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Radio World®

See pp. 25-33

Vol 19, No 14 Radio's Best Read Newspaper July 12, 1995

Patent Snags EAS, May Delay Implementation

by Lynn Meadows

WASHINGTON The attempt by the Federal Communications Commission (FCC) to devise a non-proprietary Emergency Alerting System (EAS) and roll it out on schedule may have met a glitch.

A Kansas company believes it has a patent on the requirements for the new geographically-directed alerting system.

Quad Dimension Inc., based in Overland Park, Kan., received a patent for its Storm Alert For Emergencies (SAFE) system on June 9, 1992. A significant part of SAFE is its geographically specific emergency alerts. The patent describes a composite code string that includes "a location code string component and an alert code string component."

The FCC Report and Order on EAS, issued two-and-a-half years after the patent was granted, requires stations to purchase equipment that can decode a four-part digital coded message. Along with other information, the codes will indicate both the emergency event and the location of the area that is affected.

In June, several manufacturers of EAS equipment received letters from Quad Dimension informing them that they need a licensing agreement to use technology covered by the patent. "We are interested in licensing this patent and will discuss it with anyone who is interested," said Quad Dimension Vice President Larry Ganzer.

Royalties paid for the technology by manufacturers could translate into higher costs for station owners looking to purchase EAS equipment.

FCC knowledge

FCC reaction to the news hinged on whether the person speaking was one of the handful of FCC officials aware of the patent. A review of the documents filed during the EAS development process revealed that Ganzer submitted at least three comments and the patent to the FCC.

Letters dated Oct. 9, 1992, and Dec. 19, 1992, were sent to Acting EAS Chief Frank Lucia. Another letter dated Oct. 20, 1994, went to FCC Chairman Reed Hundt. The letters discuss SAFE and its potential for the new EAS system. Ganzer also sent Lucia a videotape of SAFE being demonstrated at Kansas television station KCTV channel 5.

Lucia said his office was looking into the patent matter now that manufacturers had expressed concern over increased costs for licensing fees. "I can't give an official reaction because the weather service is also looking into the matter," he said.

Dr. Helena Mitchell, assistant to the chief at the Office of Engineering and Technology expressed surprise that a patent existed. "We are mandating a protocol and a standard but not any special equipment," she said.

It was the FCC's intent that no one company or person would have a market hold on EAS. "The latest generation of equipment approved by EAS allows for a multitude of technologies to send and receive local, state, and federal alerts," Mitchell said.

She pointed out that EAS technology has been used for several years by the National Weather Service (NWS). NWS created the National Oceanic and Atmospheric Administration (NOAA) Weather Radio Specific Area Message Encoder (NWRSAME) in the 1980s.

Patent debate

There are several similarities between NWRSAME and SAFE. Like SAFE, the NWRSAME technology uses Frequency Shit Keying (FSK) to transmit its code. According to NWS documentation, NWRSAME also uses its codes to send information indicating both the hazard message to be broadcast and the geographical region affected.

According to sources at the NWS, the idea to use geographically specific alerts dates back 15 years or more. The NWS initial emergency plan was to generate a 1050 Hz tone on NOAA weather radio to alert listeners of emergencies. They quickly discovered that they needed a way to specify what geographic area to alert.

Although NWS has been using EAS technology since the mid-1980s, no patent was ever requested for NWRSAME.

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Senate Reforms Radio

WASHINGTON Senator Larry Pressler, chairman of the Senate Committee on Commerce, Science and Transportation, met his self-imposed July 4 deadline for passing Telecommunication legislation.

On June 15, along with deregulating the cable, telephone, and television industries, the Senate swept away all barriers to radio group ownership and passed the historic bill 81 to 18. This is good news for group owners who want to expand beyond the current 20 FM/20 AM station limit.

In a statement, Pressler said, "This bill breaks up monopolies and tears down regulatory barriers. After it becomes law, the broadcasting, cable and telephone businesses will never be the same as before."

The House will debate its version of the bill next. That version, which is very similar to the Senate version, will probably be brought to the House floor before the August recess.

The Senate bill removes all caps on radio ownership and increases the license terms for radio stations to 10 years. If the bill becomes law, the industry could see a lot of shuffling as new and established group owners buy up the small stations ready to sell.

continued on page 14 ▶

Circle (28) On Reader Service Card

World Radio History

NEWSWATCH

FCC Seeks Comments on DARS

WASHINGTON The Federal Communications Commission (FCC) issued its long-awaited notice of proposed rulemaking (NPRM) on digital audio radio satellite service (DARS).

The commission is seeking comments on a variety of issues surrounding DARS including: 1) How many nationwide licenses should be awarded; 2) How much spectrum each licensee should be assigned; 3) How licensees should be elected if mutually exclusive applications are filed; 4) How the service should be regulated, and 5) Whether licensees should be permitted to use some of their spectrum for non-DARS services.

Among the options for licensing at the FCC, is the consideration to assign all the spectrum to only the four current applicants for DARS, license some of the spectrum now and hold some in reserve for future applicants, and open up the spectrum to all interested parties.

In separate statements, Commissioners Quello and Ness both raised the issue of DARS' impact on terrestrial broadcasters. Ness favors making DARS a subscription-based service. The NAB as well restated its opposition to DARS.

Comment date for the NPRM is Sept. 15 and the reply comment period ends Oct. 13.

Marconi Radio Award Nominees Announced

WASHINGTON The National Association of Broadcasters (NAB) announced the nominees for the 1995 NAB Marconi Radio Awards. The awards will be presented at the close of the NAB Radio Show in New Orleans on Saturday, Sept. 9.

More than 100 stations and personalities have been nominated in twenty-two categories. NAB member radio stations will select the winners.

The coveted "Station of the Year Award" is divided into four categories based on market size.

Up for awards in the "Major Market" category are WALK-AM-FM in Nassau/Suffolk, N.Y.; WBZ(AM) in Boston; WDVE-FM in Pittsburgh; WINS(AM) in New York City; and WJLB-FM in Detroit.

Nominees for the "Large Market" category are KSHE-FM in St. Louis; WFBQ-FM in Indianapolis; WHRK-FM in Memphis, Tenn.; WSOC-FM in Charlotte, N.C., and WZZK-AM-FM in Birmingham, Ala.

"Medium Market" nominees include

continued on next page ▶

When looking for a digital audio system for automation of satellite programing or live assist, there would appear to be many choices. But if you're looking for a system which is flexible enough to give you total control without sacrificing your sanity, there is only one choice. The Phantom by RDS.

You will see the difference as soon as you see the Phantom in action. The display provides you with all of the information you need to see in a clean, concise manner, without the crowed look that you'll find in other systems. If you are familiar with the most popular software on the PC, then you may already know how to use the Phantom. The Phantom's pull-down menus guide you through all of the steps involved in setup and daily operation, from creating and scheduling clocks to creating and editing logs.

The PHANTOM
Digital Audio Automation

The Phantom ends the confusion of automation by keeping everything organized. The Phantom simplifies your daily operations by keeping information such as input changes, voice changes, and clock changes in their own individual schedules rather than in the log. You can leave those liners and other voice drops out of the log because the Phantom will do them for you. The Phantom allows you to date new schedules to begin weeks, months, or even years in advance. When your satellite network informs you that there will be a voice substitution on Thursday, two weeks from today, you can prepare for it *today*.

The Phantom can retime spots to fit them cleanly into a satellite break without inserting silence, overlapping, or running late. The Phantom can create reports to keep you informed on a number of topics, from a list of expired spots to an analysis of potential mistakes in your log. The Phantom also maintains a history of system activity.

The Phantom has the features that others would want you to believe are theirs exclusively. The Phantom remains *completely* functional during recording, sensing relay closures and starting breaks as easily as it does when it is not recording. The Phantom can fill incomplete breaks with spots from a list you specify without ruining product separation.

While other systems tie your hands and limit your flexibility by only offering 3 or 4 inputs, the Phantom gives you 6 stereo inputs, using its AMX-84 solid state switcher, with the option of increasing the number of inputs to 14 or more. If your station is News/Talk, you know how important this can be.

The Phantom allows you to change the sampling rate, digital format, and stereo/mono settings at will to meet your needs for an individual spot. The Phantom offers a number of digital formats, including the new Dolby AC-2 format, as an option.

Call us today to find out how your station can benefit from the advanced technology of the Phantom and the experience of RDS.

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REGISTER DATA SYSTEMS

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KLBJ-FM in Austin, Texas; KLEF-FM in Anchorage, Alaska; WHO(AM) in Des Moines, Iowa; WILM(AM) in Wilmington, Del., and WMT(AM) in Cedar Rapids, Iowa.

Stations nominated for Station of the Year in the "Small Market" category are KOEL(AM) in Oelwein, Iowa; KROC (AM) in Rochester, Minn.; WDLB(AM) in Marshfield, Wis.; WHIZ(AM) in Zanesville, Ohio, and WQCB-FM in Brewer, Maine.

NAB Pleased with Legislation

WASHINGTON The National Association of Broadcasters (NAB) issued a statement saying it is pleased with the proposed House legislation to exempt broadcasters from a new performance right in digital sound recordings.

NAB President and CEO Eddie Fritts testified for the exemption in a hearing explaining that the broadcast and recording industries have a symbiotic relationship. In return for the use of its products, he said, the broadcasting industry has helped the recording industry "sell literally billions of records, CDs and cassettes, and sold millions of concert tickets."

TAB/SBE Conference

AUSTIN, Texas The Texas Association of Broadcasters & Southwest Region of the Society of Broadcast Engineers Annual Convention & Media Technologies Trade Show will be held Sept. 29 through Oct. 1 in San Antonio, Texas.

The conference includes a "futures" session with input from Microsoft, GTE, TCI, and others. Speakers at the convention include FCC Commissioner Susan Ness, Representative Jack Fields (R-Texas), chairman of the House telecommunications subcommittee, and Roy Stewart, chief of the Mass Media Bureau of the FCC.

New SPARS Board Appointee

HOLLYWOOD, Calif. The Society of Professional Audio Recording Services (SPARS) appointed Michael Tarsia to its Board of Directors. Tarsia is president of Sigma Sound and the son of the first SPARS president, Joe Tarsia.

"Having grown up with SPARS and seeing my father's contribution to the organization, it's really an honor to join the Board of Directors," he said.

Before becoming president of Sigma Sound, Tarsia earned over a dozen gold and platinum albums working with artists like Patti LaBelle, New Edition, Sheena Easton, and Bruce Hornsby.

CBS Newscaster Dies

MONTCLAIR, N.J. Dallas S. Townsend Jr., who worked for CBS News from 1941 to 1985, died June 1 at the age of 76.

Townsend wrote and anchored the "CBS World News Roundup," the longest running radio news broadcast in the nation. He received the duPont-Columbia University Broadcast Journalism Award, a Peabody Award, and an Armstrong Radio Pioneer Award for his 25 years of work on that show.

Eric Ober, president of CBS News said of Townsend, "In his more than four decades with CBS News, he distinguished himself as a great writer, reporter and broadcaster, and his loss is deeply mourned by his many, many friends and colleagues at CBS News."

Sony Launches Automation Package

by Mel Lambert

LONDON It is often said that a successful innovation can be recognized by the fact that the totality of a particular system is far more powerful than the sum of its constituent parts. In the case of Sony's new Effective Radio Automation, or ERA, which received its worldwide unveiling at the recent Montreux ITVS in Switzerland, the full integration of digital recording, mixing, DSPs and replay capabilities represents a remarkable development.

Sony personnel in Montreux were the first to point out that the majority of the ERA's components have been seen before; it is the company's interconnection and inclusion of a new hard disk-based scheduling software that enables all on-air functions to be fully integrated.

The system is centered around the familiar DMX-B4000 Series all-digital mixer, available in two mainframe sizes to accommodate either 16 AES/EBU-format digital inputs routed via eight faders to one stereo output and two stereo aux busses (model B4016), or 30 inputs routed via 16 faders (model B4016). Full digital signal processing, including assignable EQ and filters, is also available.

Inputs to the DMX-B4000 can include DAT machines, for long-form playback, CD single/multiplayers (such as the CDK-3600 CD AutoChanger being demonstrated in Montreux), and MiniDisc players (including the MDS-B3 and B4P). Dual mic/line input modules with 20-bit A-to-D converters are also available for the B4000 Series mixer, to accommodate non-digital sources. And for off-rate digital sources, the DAF-1500 frame can be expanded to include sample-rate converters and other peripheral components.

What ties all of these various system components together in a unique way is Sony's new PC-based automation software. Designed to operate on a standard 90 MHz Pentium-based platform under Windows 3.1, the new controller is equipped with both RS-232 and RS-422 serial interfaces for connecting to the DMX-B4000 Series mixer and various digital playback devices. Additional PCs can be connected to the master controller via a convention local-area network—and which would be taking care of the overall scheduling and replay functions for a station—to allow off-line workstations to be used to prepare, for example, playlists and commercial schedules. All events within the automation system are available as standard-format information that can be sorted and otherwise manipulated using word processors and database software.

(For the technically curious, at the heart of Sony's new radio-studio automation system is an industry-standard database based on SQL—or structured query language interfaces that provide simple drag-and-drop manipulation of database information within the time-dependent playlist.)

The ERA System is scheduled to begin shipping by the end of this year; tentative price for a "typical" complement of PC-controlled CDs, DATs and MiniDisc players routing through a 16-fader DMX-B4000 Series mixer is in the neighborhood of $150,000. For radio stations wishing to automate an existing B4000 mixer and peripherals, the master PC-based controller is expected to be available for around $12,000.

Because the DMX-B4000 Series is designed for full serial control, including the ability to off-load and recall entire system settings, it represents an ideal choice for automated broadcast applications. Having caused, for example, a CDK-3600 CD changer to load, pre-cue and then initiate playback mode of a selected title, it is a simple task to issue a command to the mixer that causes its microprocessor-controlled input matrix to route a designated stereo input source via EQ (if appropriate) to the stereo output at a pre-set level. Once that event has been completed, a relatively simple sequence of commands will set up and initiate the next event, and so on through the pre-programmed list of audio cues and playback elements.

In addition to a fully-automated mode of operation, with all playback events being triggered against a master clock, it is also possible to run the ERA System in operator-assist mode, whereby the PC handles playback of pre-determined sequences—a couple of music segments—followed by a station ID, for example—opens the DJ's microphone channel, and then waits for a command from the console before initiating another pre-programmed sequence. Such "pause events" can be inserted into the playlist to allow the DJ or operator to throw forward or back-announce a segment, or to introduce other events such as a phone-in or studio interview.

Because pause events are often of an unknown duration, a visible countdown displays the unfilled time remaining in a timed show.

In addition, all playback events are tagged in a read-only file that can be used for traffic and commercials billing purposes. (The events history file can be retained for a user-defined period of time.)

All in all, Sony's ERA system represents an interesting development. Utilizing proven components and user-selectable playback media, it is possible to configure an all-digital system that can be full or partially sequenced, according to your station's format.

□□□

Mel Lambert is a principal of Media&Marketing, a Los Angeles-based consulting service for the professional audio industry. He can be reached at mediapr@aol.com, or 818-753-9510.

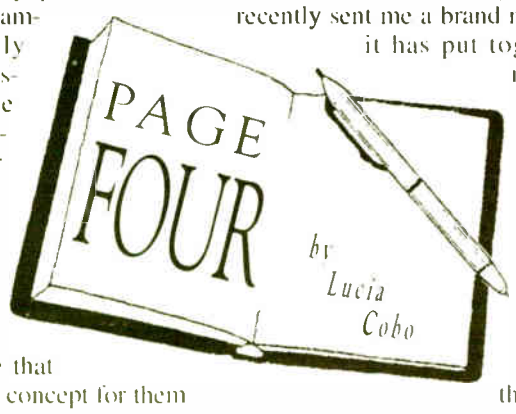
Circle (187) On Reader Service Card

World Radio History

Ranks of RDS-Ready Swell, But Promo Lags

WASHINGTON The EIA initiative to outfit radio stations with RDS capabilities is off to a great start. This issue's RDS Roll Call lists 50 more stations than the Roll Call page of just three months ago (see **RW**, April 19). The long-range goal is 500 stations in the top markets, so a 10 percent roll-out in the first three months is pretty good.

It would be nice, though, if the stations did something with RDS once they got it. Commercial stations in Washington still lag behind WETA-FM, the non-commercial station, in that department. While WETA-FM creatively promotes upcoming programming in a constantly changing scrolled message, I'm lucky to tune in more than call letters at any of the other outlets that are RDS-equipped so far.



Many important and successful radio groups own stations in this market and I find it hard to believe that RDS is such a difficult concept for them to master. Get with it, radio. Technology is passing you by...

★ ★ ★

On a related note, I received a call from a television engineer (who reads **RW**) the other day wanting to know why it was so tough for him to find a state-of-the-art radio for his car. His beef was that local retailers did not know or care about AMAX- or RDS-equipped radios for his car.

I must confess, I was very busy and did not spend a great deal of time with this engineer-in fact, I pointed out to him that **RW** is a trade publication and we do not deal with the consumer.

But since that phone call, I keep wondering if, as an industry, you are doing enough to promote yourselves technically speaking. I know you all know how to coordinate events and concerts and contests, but how about some time spent promoting ways for listeners to get more enjoyment (audible enjoyment) out of your station?

Anyone giving away RDS-equipped receivers yet? Or AMAX Walkmans?

The younger crowd these days is pretty technically with-it. I'd bet good money that anyone willing to shell out $60 to buy a computer game and $15 for a CD (I remember when that would buy you a double album) would probably want technically superior receivers with all the "fixins."

★ ★ ★

The Radio Advertising Bureau (RAB) recently sent me a brand new publication it has put together to help market radio to advertisers.

The "Radio Marketing Guide and Fact Book for Advertisers" is packed with hundreds of marketing facts that stations can use to their advantage. For example, do you ever tell potential customers that radio reaches almost every single person in the United States every week? And that the average listener spends more than three hours tuned in to his or her favorite radio station?

The new guide encompasses a broad range of data, including radio audience profiles, specific target consumer groups, competitive media and individual format profiles. Daily and weekly audience data is arranged demographically, and the book also includes information on average daily and weekly reach, time spent listening, daypart breakouts and listenership by location.

The guide features profiles of the Hispanic and African-American audiences.

The publication is a very nice, four-color book that can help just about any sales presentation. If you'd like a copy, contact the RAB's services department in Dallas at 214-753-6700.

★ ★ ★

Last time out I wrote a little bit about the war between WPGC-FM and newly acquired WKYS-FM. A release landed on my desk this morning that proves Infinity will have its hands full keeping its station's position of dominance in the market.

It seems that Radio One (founded by Cathy Hughes) just received an infusion of $10 million from Burr, Egan, Deleage & Co. and BancBoston Capital Inc. in the form of subordinated debt. Funds "will be used to assist management in its acquisition of WKYS-FM in Washington." That is a lot of money. Stay tuned everyone.

Giving Something Back

SCOTTS VALLEY, Calif. Jazz keyboard great Jason Miles hosted a multipart educational program sponsored by E-mu Systems. Held at San Francisco's Russian Hill Studios last month, the event was designed to expose the Grattan Public School second grade class to the magic of modern digital music technology.

Miles (pictured above with the second grade class) illustrated the power of digital sample-based audio technology as it relates to his composition and performance work on "People," an hour-long animated program honoring the 50th anniversary of the United Nations.

Miles explained the concept of digital sampling technology and illustrated its use through live application, computer MIDI sequences and animated clips from the program (Jason Miles employs an Emulator IV from E-mu for his work).

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Not naive

Dear **RW**,

In response to your editorial, "Politics Mires Digital Audio Radio Testing," (**RW**, June 14), the Electronic Industries Association appreciates the editorial coverage given to the DAR issue, however, we would like to rebut a few of your viewpoints.

Overall in the article, you accuse EIA of basic naivety in our quest to receive a "chunk of L-band" in order to complete our DAR testing efforts. We did assume we would receive the permission to use the L-band, but not because, as you put it, "it was EIA."

We have asked the FCC to grant us a temporary and secondary L-band license in an area in which governmental facilities will not suffer harmful interference from the proposed experiments. EIA's advanced coordination with IRAC (through the FCC in 1994) intended to reveal specific technical concerns that experimental operations might have to consider prior to filing with the FCC. The responses from the IRAC and the AFTR-CC presented no interference concerns, and the subsequent monitoring study by EIA reveals why—the entire band is almost completely unused in San Francisco. EIA's application for the experimental license remains consistent in all respects with the letter and spirit of the FCC's Experimental Radio Service rules.

In your editorial, you refer to the fact that L-band "has no chance of becoming a choice in the United States unless the entire spectrum allocation setup is reworked." However, the tests by EIA and the NRSC are not to determine which spectrum is best suited for digital audio radio, but rather to hold serious, objective, impartial, comparative evaluations of all proposed DAR technologies. At this stage, EIA believes all options must be considered. The EIA and NRSC subcommittee architecture has allowed the industry to hold comparative evaluations needed to assess system performance and created a structure to voice disparate viewpoints in an open forum. We will evaluate all the technologies based on the test data to determine how best to implement digital audio radio in the United States.

This initiative is unique in the world. Other countries are looking to our efforts in their own evaluations on which technology to support. To date, EIA has received considerable government support and cooperation from both the FCC and the NASA Lewis Research Center. This private sector initiative can further and enhance the technical base for government consideration of the merits of DAR technologies.

Regardless if the United States does not use L-band for DAR, other countries are and will. If we want U.S. manufacturers to be able to develop and manufacture DAR products for those markets, they must be able to test products in realistic conditions throughout the design process. If no experimental licenses for L-band are available in the United States, then U.S. manufacturers will have to move sizeable research jobs, money and materials outside the United States to maintain technical competitiveness with other manufacturers not so constrained.

The implication of rejecting EIA's experimental L-band license, intentional or otherwise, will have long-ranging effects. By denying the application, the government will:

1) explicitly reject non-in-band DAR system approaches—a premature decision;

2) implicitly endorse the USA Digital Radio system—without comprehensive technical backup;

3) rely on foreign test programs in a non-comparative venue to access technology; and

4) move jobs outside the United States because domestic manufacturer product testing of export products cannot obtain similar experimental authorities at L-band frequencies.

The proposed field testing in San Francisco intends to test all DAR technologies simultaneously under identical real-world conditions to correlate field test results with laboratory data and to uncover any peculiar system performance not revealed with lab testing. Field data is needed on the Eureka-147 DAB system at L-band frequencies to complete the technical record on its performance credibility.

Since our application for the L-band frequency is in line with FCC rules and previous governmental support of our DAR testing efforts, is only for use for temporary and secondary experimental testing, does not interfere with aerospace or flight test operations in this spectrum in San Francisco, and recognizes that U.S. policy remains focused on preserving the use of the band for its current purpose, we assumed that permission for the L-band frequency would be obtainable.

Gary J. Shapiro, vice president
Consumer Electronics Group,
Electronic Industries Association
Arlington, VA

Radio World

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Next Issue of Radio World July 26, 1995

Without a Doubt

Futurists in government and the radio business dream of the all-digital radio station and the plethora of services and revenue made possible by that scenario. An hour or two spent perusing this issue's *Buyer's Guide* section on automation and live-assist hardware and software reveals what many of you know already: the convergence of radio and computer is well under way.

There is no doubt that the radio industry will develop digital services to offer to the public and create for themselves lucrative new revenue streams.

Half of that battle has been won with the furious pace of software development and the integration of new digital services into the hardware and daily routines of the radio industry.

Witness the growth of station automation software manufacturing—a fledgling business less than five or six years ago—and its acceptance by stations. Competitive music and news/talk stations find they almost cannot do without software packages that did not exist a short time ago:

- Live-assist programs that allow a talk show host to know everything about the listener waiting on the line. Name, address and various other demographics (as well as the topic the listener wants to talk about) are all flashed up on a computer screen, which also tells you when to play the commercial.
- Systems to automatically record and store satellite program material and integrate it into prepared broadcast schedules which may be programmed and ready weeks or months in advance. Some systems are capable of receiving and processing data files for later retransmission by Radio Broadcast Data Service, FM subcarriers and other means.
- Software to keep track of traffic and billing, ad sales and station maintenance schedules that is often flexible enough to fit into any sized operation, from a small rural station to a multistation duopoly/LMA—even a national group.

Innovative programmers, with suggestions from their radio customers, are continually making it easier to broadcast high-quality programming with significant long-term savings.

High-tech efficiency sometimes costs people their jobs at a station level—but witness the creation of all those new jobs at the manufacturing level.

That is all the more reason radio should seek to expand itself by finding ways to convert its already-demonstrated mastery of computer technology into new digital services for the consumer and business.

—RW

And the point is...

Dear **RW**,

In reply to Kevin Powell... OK, what is your point?

The way I see it, not only did you probably use a taxpayer funded word processor on your taxpayer funded job time to write a letter defending your tax funding, for all I know you mailed it to **RW** at my expense.

Worse than that, you apparently did not read what I wrote very closely.

I said, "Mind you, I am not against NPR or non-commercial broadcasting-just the federal funding of it.

If you can get enough listeners to pay for that mind-numbing liberal drivel that NPR pumps out, more power to you.

But absent that, if we cannot cut CPB, than that is a serious indication of the futility in trying to balance the budget.

It is not about competition. It is about wasting federal dollars which we have borrowed on our children's future incomes. Over $4,100,000,000,000 of them to date.

I fully expect that new technologies will create places for lots of players. And if you have a high enough testosterone level to play the game, welcome to the world of free enterprise. I will be there (see us at http://www.ktrt.com on the web.)

But do it with your own money or money you raise in the free marketplace.

The difference between you and me is that the only danger to you is if your government paycheck were to disappear. And I provide that paycheck.

And, by the way, any time we want to get back on the deregulation track, count me in, because I may think Stony Brook is a pretty good market, too.

Fred M. Weinberg, President
KTRT(AM) Tulsa, OK

Nail on the head

Dear RW,

GREAT *Page Four* ("Hey Reed..."). Again, you've hit the nail on its proverbial head with the courage to speak out for our great industry.

Pee Wee Herman would do a better job than Hundt. What a Chump! Keep up the terrific work.

Tom McCarthy
KOMO Radio
Seattle, WA

Clarification

Our Product Evaluation of the Fostex D-25 DAT Recorder (*Studio Sessions*, **RW** June 14) stated direct ID Search was possible only by repeatedly pressing the S-ID button to the desired cut. Rick Cannata at Fostex tells us the D-25's Jog Wheel is the faster way to directly enter search information. "Wheeling in" the numerical value moves the tape to the desired track.

World Radio History

DAR Field Tests to Begin in San Francisco

by Lynn Meadows

WASHINGTON Historic San Francisco will host the long-awaited field tests of Digital Audio Radio (DAR). Famous for cable cars, the Golden Gate Bridge and Fisherman's Wharf, the city by the bay is also know for its complicated topography—making it an ideal place for phase two of the DAR testing process.

The site and test agenda were revealed in June by the Field Test Task Group, a sub-group of the Digital Audio Broadcast Subcommittee of the National Radio Systems Committee (NRSC). The NRSC's DAB subcommittee is conducting the tests in cooperation with the DAR subcommittee of the Electronic Industries Association (EIA).

Primary objective

The task group's primary objective is to see if the systems being tested provide a signal quality and durability that is greater than that which already exists on AM and FM systems. According to its release, the group hopes results of these tests will help broadcasters "make an informed decision on the future of digital audio broadcasting."

Many expect a DAR standard will be determined based on the test results. Types of systems being tested include IBOC (in-band on-channel), IBAC (in-band adjacent-channel), IBRC (in-band reserved-channel), and alternate band systems.

San Francisco was chosen primarily because of its eclectic terrain. With its mountain roads, woods, valleys, water, and suburban and urban architecture the city offers plenty of broadcasting obstacles.

Don Messer, broadcast satellite program manager for one of the seven systems being tested, VOA/JPL, said "I think the San Francisco metropolitan area has within it radio propagation conditions that represent most if not all of the United States."

Beginning in September, a van capable of receiving seven different DAR systems will begin trekking through the hills and valleys and over the bridges in and around San Francisco. The task group mapped out six paths which will last 30 minutes or more for the "Long Path" portion of the testing.

The task group's primary objective is to see if the systems provide a signal quality and durability greater than that which already exists.

During the long-path tests, audio will be recorded and monitored for audio events. The two "events" listeners will track are either a change from listenable to unlistenable audio or a change from unlistenable to no audio. Any trouble spots like tunnels or woodsy areas where these events occur will be revisited during the "Short Path" testing phase.

Propagation measures

A third test, the point test, will be used to measure propagation characteristics for distances between 10 and 50 meters. The fourth and final test will measure how well the signal is received inside a variety of buildings.

Because the receivers are rack-mounted and too cumbersome to move in and out of several different buildings, a portable antenna will be used instead. The antennas will be connected to the van by a long run of coaxial cable.

Nikil Jayant, head of advanced audio technology for AT&T, says the plan is "ambitious." A spokesman for the National Association of Broadcasters (NAB) says testing is expected to be finished by the end of November.

The IBOC systems being tested are the one from AT&T/AMATI, and three systems from USA Digital Radio: USADR-FM1, USADR-FM2, and USADR-AM. In-band, on-channel proponents like the fact that no extra spectrum is required for their service because the digital service shares the same frequency as the analog signal.

AT&T will also be testing its IBAC and IBRC systems. The IBAC inserts a new station between existing stations. Because it has its own frequency, it can be more powerful than the IBOC method, according to AT&T. With the IBRC method, however, all the analog data is replaced by digital data providing the greatest power potential, said Jayant.

Shamrock Broadcasting's KBGG-FM and KNEW(AM) will supply the signal for the field tests. Testing for IBRC will be limited to early mornings because the completely digital signal will make it appear to ordinary listeners that the station is off the air.

At press time, prospects for testing Eureka-147, a European backed DAR system that transmits in the L-Band, did not look good. The National Telecommunications Information Administration (NTIA) would not yield the spectrum necessary to test it. The fact that the L-Band is tied up by military and governmental uses in the United States is considered a drawback to Eureka-147.

S-Band system

A satellite system, VOA/JPL, will also be tested this fall, although the system is not in direct competition with the others.

Proponents of the systems being tested are pleased with the plans for the field tests. "We just wished the field test would have been a little bit sooner," said Jeff Andrew, project manager at USA Digital Radio.

Still not settled at press time was the precise strategy for analyzing the audio recordings. "The subcommittee is leaning towards having some sort of expert listeners in a controlled environment," said Dave Wilson, staff engineer at the NAB. The listeners would identify instances of multipath propagation and poor audio.

Once the tests are finished, members of the NRSC and EIA subcommittees will review the data. The NRSC is expected to vote to either recommend a system or say none are satisfactory.

Harris Allied To Market Sage Gear

ATLANTIC CITY Harris Allied will market and distribute Sage Alerting's emergency alerting equipment. Harris Allied and Sage Alerting Systems Inc. made the announcement at the Mid-Atlantic States Expo last month.

Sage Alerting, a subsidiary of AmeriData Technologies Inc., is promoting a new product called the Sage ENDEC, designed to meet the new Emergency Alerting System (EAS) requirements mandated by the Federal Communications Commission (FCC).

