

To: Head of Technical Planning

From: Director of Facility Marketing

Re: Next Generation DAT Recorders

Charlie,

What's the bottom line on these next generation SV-3900 Pro DAT decks from Panasonic? We heard them at NAB and AES Shows -- outstanding audio quality! I'd like your input on their technical features and functions.

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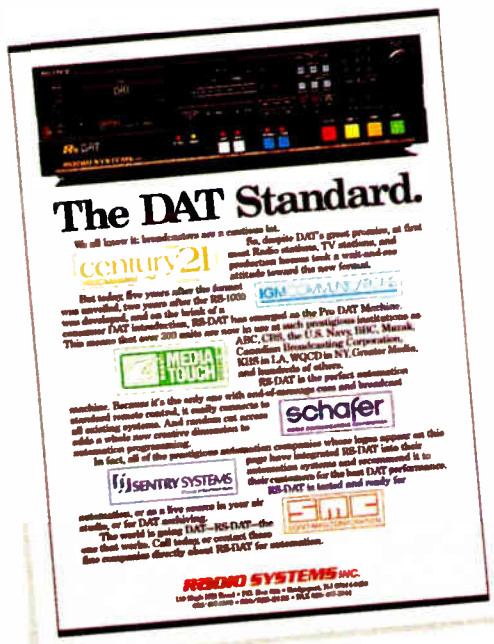

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World Radio History

The Truth and Nothing, But...

FCC Clarifies Rules On Misrepresentation

by Harry Cole

WASHINGTON As we all know—and as the Jim Kweskin Jug Band reminded us—"It's a Sin to Tell a Lie."

But it may be more than a sin at the FCC. One of the "small print" changes included in the Commission's recent revision of its hearing rules includes a little-publicized change that might make lying to the FCC an expensive proposition.

Of course, lying—or misrepresentation as it is referred to in more formal circles—has long been a world class no-no to the FCC. For a long time, it was viewed as such grievous misconduct that it would lead only to disqualification.

COLE'S LAW

In other words, the *only* penalty available for misrepresentation was denial of one's license or application. Several years ago the Commission, apparently concerned about tying its own hands too tightly in this area, included in its rules the obligation to tell the truth.

Misrepresentation

By making this rule revision, the Commission broadened the types of penalties it could issue for such misconduct: In addition to denial of license (or denial of an application), the Commission could issue fines for misrepresentations.

That was all well and good. But in the course of hearings—whether comparative hearings for new facilities or comparative renewal proceedings—it is pretty much par for the course that, at some point, one of the applicants is going to accuse another of lying.

As the Commission's Review Board once remarked, "It is all but irresistible to attempt to stick the competition with a misrepresentation (issue) . . . . It is not surprising, therefore, that our comparative case law is littered with allegations of prevarication to the point where an unfamiliar reader would deduce that our processing files are a collective rap sheet of the nation's pathological liars."

That is the nature of comparative litigation. But normally in the comparative process, the question of fines never comes up. Instead, the Commission, the Review Board and the administrative law judges historically have acted as if the only alternative was granting or denying a comparative hearing application.

In its recent revision of comparative procedures, the Commission has changed all that by throwing in, almost as an afterthought, the following wrinkle. From here on in, when a misrepresentation issue is added against an applicant, that issue will include the authority not only to deny the applicant's application, but also to fine the applicant up to $25,000 per violation, and up to a cool quarter of a million dollars for continuing violations. Ouch.

Now don't get us wrong. Lying is not a good thing. But in the comparative process, that which is alleged to be "lying" often falls far short of the mark.

Nevertheless, administrative law judges (or the Mass Media Bureau or the Review Board) occasionally feel inclined to add such issues just to be on the safe side (i.e., just to give the parties the opportunity to put into evidence whatever information they may have about the allegations.) When that happens in the future, the price tag for failing to make your case could be $250,000.

Raises questions

This raises interesting jurisdictional questions. Let's say that you are an applicant for a new FM station, and that you do not now own any other broadcast authorizations. Let us also say that you are accused of "misrepresentation" (even though, for the sake of this hypothetical, that claim is without merit).

In the old days, if you did not want to spend the time, effort or money to clear your name, you didn't need to worry. You could simply dismiss your application and that was that—the FCC lost jurisdiction over you once its only grip on you (i.e., the ability to grant or deny your application) went away.

But now it's not quite so easy. If you get a misrepresentation issue designated against you, it would appear you have a clear incentive to stay in the proceeding in order to obtain, at a minimum, a favorable resolution of that issue.

Otherwise, it is at least conceivable that the agency could, in your absence, resolve the issue against you and levy a—how shall we say it delicately?—not insignificant fine against you. This is not to say that the Commission will invariably adopt this approach. But it could, and there does not appear to be anything to stop it.

On the upside, this may discourage applicants from engaging in conduct that amounts to, or might even be alleged to be, misrepresentation. That, of course, would be beneficial.

On the downside, it will provide even further encouragement to applicants to raise misrepresentation issues at the drop of a hat, in the hope that the one-two punch of potential disqualification *and* major league potential financial liability may be enough to cow an opponent into submission before the issue is even added. And as virtually any litigator with experience before the FCC can tell you, misrepresentation issues often are added almost as a matter of routine.

The lesson we learn from the new rule is that it now is important from a financial point of view, in addition to the moral, ethical and legal points of view, to be as honest and candid as possible in your dealings with the Commission.

Failure to do so still will cost time, effort and lawyers' fees, but now it may also cost a large chunk of change in the form of a fine. In this day and age when money talks, that threat can and should be an effective deterrent even if the others are not.

■ ■ ■

Harry Cole is a partner in the Washington-based law firm of Bechtel & Cole, Chartered. He can be reached at 202-833-4190.

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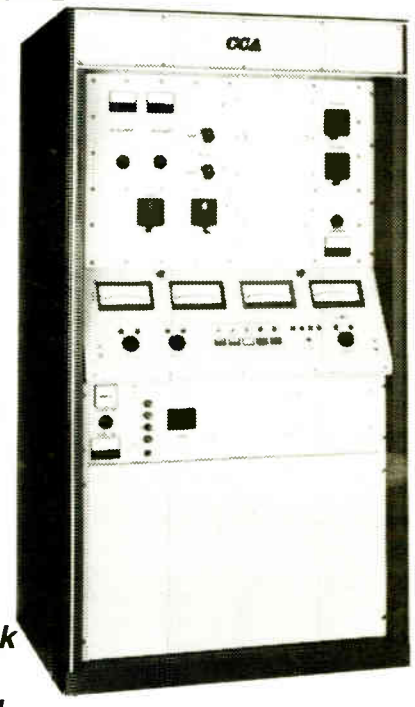

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World Radio History

On Your Own: Why and How

by John Cummuta

DOWNERS GROVE, Ill. The 1980s were the decade of the entrepreneur. More people started businesses in the last 10 years than ever before in history.

More than 80 percent of all new jobs created in the American economy during the decade were generated by small businesses.

Coupling this trend with the deregulation and more sophisticated automation of broadcast engineering has produced a movement of the station engineering position out of house in many cases. But that has proven to be just another opportunity for entrepreneurs. And these opportunities should expand only through the 1990s.

Contract/free-lance engineers

Over the next few months, I'm going to dedicate this column to the needs of the contract or free-lance engineer, as opposed to the engineering manager of an in-house department.

There are tremendous opportunities out there for people with communications electronics skills, in broadcasting and other industries, so a person starting a service business will not necessarily be limited to serving only broadcast clients.

But they will be getting into a whole new world when they transition from being responsible for part of a business to being responsible for all of a business. History is cluttered with the wreckage of hastily started businesses, opened by people with high skills in their area of expertise, but little or no business experience.

That's why I'll be dealing with a whole range of business start-up and business operating considerations.

Start at the beginning

Suppose you've been thinking about moving outside. Maybe you feel you could retain your present station as a client, or you might be able to pick up work from stations in neighboring communities. Look before you leap and count the costs.

The simplest way to do this is to do what accountants call a "pro forma." What that means is to simply list your projected income and your projected costs, and see if and when you'll start making money.

This calculation should include the fact that leaving a full-time position will mean leaving the benefit package that comes with it. You'll be responsible for your health insurance and any other perks that might have come with your position.

The next recommendation is to build a war chest before stepping out. Ideally, you should have enough money socked away to cover your monthly expenses for a half year. This would allow you to put 100 percent of the business' income back into the business for marketing, equipment and other expenses. Or it would allow you to at least sleep at night knowing that you have a safety net below you.

A compromise to this would be to start your business part-time, while you maintain your full-time job. This is frequently the best way to get exposed to the realties of running a business without the terror of not being able to meet your day-to-day needs. Nothing puts more stress on a person's nerves, digestion, marriage and performance than trying to build a business while slipping into serious debt.

One way to take some of the uncertainty out of the process is to get new clients under contract, rather than leaving everything "loosey goosey." If you can count on certain payments coming in at certain intervals, you'll save yourself a nervous reaction or two.

Start out as a real business

There are two reasons to set your new business up properly from the start: your own sanity and the IRS.

At the risk of being redundant, you will have enough stress just building a client base and dealing with the variety of personalities and technical problems you'll encounter. You don't need added pressure from not being able to find income and expense records, and not knowing how you're doing financially.

ENGINEERING MANAGER

The second point is that the Internal Revenue Service makes a very clear distinction between what they consider to be a real business and a hobby business. If you can't exhibit the organizational trappings of a real business, an IRS auditor could classify your business activities as "hobby" and disallow all the normal deductions you should enjoy.

These deductions normally include portions or your rent or mortgage payment (if you're operating from your home), the relevant portion of your phone bill, the proportionate amounts of your auto expenses and so on. If you can't satisfy the IRS that you truly are organized to do business for the purpose of making a profit, they won't let you take these deductions.

So what are they looking for?

Things like a separate business checking account, a separate business phone number, an organized bookkeeping system, business stationary, a log of the business use of your vehicles, etc. In other words, all the things you really need to be doing to properly do business anyway.

You don't need a big, fancy business checkbook. Most banks will let you open a business account using the standard pocket-sized checkbook. You don't need fancy stationary. Most quick-print shops can fix you up with a reasonably decent-looking letterhead and business envelope set. And you don't need a fancy bookkeeping system. You can use anything from a manual ledger to a basic spreadsheet system like Lotus 123 to any of the inexpensive PC accounting packages available (starting at about $49).

The key recommendation here is that you do all this set-up and preparation work before you actually start doing business. You'll have to make adjustments to your system as experience shows you better ways of managing your bookkeeping and your money. But you should at least have your startup systems in place before the real action begins.

Next month, we'll start looking at different legal forms you can use for your business, like the sole proprietorship or the corporation and we'll start to examine other business considerations, such as pricing and billing.

■ ■ ■

John Cummuta is president of Advanced Marketing Concepts Inc., a broadcast management and marketing consulting firm. He can be reached at 708-969-4400.

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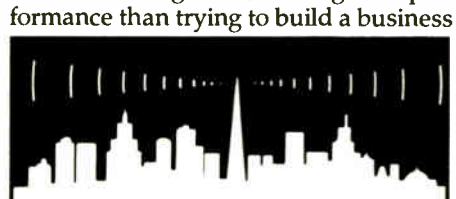

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World Radio History

NY Stations Take Over Plant

by Dee McVicker

TEMPE, Ariz. Early last year, while the staff at WSYR-AM/WYYY-FM was gearing up for a move, a building from the early 1900s in Syracuse, N.Y., was undergoing a complete overhaul. Once a manufacturing hub for Chrysler automobile gears, the old factory soon would become the stations' new home.

The building's location, part of an expansive refurbishment of Syracuse's downtown waterfront area, proved to be an ideal choice for the stations. Eager to stay in the downtown area, station management also was baited by another force: Developers were eager to have the community's most visible stations occupy the space.

WSYR/WYYYs' news center is equipped for news editing, recording and broadcasting.

With little time to spare before the stations' old lease ran out, management began renovation. For the next few months, CE Conrad Trautmannn would be busy with the unexpected challenge of making what was built for gears suitable for broadcasting.

FACILITIES SHOWCASE

After first determining the needs of each department, he began sketching facility layout. Drawing on the expertise of Pacific Recorders & Engineering's Jack Williams, Trautmann settled on a layout that divided the facility into three distinct areas of station business: the studios, sales and administrative/operations.

Staggering contrast

The results were a staggering contrast to the building's days as a gear factory. Described Trautmann, "You walk into the front of the building across a bridge that spans a creek." Greeted by a marble-floored atrium seven stories tall, visitors "walk into the reception area and can go either to the right or the left for the sales or administration area."

Located at the far end of the facility is the studio complex. The complex houses two, two-track production studios, two on-air studios, each with an adjoining news studio, and, as Trautmann described, "the most incredible newscenter you've ever seen."

The newscenter proved to be Trautmann's biggest challenge. "You can go into a million air studios and find most of them 80 percent similar. But when you go into a newsroom, every one of them is different," he said.

Unlike the old newscenter, where microphones were non-existent and where workstations' line selectors doubled as mixers for limited news production, the new newscenter was to be equipped with all the necessities for productive news editing, recording and even airing.

Previously unavailable

The co-anchor workstation and three editing/recording stations include a rack-mounted Newsmixer board, each fed by Telos 100 telephone hybrids and a 20-line selector for the recording capability not available in the previous workstations.

Each of the four workstations has editing and recording support consisting of an Otari MX50 recorder, a Tascam 122 MKII cassette deck and a Micromax cart machine. In addition, input connector panels were installed for mixer plug-in of reporters' portable cassette machines. The furniture piece for these workstations was one of the largest ever constructed by Pacific Recorders, Trautmann said.

A critical feature of the newscenter is its relationship to WSYR's on-air studio and adjoining news studio: All maintain line of sight. "The goal was that the AM air controller could see the news people in the (adjoining) news studio, and also see the news anchor in the newscenter," Trautmann said.

What Trautmann elected not to separate into two studios, however, were AM air and the group's satellite network. As the head-end for Syracuse University sports with affiliate distribution nationwide, WSYR previously had isolated these two functions into two studios.

Eliminating the need for a dedicated network operator, Trautmann combined network and AM air operation in the new air studio. The AM air, like the FM air, is controlled by a BMX III console surrounded by six Micromax cart decks and Otari recorders, which are fed by Telos 100 telephone hybrids. Adjoining news studios were outfitted with BMX II consoles, with the AM news studio also given a Stereomixer board for co-anchor premixing.

AMX-26 consoles were installed in the two production studios, along with reconditioned MCI JH110B recorders, Tascam 122 MKII master cassette machines, Micromax cart decks and Technics SL-P1200 CD players.

The new facility was completed on schedule and within budget by the end of May. Now home to Syracuse's dominant stations, which consistently trade off as number one and two in the market Arbitrons, the old factory is geared toward keeping WSYR AM/WYYY FM on the air and in the lead.

■ ■ ■

Dee McVicker is a free-lancer and regular contributor to **RW**. *To inquire about her writing service, call 602-899-8916.*

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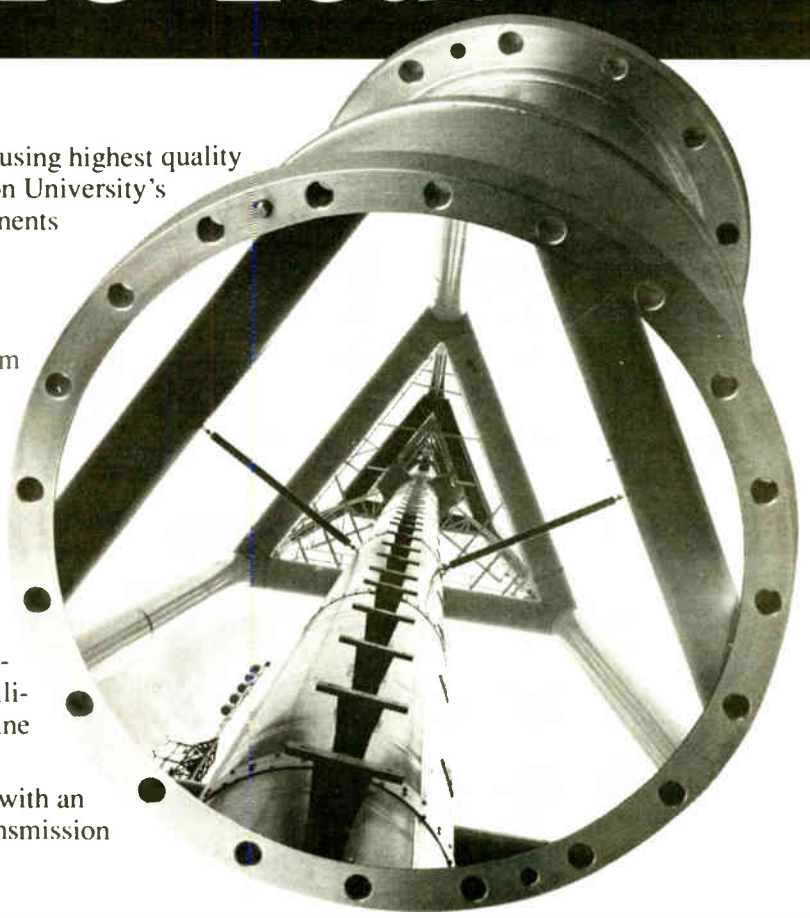

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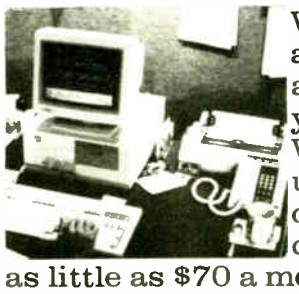

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Ringing Ears Could Spell Tinnitus

by Ty Ford

BALTIMORE After an extensive three-day demo on a compressor/limiter recently, I noticed a peculiar ringing in my ears at around 14 kHz.

After making a few calls to doctors and a trip to the library for some reference material, I came up with some facts about "tinnitus"—a condition that you need to be aware of if you're working in radio, audio production or other audio-related careers.

PRODUCER'S FILE

Tinnitus (pronounced "TIN-ah-tus") is a hearing disorder that affects about one in every six people in America. It's characterized by a ringing in the ears. Some hear it as a constant single tone, some as an occasional ringing that departs completely or subsides to a level only audible in a very quiet room. Some hear it as rushing or pulsing sounds similar to that made by locusts or chirping birds. It may be perceived louder in one ear than the other. Though my condition receded after a few days, I took the event as a major warning sign.

Tinnitus can be caused by trauma, infection, drugs and allergies or simply by wax build-up in the outer ear. Trauma, in this case, means having the ear exposed to overly loud audio for any length of time. Announcers and production people who spend hours a day listening to studio monitors and headphones are especially at risk.