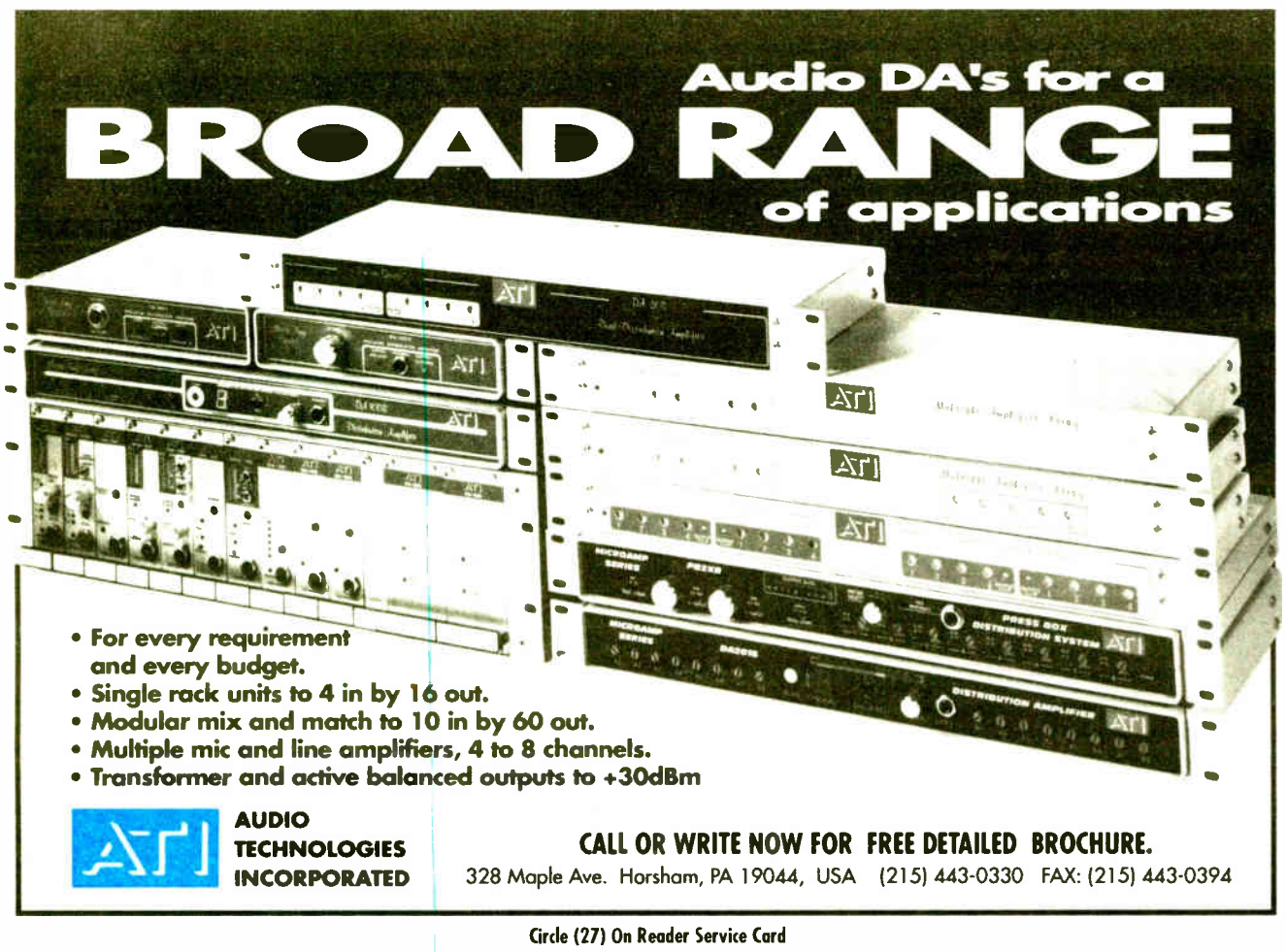
The company worked closely with the FCC during the development of the EAS and says its equipment meets all the FCC's requirements and is the only system that integrates the Radio Data System (RDS) with EAS (see related story, page 1).

RDS transmits text to receivers that are equipped to receive it allowing stations to send extra information like letters, advertisements, or emergency announcements.

In its decision on EAS, the FCC encouraged but did not mandate the use of RDS. Only systems with the RDS could cause radios to be turned on automatically in the event of an emergency.

Sage Alerting was scheduled to meet early this month with the National Radio Systems Committee (NRSC) and others to write a standard for incorporating RDS into EAS. "We did the work before the standard and now we are writing the standard as we go," said Sage Alerting President Gerald LeBow.

This is Sage Alerting's first step into the realm of selling emergency equipment to radio stations. The company also sells systems to nuclear generating facilities and oil fields which alert surrounding areas of disasters.



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World Radio History

Public Radio Embraces DAW Technology

by Alan Peterson

WASHINGTON "Partnerships and Technology" was the theme of the 1995 Public Radio Conference held June 17-21 at the Washington Renaissance Hotel. Manufacturers of Digital Audio Workstations (DAWs) made it their theme as well with exhibits and hands-on demonstrations of their products.

Digital multitrack recorders, editors and audio retrieval systems are becoming more attractive for public broadcasting member stations as existing analog equipment enters "retirement" phase and needs to be replaced. Low cost and high quality audio lead the list of reasons public radio stations—as their commercial counterparts—are replacing tape with digital.

Unlike commercial radio where most DAWs produce commercials and promos, public stations are embracing DAWs for long-form audio projects such as dramas, educational and public affairs programs and audio documentaries. Even the most basic workstation allows unprecedented power and speed over tape as well as assuring accurate timing of a project. Many DAWs are designed to sync to SMPTE or MIDI time code as well; with many non-commercial FM stations teamed up with TVs in their markets, a digital workstation that can perform tasks and mix projects for both facilities is a great value.

Many of the major players in the DAW arena were present at the 1995 Public Radio Conference. Among them was Roland, demonstrating its new DM-800 workstation (see **RW**, June 14, and page 25, this issue). Roland's hands-on demonstration included use of the optional color video monitor for precise visual editing.

Digidesign's presence was felt with its Pro Tools III and Session 8 recording systems. Pro Tools III is a high-end recorder requiring a 68040-series Mac. The Session 8 is available on the Macintosh or PC platform and features eight channels of direct to disk digital recording. The Session 8 works with a 486/25 PC, the Mac Quadra series or Power Mac 7100 or 8100.

Digidesign's big news is its Session Software 2.0 for PC users (it had previously been available for Mac users only), which allows desktop multitrack recording and editing at a low price. Session Software 2.0 requires Digidesign's Audiomedia II PCI card.

Among the veteran performers at the conference was Studer's third generation version of the Dyaxis workstation, the Dyaxis II. This was demonstrated in its broadcast production configuration, the Dyaxis IIbv, with built in dynamics control (limiter, compressor and gate), five band parametric EQ, and as a four-channel 8-track system. Using Dolby AC-2 4:1 data compression, the standard Dyaxis 1GB hard disk handles 12 track hours; more than enough capacity for most major projects.

The least expensive DAW of the day was the Deck II from OSC, based around the audio recording capabilities of the Power Macintosh. Assuming a station already has such a computer, suggested retail price of the Deck II would be $399.

Stations are embracing DAWs for long-form audio projects such as dramas, public affairs programs and audio documentaries.

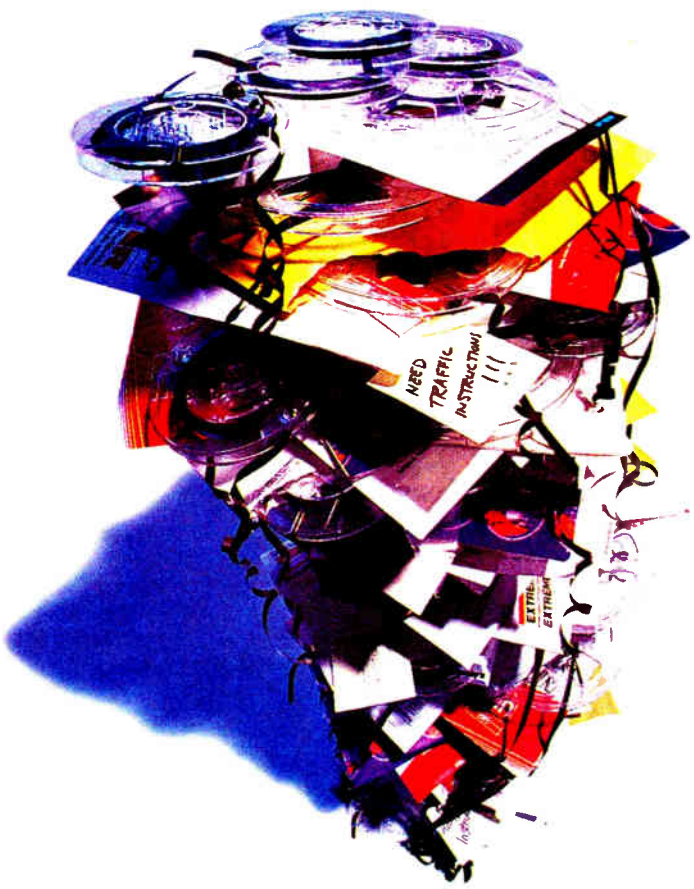
Deck II also works with Mac IIx or higher computers with one of several audio cards already installed. Track playback capacity is dependent on computer power and SCSI throughput.

Stations requiring entire control room upgrades are considering self-contained digital "nerve centers." Such unified systems were exhibited by Radio Systems and Arrakis. The Radio Systems DDS, while not a workstation, provides control over recording, archiving and playback of digital audio, CD jukeboxes, satellite control and live feeds with controllers that emulate traditional broadcast equipment. Sixteen stereo channels can play back simultaneously and be controlled through a standard broadcast console.

Arrakis exhibited the Digi-Link workstation/control room along with the new Gemini controller. Digilink's basic system provides ten hours of storage time and the optional Trak*Star feature adds an eight-track recorder and editor. Satellite and live control is also supported by the Arrakis Digi-Link.

The Gemini Command Center is Digi-Link's random access controller which emulates a "wall of carts"; buttons on the panel instantly retrieve and play back specific assigned audio files when pressed.

Workshops at the Public Radio Conference normally include sessions on cultural programming, grant writing and federal funding. This year's forums included "Digital Technology and Spoken Word Programming" and "DAWS: Local Area Networking Options." Clearly, public radio is moving predictably towards digital audio as its commercial cousin is doing.



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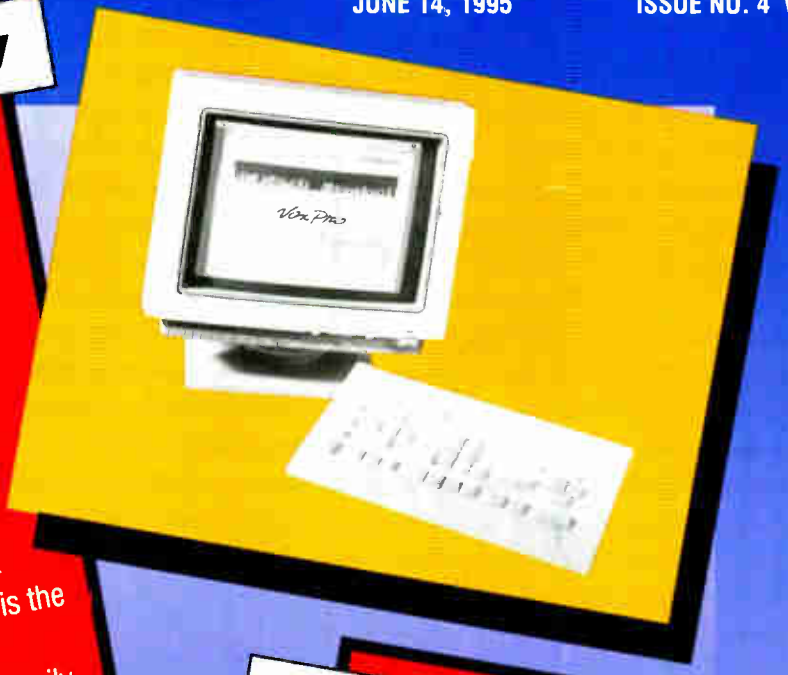

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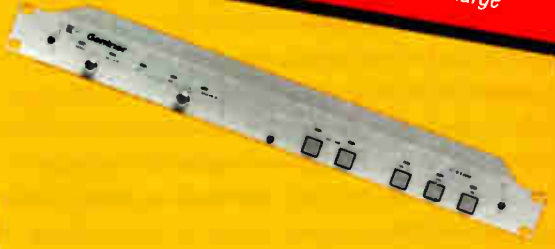

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World Radio History

INTERNATIONAL UPDATE

DAB Plan Enrages Canadian Broadcasters

by James Careless

OTTAWA Broadcasters here are grousing about a proposal from Canadian authorities to initially grant only temporary licenses for Digital Audio Broadcasting (DAB).

Although digital radio has always been intended as a replacement for AM and FM broadcasting in Canada, the Canadian Radio-television and Telecommunications Commission (CRTC) initiated a two-tiered approach to introducing digital service that may lead broadcasters to avoid embracing DAB technology.

3-year license

The crux of the problem is that the CRTC will issue broadcasters a conditional three-year license to help explore and establish L-band DAB service. During this trial period, the commission would simultaneously solicit public comments about long-range planning for DAB. That process is not expected to start until late 1996.

"This approach would allow Canadian radio broadcasters to retain their technological lead while contributing to the development of a well-thought-out strategy for the full-fledged introduction of digital radio, one that would benefit both the industry and the Canadian public in the long term," said CRTC Chairman Keith Spicer in a statement released 14 June.

Broadcasters, however, do not see things that way.

"An experimental license is not worth much," said Steve Edwards, vice president of corporate engineering and technology for Rogers Broadcasting, a major player in Canadian broadcasting and a strong supporter of Eureka-147.

What has Edwards and others upset is that there is no assurance that broadcasters will be able to make the temporary licenses permanent once the experimental period ends.

One paragraph in Public Notice 1995-95, which specifies the CRTC proposal, catches every eye: "The commission therefore reminds interested parties that any course of action or approach it may take regarding a licensing process for experimental digital radio undertakings in the short term shall not constrain the commission from modifying this approach or adopting another framework for the long term."

"I'm sure (the CRTC) does not mean that three years from now they will take the licenses away," Edwards said, "but it could be interpreted in that way by those who think `that is a possibility, and therefore I should not invest any money until they are willing to give me something that says it is a worthwhile investment.'"

No guarantees

In other words, there are no guarantees that experimental licensees will ever receive a regular license, despite whatever money they invest to make their experimental station a reality.

Given the commission's long-proven desire to help existing Canadian radio broadcasters, it is unlikely the lack of a guarantee is some sort of sinister trap to bankrupt stations that invest in digital radio.

If anything, it is probably the CRTC's way of warning broadcasters that rules may change over time—as they recently did for direct-to-home satellite TV when the federal government stepped in and overturned the commission's policy rulings. This change has let company, Expressvu, in a legal limbo as it aims for a September launch date.

There are no guarantees that experimental licensees will ever receive a regular license.

In any case, the idea of three-year "experimental" digital radio licenses has upset broadcasters who worked closely with the government to make this medium a reality.

Canadian Association of Broadcasters (CAB) Executive Vice President Michel Tremblay echoes these concerns. "My point is, do you really know what you are getting involved with at this point, if there is going to be a new policy down the road?" he said.

"It may not be entirely different, but still, it may make me think twice. The label 'experimental' could introduce a bit of inhibition," Tremblay said.

While Eureka-147 proponents are concerned about delays the experimental licenses may cause, others like Gary Slaight, president and CEO of Standard Broadcasting in Toronto, owner of highly rated news-talk station CFRB(AM), are angry with the entire CRTC proposal.

"The process is being done backwards," said Slaight, whose own company has so far refused to follow other companies in investing CN$75,000 in joint digital radio research efforts.

"Why not have public consultations first, then worry about issuing licenses? I do not know why they would want to put up signals for three years without having the overall rules of the game in place."

Look for alternatives

Referring to the CRTC emphasis on Eureka-147, Slaight said, "I think we should be looking at all alternatives, including IBOC (the U.S. developed in-band, on-channel system), before we commit ourselves."

The fact that the CRTC proposal displeases Slaight is hardly surprising, given his general opposition to the way in which digital radio has been pursued in Canada for the past few years. However, that both Edwards and Tremblay are not happy either should cause some concern at government levels.

Edwards and Tremblay are at the heart of Canadian plans for Eureka-147 on L-band. They are important not only because of the clout they carry within their own organizations, but because of their leadership within the industry. To help sell its proposals, the CRTC needs their enthusiastic support.

But that support may still be forthcoming. Some parts of the proposal are less than controversial, including the aim of making experimental licenses available to existing on an expedited basis. Other applications for L-band licenses will be evaluated on a "case-by-case basis" and would not be granted if their entry into the market would hurt existing local broadcasters.

These experimental licenses will includes some conditions that also concern broadcasters. For instance, under the CRTC proposal existing broadcasters must simulcast all but two hours of their weekly output. The remaining two hours could be used for original programming so that broadcasters, if they want to, would "have sufficient flexibility to conduct useful market trials."

To the chagrin of Edwards, developing ancillary services on any "extra" bandwidth is also disallowed under the proposal.

"I have been talking to various CRTC people for several months now," he said, "trying to dispel their concern that broadcasters will use 16 kbps for their main program service, and 264 kbps for auxiliary data services that make them wildly wealthy."

"The whole goal is to keep the thing flexible, and any limitations at this stage discourage people for doing it at all," Edwards said.

Additionally, the experimental digital radio licensees will not be able to use the transition to DAB to extend their coverage area.

On the positive side, however, broadcasters will be allowed to rent transmitter space from other companies, even those not in the radio business, and they can receive an L-band licensee for every single station—AM or FM—that they own.

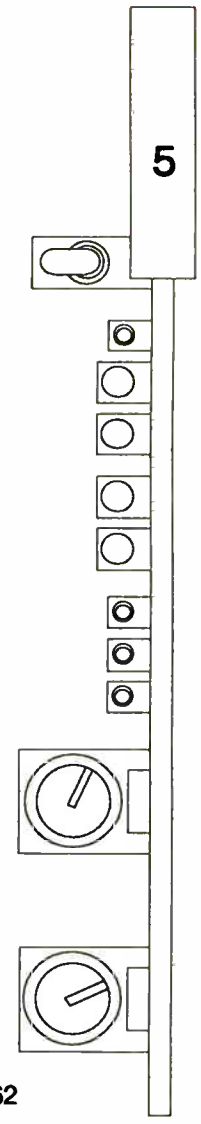
For the moment at least, the commission's proposals are just that: proposals. They open for amendment and reconsideration after the deadline for public feedback closes on 17 July.

Given that some of the strongest Canadian supporters of Eureka-147 want changes made, it will be interesting to see what exactly the commission releases as its formal rules for introducing digital radio in Canada. Its choices could have a major impact on how eagerly broadcasters embrace this technology.

□□□

James Careless, an audio producer, covers the industry in Canada for Radio World. Contact him via e-mail at aa938@freenet.carleton.ca.

MODULATION WAR?



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* Optimod is a trademark of AKG Acoustics, San Leandro, California
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*** Audio Prism is a trademark of Gentner Electronics, Salt Lake City, Utah

Circle (134) On Reader Service Card

World Radio History

RBDS ROLL CALL

The following is **Radio World's** quarterly listing of RBDS stations, equipment and receiver manufacturers and service providers.
If you would like to be included in the next listing, contact Lucia Cobo at 703-998-7600.

—RBDS STATIONS—

Station	Freq.	City
ALABAMA		
WZYP-FM	104.3	Athens
WRJM-FM	93.7	Geneva
ARIZONA		
KZZZ-FM	94.7	Kingman
KKFR-FM	92.3	Phoenix
KSLX-FM	100.7	Scottsdale
CALIFORNIA		
KSIQ-FM	96.1	Brawley
KFMF-FM	93.9	Chico
KPPL-FM	107.5	Colusa
KLON-FM	88.1	Long Beach
KPCC-FM	89.3	Los Angeles
KTWV-FM	94.7	Los Angeles
KCRW-FM	89.9	Los Angeles
KKGO-FM	105.1	Los Angeles
KATM-FM	103.3	Modesto
KHOP-FM	104.1	Modesto
KSHA-FM	104.3	Redding
KNPR-FM*	88.1	Ridgecrest
KSFM-FM	102.5	Sacramento
KPBS-FM	89.5	San Diego
KPLM-FM	106.1	Palm Springs
KYXY-FM	96.5	San Diego
KDFC-FM	102.1	San Francisco
KECG-FM	88.1	San Francisco
KEAR-FM	106.9	San Francisco
KALW-FM	91.7	San Francisco
KKHI-FM	100.9	San Francisco
KKSF-FM	103.7	San Francisco
KCBX-FM	90.1	San Luis Obispo
KUSP-FM	88.9	Santa Cruz
COLORADO		
KMJI-FM	100.3	Denver
KCFR-FM	90.1	Denver
CONNECTICUT		
WSHU-FM	91.1	Fairfield
WPKT-FM	90.5	Hartford
DISTRICT OF COLUMBIA		
WAMU-FM	88.5	Washington
WETA-FM	90.9	Washington
WDCU-FM	90.1	Washington
WGAY-FM	99.5	Washington
FLORIDA		
WAPN-FM	91.5	Daytona Beach
WSFP-FM	90.1	Ft. Myers
WAOA-FM	107.1	Melbourne
WLRN-FM	91.3	Miami
WTMI-FM	93.1	Miami
WMFE-FM	90.7	Orlando
WOCL-FM	105.9	Orlando
WUFT-FM	89.1	Gainesville
WOWW-FM	107.3	Pensacola
WFLZ-FM	93.3	Tampa
GEORGIA		
WDMG-FM	99.5	Douglas
WSTR-FM	94.1	Smyrna
WABE-FM	90.1	Atlanta
WCLK-FM	91.9	Atlanta
WKLS-FM	96.1	Atlanta
IDAHO		
KCIX-FM	105.9	Boise
ILLINOIS		
WCIL-FM	101.5	Carbondale
WLRW-FM	94.5	Champaign
WBEZ-FM	91.5	Chicago
WXRT-FM	93.1	Chicago
WLS-FM	94.7	Chicago
WNUA-FM	95.5	Chicago
WKKD-FM	95.9	Chicago
WNIJ-FM	90.5	DeKalb
WLLR-FM	101.3	East Moline
WAAG-FM	94.9	Galesburg
WWTE-FM	93.9	Lincoln
WSWT-FM	106.9	Peoria
WDBR-FM	103.7	Springfield
WGFA-FM	94.1	Watseka
WPGU-FM	107.1	Urbana
INDIANA		
WSHW-FM	99.7	Frankfort
WENS-FM	97.1	Indianapolis
WZPL-FM	99.5	Indianapolis
WITZ-FM	104.7	Jasper
WZWZ-FM	92.7	Kokomo
WWKI-FM	100.5	Kokomo
WMRI-FM	106.9	Marion
WLEZ-FM	102.7	Terre Haute
WXKE	103.9	Ft. Wayne
IOWA		
WMT-FM	96.5	Cedar Rapids
KRVR-FM	106.5	Davenport
KMFG-FM	103.3	Des Moines
KIAQ-FM	96.9	Ft. Dodge
KOEL-FM	92.3	Oelwein
KUOO-FM	103.9	Spirit Lake
KAYL-FM	101.5	Storm Lake
KENTUCKY		
WMMT-FM	88.7	Whitesburg
LOUISIANA		
WGGZ-FM	98.1	Baton Rouge
KQXL-FM	106.5	Baton Rouge
WYCT-FM	94.1	Kentwood
KFXY-FM	96.7	Morgan City
WLMG-FM	101.9	New Orleans
WMYZ-FM	95.7	New Orleans
WNOE-FM	101.1	New Orleans
KCIL-FM	107.5	Houma
KMJJ-FM	100.1	Shreveport
MASSACHUSETTS		
WAAF-FM	107.3	Boston
WBUR-FM	90.9	Boston
WGBH-FM	89.7	Boston
WBOQ-FM	104.9	Gloucester
WBCS-FM	96.9	Newton
WMJX-FM	106.7	Boston
MARYLAND		
WHFS-FM	99.1	Annapolis
WEAA-FM	88.9	Baltimore
WIYY-FM	97.9	Baltimore
WXYV-FM	102.7	Baltimore
WETH-FM*	89.1	Hagerstown
MICHIGAN		
WIOG-FM	102.5	Bay City
WLLZ-FM	98.7	Detroit
WKQI-FM	95.5	Detroit
WJLB-FM	97.9	Detroit
WQRS-FM	105.1	Detroit
WDBM-FM	88.9	East Lansing
WKAR-FM	90.5	East Lansing
WLAV-FM	96.9	Grand Rapids
WKLQ-FM	94.5	Holland
WRKR-FM	107.7	Portage
MINNESOTA		
KAUS-FM	99.9	Austin
KDNW-FM	97.3	Duluth
KEEZ-FM	99.1	Mankato
KBEM-FM	88.5	Minneapolis
KNOW-FM	91.1	St. Paul
KSJN-FM	99.5	St. Paul
KSTP-FM	94.5	St. Paul
KTIS-FM	98.5	Minneapolis
MISSOURI		
KFMZ-FM	98.3	Columbia
KGRC-FM	92.9	Hannibal
KYYS-FM	102.1	Kansas City
WIL-FM	92.3	St. Louis
MONTANA		
KCTR-FM	102.9	Billings
KKBR-FM	97.1	Billings
NEBRASKA		
KNEN-FM	94.7	Norfolk
KESY-FM	104.5	Omaha
NEVADA		
KKLZ-FM	96.3	Las Vegas
KNPR-FM	89.5	Las Vegas
KNPR-FM*	88.7	Boulder City
KNPR-FM*	91.7	Beatty
KOMP-FM	99.3	Henderson
KNPR-FM*	88.7	Indian Springs
KNPR-FM*	89.5	Laughlin
KNPR-FM*	88.7	Moapa Valley
KNPR-FM*	88.7	Pahrump
KBUL-FM	98.1	Reno
KNEV-FM	95.5	Reno
KNPR-FM*	88.1	Scotty's Junction
KNPR-FM*	105.1	Searchlight
KLUC-FM*	98.5	Las Vegas
KFMS-FM	101.9	Las Vegas
KWNR-FM	95.5	Las Vegas
KEYV-FM	93.1	Las Vegas
KRRI-FM	105.5	Las Vegas
KOMP-FM	92.3	Las Vegas
KEDG-FM	103.5	Las Vegas
KFBI-FM	107.5	Las Vegas
KYRK-FM	97.1	Las Vegas
KLNR-FM*	91.7	Panaca
KTPH-FM*	91.7	Tonopah
KEYV-FM*	103.5	Laughlin
NEW HAMPSHIRE		
WBHG-FM	101.5	Laconia
WLNH-FM	98.3	Laconia
NEW JERSEY		
WFPG-FM	96.9	Atlantic City
WKDN-FM	106.9	Camden
WBGO-FM	88.3	Newark
WFME-FM	94.7	Newark
WNNJ-FM	103.7	Newton
WPAT-FM	93.1	Patterson
WADB-FM	95.9	Point Pleasant
WCHR-FM	94.5	Trenton
WBSS-FM	97.3	Millville
NEW MEXICO		
KKOB-FM	93.3	Albuquerque
KKSS-FM	97.3	Santa Fe
NEW YORK		
WAMC-FM	90.3	Albany
WGY-FM	99.5	Albany
WZRQ-FM	102.3	Albany
WMHT-FM	89.1	Schenectady
WSKG-FM	89.3	Elmira
WHTZ-FM	100.1	New York
WNEW-FM	102.7	New York
WNYC-FM	93.9	New York
WHUD-FM	100.7	Peekskill
WBEE-FM	92.5	Rochester
NEW MEXICO		
KKOB-FM	93.3	Albuquerque
KKSS-FM	97.3	Santa Fe
NORTH CAROLINA		
WMIT-FM	106.9	Black Mtn.
WUNC-FM	91.5	Chapel Hill
WSOC-FM	103.7	Charlotte
WCXL-FM	104.1	Kill Devil Hills

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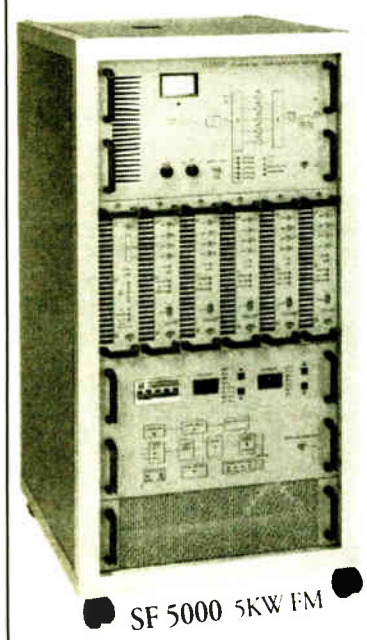

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BEXT

Circle (32) On Reader Service Card

World Radio History

NORTH DAKOTA

KSSS-FM	101.5	Bismark
KDVL-FM	102.5	Devil's Lake
KRRB-FM	92.1	Dickinson
KFNW-FM	97.9	Fargo
KNOX-FM	94.7	Grand Forks
KQDJ-FM	95.5	Jamestown
KYYZ-FM	96.1	Williston

OHIO

WOUB-FM	91.3	Athens
WGUC-FM	90.9	Cincinnati
WVXU-FM	91.7	Cincinnati
WWNK-FM	94.1	Cincinnati
WCPN-FM	90.3	Cleveland
WGAR-FM	99.5	Cleveland
WENZ-FM	107.9	Cleveland
WKSU-FM	89.7	Cleveland
WLTF-FM	106.5	Cleveland
WLVO-FM	96.3	Columbus
WDFM-FM	98.1	Defiance
WKRJ-FM*	91.5	New Philadelphia
WGLE-FM	90.7	Toledo
WKKO-FM	99.9	Toledo
WGTE-FM	91.3	Toledo
WKRW-FM*	89.3	Wooster
WKBN-FM	98.9	Youngstown
WHIZ-FM	102.5	Zanesville
WOUZ-FM	90.1	Zanesville
WGLE-FM	90.7	Lima

OKLAHOMA

KSYE-FM	91.5	Frederick
KIRQ-FM	98.1	Lawton
KTST-FM	101.9	Oklahoma City
KXXY-FM	96.1	Oklahoma City

OREGON

KYTE-FM	102.7	Newport
KOPB-FM	91.5	Portland
KKRZ-FM	100.3	Portland
KMCQ-FM	104.5	The Dalles

PENNSYLVANIA

WRTI-FM*	97.1	Allentown/ Bethlehem
WITF-FM	89.5	Harrisburg
WRVV-FM	97.3	Harrisburg
WROZ-FM	101.3	Lancaster
WDAS-FM	105.3	Philadelphia
WFLN-FM	95.7	Philadelphia
WHYY-FM	90.9	Philadelphia
WMGK-FM	102.9	Philadelphia
WMMR-FM	93.3	Philadelphia
WRTI-FM	90.1	Philadelphia
WPLY-FM	100.3	Philadelphia
WUSL-FM	98.9	Philadelphia
WXPN-FM	88.5	Philadelphia
WIOQ-FM	102.1	Philadelphia
WXTU-FM	92.5	Philadelphia
WWDB-FM	96.5	Philadelphia
WDUQ-FM	90.5	Pittsburgh
WRTI-FM*	97.7	Reading

RHODE ISLAND

WWBB	101.5	Providence

SOUTH CAROLINA

WWDM-FM	101.3	Sumter

SOUTH DAKOTA

KOLY-FM	99.5	Mobridge
KRRO-FM	103.7	Sioux Falls

TENNESSEE

WYPL-FM	89.3	Memphis

TEXAS

KEAN-FM	105.1	Abilene
KNLE-FM	88.1	Austin
KTTX-FM	106.1	Brenhane
KTEX-FM	100.3	Brownsville
KKYS-FM	104.7	Bryan
KORA-FM	98.3	Bryan
KTEX-FM	106.9	Bryan
KAYD-FM	97.5	Beaumont
KQXY-FM	94.1	Beaumont
KYKR-FM	95.1	Beaumont
KCBI-FM	90.9	Dallas
KERA-FM	90.1	Dallas
KBNA-FM	97.5	El Paso
KILT-FM	100.3	Houston
KUHF-FM	88.7	Houston
KJMZ-FM	100.3	Irving
KOOI-FM	106.5	Jacksonville
KYKX-FM	105.7	Longview
KFMX-FM	94.5	Lubbock
KKMY-FM	104.5	Orange
KATX-FM	97.3	Plainview
KCRN-FM	93.9	San Angelo
KXTN-FM	107.5	San Antonio
WACO-FM	99.9	Waco

UTAH

KSOS-FM	106.9	Ogden
KSOS-FM*	92.1	Salt Lake City
KSOS-FM*	96.7	Salt Lake City
KISN-FM	97.1	Salt Lake City
KLZX-FM	93.3	Salt Lake City
KSOS-FM*	98.3	Utah County