According to Dr. William Brownell of the Ear, Nose and Throat (ENT) department of Johns Hopkins Hospital in Baltimore, we are born with 12,000 to 15,000 hair cells in our inner ear. Since our bodies do not regenerate new hair cells, keeping the ones we have healthy is vital.

If you now are experiencing tinnitus and find people around the studio are amazed at how loud your monitoring levels are, you are a prime candidate. Don't be fooled by the perception that your hearing is becoming more sensitive. It's entirely possible that the reflex muscles that automatically shut down to keep overly loud sounds from damaging your hearing are shot. After continued abuse, these muscles cease to function.

There presently is no cure for tinnitus. Once you get it, it may stay at the same level or it may get worse.

Support Group

Audiologist Susan Sidel hosts monthly meetings of a Tinnitus Support Group consisting of about 200 people at the Greater Baltimore Medical Center. I attended the last meeting to learn more. Most of the 25 people who attended that night were between the ages of 40 and 60.

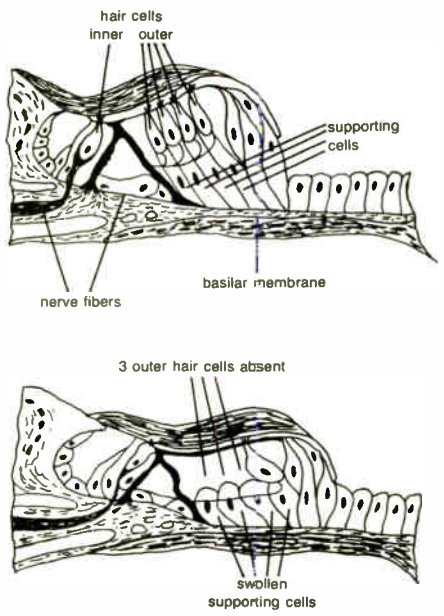
Many of them claimed they did not remember exposing themselves to overly loud sounds at any point in their lives. Some of the men commented that they had been exposed to high sound pressure level (SPL) caused by proximity to wartime firearms or industrial machinery. Curiously, there was a gap of 20 to 30 years between the exposure to high SPL and the onset of tinnitus.

A friend of mine who has been an audio engineer for 10 years recently left the trade because of problems with tinnitus. Three audiologists' tests proved that he had a hearing loss problem at frequencies just above those of the human voice. Unlike most announcers and radio production people who "work combo" with headphones, he normally used small monitors at fairly reasonable levels. Although he admitted playing in bands in his teens and 20s (at least 20 years ago), it was only recently that the ringing became loud enough to bother him. The message here is, it's a really bad idea to "keep it cranked up" until you first start to hear your ears ring. By that time it's way too late.

Coping with the problem

If you now have a minor problem with tinnitus or the condition worsens, it's important not to overreact. Consider seeing an ENT doctor to get a fix on the problem. Have an audiologist do a hearing test to see if you are experiencing hearing loss.

Figure 1.



Hair structure of the inner ear: Above, a normal structure. Below, partial injury, leading to tinnitus.

Stress, allergies, infections, diet and drugs, in addition to trauma, all seem to play a part in the onset of tinnitus. Lack of proper blood circulation in the inner ear also seems part of the problem.

Check with a doctor or nutritionist about changing your diet. Check for allergic reactions to wheat, corn, egg, yeast, milk and soy. Reports show that alcohol, caffeine, salt, nicotine and fats are out. Also ask about supplementing your Vitamin A (from betacarotene), C, E, Bioflavinoid and Zinc intake. Instead of aspirin and ibuprofen, stick to acetominophens if you can.

According to Dr. Paul Cook, who spoke at the support group meeting I attended, Ginkgo Biloba Extract (GBE) has proven to be effective in a recent study in France. The extracted oil from the Chinese Ginkgo tree apparently is being widely accepted in Europe as an antioxidant that also improves circulation. In those studies, subjects took doses of 24 percent GBE in a 40 mg capsule three times a day for 120 days.

Some people find playing the radio at a low level or being near a droning air-conditioning system helps to mask the ringing. White noise generators said to "replicate the sound of the seashore" also may work. If you try masking, it's important to remember to choose a masking sound that is near the frequency you're hearing.

Put a conscious effort behind reducing your monitor and headphone levels. Instead of turning up the gain to your usual level, experiment with finding a lower level that is still loud enough to let you hear what's going on. If you work in clubs or at concerts where SPLs are high, get a set of ear plugs.

Remember, those hair cells do not regenerate. The ones you don't blow out today will be there for you tomorrow. For more information, call the American Tinnitus Association at 503-248-9985.

■ ■ ■

Ty Ford is an audio producer/voice talent. Reach him by phone at 301-889-6201, via MCI mail (#347-6635) or via America Online (Tford).

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World Radio History

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Circle 51 On Reader Service Card

World Radio History

BUYERS GUIDE

Digital Workstations & Automation Equipment

Turtle Beach: The New Wave

by Warren Schatz, President Perfect Sound Studios Inc.

NEW YORK I first fell in love with digital editing in 1986 while producing a very successful album for RCA/ Red Seal called, "What If Mozart Wrote, 'Have Yourself A Merry Little Christmas.'"

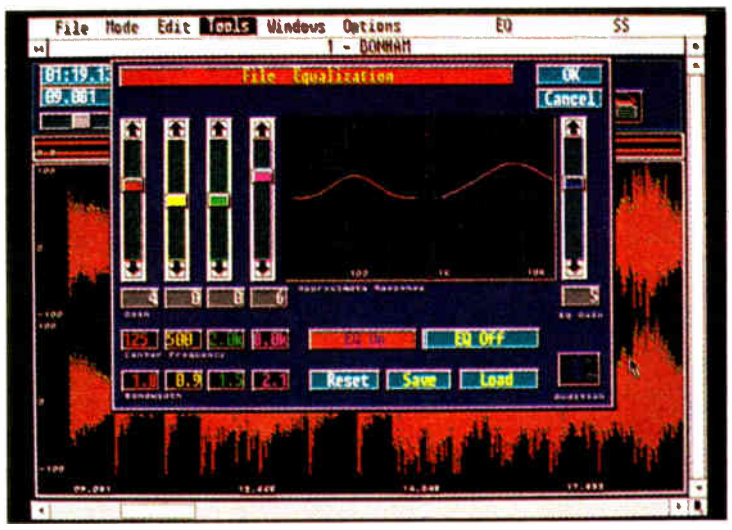
As I watched more than 50 hours of editing time slip from my pocket to RCA's studios (at a rate of $210 per hour), I dreamt of the day that I could afford a Sony 1630 system.

USER REPORT

About two years later, I saw a demonstration of Sound Tools and it made me nuts. I loved it, but it was a Mac-based system and the whole thing was going to cost me in excess of $12,000. Not just that, but I've used DOS machines for six years and didn't feel comfortable with Apple machines.

Does anyone know?

For the next few years, I continued to ask around if anyone knew a DOS-based system. Finally, two came to my attention —unfortunately, neither was built by a company I could trust to be there down the line.



Turtle Beach's 56K Hard Disk System offers a lot more than a colorful screen.

Then I heard about the 56K system by Turtle Beach Systems, a company I had known about for years as a strong music-related software company.

I talked to Jeff Klinedinst at Turtle Beach and got one of their first systems, a 386 running at 25 MHz with a 678 meg hard drive. The whole thing, including a new Pro-DAT, which I purchased separately, cost me $7,000.

What impressed me immediately was the support I got from everyone at Turtle Beach. As with any new software, there were bugs and things I just couldn't grasp. Sometimes I just couldn't get the thing to do what I wanted.

Being a New Yorker, I would call, assuming that no one would help, but I was really wrong. Most of the problems I was having were, of course, due to my ignorance. I did, however, find two bugs and called the Turtles about it. The next day, by Federal Express, an update showed up for easy installation.

From Mozart to Citibank

The first project I worked on was a classical crossover album by Robert Bonfiglio for BMG Classics. I figured that if I could edit Mozart's Piano Concerto #21, I could do a 30-second spot. It took me three days to really begin to see just how useful the system was going to be.

One of the projects the system has been most useful for is an award-winning corporate communications program I produce every Friday for Citibank. It's a three-minute talk show format with a writer/announcer who lives in Santa Monica, Calif.

He sends me a script and a DAT by Federal Express and Ed Dixon from Citibank brings a DAT of interviews. I dump everything into the 56K and then just edit everything into zones and create a playlist. Because the 56K can edit down to a single sample, and I can create crossfades in the playlist and adjust levels as I go, even the most difficult edit is smooth and undetectable as an edit.

Part of the success of the show is that it never leaves the digital domain, so when it hits the phone lines it's crisp and clean. I then transfer it to DAT and lay in the music bed from the computer as we run the shows off to a Citibank DAT master.

I also have used the 56K for editing rap records. I just finished a Run-DMC single that was full of four-letter words. I was able to measure the word to the sample and insert a 100 Hz tone of exactly the proper length so that the beat stayed exactly the same, but the four-letter stuff was gone. It was easy to do using the markers that the system provides.

In March an official update is due, which will be incredibly useful. One of the things that will be available is time compression for that 30-second spot that runs 31 seconds. Pre-roll times will be included as well as the ability to place markers on the fly.

I can't wait.

■ ■ ■

For information on the Turtle Beach Systems 56K hard disk recorder, call Marketing Director Jeff Klinedinst at 717-843-6916; FAX: 717-854-8319; or circle **Reader Service 56.**

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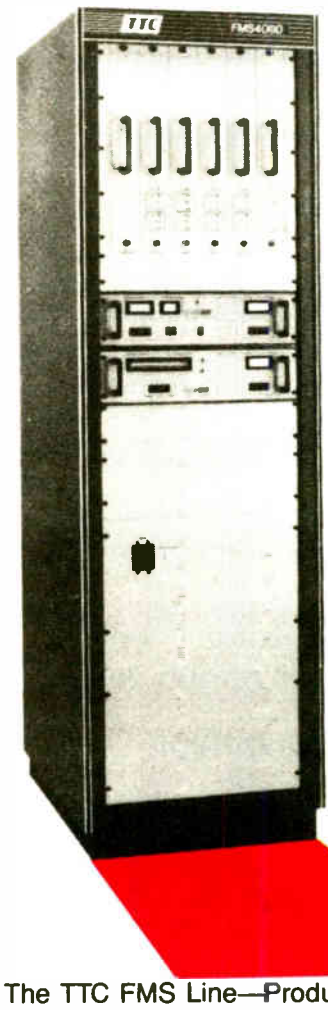
TTC



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Dolby

Circle 92 On Reader Service Card

DSE 7000 Enhances WQHT's Productivity

by Rick Allen, Prod. Dir.
WQHT-FM

NEW YORK As one of the top CHRs in the nation's top radio market, WQHT—Hot 97—always is looking for ways to stand out on the dial. Anything you can do to help one more person remember to write down WQHT in an Arbitron diary can translate into big dollars.

USER REPORT

This is one reason Emmis Broadcasting, our parent company, came to us last year and asked if we'd like to install a digital workstation in WQHT's production room.

From day one, our AKG DSE 7000 Digital Sound Editor has met both of those objectives. The day it was installed, Assistant Production Director Bill Schultz already had a full production schedule. He basically sat down in front of it and said, "Let's do it."

Up to speed

An hour and a half later, he was nearly up to speed and cranking things out faster than he could have using analog tape. We've been really impressed with how short the learning curve is, which I think has a lot to do with the DSE's design being truly radio oriented.

It's a RAM-based system, so there's no sitting around waiting for disk access or edit calculations. And it looks very much like the analog eight-track, 10-input mixer and two-track mixdown deck it replaces (although it takes up less space).

All the controls, like the tape recorder-style transport buttons and mixer faders, are right in front of you. There isn't much "computer-ese" to it at all. That makes it very easy for a radio guy to sit down in front of it and go.

We use the 32 kHz sampling rate to maximize memory time, so at first I was concerned that the highs would get rolled off a little. So far, I haven't noticed it. And if I can't hear it in the studio, I know no one can hear it by the time it goes through our processing chain.

Cutting club spots

For everyday commercial production, this system is awesome. For instance, about half of WQHT's local spots are club spots. These basically are like concert spots, with several music cuts and a voiceover in 60 seconds.

Before we got the AKG, we would make beds for each artist with 40 seconds of instrumental, the song's hook, then another 40 seconds of instrumental. We'd save those because the artist might play at several clubs that advertise on Hot 97.

Now we don't even bother saving the beds. With the DSE 7000, it's just as fast to do a new one every time. That keeps the creativity up and keeps the spots from sounding too similar.

With eight digital tracks, we can load in all the elements and very quickly edit the instrumental. If you have to make a 10-second instrumental piece into 30 seconds, you just loop it. Then you can tell the machine to drop in the song's hook right after the instrumental part.

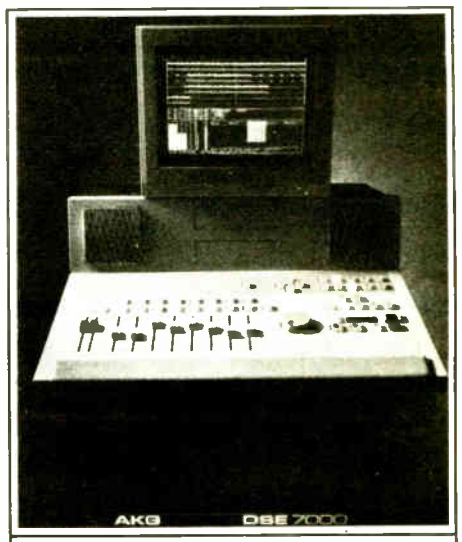
Not only that, you can make the voice-over stop precisely where the vocal track starts. The DSE 7000 will line everything up for you. As a result, spots that normally would have taken 25 minutes to half an hour now take five to seven minutes.

Although the DSE 7000 looks and acts in many ways like an analog system, it is a computer. You can try an edit, decide it doesn't work, hit the Undo button and go back to the way it was. That allows a guy to take a risk, even in a really nasty time-crunch situation (which is all the time, of course).

Stretch the doughnut

We also use the DSE 7000 to make fast alterations in agency spots. Say you have an 18-second doughnut that has to be 20 seconds. You just tell the AKG to loop a bar. We did something to a spot recently that you could never do on analog tape. It was a 60-second spot that they wanted cut to a 30.

The music bed started off with a full band and then segued into a solo saxophone, so a cut edit would have been jarring. But on the DSE 7000, Bill was able to set up a long crossfade time for



New York's WQHT puts the AKG DSE 7000 Digital Sound Editor to good use.

the edit, so the sax fades in gradually. It sounds completely normal—there's no way you can tell it's an edit.

The DSE 7000 has a hard disk that "shadows" operations in the background, so you're covered if a sudden power outage erases what's in RAM. You can save entire jobs, including audio and all editing instructions on the hard disk. But we haven't used that capability too much. Things change so fast in radio, it's easier to redo something most of the time—especially when the AKG makes it so simple to cut, loop, splice and rearrange the elements.

AKG has brought the cost of digital audio down without sacrificing quality, and they've made the DSE 7000 more user-friendly than other digital audio systems I've seen. There's no doubt that it's improved our productivity tremendously.

■ ■ ■

For information on the AKG DSE-7000, call David Angress at AKG at 415-351-3500; FAX: 415-415-351-0500; or circle **Reader Service 95.**

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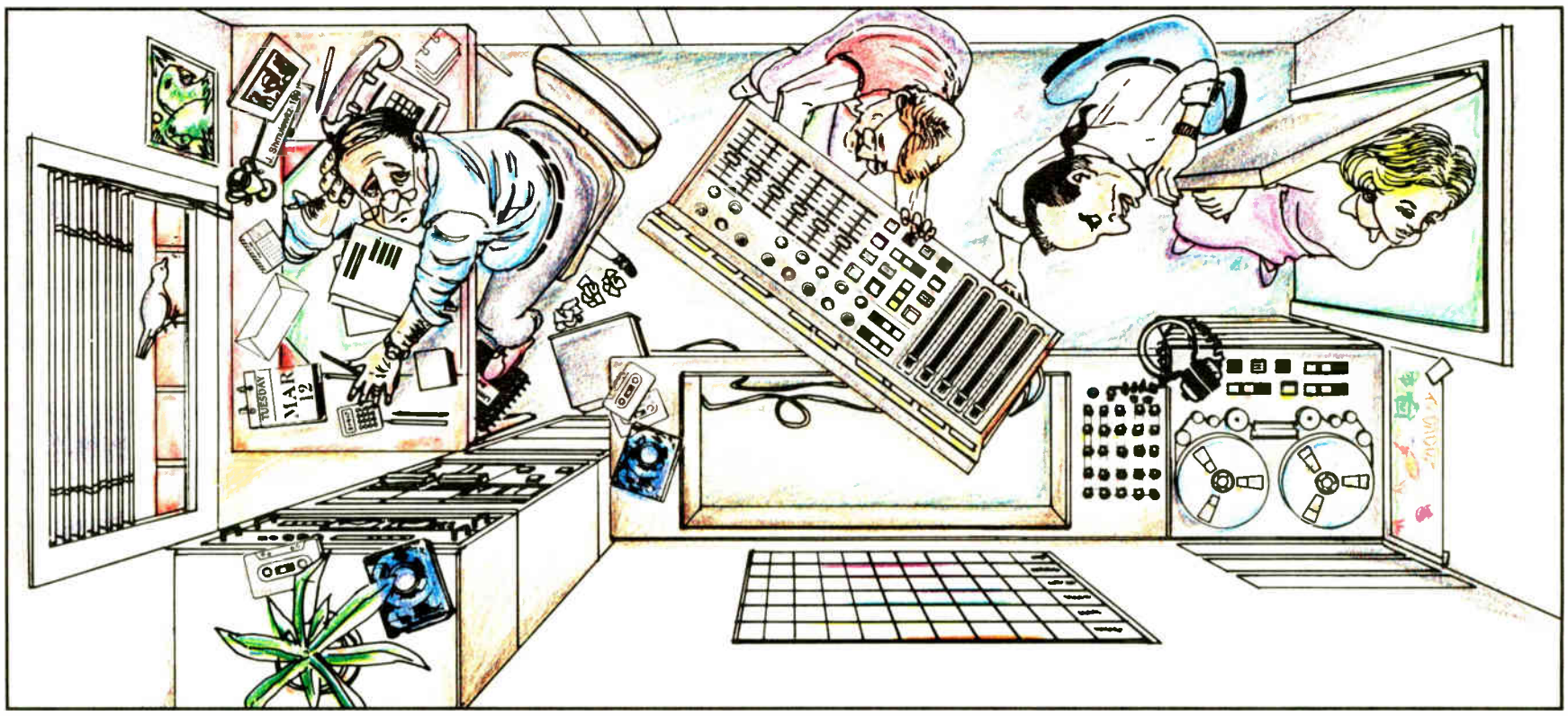

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Circle 89 On Reader Service Card

World Radio History

SV-3900 DAT Offers Broadcast Solutions

by Chris Foreman, Sales Manager
Audio-Video System Products Group
Panasonic Communications & System Co.