VIRGINIA

WLTY-FM*	95.7	Norfolk
WNVZ-FM	104.5	Norfolk
WESR-FM	103.3	Onley
WKOC-FM	93.7	Virginia Beach
WCDX-FM	92.7	Richmond

WASHINGTON

KFAE-FM	89.1	Richland
KISW-FM	99.9	Seattle
KUOW-FM	94.9	Seattle
KMPS-FM	94.1	Seattle
KMTT-FM	103.7	Seattle
KDRK-FM	93.7	Spokane
KEZE-FM	105.7	Spokane
KRPM-FM	106.1	Tacoma

WEST VIRGINIA

WHCM-FM	99.1	Parkersburg

WISCONSIN

WIZM-FM	93.3	LaCrosse
WERN-FM	88.7	Madison
WNWC-FM	102.5	Madison
WUWM-FM	89.7	Milwaukee
WMYX-FM	99.1	Milwaukee
WMSE-FM	91.7	Milwaukee

*translator

—RBDS MANUFACTURERS—

RBDS Equipment Manufacturers/Distributors

AEV (Encoder)
Via Saviolo Budrie
Di S. Perisceto
Bologna, Italy

Broadcast Supply Worldwide (Encoder)
7012 27th St. West
Tacoma, Washington 98406

Circuit Research Labs (Encoder)
2522 W. Geneva
Tempe, Arizona 85282
Contact: Valerie Hummer
602-438-0888
Reader Service 14

Harris Allied (Encoder)
3712 National Road West
Richmond, Indiana 47374

Modulation Sciences
(Encoder/Monitor)
12A World's Fair Drive
Somerset, New Jersey 08873
Contact: Judy Englert
908-302-3090
Reader Service 73

RDS Diagnostix (Test/Decoder)
74 Hanover Road
Mountain Lakes, New Jersey 07046
Contact: Boyd A Baker
201-299-8431
FAX: 201-334-7858
Reader Service 113

Audio Broadcast Group (Encoder)
2342 S Division Ave
Grand Rapids, Michigan 49507
Contact: Dave Howland
800-999-9281
FAX: 616-452-1652
75371.144@compuserve.com
Reader Service 124

AZTEC S.A. (Encoder)
31 Rue Du Chemin de Fer
67200 Strasbourg, France

RE America,Inc. (Encoder)
31029 Center Ridge Road
Westlake, Ohio 44145
Contact: Andy Bosworth
216-871-7617
Reader Service 62

Rohde and Schwarz (Encoder)
4425 Nicole Drive
Lanham, Maryland 20706

SCA Data Systems (Encoder)
2912 Colorado Ave.
Suite 200
Santa Monica, California 92404

Teli AB (Encoder)
14980 Nunashamn
Sweden

Tectan (Encoder)
Box 27157
Concord, California 94527

VG Electronics (Encoder)
Theaklen Drive
Hastings East Sussex TN34 1YQ
England

RBDS Receiver Manufacturers(with current U.S. models)

Advanced Digital Systems
(PC RDS Receiver)
13909 Bettencourt Street
Cerritos, California 90701
Contact: Mike McCoy
800-888-5244
Reader Service 45

Axcess (Paging)
6620 Riverside Drive
Suite 200
Metairie, Louisiana 70003

AZTEC S.A. (Mobile Data Receiver)
31 Rue Du Chemin de Fer
67200 Strasbourg, France

Delco Electronics (Car)
1 Corporate Center
Mail Station CT-16A
Kokomo, Indiana 46904

Denon (Car/Home)
222 New Road
Parsippany, New Jersey 07054
Contact: John Casey
201-575-7810
Reader Service 25

Grundig (Portable)
3520 Haven Ave., Unit L
Redwood City, California 94063

Indy Automotive Electronics
2420 E 55th Place
Indianapolis IN 46220

Modulation Sciences (Data)
12A World's Fair Drive
Somerset, New Jersey 08873

Onkyo (Home)
200 Williams Drive
Ramsey, New Jersey 07446

Philips Car Stereo (Car)
9600 54th Avenue
N. Minneapolis, Minnesota 55442

Pioneer (Car)
2265 East 220th St.
Long Beach, California 90810

RBDS Service Providers

Axcess/Spartan (Paging)
6620 Riverside Drive
Suite 200
Metairie, Louisiana 70003

DCI (Global Positioning)
10121 Miller Ave,
Cupertino, California 95014
Contact: Jim Bradley
408-446-8350
Reader Service 139

Coupon Radio
(Information Services)
10 Rockefeller Plaza
New York, New York 10020

Sage Alerting (EBS)
700 Canal Street
Stamford, Connecticut 06902

SATX (Data Broadcast Software)
Milestone Technologies
2221 Mariner Circle
Raleigh, North Carolina 27603

Specialized Comm. (Music Information)
1638 153rd St. SE
Bellevue, Washington 98007
Contact: Allen Hartle
206-641-9043
Reader Service 176

Terrapin (IVHS Services/Diff-GPS)
11958 Monarch Street
Garden Grove, California 92641

World Radio History

Reel-Talk Functions Like Radio VCR

by Frank Beacham

NEW YORK Depending on your politics, Rush Limbaugh is a figure to be adored or despised. But now the talk show giant has a new claim to fame: inspiration for the most unique new table radio to come along in years.

Called "Reel-Talk" ($129 including shipping), this new radio design includes a quarter-speed cassette recorder and a VCR-like timer that allows the user to record favorite radio programs for later playback.

Because it is optimized for the recording of talk shows and other spoken word material, the Reel-Talk radio trades off sonic quality for up to four hours of recording time on each side of a standard C-120 audio cassette.

Timing problems

The inspiration for Reel-Talk came when Dale Stogner, an accountant, and Chris Moen, an electronics engineer, became frustrated over the difficulty of listening to Limbaugh, their favorite talk show host, during the middle of the work day. They wanted a simple way to time shift the program to a more convenient listening period.

After building a prototype and finding a manufacturer in Hong Kong, Stogner and Moen started advertising Reel-Talk last September on Limbaugh's television show and on local radio talk shows in California. It was an instant success, selling out the initial inventory immediately. "I talk to a lot of my customers personally and I can't tell you how many times I've been told they've been looking for a product like this for years," said Stogner.

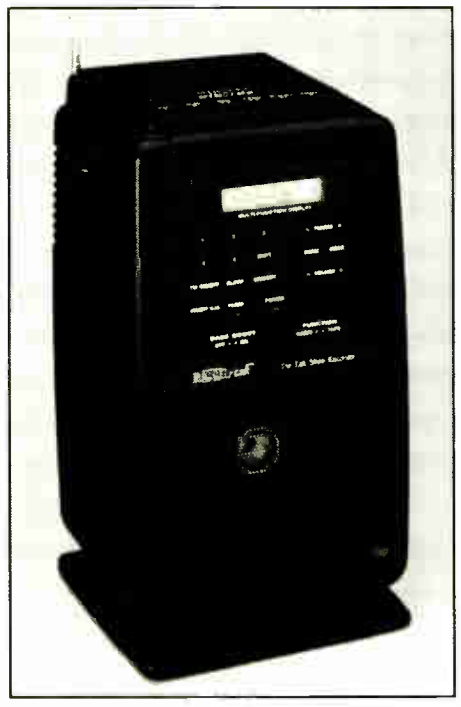
An evaluation by **RW** found the Reel-Talk radio to be an excellent performer with better than expected audio fidelity on recorded programs. Operation, unlike many timer-based VCRs, is intuitive and user friendly. The instruction manual is simple, clear and ranks among the best I have seen for any electronic device.

The AM/FM radio section performed with the best of them in the crowded New York City area and the pre-sets for 10 AM and 10 FM stations offer added convenience. The buttons have the solid feel of a quality electronic component.

Tower design

Reel-Talk's unusual tower design (6.5 inches square by 12 inches tall) places the cassette recorder on top in order to keep the overall footprint of the radio small. This configuration works well, allowing a four-inch speaker and bass port (powered by a 2.5 watt amplifier) in a very compact device. The recorder works only in the quarter-speed mode, emphasizing record time over audio quality. The manufacturer recommends high-quality TDK, Maxell, Sony, Fuji and BASF cassettes for best results.

Other features include a liquid-crystal function display, headphone jack, sleep function, clock alarm, bass boost, auto-stop tape deck, built-in condenser mic for live recording, one-touch recording, AC or battery (six D-size) operation, and battery backup for clock and station pre-sets.



Reel-Talk works like a VCR.

Though audio quality is fine for voice recording, tapes made on the Reel-Talk radio are not compatible with standard audio cassette recorders. For now, at least, playback must come from the Reel-Talk radio itself. However, Stogner said his company will soon offer a quarter-speed Walkman-sized recorder that will allow portable playback of Reel-Talk tapes. He said a wireless device will also be introduced that allows the portable to playback the tapes through any car radio.

Single-event timer

Another limitation of the current Reel-Talk design is its single event timer, which was originally conceived for long-form talk radio recording. On and off times can be set and repeated daily, but the device does not have the capability to record multiple shows at different times on different stations.

However, this limitation will be addressed soon, said Stogner, in a higher end version of the radio designed for music-quality recording. "We plan to offer a model with two standard-speed stereo cassette decks in a wooden cabinet," said Stogner. "This will be a killer unit with multi-event, multiprogram capabilities. Even with all the features it will offer, we still think we can bring it in for under $250."

In addition to talk show buffs, the Reel-Talk radio has found a home in some of the radio stations that advertise the product, Stogner said. "We have some radio station sales managers who use the Reel-Talk to record their competition in off hours to get the names of their advertisers," he said.

Reel-Talk Inc. is located at 1704 Hilltop Circle, Opelika, Ala., 36801; telephone: 800-766-TALK (8255).

□□□

Frank Beacham is a writer, director and producer. His address is 163 Amsterdam Ave., No. 361, New York 10023. E-mail: beacham@radiomail.net.

Radio Reforms

▶ continued from page 1

Reed Hundt, chairman of the Federal Communications Commission said the bill affirms the FCC's responsibilities. The regulatory agency itself briefly came under the eye of the budget-cutting Congress. "I might note that Senate bill 652 affirms the serious responsibilities invested in the FCC to ensure fair competition in communications and to protect the public interest," Hundt said in a statement.

Edward Fritts, president of the National Association of Broadcasters (NAB), was pleased with the Senate bill. In a statement, Fritts said that radio ownership deregulation "will be instrumental in helping the radio industry remain an important and competitive player in tomorrow's communications marketplace." The NAB's Radio Board had voted unanimously in favor of ownership deregulation.

EAS Snag Surfaces

▶ continued from page 1

Sources said it was agreed the technology woud be public domain so no one could "monopolize the technology."

A manual detailing NWRSAME, "DCR-400," is listed as a publication reviewed before the patent was issued to Quad Dimensions. The technology described in that document would have to have been different enough from SAFE technology to warrant issuing a patent.

After reading the patent, a spokesman from the NWS said, "The underlying principal appears to be the same. The vehicle they are using—primarily television—is different."

Although television is specifically mentioned in the patent, Ganzer said the document also covers broadcasting in general. "We think the claims are broad and cover many uses of location codes," he said.

Part of the appeal of the new Emergency Alerting System is its non-proprietary nature. One of the goals of the commission was to give broadcasters a chance to choose from several companies when purchasing their equipment.

The news that Quad Dimension has a patent on the EAS system prompted surprise from manufacturers and disbelief that the FCC knew but did nothing about it.

EAS certification of manufacturing equipment has been held up for several months by Petitions for Reconsideration submitted after the December 1994 ruling. A re-examination of the patent could take longer than a year.

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INTERNATIONAL UPDATE

Irish Debate Value of Commercial Radio

EDITOR'S NOTE: When radio broadcasters in Ireland gathered for the first Irish Radio Conference in April, the discussion centered on the fundamental issues affecting the industry.

At the heart of the debate was what the meaning of radio should be: Is it a "tool for democracy," a purely cultural activity or simply a means of earning profit?

The argument comes at a delicate moment in the history of Irish broadcasting. Concurrent with the conference was the release of a Green Paper outlining government proposals for the future of the public broadcaster Radio Telefís Éireann (RTÉ), the RTÉ transmitter network, private broadcasting and public financing of radio broadcasting, most likely through the introduction of a tax on receivers. The Green Paper also addresses future uses and regulation of new technologies like satellite-based broadcasting, which is growing in popularity throughout Europe.

Radio World International Correspondent Maggi Taylor, who has covered the industry in Ireland for the newspaper since 1990, recorded what broadcasters have to say.

Michael D. Higgins, minister for the Arts, Culture and Gaeltacht: Pitting profit motive against collective rights can disfigure politically, homogenize linguistically and depress the inclinations for cultural expression.

He added, however, that he is confident that together "we can identify ways in which, through legislation, we can maximize the promise and reduce the threats."

Higgins said the recent Green Paper on broadcasting addresses the core philosophical issues behind the role and future of broadcasting as a cultural activity in the widest sense of the term. This paper was issued at a time when many presumptions about the role of broadcasting that have stood unchallenged for over half a century appear to be under serious threat throughout Europe.

Historically, broadcasting played a vital role in contributing to education, culture and the arts, and in providing a service that should not neglect minorities who did not provide profitable audience shares for advertisers.

Higgins said that one could be forgiven for fearing that the demands of the marketplace are often in serious conflict with these presumptions.

Higgins stressed that he did not think Irish broadcasting had gone down this road but rather that it is being flooded by a multitude of transnational, commercially-driven broadcasting services where loyalty to shareholders rather than audiences is the rule.

Niall Stokes, chair of the Independent Radio and Television Commission (IRTC): There is a clear lack of a dialogue between public and private broadcasters, he said.

Shared experiences, ideas, insights and frustrations, he said, can be catalysts for change. It is easy to become locked into professional obligations and the pressures that go with them. These pressures are frequently felt even more intensely in the commercial sector.

A station manager in a franchise area with a potential audience of 80,000 may have the burning ambition to create great radio programs, but resources in that area will always be scarce. The chief executives at an independent station must keep one eye on the bottom line and another on the listenership figures.

Stokes urged against broadcasting for profit alone. Letting market forces determine what—and for whom—commercial radio offers would rob poorer, older and marginalized people of their right to the airwaves, he said.

The ultimate objective of broadcasters, Stokes said, must be to create a stronger, more vibrant, more creative and more diverse broadcasting infrastructure. Quality must become the central and sustaining consideration.

With a broadcast license comes a range of obligations, commitments and responsibilities, Stokes said. Some of these are clearly defined and others less so. Broadcasting is far too important a domain in the cultural and political life of Ireland, he continued, to ignore these less clearly defined obligations simply because of their more abstract, intellectual or social dimensions.

Stokes believes that experienced professionals should share their experience, skills, knowledge and accumulated insights with newcomers. There are issues that need to be discussed, and it is important that these should be approached on an industrywide basis without any resort to factionalism, he said.

Dan Collins, chief executive and program controller, Radio Kerry: Advertising is the only source of revenue for local radio, which severely limits the range and quality of broadcasting that

continued on page 37 ▶

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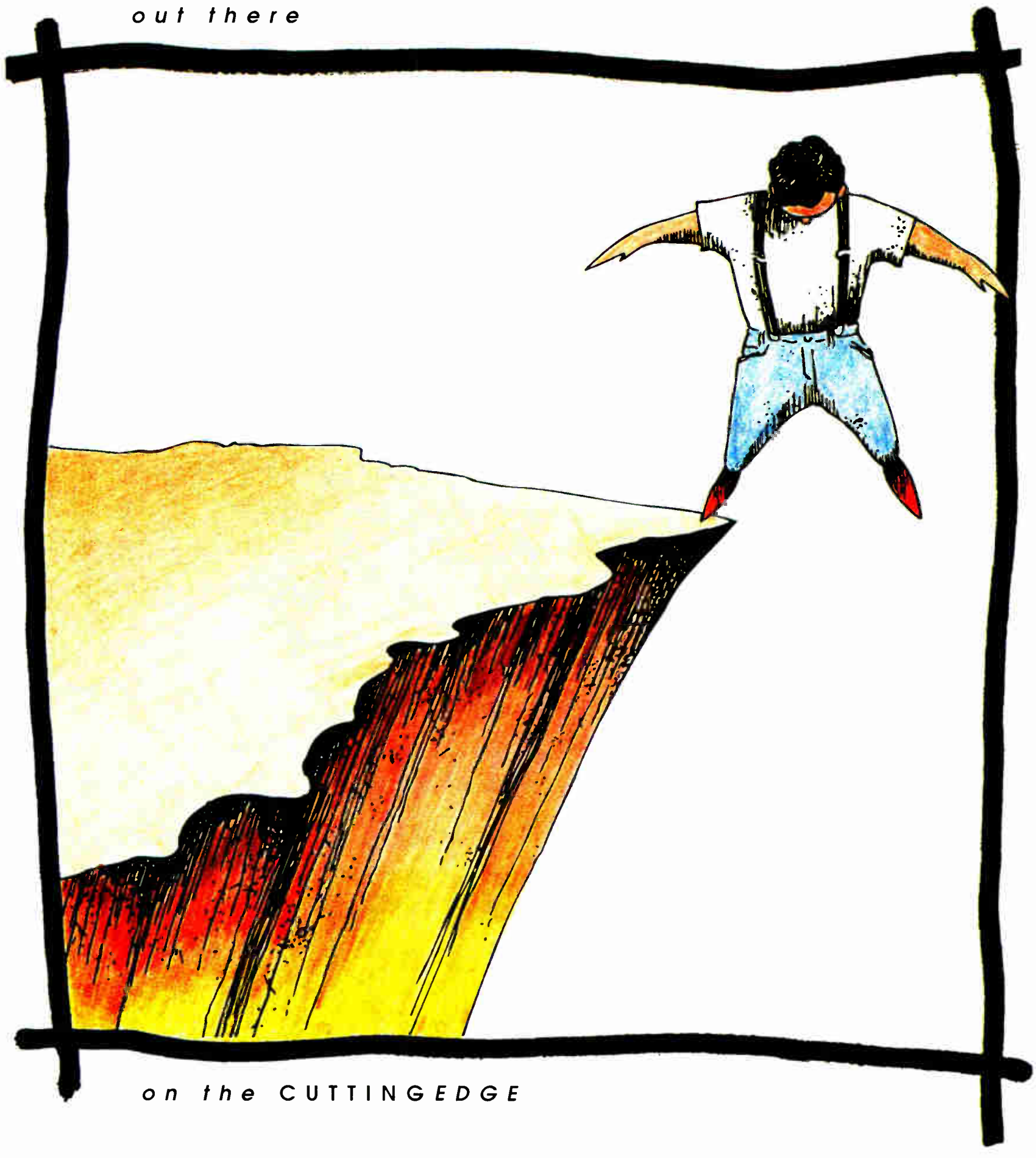

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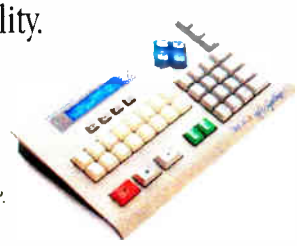

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World Radio History

Madison's WOLX-FM Hosts Reunion

by Gordon Govier

MADISON, Wis. A new oldies/talk format version premiered on WOLX-FM as Program Director Jonathan Little invited radio personalities from Madison's past to return for a three-day on-air reunion.

More than 160 present and former disc jockeys, sports reporters and news broadcasters were contacted, about half of them returned or sent recorded greetings for the celebration.

WOLX-FM veterans (l to r):
Elroy "Crazylegs" Hirsch and Bob Miller

Little, who developed WISM (AM) and WZEE(FM) "Z-104" into locally dominant and nationally prominent music stations in previous decades, said he got the idea after bumping into several former colleagues in short succession while attending a recent NAB convention.

Easy to find

Many of the personalities fondly remembered by several generations of Madisonians were traceable with only a couple of phone calls. More and more names were recalled and soon the project snowballed, almost out of control." It went crazy the last few days," Little said. "My phone rang non-stop."

The celebration began on the air Friday, June 9, as the eccentric former WISM disc jockey Stony Wallace took over the airwaves for an hour as a reception was held in an adjacent studio. He was followed in succeeding hours by Rockin' Rob Steele and Charlie "Rock n Roll" Simon.

The reminiscing was renewed the next morning with personalities from the fifties on-the-air first. Among them was Bill Dyke, who later became Mayor of Madison during the turbulent sixties.

Top-40 Rock 'n' Roll was taking over when he was an announcer at WISC radio. "Our six to midnight (shift) was in the doldrums," he recalled, and he got the assignment of doing something about it. So, "I watched Dick Clark every afternoon, and made sure I played each one of those songs four times that night."

Music research was a little more sophisticated at WKOW, reported Jack Baker, who hosted "Madison's Pop Tunes" between 4:45 and 5:30 each afternoon from 1952-1957. He did a daily phone survey of the four Madison music stores, totalled the sales, and then ranked the records. "It drove me nuts, but we played a lot of good records," he recalled. Baker went on to a long career at WTMJ in Milwaukee.

Technical snafus

Roy Gumtow, WKOW farm director for 20 years, remembered the frustrations of using unreliable wire recorders for interviews with farmers. "Sometimes you had a recording and sometimes you didn't," he said. And added you only knew upon returning to the station.

Between the WOLX oldies, through Saturday and for several more hours on Sunday, shift after shift of announcers from Madison radio stations shared their favorite on-air and off-air memories. At least most of them. "Even in the nineties, you can't tell some stories" on the air, said former WISM disc jockey Michael Hanson. For some reason, an announcer taking a bathroom break figured prominently in many pranks and mishaps.

DJ tribute

Announcers who are now deceased were remembered with a tribute, including WISM's Clyde Coffee and WIBA's Jim Mader, both morning radio fixtures for many years. The former was an incorrigible prankster and punster, the latter a molasses-smooth ad-lib talker and pitchman.

Coffee liked to tease his news announcer during the news and then beat it back to his own studio during the weather forecast. Former newsmen P.K. Powers and Bill Short both recalled being victimized by a chair pushed down the stairs outside the newsroom accompanied by feigned groans, making them worry about both an injured co-worker and the prospect of dead air coming up at the end of their newscast.

Another classic radio bit was re-created off the cuff as former WISM news director Wayne Wallace attempted to do a news update for old times sake. Halfway through, his copy was attacked first with scissors and then a cigarette lighter.

Perpetual radio contest winner Bob Elholm also enjoyed the chance to renew acquaintances with many of the announcers he had called over the years. He discussed his speed dialing technique and revealed he had collected over 800 giveaway albums and hundreds of other prizes from stations all over the midwest.

Many of the announcers are now out of the business. Others have moved up to major markets. Some news reporters are now radio and television network correspondents and editors. It's clear they delighted in sharing their memories at the radio reunion, seeing old friends once again and meeting others whom they knew only by reputation.

Such a reunion is a natural for oldies stations in any market, especially during this 75th anniversary year of American radio. But was it good radio? Did the listeners like it?

DJ reunions are a natural event for oldies stations in any market.

"The listeners who responded by telephone loved it," said Little. "Nobody complained about too much talk." Many said they enjoyed hearing the authentic old radio jingles from several stations. The whole weekend was taped and one listener requested all 21 hours of tapes.

WOLX-FM reunited former DJs
Kurt Johnson and Larry Goodman.

Gordon Govier went by the name Gordon Harris during his days as news reporter at WISM, and is now news director at WNWC-FM, in Madison. His e-mail address is scribe@xc.org.

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World Radio History

How to Analyze Resistor Circuits

Kirchoff's Law Solves Node Voltage Equations Where Ohm's Law Alone Cannot

by Harold Hallikainen

SAN LUIS OBISPO, Calif. In the first article of this series, I arrived at a "modified Ohm's Law" that determined current based on the voltage to ground at each end of a resistor.

This time I will use that concept along with Kirchoff's current law to analyze a simple three resistor circuit that cannot be analyzed with Ohm's Law alone. Further, I will continue to use MicroSim's PSPICE in my analysis.

DOS, Windows and Mac versions of PSPICE are available through our World Wide Web page at http://slonet.org/~hhallika/ (look under Harold's Bookmarks) and on our BBS at 805-541-0201, then 5 (this will take you through the voice menu, but you may want to dial manually, work through the menu manually, then put your modem in originate mode, generally by typing ATX0D).

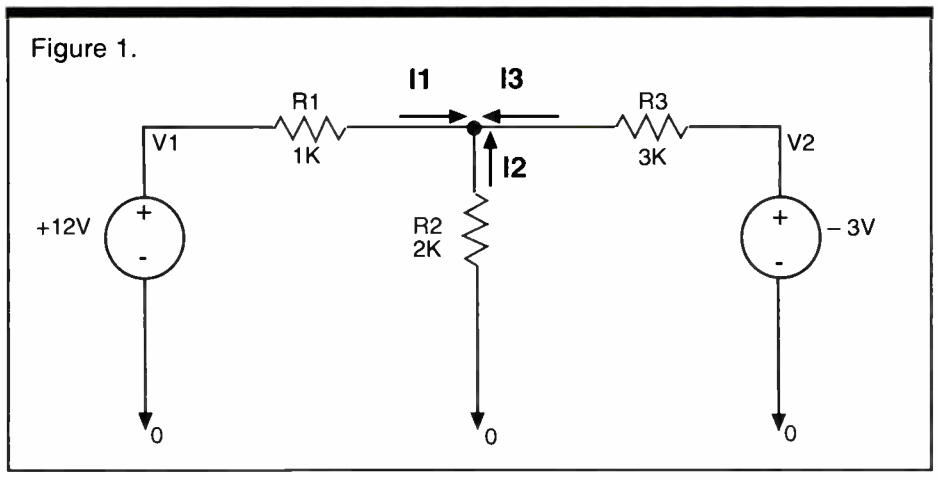
Kirchoff's Current Law

Gustav Robert Kirchoff (German physicist, 1824-1887) postulated two laws for electrical networks. These are Kirchoff's Current Law and Kirchoff's Voltage Law.

Kirchoff's Current Law (KCL) states that the algebraic sum of the currents into a "node" is equal to zero. A node is where two or more components are connected. In figure 1, there is a node at the junction of V1 and R1, the junction of V2 and R3, the junction of R1, R2, and R3, and ground. In CAD programs, a node is often called a "net." The CAD program (and PSPICE) generate a "netlist" indicating what components are connected to each node or net.

KCL is sometimes stated as "the sum of the currents going into a node equals the sum of the currents leaving a node." This is certainly true, but we then get carried away trying to determine which way currents are going. I prefer to assume they are all going into the node (for now). Any currents leaving the node will end up negative.

Figure 1.



Node voltage analysis

A common application of KCL is node voltage analysis. If you call the voltage at the junction of the three resistors Vn, you can determine it based on the following sequence of equations.

$$I1 + I2 + I3 = 0$$

equation 1

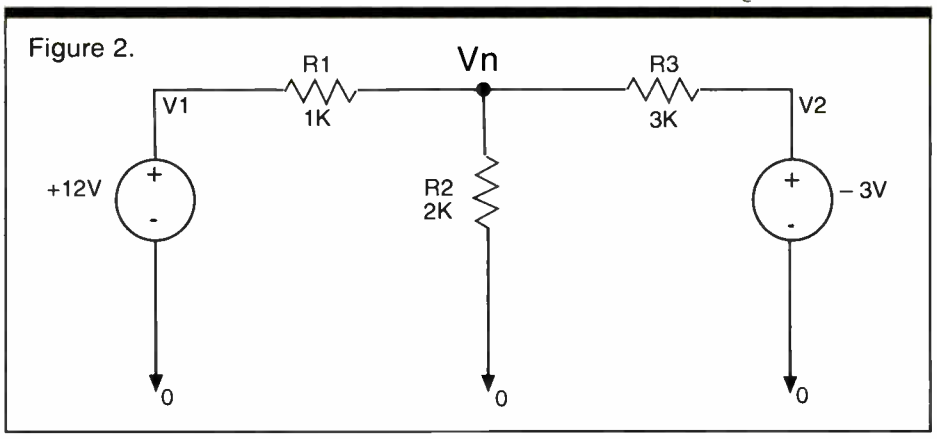
$$\frac{V1-Vn}{1K} + \frac{0-Vn}{2K} + \frac{V2-Vn}{3K} = 0$$

equation 2

$$\frac{12-Vn}{1K} + \frac{0-Vn}{2K} + \frac{-3-Vn}{3K} = 0$$

equation 3

Figure 2.



$$1e\text{-}3(12-Vn) + 500e\text{-}6(0-Vn) + 333e\text{-}6(-3-Vn) = 0$$

equation 4

$$(12e\text{-}3) - (1e\text{-}3)Vn - (500e\text{-}6)Vn - (1e\text{-}3) - (333e\text{-}6)Vn = 0$$

equation 5

$$(11e\text{-}3) - (1.833e\text{-}3)Vn = 0$$

equation 6

$$11e\text{-}3 = (1.833e\text{-}3)Vn$$

equation 7

$$6 = Vn$$

equation 8

Equation 1 is a restatement of KCL. Equation 2 substitutes the (Vtail-Vtip)/R form of Ohm's Law for each of the currents in equation 1. The remaining equations solve for Vn.

Now that you know Vn=6 volts, you can determine I1, I2 and I3, checking the results.

$$I1 = \frac{12-6}{1K} = +6mA \qquad I2 = \frac{0-6}{2K} = -3mA$$

$$I3 = \frac{-3-6}{3K} = -3mA$$

So, KCL can be used to determine node voltages where working with Ohm's Law alone could not solve the problem.

Note that you could also state KCL as "the sum of all currents leaving a node equals zero." This would reverse the direction of the current arrows in figure 1, change the polarity of the currents, and get rid of a lot of minus signs. For example, I1 with the arrow reversed would become

$$I1 = \frac{Vn-12}{3K}$$

Using this form of KCL, you end up with some positive constant times Vn on the left side of the equal sign and another constant on the right. I generally use this form to avoid all the minus signs associated with Vn.

Using Spice

You can get PSPICE to analyze this circuit for you. For the DOS version of PSPICE, you can key in the components and node numbers as you did last time. A possible PSPICE listing is shown below.

```
: Three Resistor Network

V1 1 0 DC 12volts
R1 1 2 1K
R2 0 2 2K
R3 3 2 3K
V2 3 0 DC -3volts
.dc V1 12v 12v 1v  ; Sweep V1 from 12v
to 12v in 1v steps
.print v(2) i(R1) i(R2) i(R3)
.end
```

This listing would generate an output file that would tell you the voltage at node 2 (Vn in the previous analysis) and the currents through each resistor. Note that in the node list for each of the resistors that the common node (node 2) is listed last.

PSPICE calculates the current going in to the first node and out the second node of a resistor. The node order here will result in current polarities agreeing with your previous calculations.

Schematic capture

Although generating a PSPICE input file by hand is not difficult, working from a schematic can sure be nice. The Windows version of PSPICE includes a schematic capture program. Once you have the program installed, double click on Design Center Eval 5. 4. Then double click on Schematics. You'll be presented with a blank A size drawing page. There are lots of capabilities here, but I will lead you through our simple circuit to get you started.

To start drawing parts, hit control-G to get a part, or select Get New Part from the Draw Menu. You can browse through the various libraries.

To draw a DC voltage source, select VSRC from the source.slb library, or

continued on next page ▶

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World Radio History

just key in VSRC at the Part prompt. A voltage source image will appear, and you can position it with the mouse. Click the left mouse button in each location you want a voltage source. Click the right mouse button to stop drawing voltage sources. If you do not get the part exactly where you want it, select the part with a single left mouse click. Then click and hold the left button while dragging the part to its new location.

Double clicking on a component lets you set that components parameters. If you double click on V1, a dialog box appears. Click on DC=, then click in the value field. Type in the voltage (12 V) followed by a return. The voltage must be in a form acceptable to PSPICE. The schematic will be converted to a standard SPICE input file. No space is allowed between the number and any metric prefix or the units. Click OK to store away the new settings for the voltage source.

Although generating a PSPICE input file by hand is not difficult, working from a schematic can sure be nice. The Windows version of PSPICE includes a schematic capture program.