CYPRESS, Calif. The new Panasonic SV-3900 Pro-DAT machine combines superior record/replay quality and comprehensive remote control for a variety of broadcast applications.

TECHNOLOGY UPDATE

Complementary parallel and serial remote-control schemes allow all transport and system functions to be commanded from an on-air or production console, or interfaced directly with workstations, editors, automation controllers and satellite delivery systems.

The SV-3900's parallel interface provides simple remote control from an external unit, or existing automation systems via GPI ports. The optional SH-MK390 remote controller provides access to all of the SV-3900's transport and system functions for full external control of up to 32 individual or grouped machines.

The SV-3900's nine-pin serial interface offers enhanced remote control from custom-developed software running on conventional PCs and workstations, in addition to editing/automation systems.

Function after function

Within broadcast and production facilities and satellite news/music delivery systems, the SV-3900 has a variety of applications.

The device offers comprehensive serial control of multiple replay machines and voice-over and effects elements during preparation of music, as well as final mono/stereo mixes of commercials, PSAs, station IDs, jingles, etc.

An automated search can be made of pre-recorded DAT libraries for high-speed access to 120 minutes of stereo material, replayed from multiple machines (as a potential replacement for analog NAB carts).

First-generation DAT "SubMasters" can be prepared from a station's playlist (music, commercials, IDs, etc.). Inload and archiving—from basic production tracks to final edited material—can be done in real time to and from disk-based digital audio workstations.

The SV-3900 allows programmable, random-access playback of master material at satellite network originating studios. This streamlines the playout of music tracks and the linking of voice messages from an automated music delivery service, as well as commercials and news bulletins.

Downloading

With the SV-3900, downloading of digital-quality material from a satellite delivery service—including full bidirectional control of start/stop functions at the recording site—can be automated. The user also can monitor record quality during transfer.

Integrated master/slave control can be accomplished while duplicating several dozen DAT tapes, including monitoring of record levels and other system parameters during analog/digital transfers, for in-house and syndication capabilities.

The SV-3900's bidirectional serial interface supports a choice of industry-standard P2 or ES-Bus communications protocols.

ES-Bus provides sophisticated control between multiple audio machines, controllers, synchronizers and editors connected on a serial local area network. P2-compatible interfaces use commands similar to ES-Bus, but are designed for simpler point-to-point or single-controller systems.

In addition to conventional transport and shuttle commands, other serial control sequences cause the SV-3900 to output a variety of status information, including PNO location, absolute/program time, error rates, sampling frequency, and so on.

For network management of single or multiple SV-3900 Pro-DAT machines, the SH-MK390 provides ES-Bus serial control of all transport modes and functions and a shuttle wheel for auditioning program material at slow/high speed in forward and reverse directions.

The remote unit also controls PNO; counter and absolute and program time displays; and has dedicated keys for all Start/Skip ID Write/Erase, Renumber and Fade In/out commands. A numeric keypad is available for entering machine and PNO assignments, etc.

Built-in Function Modes allow single-button dubbing or copying between multiple SV-3900s, as well as continuous recording or playback from several decks. In addition, Program Play Mode enables pre-designated sequences of audio segments to be replayed from DAT cassettes loaded into multiple machines.

Panasonic's SV-3900 Pro Digital Audio Tape Deck.

Application-specific software

To streamline the development of application-specific software, a series of utilities has also been developed for the SV-3900 Pro-DAT. Simple-to-implement utilities within the "SV-3900 Developer's Toolkit" will allow users to provide full control of individual or grouped machines connected to a master PC or automation system.

Various sample applications will demonstrate an enhanced Program Play function, with "look ahead" cueing to the next selected cut of material from multiple SV-3900s; and a "Time Search" function that causes one or more SV-3900 decks to rapidly locate to a specific absolute time, and park to within an accuracy of 13 DAT frames (10 mS).

■ ■ ■

For more information about the SV-3900 and its remote control module, contact Chris Foreman at Panasonic's Pro-Audio Division: 714-373-7277, or circle **Reader Service 10.**

Tuned In

Anniversary . . . **Audio Broadcast Group** in Grand Rapids, Mich., is celebrating 30 years in business.

People . . . **Richardson Electronics** has named Anthony Battaglia head of Microwave Division; Larry Broome, division manager of broadcast/communications; and Bob Prince, division manager for Industrial and general purpose products.

Michael David of **Interface Video** has formed a computer bulletin board for owners and operators of Lexicon's OPUS and OPUS/e digital audio production systems.

IDB Communications Group, a provider of radio transmission services, named Orlando C. Guida VP of corporate services. Guida formerly was senior VP and CEO of **Hughes Television Network (HTN)**, which was purchased by IDB in January 1989.

Business . . . **AKG Acoustics Inc.**, a manufacturer of digital audio and scientific devices, has moved its digital audio engineering groups into a larger facility at the company's engineering lab in Vienna, Austria.

Kings Electronics Co. Inc., has closed its Kings Electronics Canada division, citing new trade regulations between Canada and the U.S. that make it unnecessary to have a separate division.

We make everyone sound great, day, after day, after day.

The span between the basso growl of your morning talent and the punch demanded by your evening party animal is measured in seconds and digits—two seconds and two digits, to be exact.

Every talent on the station has worked out the optimum combination of parametric EQ, compression and de-essing for their personal requirements, and we've given them a number between 00 and 99, their personal number, to achieve this combination at the touch of a button. They just punch in the number when they sit down, and all of their processing is reset instantly, exactly, repeatably.

We keep all that processing safely out of harm's way; no need to twist any dials because when their number's on the readout, they know they'll sound their best. Call Orban for more information about their 787A. It brings a whole lot of mic processing under control.

The Orban 787A
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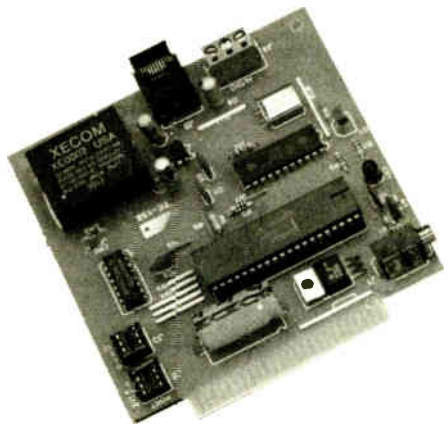
Circle 33 On Reader Service Card

World Radio History

MARKETPLACE

Radio World's Marketplace, a compendium of new and recently introduced radio broadcast products, appears monthly in Buyers Guide.



Telephone control card

Alpha Products has added the TE 158 telephone control card to its A-Bus line of data acquisition and control devices.

The card provides complete computer control of a telephone call. It offers a direct phone line interface with line connect/disconnect, call progress detection and touch-tone decoding and encoding.

The user can dial out and send messages with tones and it will answer the phone automatically. It is priced at $190.

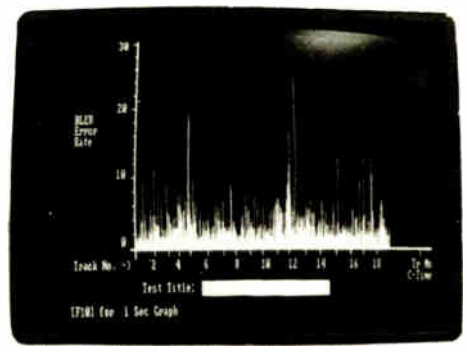
For information, call **Alpha Products sales department: 203-656-1806; FAX 203-656-0756; or circle Reader Service 147.**

CD analysis system

CD Associates announces the availability of the Quick Test CD analysis system, which enables CD manufacturing facilities to test the quality of CD pressings for conformation to the Red Book specifications in one-sixth real time.

The system consists of six CD players and an IBM PS/2 or compatible microcomputer with CD Associates software. Prices range from $12,895 to $65,000, depending on the depth and speed of analysis required.

For information, contact **Dave Loeppky at CD Associates: 714-733-8580; FAX: 714-786-1486; or circle Reader Service 23.**



Ensoniq EPS-16 Plus

Ensoniq has begun shipping the rack-mount version of its EPS-16 Plus digital sampling workstation. The EPS-16 is the first sampler to incorporate dynamic effects processing, the company said.

The system incorporates all the features of the keyboard version: 16-bit sampling with 100 dB signal-to-noise performance, 20 voice polyphony, extensive sampling and synthesis parameters, patch select buttons, "play while load" memory access and resampling of sounds with their effects.

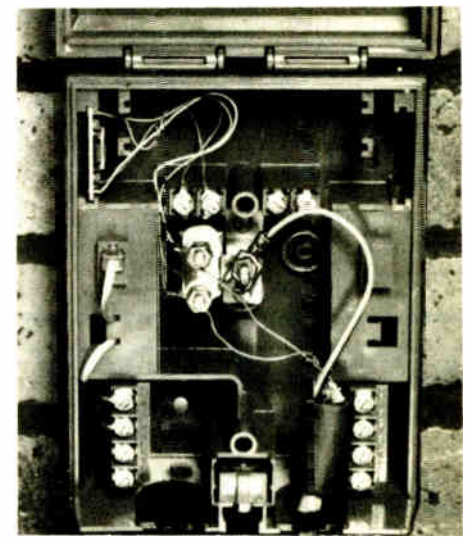
For information, call **Jerry Kovarsky at Ensoniq: 215-647-3930, extension 249; FAX: 215-647-8908; or circle Reader Service 39.**

Crystal oscillator

Raltron Electronics announces a new kind of oven-controlled crystal oscillator for use in advanced timing applications, such as personal earth station VSAT networks, TV test and broadcasting, navigation systems, instrumentation, synthesizers and cellular systems.

The new Model TF-65010-B OCXO offers oven-controlled stability for the price of temperature-compensated technology.

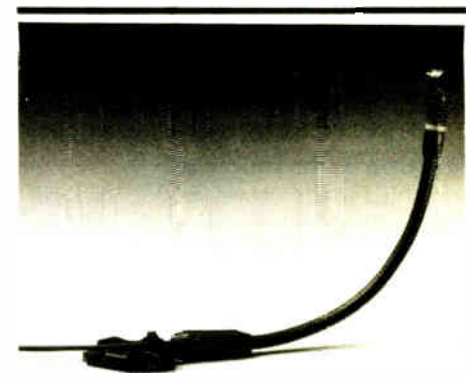
For information, call **Dick Hackmeister: 305-568-2511; FAX: 305-594-3973; or circle Reader Service 88.**



Floating ground clip

Panduit Corp., has announced a new design of a floating ground clip for use with telco wiring. Designed to provide power surge or lightning protection at an outdoor network interface box or pedestal, the floating design maintains cable shield ground even during settling of the earth in buried cable runs.

For information, call **Kim Bartolomucci: 800-777-3300; FAX: 708-990-2556; or circle Reader Service 90.**



Gooseneck condenser mic

AKG Acoustics has introduced the C406 miniature condenser microphone, part of the company's miniature studio-quality condenser mics designed for live performance applications.

The C406 features a flat response, hypercardioid capsule to boost feedback rejection and sound quality.

For information, call **David Ogden at AKG: 415-351-3500; FAX: 415-351-0500; or circle Reader Service 8.**

It's hard to stop.

What is it about the Signature III that keeps so many leading station groups and consulting engineers coming back for another, and another, and...? Is it this console's unparalleled record of reliability and longevity? The LPB Signature III's easily maintained modular electronics? Its excellent RFI immunity? Or is it designed-for-radio features like the following:

- 3 inputs per channel
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- Mono/stereo input switch (on stereo consoles)
- Components and connections clearly labeled for painless installation and easy maintenance

Chances are, it's all of the above. But whatever the reasons, leading stations and engineers across the country demand Signature III's "unstoppable" performance. In fact, they've made it one of the most popular consoles ever built. If you've been spending too much time inside your console lately, contact your broadcast equipment dealer or call LPB for full information and specifications at (215) 644-1123.

LPB Signature III audio consoles are available in 6,8,10 and 12 channel stereo and 6,8 and 10 channel mono configurations.

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Circle 106 On Reader Service Card

World Radio History

Kingdom's DAS Rules at WOLC

by E. Mark Bohnett, Chief Operator WOLC-FM

PRINCESS ANNE, Md. Under the present threat of an economic downturn, annual budget adjustments and the shortage of good board operators in small market radio, the "automation beast" once again raised its head, claiming to be the solution to our nightmares.

After four dissatisfying attempts at creating our own inexpensive and yet versatile automation system, WOLC took on the challenge of Kingdom Technology's Station Controller, along with its new Digital Audio System (DAS).

The Station Controller, along with our 286/16 MHz clone, allows us the flexibility of 12 audio input sources, which can be expanded if necessary.

Six different networks

In addition, we can utilize up to six different networks with their associated tones for our "local sound" and yet maintain tight breaks, relay closures for remote functions, silence sensing, audio fading, logging of events and many other features to allow for both flexibility and expansion in the future.

When using a low voltage control system, the 10-foot rule applies—it was confirmed with our system's installation. The computer, controller and other BCD-interfaced equipment cannot be separated by more than 10 feet without the possibility of some programming errors.

All of our previous "automation systems" (i.e., black boxes and a complete production room), were not limited by distance, and WOLC did not have the additional room necessary to accommodate the computer, two printers, the controller, cart, reel and cassette decks and two carousels in close proximity to each other.

USER REPORT

Kingdom Technology's DAS system and our 160 megabyte hard drive enabled us to compact our work area, freed up some needed equipment and introduced to us the potential of 160 30-second digital PSAs, SPAs, station enhancers, commercials, legal IDs or even short program segments. The system's potential is limited only by the size of the hard disk chosen.

Unfortunately, what you put in is what you get out. The DAS will randomly play spots of like content (IDs, SPAs, etc.) or it will allow specific spots to be placed and aired at specific times and on specific days. I even included a 1,000 Hz, 0 dB reference tone in a "file," which I use to set and maintain the output levels of the controller and all mono sources.

Programming technique

Kingdom Technology's controller and DAS systems were not shipped to us problem free. Weak documentation and user error, combined with a few software adjustments, created some initial complications. However, the service personnel have been cooperative in advising us on programming technique and quickly provided us with software corrections and/or updates.

The DAS system is not without problems, either. The sales manager has more than once pointed out the "speaker phone effect," which occurs during low or no-audio sections in a given spot. This is a problem Kingdom Technology says it presently is addressing.

If you find yourself without adequate staff or the funds to maintain every air shift, and you need a versatile automation system, Kingdom Technology's Station Controller with DAS is an affordable alternative.

■ ■ ■

For information on Kingdom Technologies' automation equipment, Call David Benoit at 904-664-5492, or circle **Reader Service 37.**

Sentry Guards KEZQ

by Mike Bettelli, Digital Systems Mgr. Sentry Systems

SEATTLE Sentry Systems has debuted its latest automation controller on station KEZQ-FM in Little Rock, Ark.

The FS12C Format Sentry is a PC-operated controller (compatible with IBM PCs) that will interface with two popular CD playback systems—the Sony 006 CD Jukebox and the six-slot Pioneer PD-M series machines.

The system interfaces with all multiple playback cartridge systems, most current hard disk systems, R-DAT machines, satellite programming and almost any type of audio gear.

TECHNOLOGY UPDATE

KEZQ is utilizing 20 of the Pioneer CD players, giving them random access to 120 compact discs. The Sentry also is ideal for live-assist operations or fully automated stations.

At KEZQ, the system interfaces with a floppy disk sent each week by Broadcast Programming of Seattle, containing complete music rotations configured to the station's clock. The Format Sentry also interfaces with most traffic systems.

According to KEZQ Operations Director Larry Henthorn, the station now can random access more than 2,000 songs and play back commercials, all controlled by a PC keyboard.

Typical cost for a complete Sentry System, including PC, CD players and the FS12C controller is less than $13,000. More than 200 Sentry Systems are in place worldwide.

■ ■ ■

For information, contact Mike Bettelli at Sentry Systems: 800-426-9082; FAX: 206-441-6582, or circle **Reader Service 103.**

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Circle 24 On Reader Service Card

World Radio History

MMCS Makes Digital a Reality

by Boyce Williams, President Pristine Systems

LOS ANGELES The Pristine Music Management and Commercial Control System (Pristine MMCS) has been developed over the last three years to meet the playlist scheduling and on-air playback requirements of radio stations in the 1990s and beyond.

The system is PC-based with two major components: a playlist generator that schedules music rotations and/or commercial break sequences; and an on-air playback system that controls multiple digital (and analog) audio sources.

The Pristine MMCS playback system controls CDs, DAT, computer hard disk audio (HDISK) and relay-triggered sources all in one playlist. It operates in a live, live-assist or totally automated environment and automatically logs playlist history for future printing.

TECHNOLOGY UPDATE

For music playback, the Pristine MMCS controls up to 48 Pioneer PDM series "six pack" CD players or 48 Tascam DA-30 DAT players, or any combination of the two using a CD/DAT controller card. An entire digital music library is on-line at all times.

The playback of commercial breaks can access up to 999 individual computer hard disk audio selections, 48 DAT players (containing up to 99 spots each) and 16 relay-triggered devices—or a combination of all three.

To address the special needs of satellite service customers, the latest release of the software has been enhanced to perform the random or sequential (user-defined) playback of hard disk audio liners, IDs and jingles. Individual "liner formats" may be defined for each on-air personality to match his or her weekly schedule.

The playlist scheduler can generate music and/or break playlists for an hour, day, week or month at a time. Music formats define music selection and rotation requirements, while break formats define when a break sequence should occur. It is possible to define more than 1,000 different music, break and day formats.

Music titles are categorized by artist, type of music, male/female, tempo and other music keywords. Allowable play hours are designated for each song to provide dayparting capabilities.

With additional optional software, the system can operate in a multitasking environment, and also can be controlled from a remote location through a modem. Software interfaces are available for several existing traffic packages and music schedulers.

A quarterly software service and support program is available to existing customers to provide them with the latest Pristine MMCS features and enhancements as soon as they are implemented.