To draw each resistor, get R from the analog library. As you are positioning each resistor, you can hit control-R to rotate the part as necessary. You can also rotate a part after it has been placed by clicking on the part, then hitting control-R. You can set the resistance by double clicking on the resistor and filling in the dialog box, as was done for the voltage source, or you can double click on the component value itself. A dialog box with just that a clue appears.

Similarly, the component instance (R1, R2, etc.) can be changed. The individual parts of a component (the symbol, the instance, and the value) can be selected individually and dragged around the schematic to give a nice appearance. The ground symbols are in the Port library.

Figure 3.

Small Signal Bias Solution Temperature = 27.000 Deg. C

Node	Voltage	Node	Voltage	Node	Voltage
(Vn)	6.0000	($N_0001)	12.0000	($N_0002)	-3.0000

Voltage Source Currents

Name	Current
V_V1	-6.000E-03
V_V2	3.000E-03

Total Power Dissipation 8.10E-02 Watts

AGND, EGND, GND ANALOG, and GND EARTH all connect to node 0, but have different schematic symbols. AGND and GND_ANALOG use the triangular symbol, while EGND and GND_EARTH use the paralle line symbol.

The components are wired together using Wire in the Draw menu, or control-W. Do a left click to start the drawing. Do another left click to complete each wire segment. Do a right click to terminate the draw. Do another control-W to draw the next wire.

All the normal Windows edit capabilities are available, including copy to clipboard. You can then paste the schematic into documents.

An analysis on the circuit can be run at this point. With no other instructions, PSPICE will determine the "bias point" of the circuit, doing a DC analysis. Select Run PSPICE from the Analysis menu. Select Examine Output in the Analysis menu to see the output listing. This output is difficult to interpret because PSPICE has assigned the names to the nodes.

You can assign node names by double clicking on a node (for example, the junction of the three resistors). A dialog box will pop up asking for a label for this point. Any valid PSPICE node name may be keyed in. In the example, I keyed in Vn. The result is shown in figure 2.

The schematic capture portion of PSPICE supports .print and .dc using the VPRINT1 component and the DC sweep in Analysis Setup menu. For now, however, I will just use the default "bias point" calculation of PSPICE to check my results.

The results of the PSPICE run are shown in figure 3. Note that Vn does indeed have 6.000 volts, agreeing with all our calculations. Kirchoff was right!

Next month I will look at Kirchoff's Voltage Law and mesh analysis. I look forward to your comments.

□□□

Harold Hallikainen is president of Hallikainen & Friends, a manufacturer of transmitter control and telemetry equipment. He also teaches electronics at Cuesta College and is an avid contra dancer. He can be reached at 805-541-0200 (voice), 805-541-0201 fax, ap621@cleveland.freenet.edu (e-mail), and http://slonet.org/~hhallika/ on the World Wide Web.

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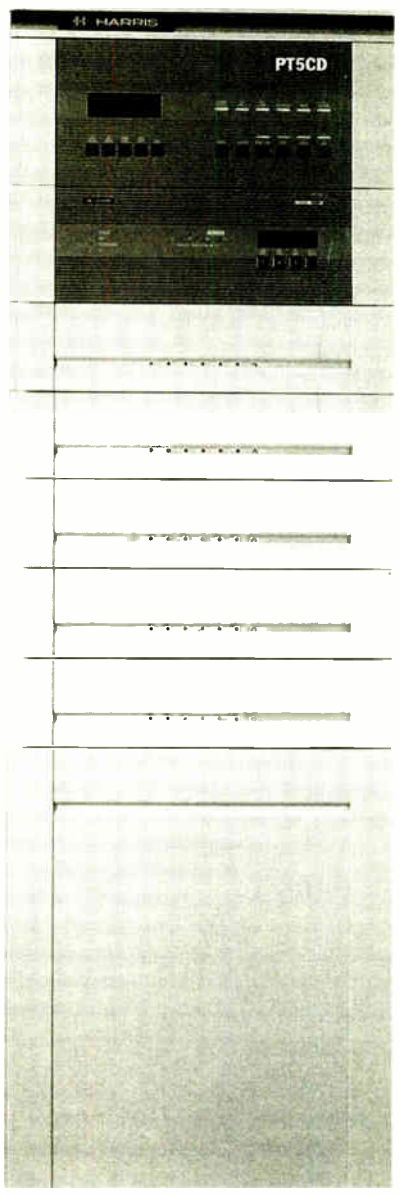

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World Radio History

Computer Mayhem Unlike Any Seen on 'Star Trek'

FROM THE TRENCHES

by Alan Peterson

Dear Luci,

Yep, all it took was just one look at **RW**'s "NAB in Review" issue to know computers have taken over. We all know there is one in traffic that puts the log together, one in the program director's office running the music software and the ones for the copywriter, engineer, newsroom, sales department, etc.

Now there is the one running spots on the automated AM, the one in FM handling commercials and zany effects for the morning show, the one in production disguised as as multitrack tape recorder, the one taking transmitter readings back by the shop and the one sequencing the CD jukeboxes on the duopolied FM.

Did we see it coming? You betcha. Pull out the service manual for the circa 1981 ITC 99 cart machine and check out that big beautiful microprocessor right there in the schematic. Don't look so surprised: There had to be a higher intelligence inside that deck running the show. And it has done so relatively flawlessly for years.

There are still way too many broadcasters not ready to embrace the computer as a necessary and meaningful part of the job. Too many problems, too many mistakes, too difficult to work. And when a computer crashes, it is a major inconvenience to the station. All I can tell these people is: just be glad it isn't 1966....

Back then, computers were designed to explode.

Diehard Trekkers will back me up on this. On any given episode of classic "Star Trek," the crew of the Enterprise defeated the enemy alien computer by flooding it with illogical equations, moral issues or demands to "execute your prime function." Within moments, flaming magnesium showered the screen and the evil machine was no more.

Never mind a nice simple "bad command or file name" prompt. Forget "file not found." These machines quite literally went ballistic.

Computers at the radio station (almost) never blow up. The worst that usually happens is the modem disconnects, data gets lost, a hard drive requires defragging or a Windows application locks up. In really rare occasions a monitor could die when the blanket of fuzz that collects inside gets too thick, trapping heat. But just imagine how things would be at a radio station if computers still carried the design specs "Star Trek" writers created nearly 30 years ago.

It would start in the traffic office. The coordinator would notice there are two nightclub spots in the same stopset, and moves one to a position later in the hour where it will conflict with a restaurant spot. Ignoring this, she goes ahead and schedules a live remote at a car dealer adjacent to a spot for a competing dealer, a McDonald's next to a Burger King and the Prom Promise PSA just before a beer commercial.

The screen will put up the red window announcing the conflicts, but the coordinator bypasses it and calls for the log to be printed. The computer, flooded with all this illogical information does the only thing it can when <ENTER> is pressed...

BOOM!!!... No log tomorrow.

Down the hall, the computer running the duopolized FM looks to find the next CD on the playlist and discovers it is the same CD now on-air. Worse, the computer sees it will end up playing two female vocal artists back-to-back. And with network news coming up, it can't find a shorter cut in the other CD jukebox to use as a fill tune to get to the hour. Painted into a corner, the automation computer does the only thing its programming will allow it to do:

KAPOW!!!... Thanks for listening.

In the AM studio, some poor soul decides to change the "cart number" of a spot recorded on a hard drive. Some systems won't allow you to do this and will tell you so. It may be possible to exit into DOS and do a REN or COPY command, allowing you to rename an audiofile with a new number. These systems come back with a "file corrupted" message, which is still much better than...

BABOOM!!! ...Oh well, it's only AM.

Do you remember the "Nomad" episode of Classic Trek (The Changeling)? The ship's computers got fried when Nomad "took in information faster than they could give it." Imagine the pyrotechnics taking place inside stations if two modems couldn't agree on a baud rate to exchange information and one tried to copy data too fast.

BAM!!! BAM!!!... Damn.

It won't stop. The first typo in a piece of commercial copy will trash the new PC in continuity, one demographic group misplaced in the sales terminal will smoke that machine, and one more spin of "All I Wanna Do" will vaporize the music director's 386 clone.

Even plugging the thing in and turning it on is dangerous, Luci. When you tell a computer to run its AUTOEXEC.BAT file, you're literally telling it to "execute it's prime function". Even casual dinnertime Trek viewers duck under the table when they hear that one coming. Booting up the station's new file server will serve up Silicon Flambé.

Thanks to careful programming, ingenious design and especially to 3.5 volt CPUs, catastrophic spark showers from computers are a rarity. Tell a computer to do something it can't do and it will say so. Executing a prime function takes you to a C prompt. Illogical equations simply give you illogical answers.

Somewhere during the development of the PC, a programmer who was a Trek fan realized there was a better way to do it than stink up the room. Clever software authors serving the broadcast community saw the potential for computers that didn't explode and incorporated them into the office and studio.

It's still not perfect, Luci. As the (relatively) old adage goes, "To really screw things up requires a computer." But at least the foresight of some now-forgotten computer pioneers are keeping things rolling safely and efficiently in the radio stations of the present.

Although, the presence of a bright flash and the smell of a hot fiberglass circuitboard would finally give the PD dramatic proof of what he's always somehow suspected in the past but could never catch in the act: jock error.

Maybe those Trek guys were onto something.

-Al

□□□

Alan Peterson wrote this from Harrisbrug...no, that should have been Harrisburg...oh, no!.....BOOM!.....

EDITOR'S NOTE: This column is the last From the Trenches—as you all know by now, Al is the technical editor of ***RW*** *and will be writing a slightly different kind of column for the newspaper henceforth.*

With this installment, I'd like to invite anyone interested in contributing a similar column, i.e., a humorous look at the daily life of a radio professional, to submit a manuscript. Submissions should be 800 words, and can be sent on DOS diskette (WordPerfect 5.1) or via e-mail at 74103.2435@compuserve.com.

Submissions should include the author's biographical and contact information.

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63 Years Ago

Reprinted from Radio World July 9, 1932.
Editor's note: The RW of old, printed for a time in the 1920s and 1930s and today's RW are unrelated except in name.

Distributor Misaligned, Auto Sets Pick up Motor

There are still a few installation men who have an occasional job on which they cannot get rid of all motor noise, says Transitone Automobile Radio Corporation.

Usually this is caused by the distributor. The high tension terminals or contacts are not lined up perfectly due to shrinkage or warping of the head or to wear in the distributor gears. The rotor may strike a few of the contacts and miss the rest.

Chalk the Contacts

When peening a rotor under such conditions, the best plan is to chalk the contacts or terminals and then after the rotor has been carefully peened, turn over the motor a few times with the ignition turned off.

Remove the distributor head and examine the chalked terminals. If the rotor has cut the chalk on a few of the contacts, these contacts should be scraped down with a hard sharp tool and the rotor again peened.

Shielded Loom

This procedure should be carried on until the rotor just traces a line through the heavy chalk layer on all the contacts. Obstinate cases of interference can be eliminated this way.

As a further aid to installation there is a stock shielded loom for shielding the secondary ignition cable between the instrument panel and the dash. It is made up in eighteen-inch lengths.

World Radio History

YOUR CALL

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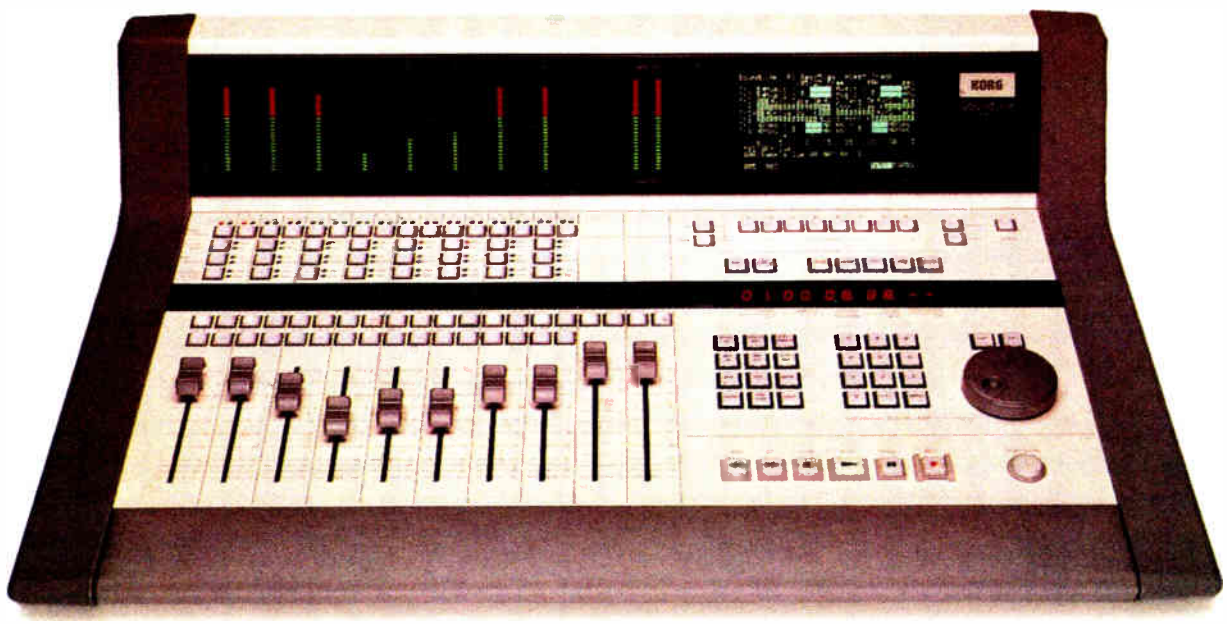

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WJR-AM, Detroit
Capital Cities/ABC, Inc.

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— Fred Holub, Chief Engineer
KLAX-FM/KXED-AM, LA
Spanish Broadcasting System

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— Roy Pressman, Tech. Director
WLVE-FM/WZTA-FM/WINZ-AM
Paxson Broadcasting, Miami

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Circle (208) On Reader Service Card

World Radio History

Studio Sessions

Equipment and Applications for Radio Production and Recording

DAT
Maintenance Tips
See p. 28

PRODUCT EVALUATION

Roland DM-800 Portable, Powerful

by Ty Ford

BALTIMORE In the last *Producer's File* (**RW**, June 14), I gave a general overview of Roland's new DM-800 workstation with two 500MB hard drives ($7,495). In this part, I'll delve more into the actual operation and features of the unit.

First, no doubt about it, due to the 1-bit, 128x oversampling delta-sigma A/D conversion, 8x oversampling and 18-bit D/A converters, the sound quality of the DM-800 is extremely good. All internal processing, including digital EQ, is 24-bit processing.

Some Roland-speak

Although Roland gets good marks for the Troubleshooting, SCSI and SMPTE sections of the manual, many of the operational parts remain in Roland-ese; little things, like being told to hit the Record button when what they really meant was the Rec button (yes, there are two). These oversights are really off-putting, especially to the new user.

(In the middle of writing this article, I received a "hot off the e-mail" 19-page tutorial. Its applications approach cuts through a lot of the mystifying rhetoric of the manual. There is also a three-part, color-coded applications video currently in production.)

As with many DAWs, the DM-800 stores audio on a SCSI system of internal and external hard drives. Even though the two 500MB internal drives are designed to operate without a cooling fan (and the drives themselves are less noisy than some I have heard), they generate enough noise to create problems if the DM-800 is to be used near an open mic. If you are used to a combo studio with half a dozen cart machines and other tape transports whirring in the background, the noise probably will not bother you, especially if you use an expander on the mic circuit. On the other hand, if you are trying to record pristine audio in the same room with one or more open mics, the drive noise will be a factor.

Speaking of hard drives, Roland suggests that if you are doing a lot of small projects, back up everything to tape and reinitialize (defragment) the drives once every two weeks, or before starting a new big project.

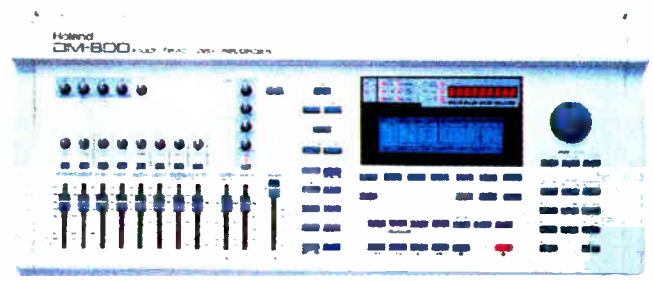
Editing eight tracks using the onboard LCD display is like viewing the Grand Canyon through a keyhole. I highly recommend using a monitor (NTSC, PAL, S-Video, Atari, NEC or IBM). They all may be ported directly from the DM-800 and will give an expanded view that includes metering, a four-track close-up view and a total overview of all tracks in a project.

Using the DM-800

The DM-800 uses dedicated controls and soft keys; there is no mousing around. There are seven mode buttons: Record, Playlist, Mixer, Tempo, Trigger, Catalog and System. Within each mode, there are a number of "pages" that are accessed by the F-Keys positioned under the on-board LCD. Four cursor buttons and the Value/Time wheel are used to navigate to and from the various fields to change the values. Numbers can also be punched in via the keypad.

To start a project, go to the Catalog mode, choose the sample rate (32, 44.1 or 48 kHz), name the production and initialize. Set the Sample Clock Source to determine whether the DM-800 will be providing internal sync, receiving it from an external SMPTE source or from an external digital source. The Time Base is set independently from the Sample Clock Source. If you are not trying to sync to outside sources, simply stay Internal. The time displays can be set to read in SMPTE, Min/Sec or Measure/Beats.

During setup, you can also change the length of audio heard in each of the Up To, Thru and From preview and scrub preview modes. You also get your choice of Trigger, Gate or Loop preview modes. Trigger plays the preview selection through once when any preview button is pushed. Gate mode passes audio only when the preview button is held down and Loop plays the selected audio in a loop with one press of a preview button.



Roland DM-800

Monitor features

You can monitor either Source or Disk. When Source is chosen, the input source will be monitored when a track is in Record Ready. Use this mode if you want to play along until a punch-in. When Disk is chosen, a track will play back from disk at all times, except when actually recording and the Track Status Select red light is on. Use this mode if you want to hear other recordings on the track so you can punch in at a specific point.

There is a separate window for setting punch-in/-out times and you can also punch in and out of record via a MIDI trigger or a footswitch, or by using the multipurpose Shift/Marker buttons. This kind of housekeeping only needs to be done once, unless you need to alter a production for connectivity to the outside world.

One of the features I did not like about the earlier DM-80 was that the sound passed to the outputs in "scrub" mode was like hearing a CD in "pause." The DM-800 still operates the same way, but you can call up a waveform display that makes it a lot easier to find the edit point. The waveform display only shows one track at a time and shows only levels above -48 dB digital and -28 dBm analog. Even at the highest of the three vertical resolution levels, the display does not give you much of a visual idea of the location of a low-level sound.

Recording with DM-800

After hitting the Record mode button, press the In/Out F-Key to access the internal routing. This determines which analog or digital input is directed to which track, and whether the internal tracks are output directly or through the internal eight-channel Mix bus to any of the output busses.

There are three record modes: Manual, Auto and Loop. In the Manual mode the DM-800 operates much the same way as any tape recorder. Auto mode is used for automated punch-in/-out. Loop mode repeats a section, allowing you to record a

continued on page 33 ▶

Product Capsule: **Roland DM-800**

Thumbs Up	Thumbs Down
✓ price	✓ needs better scrub
✓ sound quality	✓ glitchy time compression
✓ tons of features	

For more information, call Roland at 213-685-5141; or circle **Reader Service 51**.

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World Radio History

Legendary Les Paul Turns 80 This Year

by Frank Beacham

NEW YORK Les Paul is such an easy-going, friendly, accessible man that it is sometimes hard to comprehend how important his contributions have been to both contemporary music and modern audio technology.

Of course his name is synonymous with the electric guitar (yes, he perfected it). But add to this such audio innovations as multitrack recording, reverb, sound-on-sound and overdubbing and you begin to understand the impact Les Paul has had on our music and culture.

This summer Les, who still performs every Monday night at Fat Tuesdays in New York City, turned 80. To celebrate his extraordinary life and career, look for a Les Paul television special this fall from the Gibson Guitar company, maker of the legendary line of Les Paul-designed guitars. Also, honors will come to Les later this year at the Smithsonian Institution in Washington, D.C.

Off the Shure assembly line came a one-of-a-kind, very limited edition SM-58 with the name "Les Paul" engraved in a circular band just under the metal screen.

Since conducting an interview with Les a couple of years ago, I've stayed in touch with the man once known as "Red Hot Red, the Wizard of Waukesha" (his Wisconsin hometown) and have been rewarded with some wonderful evenings of music and great conversation. Recently, while on a visit to New York, I introduced Michael Pettersen, director of the applications group at Shure Brothers, to Les before his weekly gig at Fat Tuesdays.

The two hit it off well, with Les reminding Michael that he was hanging around the Shure Brothers factory in Chicago before Michael was even born. Les said he is a big fan of the venerable Shure SM-57 and 58 mics, which are staples of performing musicians everywhere. "Best f...ing microphones in the world," Les proclaimed enthusiastically, telling Michael he could take a $100 SM-57, and with good technique and equalization, make it sound as good as a $6,000 German microphone.

All this carried over into his stage performance later, where Les did a mock "test" to demonstrate the capabilities of his battered, war-torn SM-58, a mic that Les has obviously put to good use for many, many years.

As a token of all this good will, Michael decided it was time Les upgraded his vintage 58. So off the Shure assembly line this summer came a one-of-a-kind, very limited edition SM-58 with the name "Les Paul" engraved on a circular band just under the metal screen. Hopefully, by the time you read this, Les will be using the new "Les Paul" mic on stage with his "Les Paul" guitar at Fat Tuesdays.

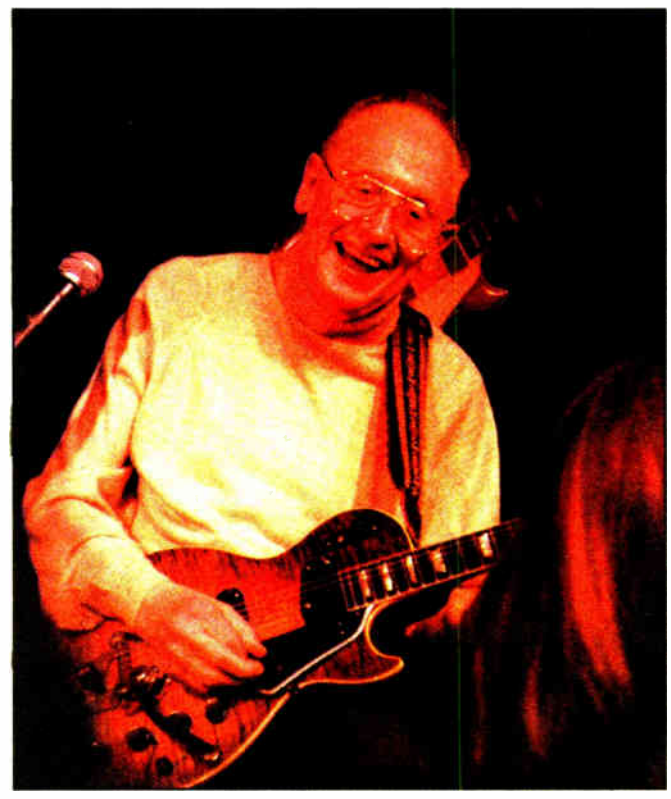


photo by Frank Beacham

Les Paul performs at Fat Tuesdays in NYC.

Sony's Hot New Wireless

It is no secret that wireless microphones are getting better and cheaper, but until now, I had not been able to find a decent, inexpensive portable system small and convenient enough for routine recording of news events. Just before this column went to press, Sony sent us a sample of its new $150 WCS-990 wireless mic system. Though it is designed for consumer camcorder use, I immediately recognized the potential to use this elegant, sub-miniature system in some less-than-critical professional applications.

Could this be a useful wireless news conference mic for radio reporters and news writers? Well, it is too early to tell, but the system certainly has all the right features.

First of all, the system uses transmitter and receiver packs about the size of tiny pocket pagers, each weighing well under three ounces powered by two AAA batteries. The antennas are internal, so there are no protrusions from either device. This is absolutely the most minuscule wireless mic system I've ever seen.

The transmitter (which comes with its own electret lavalier mic) has Sony's plug-in power jack that can deliver phantom power to professional microphones. We tested the unit with Professional Sound Corporation's Millimic condenser mic and it performed flawlessly.

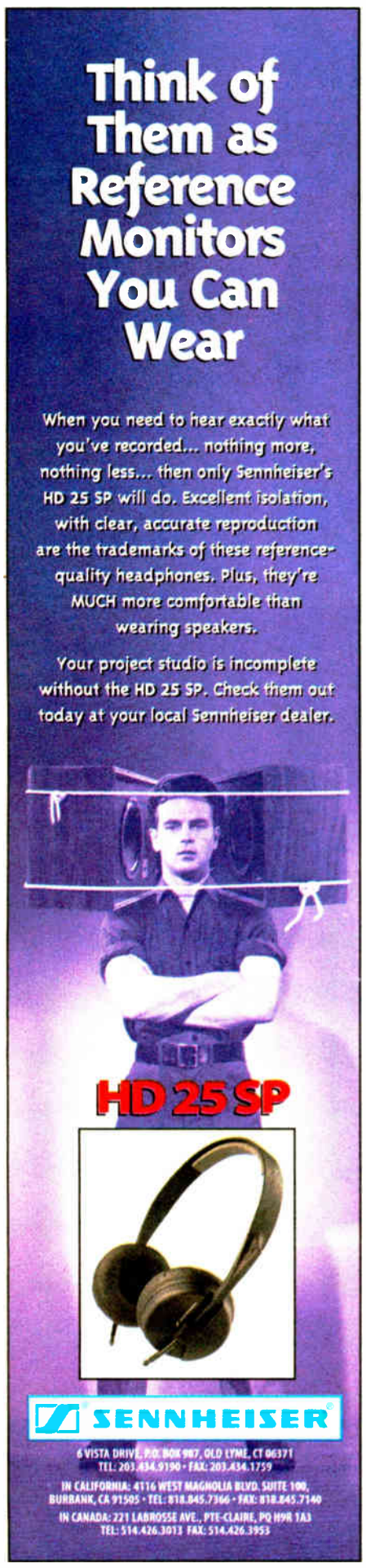
The receiver has an 18-inch output cable with mono minijack for tape recorders and a separate headphone jack for monitoring sound at the receiver. There is also a mic jack input for mixing with the microphone at the transmitter.

The new Sony system operates in the 912-916 MHz range, offers two switchable channels and has a transmission range of up to 100 feet. Frequency response is 100-15000 Hz and dynamic range is more than 78 dB.

We put Sony's new system through some quick tests and got excellent results with no interference. However, in the days ahead, we want see how it performs in real-world conditions on the mean RF streets of New York. We'll be back with the results.

□ □ □

Frank Beacham is a writer, director & producer. His address is 163 Amsterdam Ave. #361, New York, NY 10023. E-Mail: beacham@radiomail.net.



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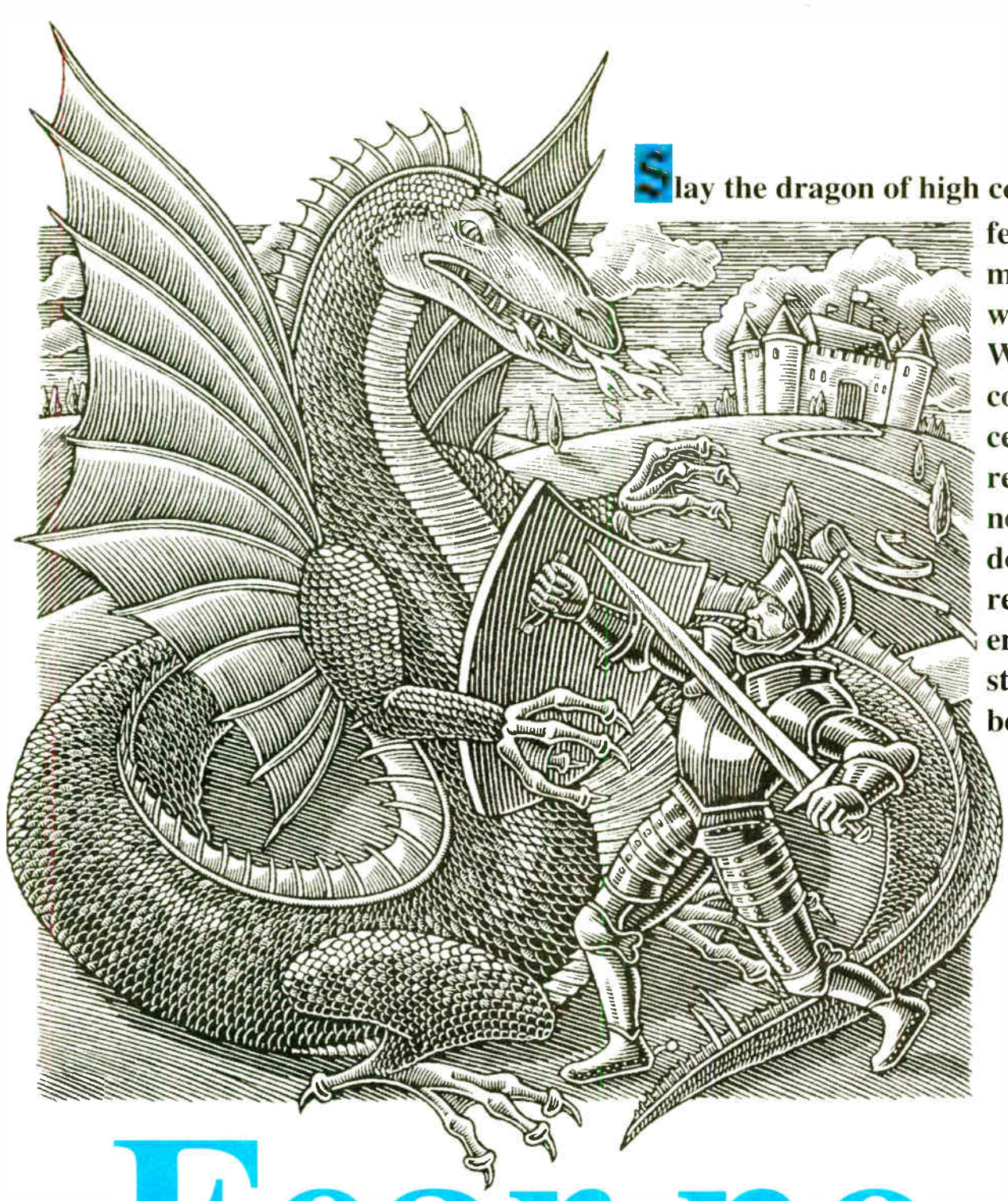
World Radio History



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World Radio History

LINE OUT

Maintenance Keeps DATS Error-Free

by Bruce Bartlett
with Jenny Bartlett

ELKHART, Ind. You just finished a perfect mix and recorded it on DAT. But when you play it back, you hear a glitch. It is either a noise burst or a short silence. What is going on, and how can you fix it?

Dust, oxide flakes, or tape misalignment can cause errors in the digital signal. A glitch occurs when the error-correction circuit cannot remove all the errors. Some DAT machines mute the audio when this happens, creating a dropout.

Errors are less probable if you use high-quality tape and keep the heads clean. Good tapes and clean heads usually give error rates well below 50. If you hear glitches, or if the error display reads high (over 100), it is time to clean the heads.

You can do this in three ways:

- With a dry cleaning tape;
- With a wet cleaning tape,
- Manually with a swab and cleaning fluid.

Only manual cleaning gets to the entire tape path of rollers, tape guides and heads. Let's look more closely at each cleaning method.

Dry cleaning tape

The only maintenance that Sony recommends is a dry cleaning tape. They say that dirt on the capstan is not much of a problem. Sony does not recommend cleaning the pinch roller and guides unless you are used to doing it. Tape tension is more often a problem, and usually only in new machines.

A dry cleaning tape works by scraping the head drum to remove dust and dirt, trapping it in the tape fibers. To clean your DAT machine, pop in a dry cleaning tape and press Play. Eject the tape after 10 seconds. Because the tape collects dirt, do not rewind or reuse it.