Engineers may be interested to know that the audio and computer equipment used with the system hooks up without modification, and can be acquired from a large selection of suppliers.

The Pristine MMCS has been designed and developed with the playlist scheduling and on-air playback needs of the digital radio station in mind. The Pristine MMCS has shown it can operate as a music source, a satellite commercial source or a fully integrated broadcast system.

Pristine MMCS software prices start at $2,300, with complete systems typically costing between $10,000 and $25,000.

■ ■ ■

For information on the Pristine MMCS, call Boyce Williams at Pristine Systems: 213-852-0737; or circle **Reader Service 85.**

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When you work with Harris Allied Systems, you work with people who know broadcasting and communications from conception and design through final sign-on and documentation. So you can be most confident that your project will have a functional, ergonomic layout like the ones pictured here. You can be sure that all of your equipment will meet the highest standards of form, function and reliability. You can then concentrate on the other important aspects of managing your facility.

From transmitter building (pre-fabricated or constructed on-site), to transmitter installations, towers, antenna systems and even terrestrial microwave links, the experts at Harris Allied Systems will ensure total systems integration and performance.

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Qwik Disk at WVVE

by Matthew Allen, Ops. Mgr. WVVE-FM

NEW LONDON, Conn. At WVVE, our decision to choose a satellite delivery system for programming was about 90 percent economics and 10 percent programming.

So when we began to look for ways to execute Satellite Music Network's Pure Gold format, it seemed ludicrous to spend thousands of dollars on new equipment that would not give us dependable performance for the lowest possible cost—including personnel costs.

Also, we already had spent a bundle on a new audio chain to make the satellite sound fantastic, and I expected our commercials to do nothing less than complement this new equipment.

The best available

The word "automation" brought to mind an image of a wall-sized mechanical monster with carousels, instacarts or other maintenance-hungry, cart-eating gear. Amazingly, I found many companies still promising these nightmares as the "best available."

So after rejecting traditional products, I looked at a host of the new, PC-based digital systems and finally chose Quik Disk from Systemation. It wasn't the least expensive—or the most—but it offered many features and benefits not found elsewhere.

Quik Disk, the size of an IBM AT, with color monitor and printer, fits nicely on the countertop in our production studio. It is well-built and has taken everything our production and sales staff can dish out.

I was not computer literate when Quik Disk arrived and I was nervous, expecting huge manuals, hours of learning and the inability of our staff to first learn the system.

Surprisingly, within two hours of installation, I was moving with ease through the multiple functions of Quik Disk and modifying the many available clocks to match our needs (Systemation does a fantastic job of configuring the system at the factory, greatly simplifying our job). Loading traffic manually from the keyboard is a snap, but downloading from our traffic system will take even less time.

On their way

After a half-hour training session with the staff, they all were able to input, playback and edit spots, promos and liners and use the system as easily as our cart decks. Even the sales staff was able to verify, check and edit end dates and play spots for clients.

USER REPORT

Systemation's programming department has gone above and beyond with information, features and a brilliant user screen. Unlike a word command driven system, Quik Disk uses something closer to a Macintosh-type icon system. For live assist, it's quick, simple and informative.

Quik Disk has not been without some minor complications, but every problem has been handled "qwikly" and efficiently by Systemation staff. Systemation has a 24-hour number with a qualified tech person on site during the day, and on call at all times. This alone is worth thousands to me. In addition, Systemation sends regular software updates and is extremely receptive to customer ideas for their updates.

Systemation has been in automation for more than 10 years, and with the development of products like Qwik Disk for satellite and CD automation, I believe the company has ensured its place in radio for the 21st century.

■ ■ ■

For information on Qwik Disk, contact Systemation representatives David Gerety in Dallas at 214-458-8807, or Steve Bellinger in Decatur, Ill., at 214-428-7101; or circle **Reader Service 138.**

World Radio History

BAI Automates Alia Network

by Julio Zaga, President
Alia Communications

HOUSTON The Alia Spanish Network was designed to provide continuous Spanish news, sports, music and entertainment programming to affiliates throughout the Americas. To reduce costs and human errors, and to get more productivity from our present staff, we decided that automation would be the logical next step in our development.

USER REPORT

We wanted the network to be as simple as possible for our clients to implement, so we began searching for a system integrator experienced in automation equipment that could help us design such a system.

After explaining our requirements to several possible vendors, the only one we found that could meet our demands at a reasonable price was Broadcast Automation (BAI) of Dallas, Texas.

At the top of each hour, we broadcast two minutes each of national, international and sports news. There is a one-minute local block available during the news block. Stations are free to take as much or as little of this news as they wish.

Additionally, there are combination five-second station IDs/one-minute spot breaks throughout the hour and a 30-second satellite ID just prior to the top of the hour. Automated stations must be told when these breaks are to occur by the use of 25 Hz and 35 Hz tones on the program channel.

Alia Spanish Network uses Broadcast Automation's digital automation system to transmit to affiliates nationwide.

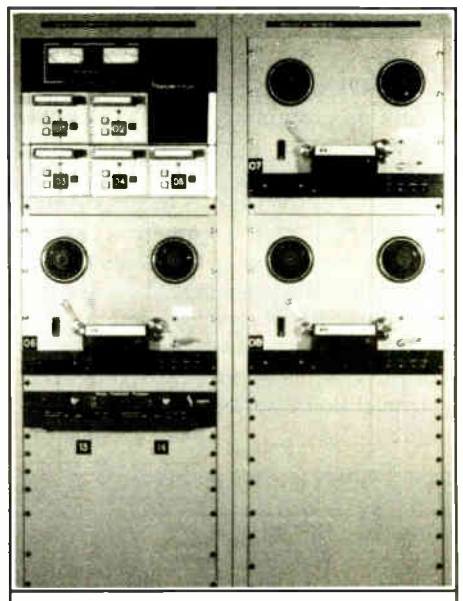
BAI proposed an automation system consisting of a Format Sentry automation controller, a Time Sentry module (accurate clock) for use in our computer system, four Otari ARS-1000 reel-to-reels for music, five Audi-Cord single play cart decks for news and IDs, Conex tone generators, connections for our satellite and studio feeds, and several additional pieces of gear.

BAI did some custom work on this system. By using all the items listed above, we nearly exhausted the 12 inputs available to the controller. In fact, to be able to program the 25 Hz and 35 Hz tone generators as individual sources would have required 13 source inputs.

To remedy this, BAI built a custom interface that allowed us to program the Conex tone generators individually without using any of the standard inputs. This leaves us the capability of adding another source later, such as a Sony CDK-006 compact disc jukebox.

The comapny also provided standard barrier strip connections for all our local input and output requirements. This allowed external connections to the system to be made easily.

Installation was quick and easy. BAI delivered the system, installed it, trained our personnel in its programming and assisted us in making our own music tapes direct from compact disc.


Broadcast Automation's digital system found a home at Alia Spanish Network.

The only negative we have experienced is that we cannot edit our next day's on-air program while the current day's program is on the air. We get around this by doing future day's programs on another computer.

Overall, we feel that our experience with BAI was a positive one. We'll be recommending BAI as a primary source for automation equipment for our clients.

■ ■ ■

For information on Broadcast Automation, contact BAI Operations Manager Steve Walker at 214-380-6800; FAX: 214-380-0823; or circle **Reader Service 143.**

Doing It with Digital

by Dane Butcher, President
Symetrix Inc.

SEATTLE Because digital audio has become a primary element in the formula for modern radio stations, the digital audio workstation is a beast that every engineer must reckon with sooner or later.

If you don't have a workstation in your production room or project studio yet, you just might in the not too distant future.

As with any other capital expense, a workstation must be justifiable from a bottom line point of view. Currently, scores of manufacturers are marketing workstation products for a wide range of applications, including film and video post production, music recording and broadcast production.

Only a dream?

The available technologies range from simple DSP cards that plug into personal computers (and make use of the PC's hard drive to store audio) to stand-alone systems priced in excess of $250,000. If one were to assemble the best features of each of these machines into a single dream system, imagine some of the things one would be able to do:

- Record, play, edit and overdub multitrack recorder-style (24 tracks or maybe even more). This capability could be used to create or edit music beds, dialogue and sounds effects, IDs and other elements. Use the workstation's analog inputs and outputs or come in from CD or DAT via the digital ports.

GUEST OVERVIEW

- Work on a CRT with a mouse or graphics tablet or on a traditional "hard" control surface (which looks pretty much like your existing analog console) and perform non-destructive edits in seconds. Trial and error cut and paste editing allows unlimited experimentation. This allows you to be as creative as you wish without worrying about destroying "originals."
- Precisely drop in sound effects from "store-bought libraries" or roll your own custom effects into proprietary libraries.
- Lock the workstation via SMPTE or

(continued on page 40)

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Circle 75 On Reader Service Card

World Radio History

KQMJ Selects DCS Automation

by Troy Langham, Ops. Mgr. KQMJ-FM

TULSA, Okla. When we decided to put satellite programming on KQMJ, I knew I did not want to go the normal route of using a cart-based automation system.

After a careful look at our options, I selected the Digital Commercial System (DCS) from Computer Concepts Corp.

DCS allows us to retain the best features of a conventional system such as spot overlap, instant random access and multicut carts, while adding capabilities that no conventional system can do.

Our DCS system has two workstations communicating on a Novell Local Area Network (LAN). One is for the production room where all "carts" are recorded, and the other is in the control room, where it is used for live programming as well as the hours that we are satellite programmed.