If a high error rate cannot be corrected by a dry-cleaning tape, send the DAT machine to the manufacturer's service department.

How often should you clean the heads? As little as possible, because the dry cleaning tape is abrasive. Use it only when you hear dropouts or when the error rate is too high. To be safe, clean the heads just before taping a live concert or a mixdown.

It is also a good idea to run a redundant machine in critical situations.

"DAT tape doesn't shed as much as analog tape," says Rick Canata of Fostex tech service. So unless you are in a very dusty environment, he says, cleaning with a dry tape once a month should be enough.

Errors are less probable if you use high-quality tape and keep the heads clean.

Wet cleaning tape

One wet cleaning tape is the DAT-101 from American Recorder/Intraclean, Simi Valley, Calif., 805-527-9580. It uses a non-alcohol hydrocarbon based liquid that evaporates faster than alcohol.

Fostex does not recommend wet cleaning tape because excessive fluid can damage your DAT machine.

Manual cleaning

Bob Kozlarek of Panasonic tech service says, "Maintenance is more than head cleaning. Get the service manual for your machine and follow its periodic maintenance schedule. Use only an authorized factory service center. You will be rewarded with a smooth-running machine." A VCR repair facility, Bob says, is not equipped to properly service DAT machines.

Manual cleaning is best done by a qualified technician. If you feel comfortable doing it yourself, proceed with caution. Jimmy Yamagishi of Tascam tech support says, "Order the service manual for the particular machine you are using, since they vary." The manual also shows lubrication points.

You will need some foam-tipped swabs and cleaning fluid. Do not use cotton swabs because they can leave lint and can catch on the heads. Rick Canata of Fostex cautions against using chamois-tipped swabs or a chamois cloth because they can shred.

Some common cleaning fluids are denatured alcohol, freon-based chemicals, and halogenated hydrocarbon-based chemicals such as Intraclean S711. Alcohol is said to dry out rubber parts, so use a rubber cleaner on pinch rollers.

Clean everything the tape touches: the guides, rollers, pinch roller, and capstan. Dust and oxide deposits on the capstan can cause mistracking, so it is important to clean it. Part of the capstan is covered by a half-cylinder, so you can clean only part of the capstan at a time. To expose the other half, turn on the deck, load and unload a tape, and turn off the deck. If you do this a few times, chances are that all sides of the capstan will be exposed for cleaning.

To get at the head drum, you might need to disassemble the tape loading mechanism. Once this is done, moisten the foam swab with cleaning fluid. While holding the swab very gently against the drum, turn the drum in one direction only. This action cleans the drum and each head.

Caution: Keep the swab stationary. Do not move it up or down while it is contacting the drum, or you may break off the head. Neither I nor **RW** are responsible for damage to your DAT.

Alignment

Does your deck play its own tapes, but does not reliably play tapes from other decks? Most likely, the problem is tape-to-head alignment. You cannot align the heads because they are stationary.

But you can adjust the posts that guide the tape correctly past the rotating heads. Caution: This is recommended only in an emergency as a last resort. Again, we are not responsible for damage to your DAT or DAT tapes.

Because the tape guides are slotted, you can turn them with a small screwdriver to change the path of the tape relative to the heads. Play your problematic tape and adjust the guides until the tape plays OK.

Exercise a blank tape before using it. Fast forward the tape to the end and rewind to the top. This loosens the tape pack so it travels freely, and spreads the tape lubricants more evenly.

Store tapes wound all the way to the head or tail. Store tapes on end. Keep them away from heat and magnetic fields.

Some manufacturers have DAT tech support hotlines:

- Panasonic—The DAT Help Line at 800-524-1448; 800-624-1746 (New Jersey) Panasonic Pro Audio, 6550 Katella Avenue, Cypress, Calif. 90630, 714-373-7277;
- Sony—DAT Hotline at 908-SONY-DAT; 908-766-9328.

You can clean the I/O connectors with ProGold conditioning treatment, available from CAIG Labs, 16744 W. Bernardo Drive, San Diego 92127, telephone 800-CAIG-123; fax: 619-451-2799.

Following is a list of some vendors of dry cleaning tapes:

- The Tape Company (Dallas 800-992-0336; Chicago 800-437-2175; Twin Cities 800-831-3031; Cincinnati 800-437-2125);
- Polyline at 708-390-7744;
- PolyWest at 818-969-8555.
- Total Media Inc. at 800-848-4118.

Thanks to tech support at Tascam, Fostex, Panasonic, and Sony for their help with this article.

□□□

Bruce Bartlett is a microphone engineer and technical writer, and the author of "Practical Recording Techniques" published by Howard Sams. Jenny Bartlett is a technical writer. Bruce can be reached at 219-294-8388.

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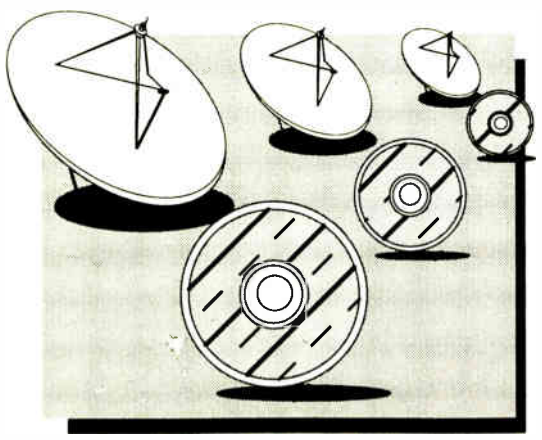

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World Radio History

PRODUCT GUIDE

Companies with new product announcements for Studio Sessions Product Guide should send them to Radio World, c/o Studio Sessions Editor, 5827 Columbia Pike, 3rd floor, Falls Church, Va. 22041

Tascam CD-301MKII CD Player

Tascam announces availability of the new CD-301MKII compact disc player for on-air and production room use. Features include balanced/unbalanced analog and S/PDIF digital outputs, 1 bit delta-sigma D/A conversion and an Auto Cue function for on-air use which prevents dead air at the start of program material. Wired and wireless remote controls are optional and a single play feature stops playback at the end of a selection.

For more information, contact Tascam at 213-726-0303 or circle **Reader Service 214.**

Digitech Studio Vocalist

The DigiTech Studio Vocalist creates high quality vocal harmony, thickening and pitch correction. Six-octave shifting can be achieved without "chipmunking," making the Studio Vocalist ideal for in-house commercial jingle production and specialized voice processing. Features include balanced and 1/4" line/mic input with phantom power, MIDI and digital I/O.

For more information, contact DigiTech at 801-566-8800, or circle **Reader Service 79.**

Audix Professional Monitors

Audix Corporation has developed the Mini-Monitor series, the Studio series and the Nile series of high-level monitor speakers. Applications include portable studios (remote vans) to critical production room monitoring. The Nile X monitor uses two 7" Kevlar woofers, reproduces 40 Hz to 20 kHz and has a power capacity of up to 350 W.

For more information, contact Audix Corporation at 503-692-4426 or circle **Reader Service 207.**

Roland DM-80 Large Track

Roland's DM-80 DAW is now available in configurations from eight to 32 tracks. The 24-track version provides 100 layers per track, three professional sampling rates, tape recorder-like operation and can be expanded to hold 72 hours of recording time with standard SCSI drives. Twelve digital inputs and 24 balanced analog inputs are available.

For more information, contact Roland Corp. at 213-685-5141 or circle **Reader Service 160.**

Soundcraft 10s Console

Soundcraft USA introduces the new Series 10s modular mixing console available in three frame sizes. Separate Audition and Program busses, full logic interface for start/stop machine control and auto muting of the pre-fader Cue circuit. The production version comes with long throw P&G faders for Prog and Aud master levels and can be configured with the user's choice of modules.

For more information, contact Shannon T. Celia at Soundcraft USA/JBL at 818-895-3426 or circle **Reader Service 54.**

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CONNECTING THE WORLD

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World Radio History

Put Operations Manual on the Net

by Rich Rarey

WASHINGTON Ever gone searching for the "right" information? Spec sheets, glossaries, and price lists squirreled away in file folders, three-ring binders and drawers, all in anticipation that one day you would need to retrieve that priceless artifact?

Did you ever have the need to create and maintain a compendium of knowledge across multiple computer platforms, so that many users could access it in meaningful ways?

We have, and we found a solution in an unlikely place: The World Wide Web.

Glancing back

Let me backtrack to the late 1970s at NPR. Our three studios and master control were each furnished with a thick three-ring binder describing nearly everything a broadcast technician would want to know: telco circuits and phone numbers, length of leader tape for reel duplicator masters, how the landline-based "Round-Robin" NPR broadcast circuits were routed and so on.

Needless to say, some of the binder's contents were always going out of date and there was no single individual designated to maintain the books. They gathered dust and became a historical artifact about how things "used to be done" at NPR.

In the mid 1980s, the master control technical director assumed responsibility for maintaining phone directories and information sheets about existing audio circuits. The book slowly grew, as useful information was inserted; everything from setup and diagnostics of overseas broadcast circuits to operating the Sony Beta (F-1) recording decks for network program re-feed backup.

This three-ringed resource increased in value because any overnight shift technician, regardless of experience, could properly manage the facilities by referring to it. Technicians who felt "rusty" on troubleshooting techniques, who needed to find telco numbers to report trouble or just liked to know how things worked would refer to the book.

Managers discovered good documentation reduced on-air errors and made technicians more valuable—truly proving that information equals power.

Duplicating info

Unfortunately, maintaining multiple copies was a chore, and it became apparent that the most efficient way to keep technical material timely was to update a single source. But could we maintain effortless distribution with paper?

While we struggled to keep paper-based information current, NPR began expanding its VAX mainframe service and all NPR employees were given a computer account on a VAX mainframe. Digital Equipment Corporation terminals populated the company's headquarters and appeared at NPR's bureaus. After using VAX Help libraries we began experimenting with the creation of our own library to hold a text-only version of the thick three-ring binder.

Master Control Technical Director Norb Gallery authored the first version of the Master Control Help Library, created from plain text files and processed by invoking the VAX Librarian Application. Users could browse the library by entering the arcane command HELP/LIB=SYS$PGM_TP:[MASTER]MCHELP.HLB.

This information system worked reasonably well for several years and was easy to update: just rewrite the plain text source then re-compile the library. It was accessible: any NPR staffer could log on from anywhere to search for member station Switched 56 numbers, contact numbers, descriptions of NPR facilities in and out of Washington and other useful information.

Easy to use

It was keystroke-easy to use after a VAX "menu front-end" was implemented (insulating the user from the archaic command line interface). A typical search would begin with: "Do we have a member station in such-and-such town who could record a tape-sync?"

Eventually we came up against the limitations of the format. NPR was evolving from mainframe to desktop computing (PCs and Macs), and the VAX Help format was not translatable. We desired cross-platform accessibility, the facility to easily update text without having to re-compile, and we wanted to take advantage of the desktop's look and feel to make the library "friendly." The Microsoft Windows Help file system looked promising but was not compatible with the VAX and Mac file structure. Having a custom Help file system for each of the three platforms would only return us back to the days of multiple three-ring binders.

Almost simultaneously, a rapid rise of all-things-Internet brought World Wide Web viewers into the workplace. Norb Gallery then conceived an ingeniously simple solution: author Help files using HyperText Markup Language (HTML) and files will be virtually universal to any platform with a Web viewer written for it. HTML files are simple text files that can be authored on a word processor (more elaborate HTML editors can be downloaded from Internet sites as desired). A big plus: graphics, logos, and diagrams can be easily rendered where appropriate, mindful of the text-only terminals VAX users have.

Wider Web scope

In the NPR implementation, the content of the "new" HELP files has been deepened and renamed Audio Engineering Help (AEDHELP) to reflect their wider scope. The files are not actually on the Web, but reside on a protected server accessible by PC and Mac users running Netscape, or by VAX users running Lynx. The Lynx interface is superior to the old VAX Help file system, and encourages users to browse and learn.

As of June 1995, the AEDHELP page contained a list of linkable topics including Public Radio Conference information, a white paper on M-S stereo authored by a colleague, searchable lists of member stations' ISDN numbers, complete descriptions of NPR facilities and their connections to the headquarters, and a glossary; any information technical people need to grab quickly will be put into AEDHELP.

Your station could use these techniques for authoring an electronic "info sheet." Volunteers and staff could refer to a searchable, easily maintained document

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SHORT TAKE

Oktava MK 219 Mic: The Soviet Sound Arrives

by Ty Ford

BALTIMORE The Oktava MK 219 ($549) shown at the spring NAB by Harris Allied is evidence of the continuing emigration of technology from the former Soviet Union. The first MK 219 to arrive on my doorstep had some circuit problems that resulted in it periodically passing a lot of low-frequency noise and crackles. By the time the second one got here, the first had started to behave.

The MK 219 is a large-diaphragm, cardioid-only condenser microphone. Frequency response is quoted at 40 Hz to 16 kHz, sensitivity at 11mV/Pascal (Pa). Output impedance is rated at 200 ohms.

At a working distance of about four inches, which is how close you have to get before hearing the proximity effect, the MK 219 showed a good 4 dB hotter than my Microtech Gefell M71. Curious, because the specs show the Gefell to be 2 dB more sensitive. The MK 219 uses magnetic reed switches for both the 10 dB pad and high-pass filter. Roll-off is at 50 Hz at a rate of 5 dB/octave set flat. With the high-pass filter on, roll-off starts at 400 Hz, with a 3 dB/octave slope. With a bright preamp—like those found in the Mackie 1604—the MK 219 can sound "edgy" and a bit brittle.

Again, the application should determine the acceptance. If your radio station uses a lot of gain reduction and mic processing, the "edge" might be helpful in allowing the voices to cut through.

When compared to a Neumann U87 and an AKG 414, the MK 219 sounded more like the U87, but less open. Some might complain about the "lack of air" and "sparkle," but in a live, reflective environment (like lots of glass and hard parallel surfaces) the MK 219 can help by ignoring some of those unwanted high frequencies.

There was a noticeable difference in sound as the mic was moved more than two feet away from the sound source. With the U87 and 414, the distance matched the reduction in level. At a distance of two feet, the MK 219 sounded as though it was across the room.

Actually, on male voice, the MK 219 sounds a lot like a Sennheiser 421 with the EQ adjustment one click off "M" towards "S." If you like the sound of the 421, but have had noise problems while using it close to video or computer monitors, try an MK 219. Thanks to Dave Burns of Harris Allied for supplying the mics.

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PRODUCT EVALUATION

Crown Listens, Improves Headset Mic

EDITOR'S NOTE: In the month since this review was written, and after conversations with the factory, Crown has addressed the concerns raised in this article. These will be noted point for point in the text of the review. Rich Rarey and RW note Crown International's acceptance of and swift action on the reviewer's comments and points raised in the following.

by Rich Rarey

WASHINGTON A manufacturer's suggested uses for a product command the reviewer to create fair-use tests just to see if the product will perform as advertised. Frequently a product shines under these tests, but sometimes a product simply does not perform quite as well as expected.

This was the case with two head-worn microphones from Crown International. The CM-311HS and the CM-312HS are cleverly designed to attach to your Sony MDR-7506 or MDR-V6 headphones, making an inexpensive broadcast headset. I found the performance in the CM-312HS somewhat lacking, and the suggested applications for the CM-311HS inappropriate.

Similar construction

The 311 and 312 are constructed similarily; both have a high impact plastic semi-circular ring mount with tabbed grooves that mount around the Sony's forked earcup yoke. The mount slips easily on and off the headphones. A thumbscrew at the bottom of the mount keeps the boom assembly from pitching up and down, and a second thumbscrew on a connecting block restrains side-to-side movement of the boom. The assembly as delivered is to be slipped over the right earcup, but can be transformed to mount to the left earcup in eight easy steps.

A slender, four-foot cable connects the boom assembly to the belt pack electronics, where an XLR connector outputs to your mic preamp. The belt pack contains a 9 V battery (if you are not using phantom power), a battery On/Off switch, and a "cough" button. Overall it weighs just 8 ounces, and the boom weighs in at 1.8 ounces for the CM-312HS, 2.3 ounces for the CM-311HS.

I was disappointed with the belt pack construction for several reasons. Personally, I have come to associate all-metal construction with rugged quality, but the belt pack cover is high impact plastic that screws to a steel shell. Although a 9 V battery is specified to last 134 hours, you may hope you do not have to use it at all; the battery clips are extremely stiff, making it difficult to change batteries.

I pricked my finger and drew blood from the sharp component leads while trying to wiggle the battery into place. The cough button is on the bottom of the belt pack, meaning you push up to activate. If the pack is clipped to your trousers, you have to clamp the top of the pack with your thumb and push up with your pointer finger, else the entire pack will slip off your trousers. *(Crown designers have recognized these problems and are now redesigning the belt-pack.)*

In subjective tests, the CM-312HS was connected to a Benchmark preamp, and used the preamp's phantom power. We asked one of the local deep-voice talents to try the headset in a radio studio, a use suggested in the Crown instruction sheet. His voice sounded distinctly pinched as if he were holding his nose. When we adjusted the boom for a more natural sound, the sibilance disappeared, making his voice muffled.

Crown CM312HS shown with Sony headset

Anchor the boom

We kept hearing scratching noises and realized the boom mic cable is extremely sensitive to motion and touch, so much so that Crown has included a small clip for anchoring the boom cable.

The talent had difficulty adjusting the boom; when using a boom mic, one's natural inclination is to bend the boom to one's mouth. The rigid steel boom will not bend, and the user is forced to slide the boom forward and back to adjust for comfort and elimination of the plosives.

Adjusting the thumbscrews is awkward, as both the CM311-HS and CM-312HS have some degree of play when mounted on the Sony headphones, and tightening the screws will cause the assembly to slip. The CM-312HS is not forgiving on P-pops and other plosives. Regardless of the manufacturer's instruction sheet to the contrary, we did not have much luck positioning the boom to retain any sort of natural voice quality *(Crown has recognized this and has revised the data sheet to include diagrams for proper mic placement.)*

Because the Crown manual stated the CM-311HS rejected backround noise extremely well and was "well suited for use in traffic-copters, sporting events, or car races," I wanted to test the microphone in that environment. Having already reserved a Cessna 172 fixed-wing airplane for the express purpose of practicing standard flight maneuvers, bringing the CM-311HS along with a DAT recorder seemed like a good incidental exercise. After stabilizing at 1,400 feet I began the recording.

In listening to the playback later, the microphone rejected engine noise well, but suffered from plosives and breath noise. Crown provided a two-stage pop filter that replaces the original, but I still had difficulty placing the boom where "p-pops" would be eliminated. The boom assembly was problematic again, as the boom cable tangles when one's head is turned towards the cable. The result is the boom is lifted above the user's mouth. My concern with the CM-311HS in these high noise situations does not involve the microphone, but rather the headphones. The Sony V-6 headphones are great for normal ambient recording, but are not isolating enough with a prolonged dose

continued on next page ▶

NPR, HTML Store Info

▶ continued from page 30

with station attributes such as mission statement, format, pledging guidelines and goals... just about anything you would find useful. If your station already has a networked computer system, one way would be to obtain a Web browser application such as Netscape (http://home.netscape.com/ or 415-528-2555) for each PC or Mac on your network.

You need not have a connection to the Internet to use the Web browser. You can write your HTML files using any word processor, and place the files on your network server. Set up the Web browser to load your main HTML file from your server, and you are in business.

HTML files are text files with commands that tell the Web Browser to display a particular text size, insert a .GIF picture, and so on. Books describing how to write HTML files are in bookstores everywhere. The Internet is also a good place to find HTML documentation.

With more than 70 public radio stations already supporting their own World Wide Web home page, it is clear that the Web is a great medium for public Internet consumption. It is my feeling that this same technology is as valuable for within the station as it is "without."

Until next month, I remain, your ob'd'nt eng'r.

□□□

Rich Rarey is the technical director for National Public Radio's "All Things Considered." He can be reached at rrarey@npr.org

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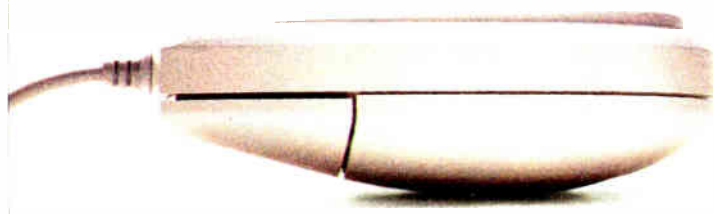

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FOUNDATION

World Radio History

Recording, Mixing Fast on DM800

▶ continued from page 25

section and listen back without stopping. Each recording can be saved as a different Take. You can then choose among the different Takes for the best ones.

Assume you have chosen Manual Record and have assigned the correct input to the correct track, checked and adjusted the analog input levels and put the desired tracks into Record Ready on the mixer using the Track Status Select buttons. You then hit the Rec button on the transport, which will begin flashing along with the Track Status light. When you are ready to roll, hit Play, and you are recording.

When you hit Stop, the DM-800 prompts you to keep or delete what you have just recorded, and what to name the Take and Phrase. You can enter that information via the built-in alphanumeric keypad or a PC XT/AT keyboard you provide before booting up. The audio you just recorded is stored as a Take on the hard drive. The Phrase shows on the LCD display as a rectangular box, on whatever track you chose to record it.

You can mess with the Phrase all you want, including deleting it, and the Take remains intact. At any point you can go back to the Take and create a new Phrase to fit in your production. You can also make new Phrases from existing Phrases. Each project can contain as many as 128 Takes per four tracks and a maximum of 300 Phrases per four tracks. Each track can play only one Phrase at a time with a maximum of a one second crossfade. It is a good idea to name your first Phrases and Takes, because subsequent Takes will be similarly named with additive numbers (e.g. voice, voice 1, voice 2).

Location, location...

The dedicated Phrase Locate buttons move you quickly to the beginning or end of a take. The eight Marker buttons can be used in Stop or on the fly in Play or Record. Although there are only eight buttons, you can "shift1, shift2," etc. to get five pages, each with eight marker points. The Marker buttons also do double-duty with the Shift button to allow quick choice of loop start/end points, punch-in/-out points, internal/SMPTE/MTC time base and Now Time capture.

Editing on the DM-800 is done in the Playlist mode. Editing abilities include Move, Trim in/out, Offset, Relative Move, Phrase edit, Copy, Insert time, Cut/Erase, Split Phrase and Overlap. Different Takes can be used by a selected Phrase. Groups of Phrases can be moved, copied or deleted.

The MIXER mode lets you access the faders, EQ and pan controls and their automation. In addition to dynamic automation of these controls, the DM-800 also does snapshot automation, fader grouping and micro-editing of automation. The Tempo mode allows tempo maps to be created for MIDI sequencing.

Radio and theater production folks will really like Trigger mode because they can instantly fire sound elements using a MIDI keyboard or keypads 1-8 on the DM-800. Triggered events can be set to play all the way to the end, or as long as the key is held down. The Advance Trigger feature is used to fire successive phrases that you have positioned on a given track. This is Big Fun, but the manual fails to mention that the keyboard and DM-800 need to be on the same MIDI channel.

Compression depression

Although the DM-800 does time compression, pitch change or vari-speed, it has some problems, especially with voice only or voice-over-music. Even 5 percent time compression of a voiceover spot resulted in glitches. Curiously, the sung part of the jingle was unaffected. Compressing a 33-second mono voice track to 30 seconds took 4:12 using the "A" algorithm, 4:27 using the "B" algorithm and 5:09 with the "C" algorithm.

There are a lot of other features and uses of the DM-800, but no room left to write them in this article. Suffice it to say that the DM-800 is the first full-featured system I have seen that delivers so much at its price point. Watch for the DA-400 ($545) which plugs into the two S/PDIF outputs to give you four extra analog outputs for a total of eight and the DIO-800 ($900) for direct transfer to and from ADAT and DA-88 machines, eight tracks at a time.

□□□

Ty Ford has been known to disappear from time to time when he gets a neat piece of gear to play with. We haven't been able to reach him lately, but you can try. His e-mail address is Tford1010 @aol.com.

SHORT TAKE

Beyer Big and Bassy

by Ty Ford

BALTIMORE Two of the most irritating things about headphones are that the cable breaks right at the ear piece and open-air headphones leak into mics, causing feedback when they are cranked up.

The Beyer DT 150 ($179) addresses both problems with logical solutions. First, the cable attaches to the headphones with a sturdy six-pin plug. A small threaded bolt runs through the connector on the end of the cable and fastens into the backplate of the headphone cup. When the cord does wear out or break, it will probably take longer to remember where you put the replacement cord than it will to change it.

The closed-cup design reduces the possibility of on-mic feedback The DT 150 is a relatively sensitive set of phones; 97 dB (1 Pascal) at 1 kHz. This makes them louder than most of the AKG 141 and 240 series phones, but not as loud as the Sony MDR series, for the same level of input. If you have a headphone amp that does not have the guts to drive your AKGs without hemorrhaging, the DT 150 is worth a listen.

Output impedance is 250 ohms and frequency response is 5 Hz-30 kHz. Without the cord it weighs a little over half a pound. The cushioned ear cups are easily replaceable and very comfortable, and the cushioned headband is removable as well.

I was surprised by the bass response on these phones. With some phones I have tried, the bass just makes it difficult for me to hear my own voice properly when doing voiceovers. The DT 150 has a great bottom that never gets in the way. The bottom line is, they are comfortable, loud and easy to fix.

Beyer DT 150 headphones

Improved Crown Mic

▶ continued from previous page

of engine roar.

The playback sound was of someone who could not quite hear himself over the engine, even though the headphone levels were adequate during recording. Crown must have realized the headphone's limitations too, because they make a boom mount available by special order, for the popular David Clark aviation headset which has more noise isolation. *(Crown's revised data sheet for the CM-311HS mentions the availability of the David Clark attachments.)*

In summary, I had a difficult time positioning both the CM-311HS and CM-312HS microphones against plosives, and concerns about having to "dress" the mic cable so it would not rustle against clothing. The revised data sheets coming from Crown recommend clipping the cable right to your clothing to minimize handling noise, and will also include diagrams describing proper mic placement.

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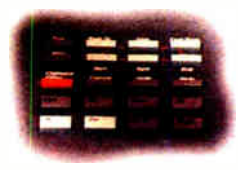

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FEED LINE

Age, Environment Can Affect AM Arrays

by W.C. Alexander

DALLAS There are an awful lot of directional antenna systems currently operating that were built 50 or more years ago. These arrays were constructed using what was then "good engineering practice" and state-of-the-art technology. Some of them—many perhaps—sounded quite good and worked very well. Many others, however, while they may have once sounded and worked well, do not anymore.

Aging of components and environmental changes have altered the performance of these old arrays. The station may not sound very good because of bandwidth problems and mismatches, both at the common point and at other points in the array.

Another problem experienced at many stations operating old directional arrays comes when an old tube-type transmitter is replaced with a new, solid state unit. Perhaps the idea of a new transmitter was sold to the station owner as a means to improve the station's sound, coverage, reliability and efficiency.

Surprising moment

The surprise comes when the new transmitter will not operate properly into the load presented by the antenna system. I have seen arrays where modulation had to be reduced to prevent a solid state transmitter from kicking off due to VSWR on modulation peaks!

In these cases, sometimes a tune up of the existing directional array is needed to get rid of mismatches, improve bandwidth and reduce losses. If the system is in really good shape, perhaps you can get away with tuning up what is already there. More often, however, tarnished inductors, frozen controls, inoperative turn counters and components of incorrect value make replacement of the entire phasing and coupling system more practical (and perhaps more economical) than working with the existing system.

Back in the days before the operating impedance bridge (OIB), driving point impedances were difficult to measure. Static measurements with a standard, low-level bridge did not give anything close to an accurate picture. Prediction methods were such that great latitude had to be allowed in the design of phasing and coupling systems so that the correct pattern could be achieved with the actual hardware installed in the field. *Exempli gratia*, to allow for an unknown reactance at a tower's driving point, components would be chosen to allow a range of adjustment from, say, 100 ohms negative to 100 ohms positive. The resulting L-C combination often formed a high-Q circuit that limited bandwidth at that point. Multiply this by the number of elements in the array and you can see why a lot of old arrays tend to sound bad.

Today, we have at our disposal the cumulative knowledge, wisdom and experience of 60-plus years of directional antenna design and construction. We also have some scientific tools in the form of computer models, accurate prediction methods and excellent test equipment. We can design a system just knowing about what the behavior of each element in the system will be—even re-radiators! Modern designs, taking all the known factors into account, can provide an optimized bandwidth at each element and at the common point.

System Design

In updating an old array, it is first necessary to know the characteristics of the transmission lines in the system. Even in very old arrays, often the transmission lines have been replaced with modern coaxial lines. A designer will need to know the length, characteristic impedance and velocity factor of each line in the system. If these are existing lines, it can probably be assumed that the power handling capability of the lines are adequate. It would not hurt to reevaluate this at design time, however. A burned out transmission line can ruin your whole day. In systems with older lines, such as open six- or three-wire or even 65-ohm "water pipe" lines, it would pay to go ahead and replace the lines with modern coaxial cable.

(In a recent installment of *Feed Line*—RW, Aug. 24, 1994—I examined the principles of selecting the right transmission line for the job. I will not revisit those here, but those considering replacement of transmission lines would do well to dust off that issue or any of the texts written on the subject before placing any orders).

The next step in the design process is to find the operating parameters and characteristics of the array. These include not only the array geometry and theoretical parameters but also the mutual coupling between elements, driving point impedances and the like. Some of this information can be found on the station license; the rest has to come through actual measurements or through careful modeling of the array. Having the measured driving point impedances on hand is a real plus, both at design time and later, during troubleshooting.

Measure impedance

To measure the driving point impedances, insert the OIB between the output of the antenna tuning unit (ATU) and the array element, fire up the array at a power level that will not exceed the rating of the OIB, then tune the array to compensate for the insertion effect of the bridge. When the antenna monitor again reads at the licensed values, read the driving point resistance and reactance on the OIB. If

continued on page 47 ▶

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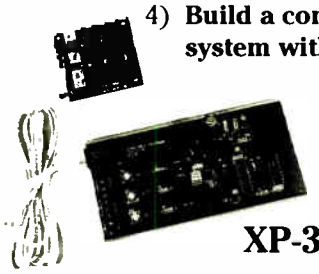

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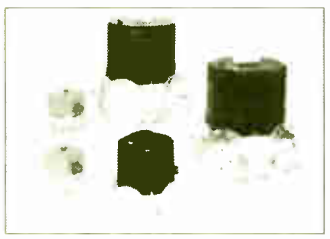

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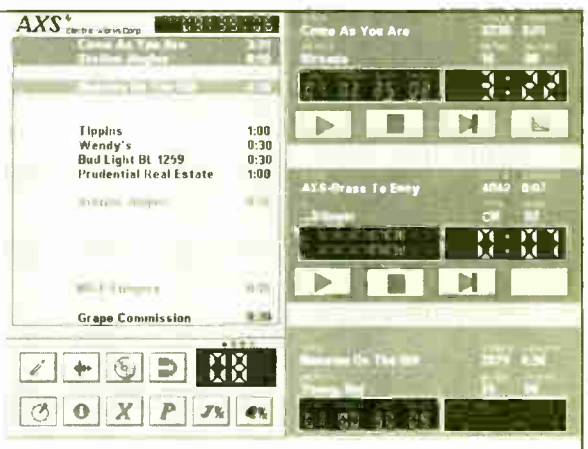

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World Radio History

Ireland Debates Commercial Radio

▶ continued from page 16

can be delivered because of the high costs associated with quality speech programming, he said.

Modern communications media give advertisers an opportunity to market their product or service, he added. Advertising and marketing strategies are important for all concerned. But seeing a local radio service as primarily a marketing tool is not realizing the full potential of the medium.

It also is a tool for democracy. In a unique way, the real potential of a local radio service depends on its interaction with the community. It is not only a delivery system but also a carrier for a sophisticated mix of music and marketing messages. That may indeed be a valid and entertaining use of the medium for many listeners, but it has the power and potential to do that and much more.

Collins explained that the human voice is central to the medium of radio. The interplay between voice and locale, origins and directions is the pulse of real local radio.