USER REPORT

Having two workstations means that I have 100 percent redundancy, not only of storage of our spots but of the hardware that plays the stored "carts." This redundancy gives me much peace of mind.

Two major problems with conventional automation for satellite programming are a limited number of cart slots and timing of stop sets. Both problems are solved by DCS, which allows an unlimited number of slots. We have more than 400 carts on-air.

DCS also eliminates timing problems where either the stop set is two or three seconds short or where a spot is missing. DCS will place delays between "carts" to compensate for those small timing problems. If an entire 30-second or 60-second spot is missing, it will automatically fill the set from a list of approved filler PSAs and promos.

The problem of stop sets that are too long is addressed by Computer Concepts' new program that applies time compression/expansion with pitch transposition to the entire stop set, making all our stop sets exactly match the network breaks.

DCS interfaces to the station through professionally balanced 600 ohm inputs and outputs. While this may seem standard, I found that many other digital systems were unbalanced in and out. The audio quality is fantastic, of course, because of the digital storage. The sample size and sample rate, as well as mono and stereo, are selected each time you record a "cart" with more than 80 cuts, and then select which of those cuts will run on-air and in what order.

Because DCS is fully interfaced with our traffic and billing system, we do not have to type in a log. DCS reads the log from our traffic and billing computer both for satellite programming and live programming.

Another unique feature for a digital storage automation system is the ability to play two "carts" at the same time. This gives us a more "live" sound on satellite by allowing the end of one spot to flow underneath the start of the next.

Computer Concepts' Digital Commercial System gets thumbs up from KQMJ-FM.

Computer Concepts Corporation has given me 100 percent support. Not that I have had any failures after getting the initial bugs out of the system, but being able to pick up the phone and talk with someone any time I have a question is great.

This accessibility helped make our transition to this new technology as painless as possible. Having placed satellite programming on three other stations using conventional automation systems, I honestly believe that using a digital system is much better and hassle free.

■ ■ ■

For information on the DCS, call Rich Habedank at Computer Concepts: 913-541-0900; FAX: 913-541-0169; or circle **Reader Service 20.**

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(and it is)

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It may be an old cliche, but it is factual that Harris Allied Equipment Exchange has been, and will continue to be, the broadcaster's friend in good and soft times and offer you the best in the BUY—SELL—TRADE market for used broadcast equipment.

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Working with Digital

(continued from page 39)

MIDI timecode to synthesizers, samplers, emulators, drum machines or computers to create everything from special effects to expansive original music beds in a fraction of the time it used to take to do it in a dedicated multitrack studio.

- Time compress/expand material as needed. If the bed comes in at 31 seconds, you can squeeze it down to 29.5 with the stroke of a few keys. Process the entire bed or just an individual sound effect.
- Play with some signal processing—add a touch of reverb, a little EQ, compression, limiting or leveling without leaving the digital domain. Load up a special offline processing algorithm that squeezes the entire spot into a 20 dB dynamics window.

When the spot is completely assembled and edited, perform an automated mix while still in the digital domain. Let the workstation drop in 30 different tags at the end of the spot while you go out to lunch.

- Back up the completed spots to a removable magnetic optical disk as a background task. You work on the next project while the workstation automatically backs up the last one.
- Eliminate noise. Reprocess old carts or LPs, removing tape hiss, surface noise and scratches.

All of this might sound like a late-night techno dream, but it's really not. The above-mentioned technology is on the streets now—but not, mind you, all in one workstation. At the recent AES convention in Los Angeles, I counted more than 50 manufacturers on the show floor with workstation products.

So if this technology lets us do twice the work in half the time, why not blow the 1991 budget on a workstation? Great idea. But keep in mind that every emerging technology comes with a few caveats.

Let the buyer beware

When making a decision about your own digital workstation, remember that new technology means more education. Part of your capital outlay will involve paying for the learning curve. Choose a workstation that's easy to learn and easy to use.

Also keep in mind that the technology still is evolving rapidly, which means the workstation you buy today may depreciate rapidly with new advances.

And purity of your audio signal is just as important in the production room as it is on air. Check and double-check workstation specifications, paying special attention to A/D and D/A converter numbers. Not all digital machines were created equal.

Last but not least, don't overlook such mundane issues as maintenance. Choose a manufacturer with a solid reputation for aggressive, ongoing support.

Remember, a workstation is a very sophisticated audio computer. And as we all know, computers that never crash are about as rare as jocks with a halo.

■ ■ ■

Dane Butcher is president of Symetrix Inc., a Seattle, Wash.-based manufacturer of audio signal processing devices. He serves as director of development for the Symetrix "DPR" series of four-, eight- and 40-track digital audio workstations.

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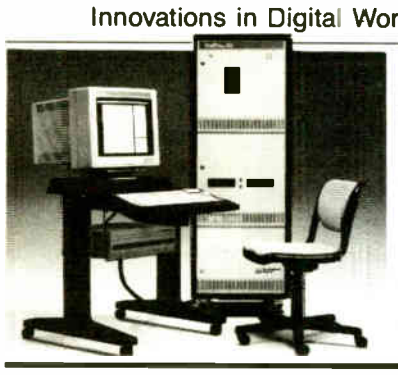
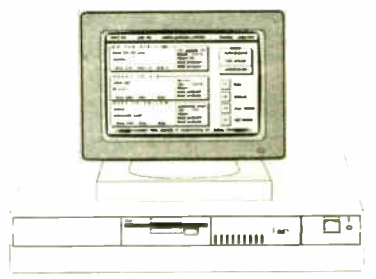


WHITE RIVER JUNCTION, Vt. The PostPro SD digital audio workstation from New England Digital integrates hard disk recording/editing with RAM-based sampling under a single operating system, allowing users to create and modify sounds while editing audio to picture.

For information, call Ted Pine at New England Digital: 603-448-5870; FAX: 603-448-3648; or circle **Reader Service 13.**

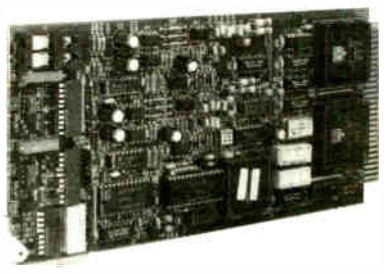


DALLAS TM Century's Digital Studio System allows users to control all music CDs and jingles, sweepers or spots on cart, RS-DATs or TM Century's Digital Commercial System.

Countdown clocks, intros, lengths, endings, spots, titles, artists and trivia all are on the screen at a glance.

The Digital Studio System comes with computer, log printer, CD changers and interfaces for cart and DAT players—only console, mic and commercial cart players are not included.

For information, contact Dave Scott, president of TM Century, at 800-937-2100; FAX: 800-749-2121; or circle **Reader Service 44.**



LITTLETON, Mass. Intraplex Inc., has begun shipping its new PT/PR-150 compressed digital audio program modules.

The PT-150 and PR-150 are plug-in modules for digital coding of 15 kHz and 7.5 kHz audio channels. The modules use linear 16-bit coding to obtain CD-quality performance.

For information on the products, call Christine Doyle, communications director of Intraplex, at 508-486-3722; FAX: 508-486-0709; or circle **Reader Service 18.**

ROSEVILLE, Calif. The Caps II Computer-Assisted Programming System from Concept Productions is a complete audio storage and playback system for automated or live radio stations.

Music storage on DAT allows for 124 hours of songs, while hands-off operation allows unassisted programming for several days or several weeks.

Random accessible system features include computer-controlled audio mixer; up to 22 stereo channels; audio fade; program and audition bus; audio overlap for smooth, tight production; and real-time commands.

For information on Caps II or Caps I, call President Dick Wagner at 800-348-4800; FAX: 916-786-8304; or circle **Reader Service 127.**

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A powerful group of accessory modules will increase your production control, like a 7-station intercom module that links this console with other Wheatstone consoles and talent stations throughout your complex; a full-function tape recorder control panel; an 8-position source selector to enhance input capability; additional studio modules to accommodate multi-studio installations; and finally, a digital event timer and a precision clock.

So contact Wheatstone, the company with the integrity and experience you can count on.

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SP-6

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Finally engineers confined to tight budgets can choose a console that won't compromise station reliability or signal integrity. After all, the A-32 is a Wheatstone console. It borrows from the componentry and design of our larger A-500 consoles, currently installed in major markets all over the country, from frontline independents to national networks.

Our new A-32EX is even better, with ample expansion room for additional inputs and a powerful family of accessory modules, including our new MP-32 talkshow module (that neatly interfaces multiple hybrids, tape recorders, announcer mics and studio-to-caller feeds), our ICM-32 six station intercom module (letting you communicate with other conscle locations and announce studios), and our SC-20 studio module (to provide comprehensive studio monitor, automatic muting, and talkback functions), plus multiple line selector and machine control modules, and a complete family of studio turret components.

The A-32EX console features modular construction, a fully regulated rackmount power supply, logic follow, full machine control and of course, an all-gold contact interface system. It has two mic channels and fourteen stereo line modules, each with A/B source select and Program/Audition bus assign, plus Cue switches on the line modules. Standard features include Program and Audition VU meters, digital timer, and a monitor module for control room and headphone functions. The console is also available in a smaller version (the A-20) with two mic channels and eight stereo line input modules.

The A-32EX is a perfect choice for stations planning an upgrade in signal quality and control room image. It's also a natural choice for the newsroom. So profit from Wheatstone's experience and reputation–call us today for immediate action!

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