Local radio reaches deep into the heart of a community and monitors its heartbeat in times both happy and sad. This process, helping a community or region express its voice with confidence, must be of value.

Such a programming policy is clearly at the heart of public service broadcasting. It implies a commitment to the needs of the community and involves devising programs that respond to those needs and aspirations.

The popularity enjoyed by most local radio stations in Ireland, which include a significant level of public service broadcasting in their program schedules, indicates the real demand for this kind of broadcasting, Collins said.

It needs to be done well to be effective and this adds enormously to the cost of running a radio station. Much of the quality broadcasting on local radio is done of the goodwill of individuals, rather than with structures that are adequately resourced. Where a real commitment to quality programming has been demonstrated, it should be supported and encouraged, with public funding made available for clearly defined program objectives.

There is a complementarily between the national radio service provided by the state broadcaster Radio Telefís Éireann (RTÉ) and the local radio service.

However, when we compare the resources available to RTÉ radio and the resources available to Radio Kerry we are struck by the imbalance and the disparity as well.

As someone who has spent many years producing and presenting radio programs in both broadcast services, Collins explained that the immersion in the local broadcast setting after years in the national broadcast service was a shock to the system.

No amount of commitments and enthusiasm prepares one for the reality of sink or swim, he added.

If radio listeners get into the debate and make demands to have their broadcasting needs and interests addressed, he said this broadcasting debate could spark into a lively flame.

Mary Ruddy, station manager, Connemara West Community Radio, and a member of the IRTC board: Community radio is at a disadvantage Ruddy argued because it is a late arrival in the relatively new seven-year independent broadcasting regime in Ireland.

Ruddy said community radio must find a niche and an audience long after the commercial sector already was established. This does provide a long-awaited opportunity and challenge for the new stations now being licensed, she added.

Historically, broadcasting played a vital role in contributing to education, culture and the arts.

Community radio should not accept a definition of being marginal or confine itself to operating only where it is otherwise commercially unattractive for other operators. It is a sector with a different role or function and has a contribution to make to the debate in the public sphere.

She said that where the character of community radio was different was the notion of access and participation, where listeners, if they abide by general broadcast principles and undergo some training can also make programs.

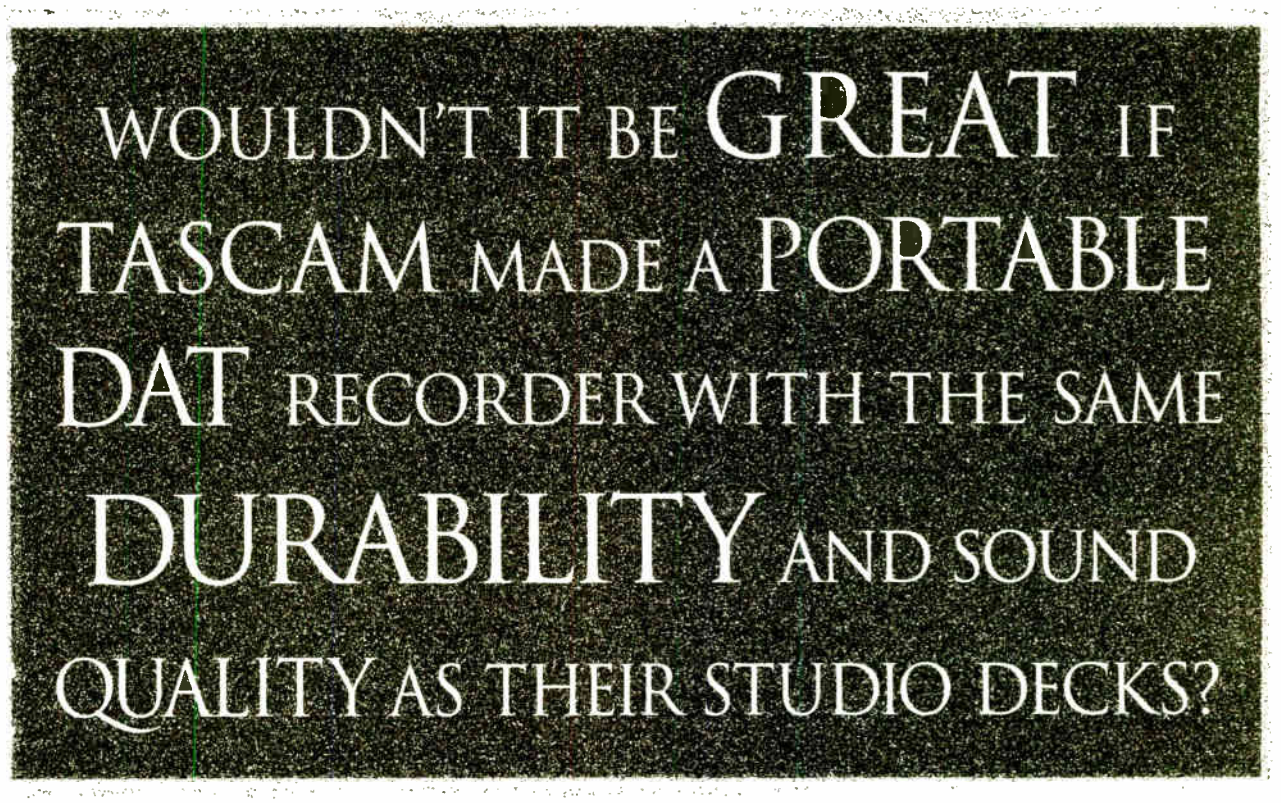
It has been the experience elsewhere that those who have the confidence to do this are generally already active, middle-class and articulate.

The challenge for the new stations was going to be to find a way to ensure that those who feel otherwise alienated or marginalized will feel that they can also participate.

As small enterprises, community radio stations are very vulnerable to economic and regulatory changes and therefore need support.

Ruddy recalled the mantra of community radio around the world: Radio should be converted from a distribution system to a communications system.

Radio can be the most wonderful communications system imaginable—a gigantic system of channels, she said. Can be, that is, if it were not only capable of transmitting but of receiving; of making the listener not only hear, but also speak.



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READER SERVICE NO. 56

World Radio History

OFFBEAT RADIO

Cybernet Station Operates Two Channels

An Estimated Quarter of a Million Listeners in 140 Countries Tune in to Station on Regular Basis

by Dee McVicker

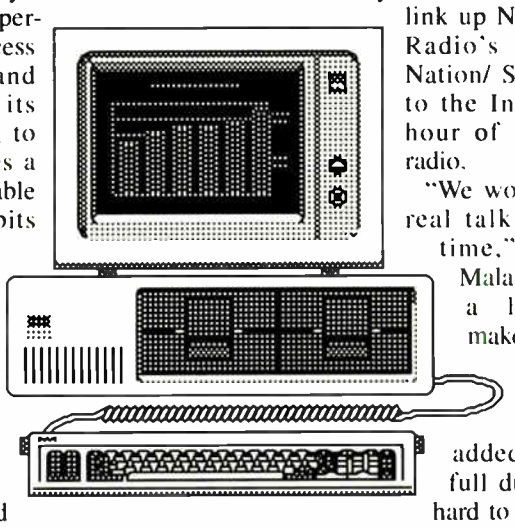
WASHINGTON Stay tuned to your local... cyberstation? It is true. Non-profit organization Internet Multicasting Service in Washington is "cybercasting" from the world's largest electronic watering hole, the Internet, and people are listening.

"We are estimating a quarter of a million listeners at this point on a regular basis," said Carl Malamud, a veteran Internet innovator who saw the need for researching radio on the Net and formed the cyberstation on that basis several years ago. The multimedia service went on the "air" April 1, 1993, billing itself as the first radio station to reach out across cyberspace to the Net's now estimated 30 million people in 140 countries.

Two service channels

The Internet Multicasting Service received its initial funding, in both money and equipment, from Sun Microsystems and O'Reilly & Associates. Continuing support is provided by a variety of institutions and it is now operating two service channels on the Internet, referred to as Internet Talk Radio and Internet Town Hall.

Although just about anyone with a multimedia or equivalent personal computer can access the cyberstation and download many of its audio files, listening to programs live requires a computer network capable of accepting 64 kilobits per second (kbps), the sound quality of ISDN. Standard Pulse Code Modulation (PCM) sound format is used—8,000 samples per second—with each sample being 8 bits. An hour of programming is 30MB and the organization typically publishes between 30 to 90 minutes of programming per day.



Recently, the cyberstation began supporting RealAudio! software that delivers real-time audio over the Net (see RW, May 31). On-demand retrieval of the cyberstation's audio files for playback is selectable at 14MB, 2.9MB, or 1.8MB.

Not FCC licensed

Like others on the Net, the cyberstation is not regulated by the Federal Communications Commission (FCC). The station licenses most of its material. Its carriage rights include satellite-based programming such as a 24-hour live data stream of audio from World Radio Network, network-based programming such as SoundBytes, and live links into the United States Congress. Speeches on the floor of the House and Senate are recorded by Internet Multicasting Service, indexed for search and find cues and made available in the form of audio files to users who want to hear the proceedings on their computers. Currently, the organization is hard at work developing voice recognition software to distinguish floor speakers from each other by identifying idiosyncracies in each speaker's digital "voice print."

The cyberstation pipes in public broadcast programs Technation, Dialogue and Common Ground. Its more recent addition is the HarperAudio! program, featuring recordings from the arts with luminaries such as T.S. Eliot, Robert Frost, J.R.R. Tolkien and Ernest Hemingway reading their own works.

The response to the cyberstation has been overwhelmingly positive, an indication that there is a great need for more cyberstations on the Internet.

It has its own booth in the National Press Club, joining C-SPAN and National Public Radio as official licensees for the club's Luncheon series, which has aired distinguished speakers such as Bob Dole, Larry King and Yassir Arafat. The cyberstation was the first to link up National Public Radio's Talk of the Nation/ Science Friday to the Internet for an hour of live national radio.

"We would like to do real talk radio sometime," commented Malamud, who said a limited staff makes this difficult programming to bring on line. Still, he added, "Real-time, full duplex voice is hard to do on the Net, and there are so many other things you can do."

Radio geeks

Of the original productions that the cyberstation does, its most popular is "Geek of the Week," a 30-minute program interview of computer nerds. This program, which has wound up on a few radio receivers as rebroadcasts from college stations, has an old-time radio feel complete with campy theme song and Larry King-style interviews.

Then too, last winter the organization carried a virtual Santa Claus who could be reached on line and answered e-mail messages from around the world. Some 1.2 million Net visitors "visited" with Santa in 30 days, clicking onto a winter wonderland complete with Santa's elves. Net surfers were even able to stop at the North Pole for a while to listen to a few Christmas song originals.

"We're not just radio on the Net," clarified Malamud. "This is a multiprotocol, multidata, multimedia thing and so we use audio and video and images and text, and we make it available using anything from downloading from CD to live for whatever is on your desk." Nor is Internet Multicasting Service limited to audio and video data. Given a grant from the National Science Foundation, the organization posts for free access on the Internet the full text of all 1994 U.S. Patent and SEC documents.

"I feel very strongly that this is a whole new medium, and after two years of doing this we have learned that very much the hard way," commented Malamud. "Every time we have taken one of the metaphors, like radio, and try to apply it too strongly, it just breaks down... this has some characteristics like radio... but I think people, when they are doing live events and they are selling rights, they are going to be selling one set of radio rights, another set of television rights, and a third set of Internet rights."

Overall, the response to the cyberstation has been overwhelmingly positive, an indication to Malamud that there is a great need for more cyberstations on the Internet. Cable companies, telephone companies and others are all rushing to provide Internet connection to home users, while fiber-optic is becoming the high-speed byway, making the Internet ripe for other cyberstations. The Internet continues to grow at a rate of 15 to 20 percent per month, by some estimations.

Said Malamud, "I think it is important that there be additional groups like ours, and we have been encouraging others to do that. One reason I took it non-profit is because, as the first station of its kind, we would have more flexibility to break new ground." Which the Internet Multicasting Service has most definitely done.

To learn more about Internet Multicasting Service, send electronic mail to info@radio.com.

□□□

*Dee McVicker is a regular contributor to **RW** and can be reached at 602-545-7363.*

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World Radio History

WORKBENCH

Restored Ammeters Go Easy on Budget

by John Bisset

SPRINGFIELD, Va. Storage space at a transmitter site is always at a premium. That is why the scheme in the photo is so useful. Spare rigid line must be properly supported when stored. Line left to lie on its flanges can warp or bend, get kicked or dented. This ceiling storage system was easily prepared using a few pieces of Kindorf and some readily available conduit clamps.

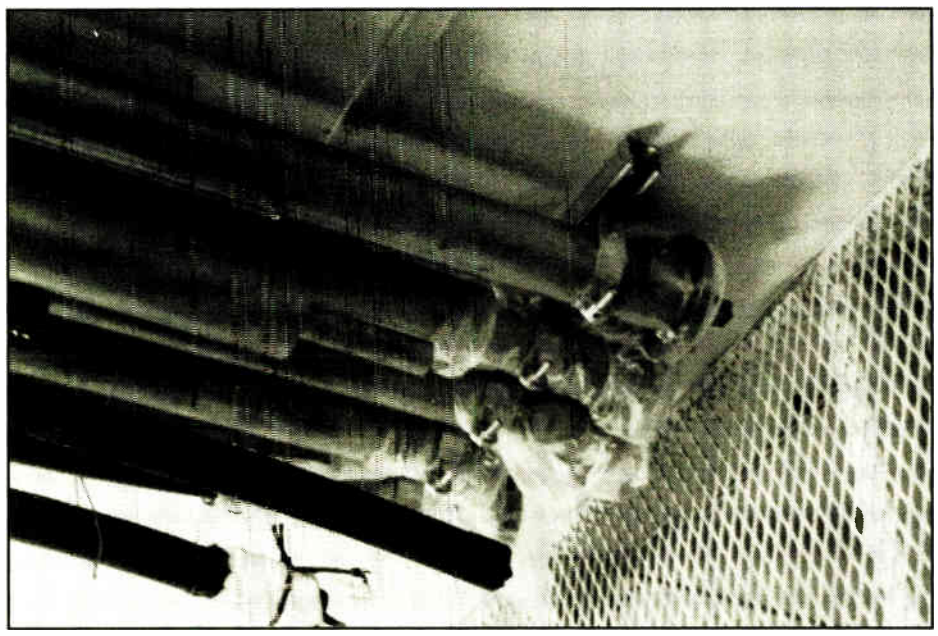
The Kindorf provides enough spacing from the ceiling, so the flange does not touch, and the individual conduit clamps prevent the whole stack of line from coming down. Thanks to Chip Fetrow of Skyline Antenna Management for sharing this idea.

★ ★ ★

Ed Burkhardt of Burkhardt Monitoring sent us a card describing a free quarterly newsletter from Polyphaser. The newsletter is called "Striking News" and discusses lightning protection. Polyphaser products are available from Bernie O'Brien of S.C.M.S. For more information, contact Bernie at 800-874-7267. Polyphaser can be reached by circling **Reader Service 71.**

★ ★ ★

If you can find a dead analog clamp-on Ammeter, it is feasible to modify it to use with your digital multimeter. Lewis Downey of KRCL(FM) in Salt Lake City obtained such an ammeter at his local power company. Because KRCL is a non-profit station, the power company donated the ammeter. Lewis suggests your local utility as a good place to start, because the clamp-on meters take a lot of abuse from linemen.



Inexpensive electrical supplies can be used to store spare transmission line.

Invariably, they will end up with a broken meter movement, and will be ready to throw it away. Armed with your stash of station T-shirts, mugs or key chains, make your best trade.

When you open the meter, remove the dead movement, meter multiplier resistors, range switch and rectifier. Add the appropriate load across the secondary of the clamp-on transformer output, add the voltage divider, and then check the calibration with an audio amplifier pumping a 60 Hz signal into a resistive load. Install the appropriate cable and connector to use with your DVM.

It is important to load the transformer with the appropriate resistance. After you have your ammeter clamped around one conductor of the cable connecting the audio amplifier to the resistive load, connect a variable resistor across the clamp-on transformer output, and adjust it until you see the 60 Hz sample drop 6 dB as compared to the unloaded voltage. A DVM or VTVM will do nicely for this determination. Lewis's unit gave the following frequency response:

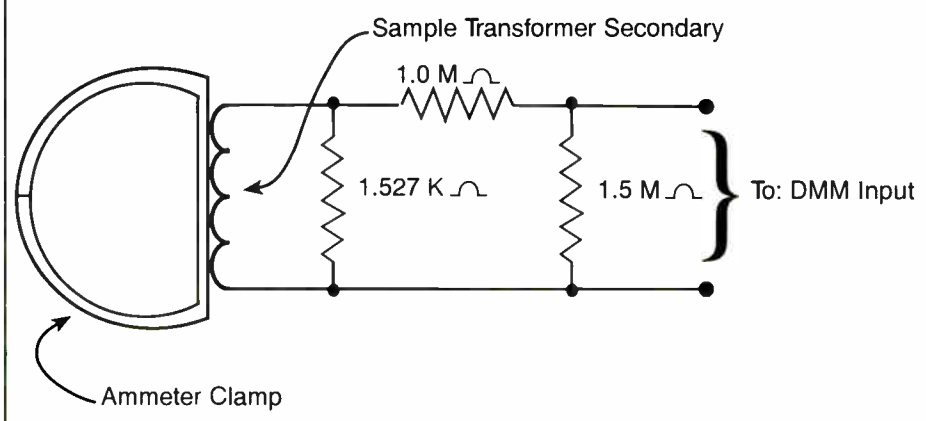
Frequency	dB Loaded	dB Unloaded
60 Hz	0	0
180 Hz	+2	+9.2
300 Hz	+2.4	+13.1
540 Hz	+2.4	+17.4
900 Hz	+2.2	+20.8

You may have guessed what kind of problem we're preparing to check. You do not want power line harmonics giving you erroneous numbers, and if you have harmonics in your facility, you want to be able to measure them.

After loading the sample transformer, Lewis made a tabulation of the sampled AC voltage from the clamp-on meter output, versus the actual current the audio amplifier was putting into the load. You will want to use a resistive load of a known value, so that you can calculate the current with Ohm's Law. To do this, measure the voltage across the load resistor. If you have a spare AC Ammeter, you can leave it in the circuit and save some time. As you make your measurements, do not allow the amplifier to clip the signal—the harmonics generated by clipping will defeat your efforts.

By now, you have an idea of the clamp-on transformer's linearity (circuit current versus sample voltage), and what kind of voltage divider you will need to marry the unit to your DVM. A little work with Ohm's Law and some voltage divider resistors gives you a new tool. Lewis Downey calculated his network to give him a "10x" probe. In his case, you take the DVM reading and multiply it by 10 to get the circuit current in amps. A schematic of Lewis' finished product is shown in Figure 2.

Figure 2.



A simple voltage divider network matches an old clamp-on ammeter for use with a DVM.

Lewis Downey can be reached at KRCL, 801-363-1818.

□□□

John Bisset is a principal with Multiphase, a contract engineering and special projects company based in Washington. He can be reached at 703-323-7180. Fax submissions to Workbench to 703-764-0751. Printed submissions qualify for SBE Certification credit.

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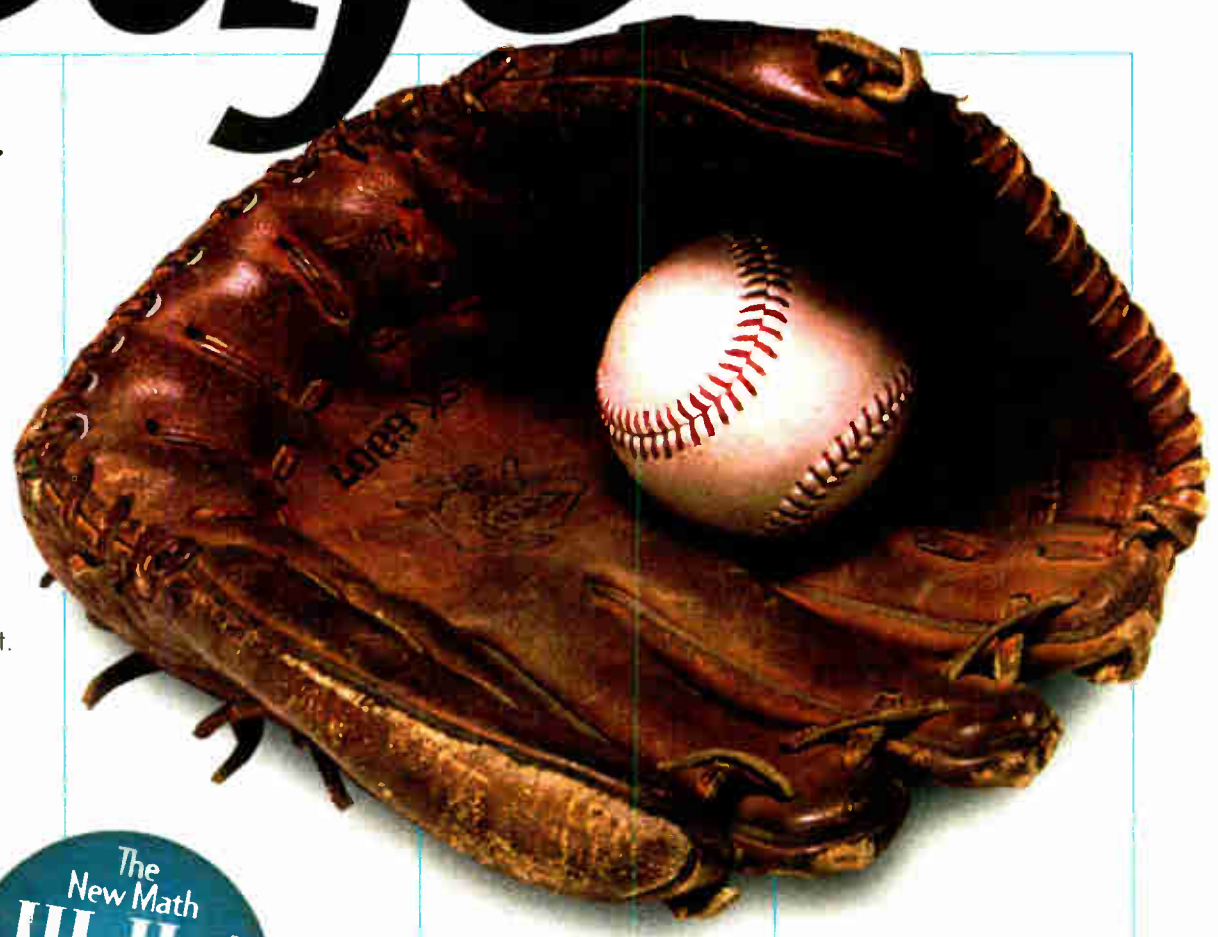

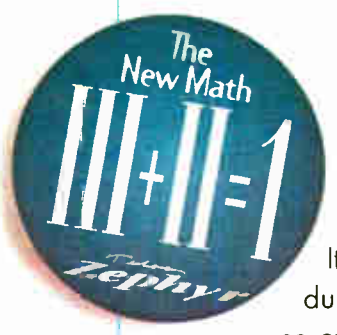

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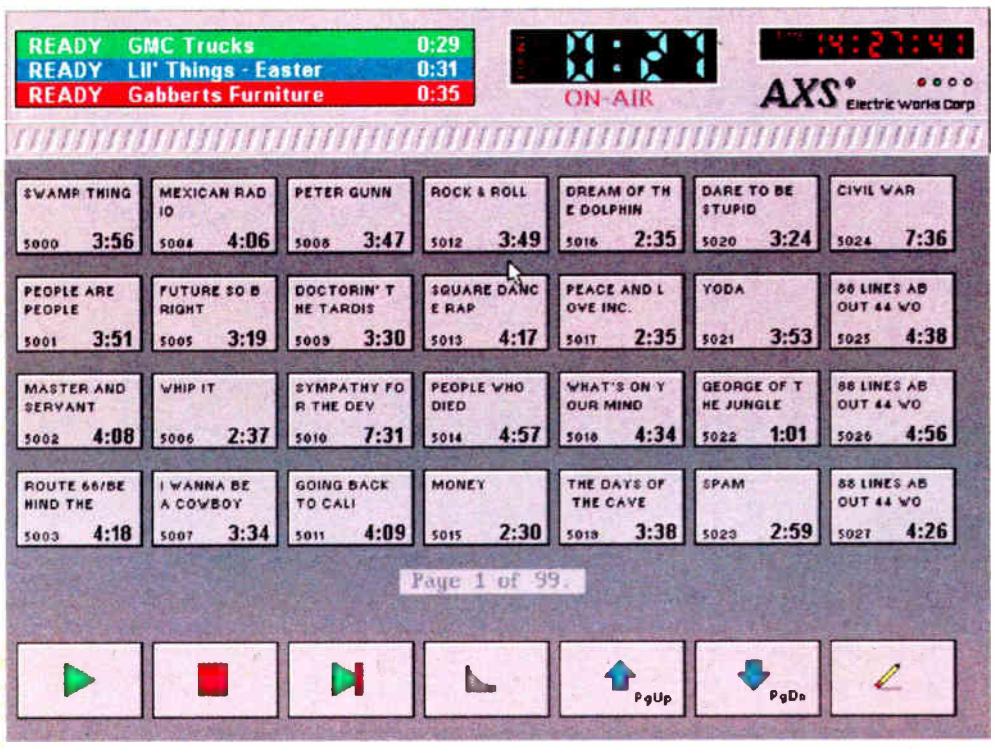

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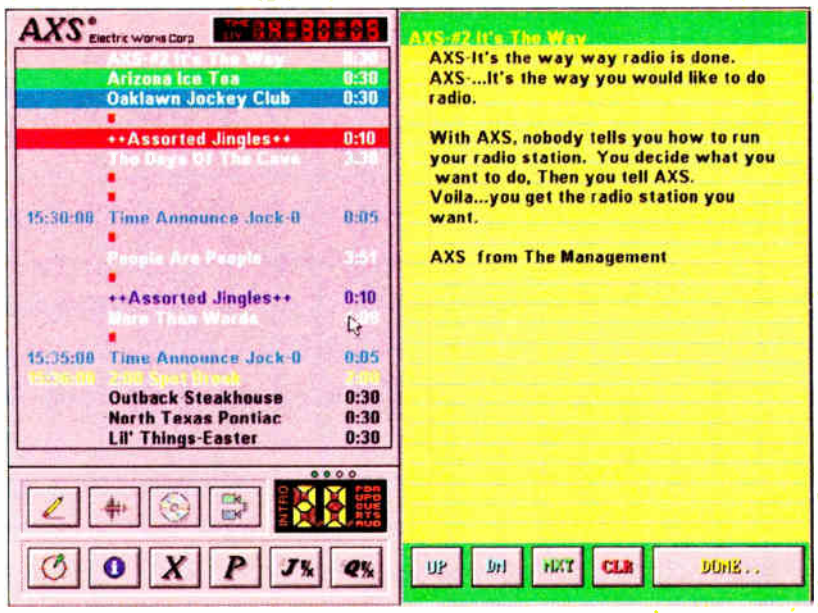

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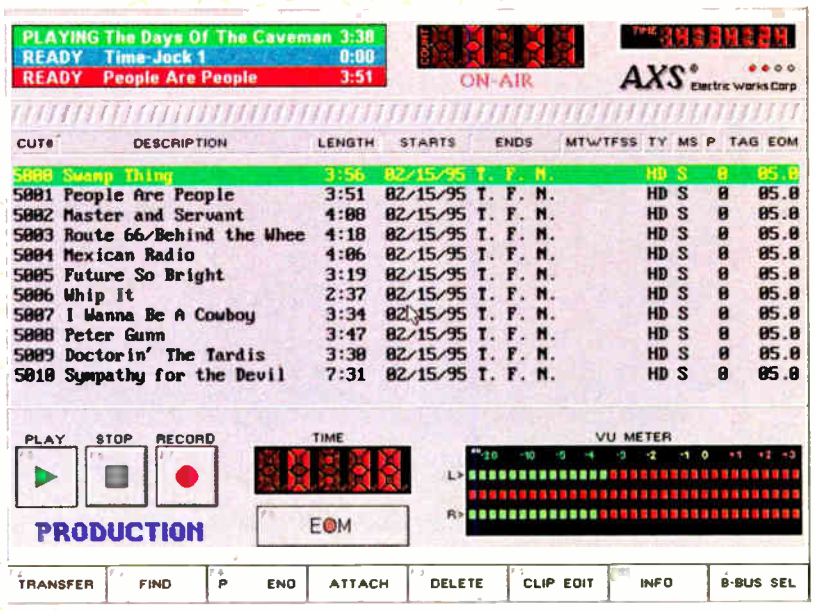

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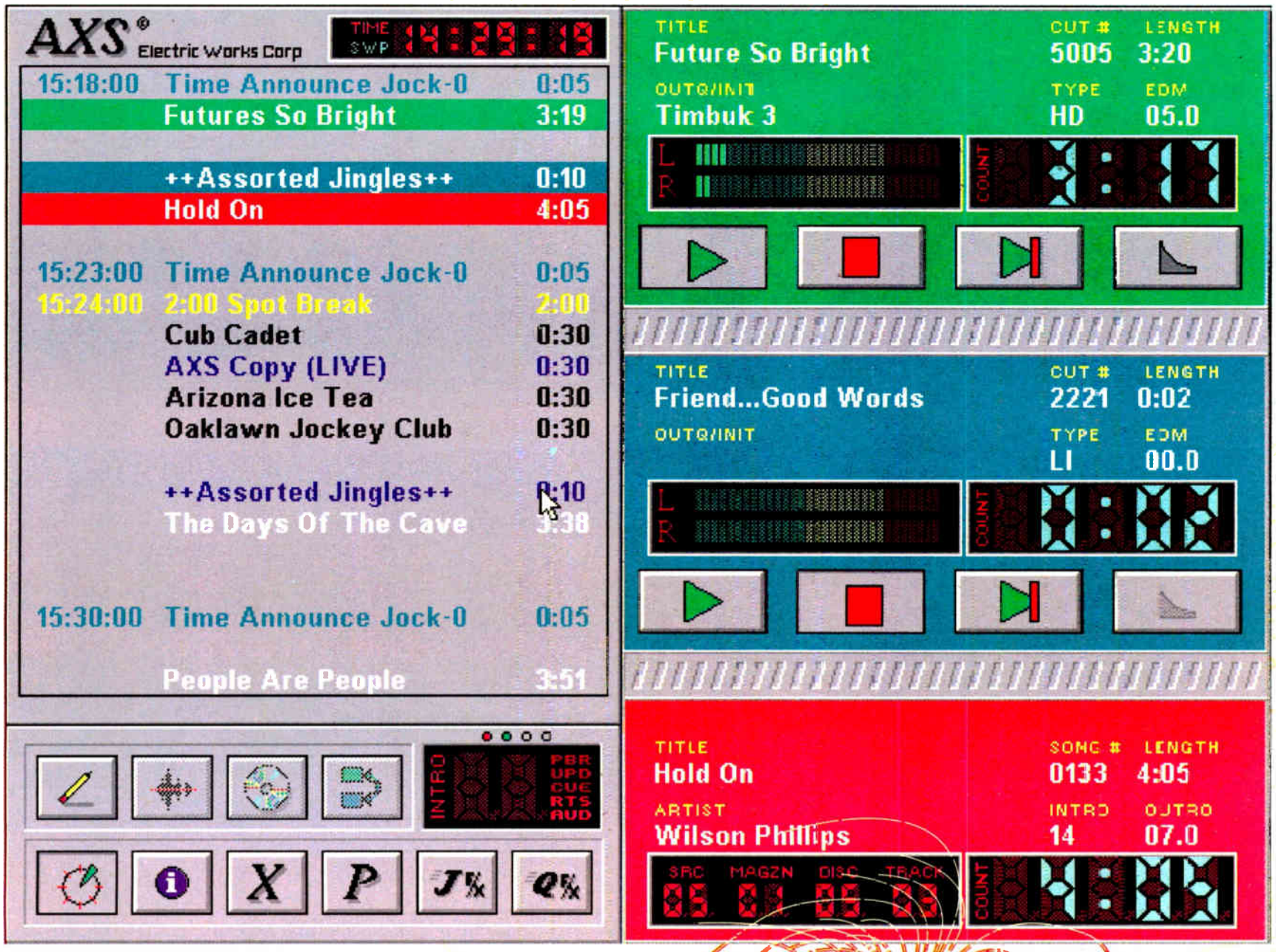

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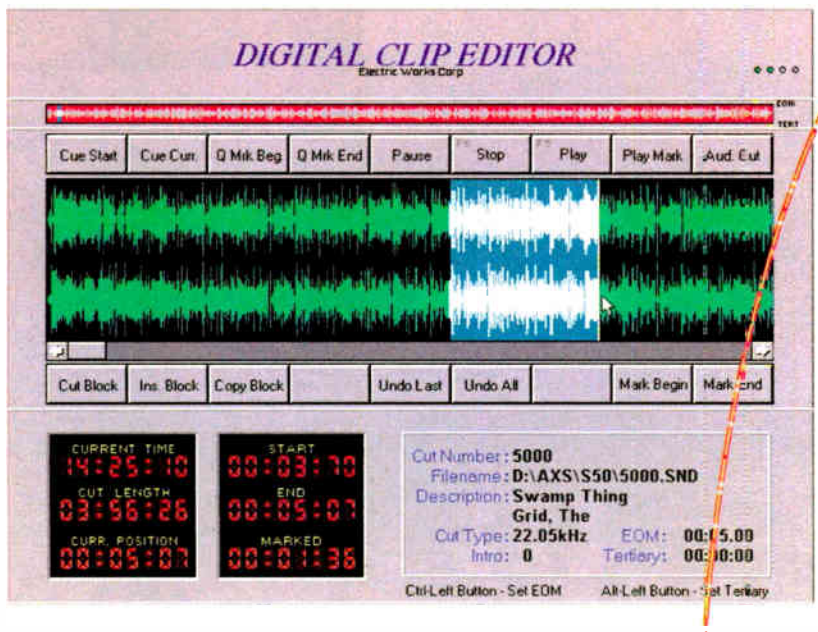

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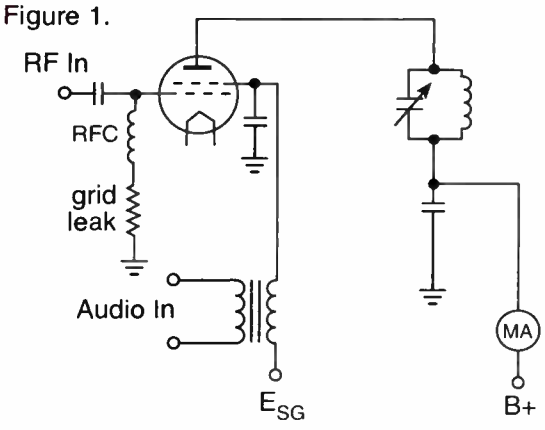
World Radio History

Efficiency Modulation Transmission

by Tom Vernon

HARRISBURG, Pa. The last decade has witnessed quantum leaps in AM transmitter efficiency. The improvements have been going on almost since the beginning of radio. Modulation schemes such as Ampliphase, modified Doherty, and PDM have been described extensively.

Figure 1.



Simplified schematic of screen grid modulated PA

Comparatively little has been written about efficiency modulation—so this time out I will be discussing a forgotten topic.

Vacuum-tube days

Because high-level plate modulation was all-pervasive during the vacuum tube days, we sometimes forget that AM can also be created by modulating any of the other elements in the PA tube. When the modulating voltage is applied to the suppressor, screen, or control grids of the PA tube, it is known as efficiency modulation. Figures 1, 2 and 3 present simplified schematics.

While it is theoretically possible to modulate any of the grids, in the real world control and screen circuits are most common, and I will focus on screen grid modulation here. Suppressor grid circuits are seldom seen on practical applications. This is because there are few power pentodes with the suppressor grid isolated from the cathode and brought out to a separate pin. Also, suppressor grid characteristics usually are not that well controlled by tube manufacturers. Thus, a suppressor grid circuit would require considerable readjustment each time the PA tube was changed, not a desirable situation.

Regardless of which grid is modulated, the principle is the same. Because the plate voltage must remain constant, the increase in power with modulation is achieved by varying the plate current and efficiency. To reach 100 percent modulation, both plate current and efficiency must be doubled from their un-modulated values. Optimum efficiency is realized at 100 percent modulation. This is illustrated graphically in Figure 4.

Good linearity

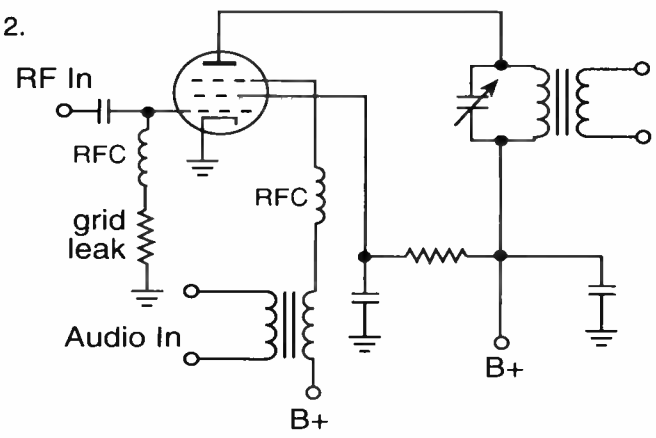
When optimized for good linearity, peak efficiency will be around 66 percent. With no modulation, efficiency will be about half this figure, or 33 percent. In screen grid circuits, it is usually necessary to drive the screen grid slightly negative, because complete cut-off of plate current does not quite occur at 0 volts.

Power output of this configuration is about one-third that available by plate modulating a given tube. Here the relationship between screen voltage and current is non-linear, meaning that the modulator load varies as a function of modulating frequency. This problem may be largely remedied by overall feedback.

From a practical standpoint, efficiency modulation had many advantages over high-level plate modulation. Most of these came from the elimination of the modulation transformer and reactor.

Without modulation iron, overall feedback may be utilized. In this scheme the RF is sampled, rectified, and returned to the first audio stage as negative feedback. Because the mod transformer is a non-linear device, such overall feedback is not possible with plate modulated transmitters. Overall feedback results in improved performance specs. Distortion is lower because the feedback loop now includes the PA stage, and any non-linearities there are canceled out. Noise and hum are reduced by the amount of feedback employed. Frequency response is improved by the elimination of the mod transformer with its attendant leakage reactance and shunt capacity at higher audio frequencies. Overall feedback also controls gain over the full audio range.

Figure 2.



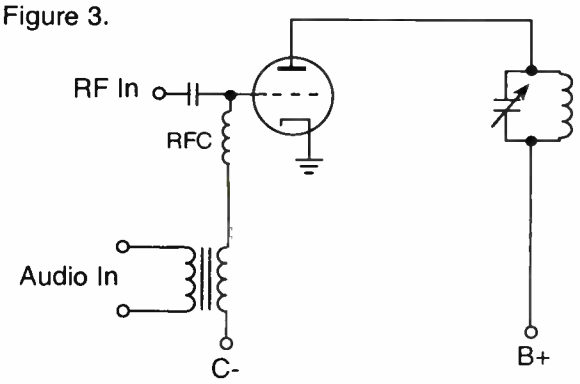
Supressor grid modulation of pentode type RF amplifier

Simpler circuitry

Efficiency modulation was usually achieved with simpler circuitry than used in high level plate. This is because plate-modulated tetrodes must also have a means to modulate the screen grid to at least 70 percent modulation, and many times the RF driver stage is modulated as well, adding to circuit complexity.

The modulator power required in this type of transmitter is very low. Thus the ubiquitous Class B modulator with its vast power consumption is eliminated. In its place, a 1 kW transmitter could be easily modulated by a single 807 tube.

Figure 3.



Control grid modulation of RF amplifier. The grid bias is varied with modulation. High percentages of modulation are not possible with this type of circuit

Because peak plate voltages are much lower with efficiency modulation, smaller values of plate blockers and tank components may be employed, resulting in reduced size and cost.

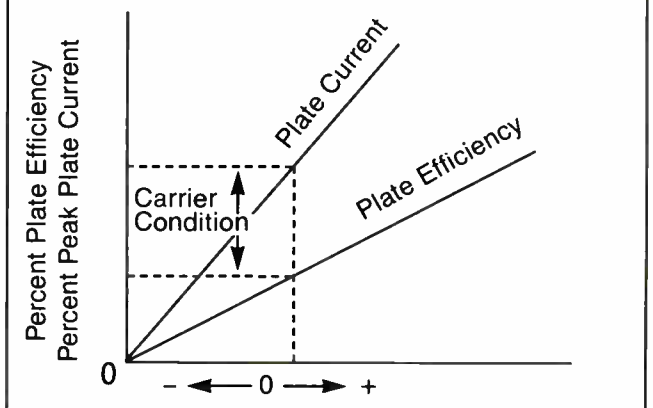
Densely processed audio can be a problem for plate modulated transmitters because of the resultant increase in temperature, particularly in the mod transformer. Recall from earlier that with efficiency modulation, optimum efficiency is achieved at 100 percent modulation. Thus, efficiency modulated transmitters actually prefer highly-processed audio, as it makes them run cooler.

Historically, the use of efficiency modulation of Class C amplifiers by broadcasters is limited. In the mid-late '50s, Continental Electronics manufactured 1, 5 and 10 kW transmitters utilizing screen grid modulation of class C RF amplifiers. These were the 314-2, 315, and 316 models respectively.

Grid modulated transmitters were also popular with carrier current broadcasters during the early days when most equipment was home made. The motivating force here was cost, because college stations on a shoestring budget could not afford UTC CVM or LS series audio transformers.

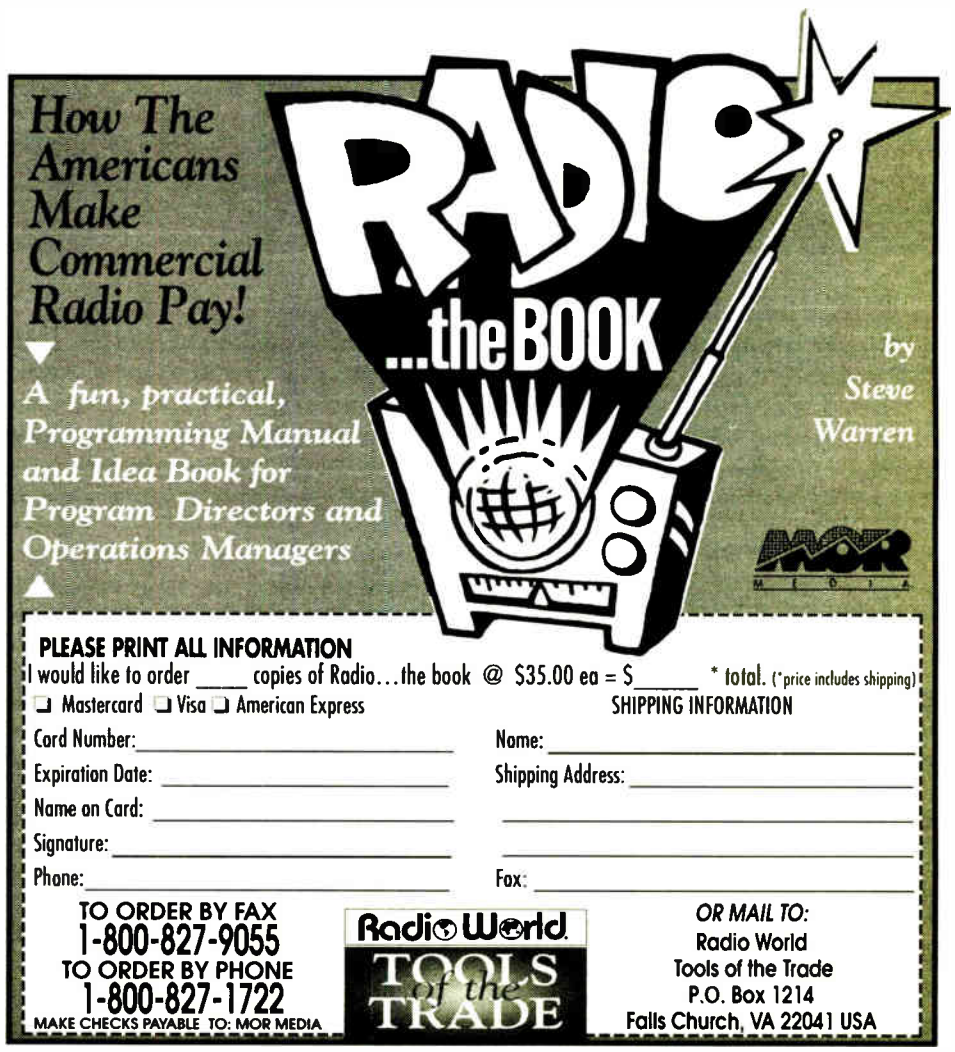
If you would like to experiment with screen grid modulation circuits, there is a wealth of good information in old copies of "The Radio Amateur's Handbook."

Figure 4.



Variations in plate current and efficiency during a complete modulation cycle.

Tom Vernon writes about radio and multimedia. He is occasionally sighted around WXPN in Philadelphia. Reach him at 717-367-5595, or at TLVernon @AOL.COM.



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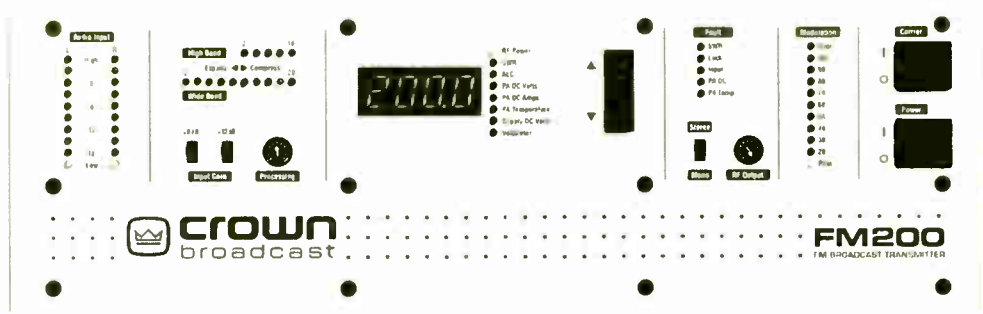

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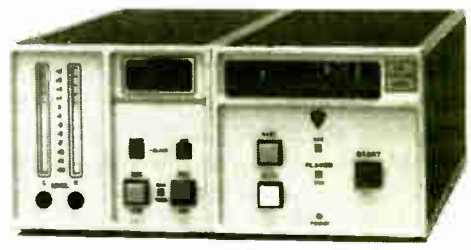

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World Radio History

Updating Old Arrays

▶ continued from page 34

reading a negative (parasitic) element, you will have to reverse the bridge leads (and swap the sign of the reactance) to get a correct reading. Repeat this for each element in the array, being careful to tune out the OIB's insertion effect before reading.

With this information in hand, the design engineer can come up with a workable phasor design that is optimized for bandwidth and efficiency. Typically, this design will incorporate an "Ohm's Law" or shunt power divider. If the array has many elements, a capacitor may be shunted across the power divider bus to raise the impedance at that point.

A good designer will not only maximize performance but will find economical compromises in component selection and count. Vacuum capacitors are expensive as are many other components in a typical phasing and coupling system. There is much that can usually be done to cut down on such component costs while making only minor compromises in performance.

Placing the order

With the completed design in hand, the next step is to send it to several manufacturers for bid. Be sure that the specifications are narrow enough that the manufacturers will not substitute components in the system or make changes in the design without both your prior approval and that of the designer.

Modern designs provide an optimized bandwidth at each element and at the common point.

Antenna tuning units can come in either weatherproof cabinets or constructed on a chassis. If your existing system has "doghouses" and these are still in good condition or can be easily restored, using chassis-mounted ATUs are an economical and easily installed way to go. Otherwise, weatherproof cabinets are an excellent option. Be sure to specify to the manufacturers what form the ATUs will take.

Another often overlooked factor is the maximum size of the phasor cabinets. Remember, the phasor cabinets have to go inside the building, and they must enter through the door. If the cabinets are too big to fit through the door, you are going to have to enlarge the door. This runs the cost of installation way up and messes up your building. Be sure to specify the maximum size of phasor cabinets to be such that they will fit through the door with a little room to spare.

The bid submitted by each manufacturer should come complete with a written description of the RF and control portions of the phasing and coupling system. Compare these carefully to be sure they are comparable. Different manufacturers offer various features that you may or may not like. Some offer motorized RF contactors; others use solenoid-driven units. Motorized units are quiet and use little power, but they are slow. Solenoid units are noisy, violent and have a high current draw. These and many other factors should be considered along with price when selecting a manufacturer for your new phasing and coupling system.

The installation of the new phasing and coupling system is a project that must be carefully planned, particularly if the station must stay on the air throughout the project. I have successfully replaced the phasor and ATUs in a three-tower DA without losing any daytime airtime over a two day period, and with careful planning, down time in any such project can be kept to a minimum.

Start by realizing that reduced power non-directional operation will be necessary during the project. The daytime ND power level will likely be the one authorized during the last full proof-of-performance. At night, 250 watts is likely to be the maximum. Float all the towers but one and measure the self-impedance of the remaining tower. Calculate the tee-network (or L-network) values necessary to match this self-impedance to 50-ohms. Do this again with one other tower, giving yourself a choice of two different ND elements. In this manner you can shuffle ND operation between those two until the ATUs have been replaced at all towers. You will have to make whatever arrangements you need to in order to keep the transmitter connected to a radiating element. This may be a piece of RG-8 running across the floor!

Once the new phasor and ATUs have been installed, set all the networks to the design values. Often, manufacturers preset components prior to shipment. If this has been done, this step can be omitted. Simply check all connections for security, and it would not hurt to trace all RF wiring to be sure there have been no mistakes.

Straightforward procedure

The tune-up procedure is fairly straightforward, unless negative power flows complicate the process. Remember that a separate tune-up will be required for each pattern.

With the transmitter feeding the system at low power (say, 100 watts or so if that is possible—otherwise, as low as possible), check the antenna monitor for operating parameters. Adjust the phasor controls to achieve the licensed operating parameters on the antenna monitor, being careful to see that the phases are leading or lagging as specified on the license. Sometimes, particularly when the phase meter is close to the bottom or top of the scale, the phase can flip from leading to lagging (or vice versa) without your knowing it.

If the on-frequency driving point impedances were known in advance and the ATU tee networks were set to match these values, all you will have to do is adjust the phasor controls for proper antenna monitor readings. If the driving point impedances were not known, you may have to vary ATU settings and even the shunt legs of the phase shifter networks to achieve correct antenna monitor indications. Once this has been done, measure the driving point impedances as described above (being sure to tune out insertion effect), then recalculate and reset the ATU tee-networks to their proper values. With this done, you will have to again readjust the phasor for proper antenna monitor values, probably resetting any phase shifter shunt legs to their former values.

As a last check, insert the OIB at the input of each ATU, tune out the insertion effect and read the VSWR at that point. If necessary, repeat the procedure in the preceding paragraph until a match is achieved at all ATU inputs.

Play with phase

Finally, you may wish to play with the phase shift at the input (common point) tee network to optimize bandwidth. Often, a more symmetrical and flatter bandpass can be achieved at a phase shift other than -90 degrees. This can only be found through experimentation in the field.

No proof or partial proof of the array should be necessary if you did not change anything above the base insulator of any of the towers, but you should check the monitor points before you pronounce the project done. If you accurately reproduced the licensed operating (not theoretical!) parameters on the antenna monitor, the pattern will be correct.

The end result of the phasing and coupling system redesign and replacement should be better sound, better stability and higher efficiency. Chances are that if you ran a proof on the array you would see a higher RMS than was realized during the last proof with the old system. Take care of your new system, keeping controls lubricated (use silicon grease) and exercised, and keeping bugs out of the ATUs and phasor (use moth balls). It will last you at least as long as the original system, and that should be just about until AM DAB becomes a reality.

□□□

Cris Alexander is the director of engineering at Crawford broadcasting in Dallas. He can be reached at 214-445-1713 or care of RW.

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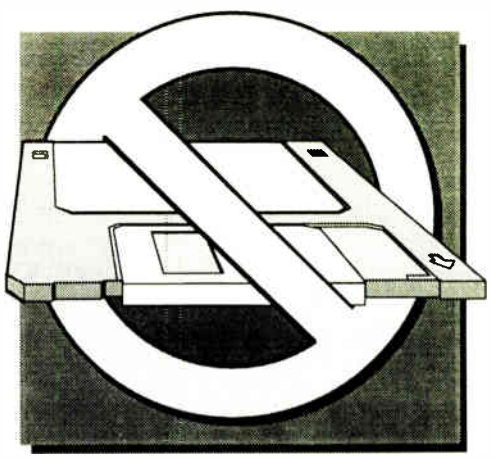

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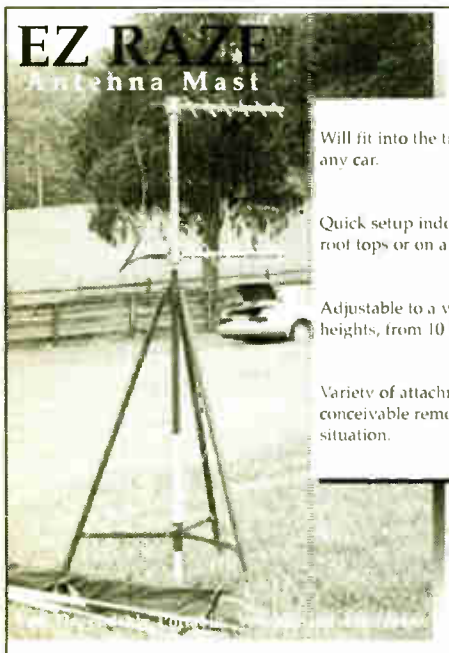

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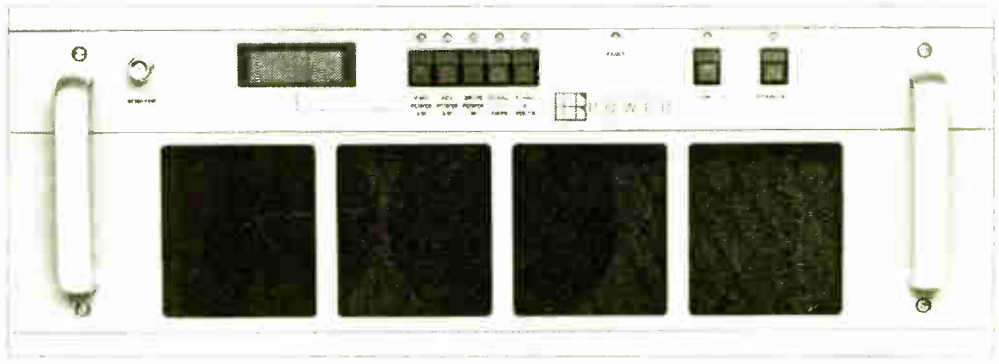

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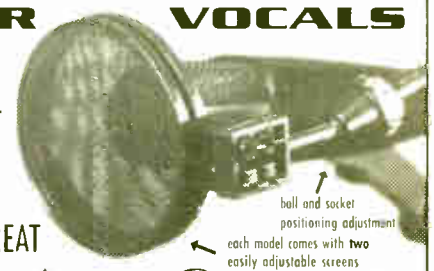

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World Radio History

GUEST COMMENTARY

Radio Is Building Digital Future Today

by Greg Dean, President
Computer Concepts Corp.

LENEXA, Kan. The radio industry is at an interesting crossroads in its conversion to digital technology. Broadcasters are faced with almost too many choices and, at times, risks. On the manufacturer and vendor side, we have to try to forecast the future and determine what new digital technologies and formats to support.

I remember the comfort Novell provided to me some years ago when it appeared that IBM's NetBios might become the dominant standard of networking. Novell, having just announced its 286 version (which pre-dated the NetBios development), immediately announced total support for "whatever IBM does." Novell had some credibility in this regard because it had already demonstrated an amazing amount of adaptation for more diverse network topologies than any other solution available at the time.

IBM then signed up as a provider of "big red" in a "big blue" package. In the 18 months following its announcement, Novell's stock went through an astounding appreciation and its sales growth soared.

I think a similar situation exists today in the marketplace of digital systems for the radio industry. Any consumer with a budget large enough to accommodate a consideration of all available systems and technologies is faced with quite a formidable challenge—and risk. Spending a lot of money for a system that does not support the evolving standards is a mistake no one wants to make.

There are several important ways these concerns play out in the marketplace. Two major ones are file formats and compression algorithms. Microsoft has been venturing into MPEG formats with its .WAV file structure. Developers of various algorithms saw the multimedia concept being adopted and the ISO/MPEG specification reaching critical mass. The next step was the development of algorithm decoders on a single chip, for off-the-shelf implementation.

This has been a motivating force for companies on the cutting edge of technology. We, as manufacturers, face the need to adopt the widest number of formats in order to reach all possible customers. I do not believe there will be one single standard for some time, so we have to find a way to make sure our systems at the very least "talk" to all possible formats and, ideally, implement the emerging technologies without driving the costs of our equipment beyond our customer's reach.

Key to product planning and development will be the ability to provide seamless integration of new technologies in a comprehensive way. By seamless I mean not just that the choices in a single system exist, but that many different technologies and formats co-exist in a single system in a way that is completely unnoticed by the customer.

We, as manufacturers, face the need to adopt the widest number of formats in order to reach all possible customers.

Seamless rate conversion is another important consideration. Sure, 32 kHz is fine for today's broadcaster who demands only 15 kHz frequency for even the best FM sound. But will single-rate systems, and those concentrating only on today's environment, end up costing stations money when they are made obsolete by digital audio broadcasting (DAB) or digital conversion on a network level?

Regarding networks, transcoding of digital audio is another critical area. A single format at a low bit rate is fine for today, when a commercial hard disk system might be the only (probably actually the "first") block of digital equipment at the station. But what happens as networks, program providers and commercial producers convert to their chosen formats? Add DAB to the mix—now that it is more of a reality—and the possibility that a single piece of audio might go through several D/A conversions and several algorithm encode-decodes. Now the problem multiplies.

What is a savvy broadcaster to do?

The first step would be to urge the industry toward standards. As a manufacturer, it is not our place to impose standards on the marketplace. Unfortunately, there is no "Big Blue" in the broadcast industry. But we can support the emerging standards and reassure customers that our equipment will continue to evolve as the standards change, and also that we will be there with the solutions when problems do arise.

Evolution of standards is going to happen no matter what manufacturers wish. We have to stay informed about changes that are taking place among large networks and major group owners so that when de facto standards begin to crystallize, we are not years away from implementing them.

For station owners trying to plan their futures, the caveat is to keep abreast of current digital formats and to question potential suppliers as to the ease or difficulty of implementing and integrating them into systems they are considering purchasing.

The bottom line is that choosing digital equipment is a long-term investment. It is crucial to rely on those with a proven track record: companies who have stayed on the leading edge of technology that can implement and bundle a variety of formats, that provide ample and accessible support for their customers, and in the end, that will support not "whatever IBM does," but "whatever the radio industry wants."

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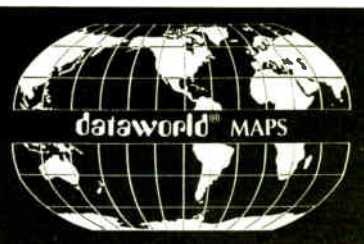

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USER REPORT

Audiovault Launches Stations into '90s

System Helps Station Automate, Interface and Ultimately Go Paper-free by Handling Variety of Tasks

by Phil Woods
Chief Engineer
WBAV-AM-FM

CONCORD, N.C. In January 1994, WPEG(FM)-WBAV(AM), owned by Broadcast Partners Inc., acquired WCKZ Radio—now WBAV-FM. Because of our use of satellite programming, we were in search of a system to automate our AM and one of our FMs.

We were looking for a system that not only would automate the stations but could also be expanded and used in other capacities, such as handling commercial audio, music audio, liners and interfacing with traffic, ultimately helping us achieve a paperless studio. The **Broadcast Electronics** Audiovault 100 fit the bill.

Heart of the system

A 486/33 MHz file server is the heart of the system. This unit houses four 1 GHz hard drives for the storage of all audio, about nine hours of stereo audio. The AV100 audio boards are contained here as well. Each workstation is connected to the server via ethernet cards and uses Workgroup for Windows. We ordered boards for each of the four workstations.

Our first workstation is used for WBAV-FM, a station utilizing two satellite music network formats, along with two network affiliations. The workstation uses two AV100 boards so that we can record and play back at the same time. We use the Audiovault's AVSat screen for our on-air playback and the network delay screen for the recording of commercial feeds.

Because of the multiple on-air audio feeds and network commercial feeds, it was necessary to use 4x1 audio switchers for the AVSat screen and the network delay screen. These switchers are controlled by the workstation programming.

Trial playlist

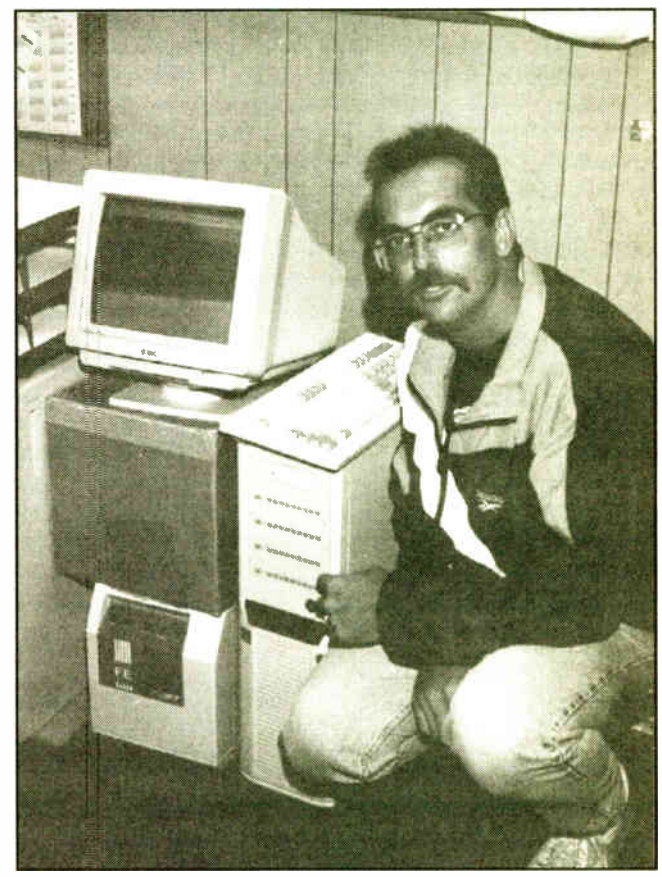
Prior to implementing this workstation, we developed a trial seven-day playlist. We needed to be able to switch back and forth between audio sources and use two different satellite commands for the AVSat screen. We also needed to be able to record at certain times of the day on the network delay screen.

We needed to be able to switch back and forth between audio sources and satellite.

The AVSat screen consists of one commercial playback machine which, when triggered manually or from a closure of a satellite decoder, plays all of our commercials for that specified break. The AVSat screen also contains six ancillary decks that can be fired manually or by the satellite. These decks generally contain liners, magic calls and IDs.

During the satellite morning show, which is live-assist, we had some special needs for local news, contests and weather. Through the Audiovault 100 we recorded dummy carts (a specified time of blank audio). When these are played, our local announcer comes on live and does the local news, contests and weather forecast. After the morning show, we use time commands to switch back to our standard satellite format.

At various times during the day we also load stacks (a complete reload of the liners, magic calls and ID machines) in order to match the voices of the liners to the personality who is live on the air at that time.



WBAV's Phil Woods and the Audiovault

Catching feeds

We use the network delay screen to catch all of our commercial feeds. We catch the satellite music commercial feeds during our two-minute mandatory break. During that two-minute break, when the satellite sends a closure for the break, two things happen.

First, the closure fires deck one, our commercial machine and AVSat screen, which plays our commercials. It also fires the network delay record machine that controls the network 4x1 switcher to choose the proper audio and records the commercial information received from the closed circuit feed from the network.

After this material is recorded onto the hard drives of the file server, our production director is able to access this information from workstation number two, the production studio.

The production room consists of an AVRPS screen for record/playback. The AVRPS screen is where all of the commercials are entered into the Audiovault system. A create/modify screen comes up, containing all the information about the client, such as category, cart number, description, start date, end date and client ID. After inputting all the information, he records the audio. The Audiovault automatically trims the recorded audio, removing any dead air.

File maintenance

All file maintenance and management of the Audiovault occurs in the production room. The commercials or files are either deleted or saved to DAT tape through our Roland DM-80 workstation. All information is saved in case the client wants to run their previous commercial at a later date.

Our third workstation is for our AM. We use the AVSat screen with our satellite format along with local live gospel from 7:00 p.m. to midnight. We also use the indicators to switch between satellite and audio, live audio, satellite

continued on page 52 ▶

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World Radio History

Circle (1 S) On Reader Service Card

USER REPORT

Hard Drive Leap Eased with Scott

by Jack Carter
Programming Consultant
Carter Consulting Co.

PUEBLO, Colo. Remember the day you pulled the turntables out of the control room to go all cart? No more cue burns, scratches, skips or songs at the wrong speed. Then you pulled out the cart racks to go all CD. No more dirty heads, un-cued carts or worn tape.

But those technological leaps pale in comparison to the day we turned on the **Scott Studios** system. Music, jingles, spots (and DJ voice tracks, if you choose) are all on hard drive. The system uses input from your music scheduling and traffic software and handles playback of everything.

Our first Scott System was installed in April 1994 on our oldies station, KDZA-FM. The system comes complete right down to the music library. It consists of an on-air computer, the Production Bank, which contains a 9GB hard drive and handles playback chores, and the production workstation containing a record/play audio card used for dubbing into the system.

Installation

For the installation, Scott sends a knowledgeable technician who sets everything up and trains the staff. Do not plan for weeks of training; the system is so simple, folks at our station picked it up in minutes. Scott also has excellent telephone tech support people available night and day.

The on-air system displays the event currently on the air and the next five coming up. You can move events around, delete items coming up, and with a simple key press, your music library is displayed. Pick a title and you have scheduled a request. The on-air system also includes "hot keys" for instant playback of designated items. We use hot keys mainly for breakers to drop in over intro times. Some of the on-air folks also use hot keys for applause, laugh tracks, contests, music beds, news beds, drop-ins, etc.

Touchscreen control

We opted for keyboard control of the system. If I had to do it over, I would buy the Scott touchscreen. With it, you touch the Play box inside the title and it plays. Touch the library title and it inserts. Touch the hot-key label and it fires.

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Launching Stations Into '90s

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remote control and local remote control. We also flip screens to an AVRPS screen in which we input the daily playlist manually. We are currently looking at a file import/export filter to use with our Marketron traffic system, which will assemble the playlist automatically from the log generated by the traffic department.

Our fourth workstation, which will be used only for commercials on our live FM, is not installed as of yet. We are waiting to install the workstation when we have completed the import/export log file transfer with our traffic software.

Backup

We are also in the process of purchasing a 4GB DAT tape backup for the four hard drives that contain all of the audio files. We were without a backup when we suffered a hard drive crash in the first 90 days. We immediately received a new hard drive, but without the tape backup, we had to reconstruct all commercials that were lost.

As of this writing, we have experienced a direct lightning hit that wiped out our file server computer. Luckily, there was not any damage to the hard drives. With BE's help, we were able to reconstruct the file server in three days. Both stations operated in the live-assist mode until repairs were made.

Although we have encountered a few problems along the way, we still count on the BE AV100 system to be a viable part of our operation. Future considerations include expanding our audio storage time and redundant file servers with mirroring drives.

BE continuously updates this product through improvements in its software and hardware. As the Audiovault system grows and is refined, we hope to grow with the system as well.

For information, contact Bob Arnold in Illinois at 217-224-9600; fax: 217-224-9607; or circle ***Reader Service 4.***

RE2000

The Diaphragm
We vacuum-laminate gold—just a few molecules thick—to our ultrathin diaphragm. Its unique diameter provides an extremely uniform, supercardioid pattern, wide dynamic range and exceptional transient response.

The Performance
Self-noise is 5 to 10 dB lower than "industry standard" microphones. And we keep it that way even in conditions of high humidity with our Constant Environment System™ (CES), which keeps the element at a constant 125 °F.

The Transformer
Our custom-designed Jensen® output transformer is low in distortion and a true 150 ohms. It provides the high rejection of electromagnetic noise that only a transformer can.

The Amenities
Shock-mount system, computer-grade power supply, external pop filter, hard-shell case, stand adapter and 20 ft. of premium cable with gold connectors.

The Awe-Inspiring, Uncompromising Studio Condenser Microphone

Even before its introduction, the RE2000 had earned an amazing reputation and an enthusiastic following. Its exacting performance elicited accolades from professionals who thought they had heard it all.

"The RE2000 has a richness of sound I have experienced only along the lines of a tube mic"— David Esch, Eschicago

"The perfect mic for recording any acoustic string instrument."—
John Beland, Flying Burrito Brothers

"The RE2000 has the warmth of a tube mic—extremely quiet and sensitive, allowing me to pickup low-level material without adding noise."—
Scott Weber, Buena Vista Sound, Walt Disney Studios

"The RE2000 has a crisp, clean and quiet response. I used less EQ to achieve what I look for. What goes in...comes out! It's also extremely versatile...from vocals to acoustic guitars to trumpets and violins."—
Tom Cusic, TM Century, Dallas, TX

"I think it's one of the most versatile I've ever used."— Roy Thomas Baker, Producer

In fact, all of these professionals asked one remarkably familiar question:

"When can I get one of my own?"

It's available now! And once you've heard it, we expect you'll be inspired to send us an accolade or two as well.

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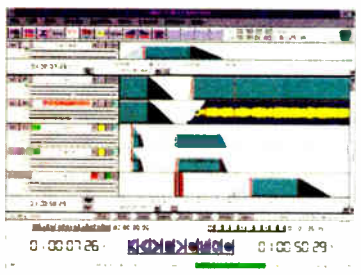
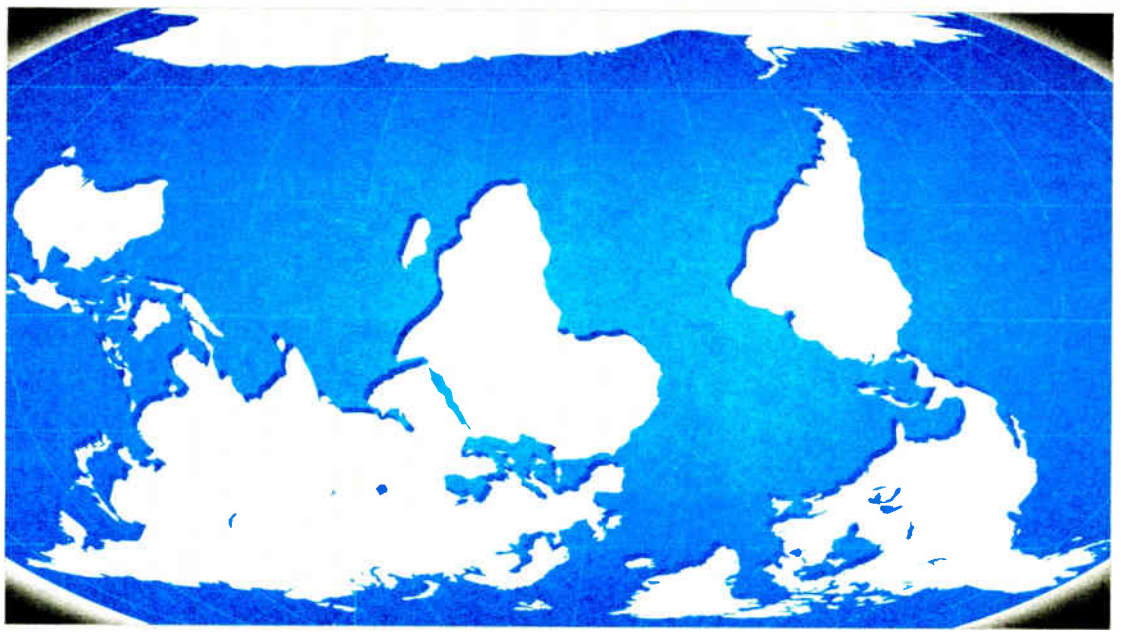
Computer Concepts, serving broadcasters for over 20 years



STUDIOFRAME PRODUCTION IS FAST, EASY.

In the production studio, time equals money. For the fastest, easiest multi-track production for commercials and station promos, Computer Concepts introduces the StudioFrame™ the complete audio workstation, "studio in a box." Every production feature from true 8 track input and output (expandable to 24 tracks) to time compression, digital EQ and filters is built into StudioFrame. Best of all, with its direct integration with DCS, produced spots can be on the air seconds after completion.



COMPUTER CONCEPTS IS TURNING THE WORLD OF RADIO UPSIDE DOWN

LAS VEGAS- Visitors to the 1995 NAB convention were amazed to see no fewer than six new products for radio from Computer Concepts, makers of DCS™, the world's leading hard disk system. For the first time, one company offers proven products for stations of every size — from 100% live major market powerhouses to fully automated local stations — all working together through the DCS architecture. Some of these new products, while new to the US, have been in use for years in international markets... another advantage of Computer Concepts' world-wide scope. With so many products to choose from, Computer Concepts can now custom-tailor a profit-making system for every radio operation.

COMPUTER CONCEPTS - THE POWER BEHIND THE RADIO REVOLUTION.

What makes Computer Concepts stand out of the pack of companies now offering hard disk products for radio? We're customer-driven, and we have been since we started over 20 years ago. We maintain direct contact with our customers before, during and after the sale. We're so proud of our customer relationships that unlike most other vendors, we'll be happy to supply our entire customer list to any prospective purchaser.

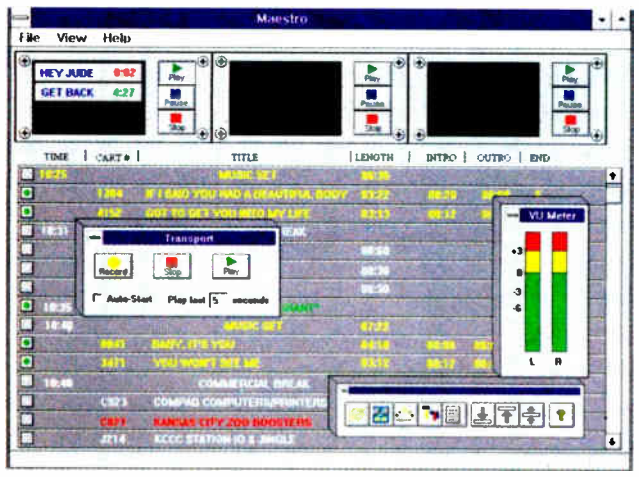
DCS from Computer Concepts has long been the leader in automating commercials and spot insertion for stations of all sizes. But the big news this year is an unprecedented array of new products for every facet of on-air operations, and every kind of radio facility. All are field-proven and backed with the kind of customer service that has been instrumental in the success of Computer Concepts.

As your needs change, so can your DCS-based system. For example, DCS systems can be configured to store music, commercials, jingles and other audio cuts either centrally on an audio server or distributed on individual DCS workstations. A new option, Audio Central+ distributed audio, offers both capabilities plus complete fail-safe redundancy.

Another new DCS option developed in response to customer requests allows the system to start playing back material while it is still being recorded. Perfect for delaying network news-on-the-hour for a few seconds or minutes while giving local headlines first.

All the new and exciting Computer Concepts products integrate seamlessly to DCS. It's your assurance that — whichever components you choose to make up your DCS system today — your system can be expanded tomorrow.

Large stations or small, simple system or very complex, today more than ever, there's one place to call for total expertise and total customer responsiveness in hard disk systems. Call Computer Concepts at 1-800-255-6350 and profit from our experience.



MAESTRO BRINGS MUSIC AND SPOTS TOGETHER.

DCS has always managed commercials and spots flawlessly. Maestro™ now does the same for music, integrating all music and commercial information and control with a Windows™-based on-screen interface. Maestro is the key to accessing music directly from hard disk. It interfaces directly with music scheduling database systems and gives on-air talent total flexibility to execute perfect song-over-jingle-over-song crossfades. Music search by type, artist, etc., intro and outro countdown display and instant access to news and weather info are just a few of the many features which make Maestro the perfect DCS interface for creative on-air control.

Newsroom keeps you up-to-the-minute.

Radio news can be a profit center with Newsroom™, the complete electronic news operation from Computer Concepts. The key word with Newsroom is *efficiency*. The system automatically takes both text and actualities from wire services, networks and other sources. A news person writes and edits copy on screen, linking sound bites to the copy — playing the wrong "cart" is a thing of the past. Editing of audio actualities is fast and precise. On-screen prompting lets talents read final copy right off the screen. Newsroom is fully integrated with DCS and Maestro and can be added to an installed system at anytime.

CARTRACK TAKES THE HASSLES OUT OF LIVE RADIO.

CartRack™ is a field-proven "front-end" to DCS which puts right on the screen all the carts your morning (or other) talent could ever want, for instant, no-hassle access. Individual "racks" of carts can be programmed for each show — there's no limit. Talent uses a touchscreen, trackball or mouse to "point and play" carts to three on-screen graphic "cart machines." Events played from DCS can be controlled by CartRack. It's the easiest way to handle live shows offered by any hard disk system. Let CartRack bring order into your hectic, live, money-maker drivetime shows, and then let DCS automation take over to handle other dayparts.

Computer Concepts CORPORATION

8375 Melrose Drive, Lenexa, Kansas 66214 Tel.: 913-541-0900 • Fax: 913-541-0169

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Leap to Hard Drive Eased by Scott

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Also on the on-air system is the Manual/Auto button. In manual mode the system finishes the event on the air and waits for a key press (or screen touch). A DJ could leave it in manual and start every audio event just like we have for years.

Events are fired using end-of-message (EOM) tones. Once the tone is in the right spot, the next event starting point will always be perfect. What a weird feeling to outro the song going into the stop-set, manually start the first spot, put it back in auto, and the spots, weather, jingle and next record all roll on their own, perfectly. Our staff runs it in automode and DJs jump in over intro times without ever touching the keyboard.

The Production Bank makes dubbing spots and music to hard drive easy. EOMs can be moved after they are placed to assure they end up in the perfect spot. If the dub is too loose or too tight, it may be trimmed. Each hard drive slot accommodates rotators, just like putting multiple cuts on one cart. The difference is that if you have a problem dubbing cut five, you do not erase and start over with cut one.

Do not plan for weeks of training; the system is so simple, folks at our station picked it up in minutes.

I mentioned that the system comes complete with music. Scott Studios must have an amazing record library. Scott's music guy, Bob Stevens, has gone to great lengths to find the premier version of each cut. Everything is high quality with perfect EOM placement. You tell Scott Studios the songs you want, regardless of format, and they ship the system with your selections.

Music software

To run the Scott System, you need compatible music and traffic software. The Scott System merges the playlist and the traffic schedule for each day's programming.

Our music software is MusicMix, a program that I developed and market nationally. After installing the Scott System at KDZA, I rewrote many areas of the MusicMix software to more seamlessly integrate with Scott. It easily handles song intros and outros, which can be recorded up to a week in advance for unassisted operation. It allows scheduling jingles, liners, IDs, even programs, as well as the music, according to your format clocks and scheduling rules.

Because we operate automated overnights and Sundays, one of our main motivations for moving to the Scott System was our frustration with not being able to find part-time talent for those time slots. Now, our main talent is on the air around the clock. They go on vacation, they are still on the air. Somebody is sick, we just lay down some voice tracks, reschedule in MusicMix and get back to our normal day. It takes 10 to 20 minutes to track a four-hour show.

Triple overlap

Scott's voice-tracking ability was a major selling point for us. A unique part of the system is the use of three (rather than two) audio cards. They call it "triple overlap." As a song is fading on card one, card two activates with the intro and instantly fires card three with the next song under the intro. For a moment during the transition, all three sources are on air at once and you have a live-sounding radio show.

How much do we like our Scott System? In January we bought a second one for country KCCY(FM). This time our goal was not unassisted operation but rather the improvement in audio quality that comes with the hard drive.

A Scott System in a duopoly makes perfect sense. We send every commercial we produce to the hard drives of both stations. We never worry about what spot belongs where, and we always have a backup of everything we produce. Talent from one station is available to do voice tracks on the other.

What would I change? Sometimes it would be nice to listen to a spot or song on cue before putting it on air. We often need to verify if something has been updated, for example. Scott tells me this feature is coming soon. I would also love to have the music library section tell the jock when a song was last played.

This system is a new way of doing radio. It will make your station sound better and enable better utilization of your most expensive resource: your staff.

For information, contact Dave Scott in Texas at 800-726-8877; fax: 214-620-8811; or circle ***Reader Service 194****.*

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This special radio section will illustrate each of radio's decades, its impact on America and the world. We'll take an in-depth look at the people, the music, the entertainment, the news, the research and radios critical role in the marketing mix. We'll detail how radio works for American marketers yesterday, today and explore how it will work well into the 21st Century.

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If you're a radio network, representative, group owner, advertising or promotion agency, research company, syndicator or have any involvement in radio...this special 75th Anniversary section will be the most comprehensive vehicle you could ever have to deliver your message to virtually every major advertiser and agency in America.

THE CIRCULATION:

This story is so important to American marketers there will be one of the biggest bonus distributions in Adweek history in addition to the Adweek / Mediaweek / Brandweek circulation of 91,000 there will be a *Special Bonus* distribution of 15,000 to:

*NAB Radio '95 Convention (Sept. 1995)

*The Association Of National Advertisers (ANA) Annual Convention (Oct.1995)

*AAAA (American Association Of Advertising Agencies) Media Conference (Feb.1996)

*Ad Club Of NY-Radio 75th Birthday Luncheon (Nov. 2, 1995)

If you've been part of the radio story or are involved with radio this is an opportunity you can't afford to miss.

FOR MORE DETAILS AND ADVERTISING INFORMATION CALL:

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Steve Crane	(Chicago)	312-464-8530
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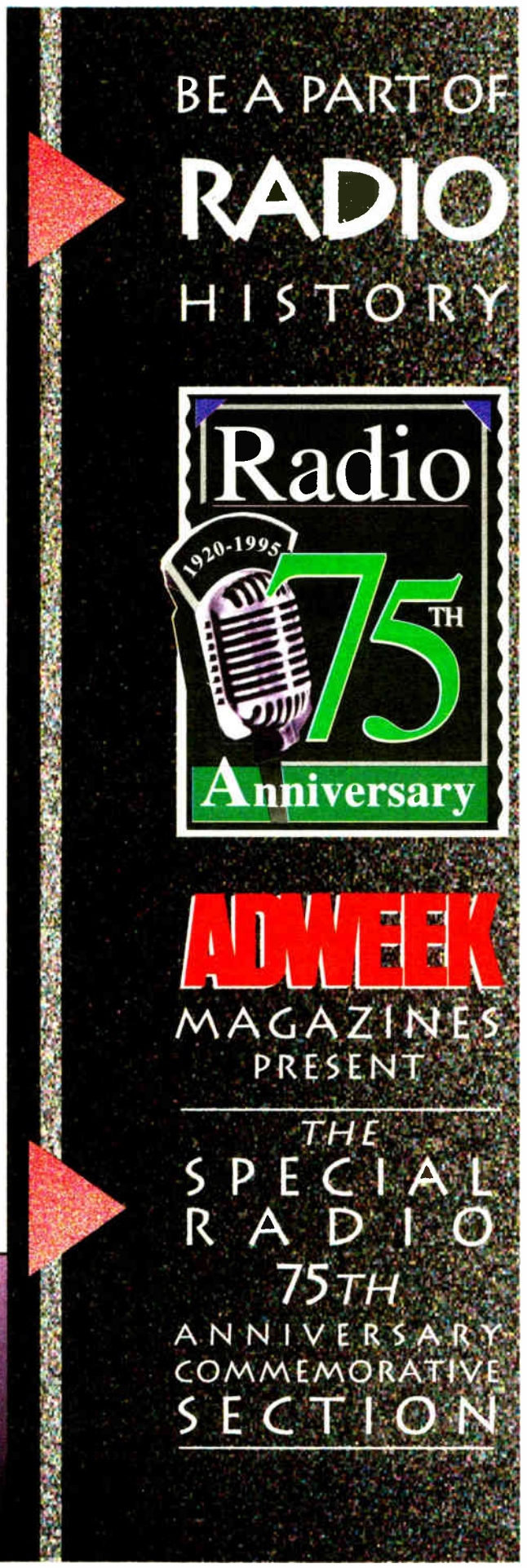
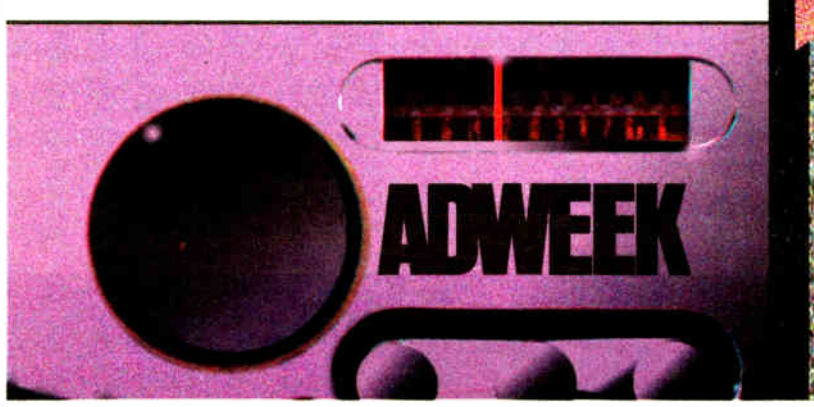
ISSUE DATE: SEPT. 4TH, 1995





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World Radio History

USER REPORT

UDS2 Transforms Florida Stations

by Barry Grant Marsh
Operations Manager
WSTU(AM)/WHLG(FM)

STUART, Fla. On May 25, 1994, radio history was made and the way radio is done in the United States was changed forever.

That was the day WHLG(FM) became the first UDS2 radio station in the United States. The technology, developed by **TM Century**, was brand new. There were only two other radio stations in the world operating with UDS2: one in England, the other in Kuwait.

Daring

At the time, neither I nor my general manager realized how daring we were. UDS2 has changed our lives. It transformed our inconsistent on-air sound into a virtually trouble-free operation.

The UDS2 consists of the Z4000 professional computer that operates and interfaces with Computer Concepts' digital commercial system and the Sony CDK 3600 Jukebox, giving us a complete digital sound, as well as a competitive edge in the marketplace.

There are no cart or reel-to-reel machines in our control room. All commercials and promotional announcements play on the hard drive of the DCS through the UDS2 audio controller.

The UDS2 gives WSTU and WHLG digital sound and a competitive edge.

Every second of our broadcast day is controlled via the UDS2 utilities software that interfaces with the Powergold music scheduling program. Our sister station, WSTU(AM), was one of Powergold's earliest customers, so we were well acquainted with the software. But we could not believe the performance level we attained with the software program in UDS2. It schedules all of our stop sets and songs and gives us a flexibility far beyond satellite music operations.

When we purchased our first UDS2 system from TM Century, WHLG was in the midst of a complete format change. We were the top radio station in the market with a beautiful music/nostalgia-type format and watching most of our audience of 25 to 54 year olds erode. We moved to a light AC format.

With the help of TM Century's Golddisc no-noise music library and the 360-CD capacity of the Sony CDK 3600, our delivery problems were solved. Our first Arbitron was a winner. We more than doubled our 25-to-54-year-old demographics, and our clients are pleased with the new audience.

Low maintenance

With any new technology, there are bound to be problems. I am happy to say the problems we have encountered with UDS2 have been minimal. The maintenance of the equipment has been incredibly low. We have kept it sheltered from power failures using Best interrupted power supplies. Our maintenance tool is a vacuum cleaner/blower for dusting purposes. There are no heads to buy or align, no pinch rollers to worry about. In fact, if the only thing our chief engineer had to worry about was repairing or maintaining the UDS2, he would resemble the Maytag repairman.

TM Century's trouble-shooting team has been tremendous. Its software

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USER REPORT

DCS Draws Duopoly Back To Computer Concepts

by Dan Kelley
Operations Manager
KKFG(FM)-KDAG(FM)-KCQL(AM)

FARMINGTON, N.M. One way to determine if a company's product is successful is to see if a new customer becomes a repeat customer. By that definition, the **Computer Concepts'** DCS system is definitely a success for us.

We are a three-station duopoly that includes KKFG country FM, KDAG classic rock FM and KCQL oldies on AM. We also have an LMA AM in KRZE with a Spanish format.

Back for more

We purchased two DCS digital commercial systems from Computer Concepts several years ago, and two years later, we came back to buy two more systems. Now we have three of the systems running 24 hours in half-satellite-automated, half-live formats on KKFG, KDAG and KCQL with one system as a backup.

We went with Computer Concepts because of the company's reputation and because the DCS can perform several important functions simultaneously. DCS has the ability to air the satellite program—with full liners and local announcements—and at the same time record another satellite feed and put in its unique liners for later playback.

As far as I know, no other hard disk system has the ability to perform this 2+1, as it is called by Computer Concepts. This feature was important to us because we were considering adding a network feed that would require just such magic, and the DCS was the ideal choice. When I saw how seamless the whole process would be, I thought it was incredible.

I also like the automatic time-check feature that lets our jocks record specific and accurate time checks for later air. Because we never have to air those generic "10 past the hour" checks, we always sound local to our listeners. This really lets us cut costs, make full use of the satellite formats and and do well in the ratings. Our two FMs are two of the top three FMs in the Farmington market.

It was easy to train our staffs to run the DCS without too much trouble; even the computer-phobic personnel adapted to it with little trouble. We also like the fact that DCS is connected to Computer Concepts' traffic system. Because of this, we always have verification that spots are aired when they should be.

I appreciate Computer Concepts' commitment to its customers and their around-the-clock support. Some time ago a power supply went bad, and I received a new one the next day. We have even called them late at night and gotten a quick turnaround.

The hub

We put DCS in as the hub of our station equipment so that all our equipment integrates with it. That is an important consideration as radio station gear becomes increasingly digital. It is also good to work with a company that we know will be there for us when we need to upgrade or add equipment.

Because of all this, it is not hard to understand why customers like us who start with DCS tend to return for more. In a digital hard-disk marketplace that is more crowded than ever, a satisfied customer is truly the best measure of success.

For more information, contact Computer Concepts Corp. in Kansas at 800-255 6350; fax: 913-541-0169; or circle ***Reader Service 148.***

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USER REPORT

DAD486x Takes on Demanding Facility

by Paul Barzizza
Chief Engineer
WMC-AM-FM-TV

MEMPHIS, Tenn. WMC(AM) underwent massive change during 1994. After almost 75 years of broadcasting under the same ownership, the station was sold to Ellis Communications.

In the age of automation and cutting the middle line, Ellis takes a bright, fresh approach of growing the top line. For WMC, this meant a total rebuild, including all new studios—four newsrooms, master control, production and a talent studio. We knew that we could not install tape-based equipment in 1995.

Not adequate

I researched every digital audio system I could find, from the smallest to the largest, but even the best-known systems were not adequate for our demanding needs. Then I saw an ad for the DAD486x from **Enco Systems.**

After calling Larry Lamoray at Enco and receiving a fax outlining the features and capabilities of the DAD486x, I decided that this product warranted a closer look. A quick day trip to Enco's facilities in the Detroit area and a hands-on demonstration of the DAD piqued our interest.

After the trip, discussions among ourselves and subsequent calls to Enco, the DAD really began to set in our minds. Recording, playback, and cut-and-paste editing are all done quickly and cleanly with the ease of tying your shoe. It interfaces with scheduling and other equipment and runs on non-proprietary hardware.

Installation of a DAD486x was part of a massive renovation at WMC.

We ordered seven workstations to operate on a local area network, utilizing a common file server with redundant store. Although we felt that this was the right system, we were still apprehensive about tying the reputation and credibility of WMC to networked computers. Six months later, hindsight tells me that our fears were unwarranted.

WMC has not had to modify our operation procedures at all. The DAD486x dropped right in and was immediately productive. One of the fears that staff members had prior to the arrival of DAD was the fact that they could not hold a tape cart in their hands and carry it from one newsroom to another to be played. But with DAD in a networked configuration, anything done on one workstation is immediately available at any other workstation. Any fears or hesitation were eliminated after the systems were put into use.

As a full-service, 24-hour station with live shows, traffic, news, weather and sports, WMC is a demanding facility. We also receive satellite feeds, some to be time-shifted, some edited, and we take great care to achieve a quality sound in all cases. DAD allows us to accomplish more with less equipment than before. The operators love DAD because we can throw anything at it and it performs flawlessly. The touchscreen interface makes operation a breeze.

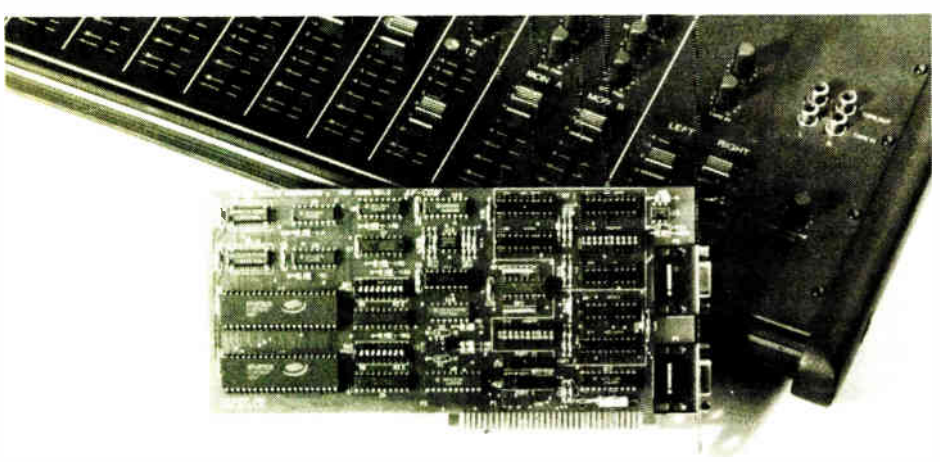
Command cuts

Some of my favorite features of DAD include the ability to play, record and edit simultaneously on any one workstation; arrays and mini-arrays; panels of buttons that each jock can assign pieces of audio to for immediate playback; and auto-timed recording. Command cuts are helpful programmable logic macros that cause internal or external events to occur either manually or automatically and, to my knowledge, are not available in other systems. One of our Command cuts, for example, causes DAD to refer to our facility's master clock and "sync up" once every hour. This happens automatically, with no interruption of any operations on DAD at the same time.

DAD486x has been of significant benefit to the WMC stations. Later this year, we plan to install at least three more workstations for WMC-FM 100. Our reasons are simple. This equipment purchase has been enjoyable and beneficial for all of our departments, encompassing sales, programming, management and engineering.

Considering all of the economics—the product's flexibility, user-friendly operation and, above all, the 24-hour-a-day service and support from Enco—other choices have been eliminated.

For information, contact Larry Lamoray in Michigan at 810-476-5711; fax: 810-476-5712; or circle ***Reader Service 210.***



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Other Products Available!

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Transformed by UDS2

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updates have made the UDS2 technology virtually bulletproof. If we noticed a problem or wanted UDS2 to do something better, TM's team offered a solution very quickly. It also helped Computer Concepts and Powergold update their software programs to communicate better with the UDS2 system.

Exactly nine months after the first installation, we installed our second UDS2 at our AM facility, WSTU. This installation took about half the time of the first. WSTU is an AM oldies station with a 40-year heritage in the Stuart/Ft. Pierce/Vero market. Westwood One's New Gold on CD supplied us with our library of songs from the 50s, 60s and 70s.

Rockin' and rollin'

I was able to rebuild our music database using Powergold and loaded the entire library of CDs into the Sony CDK 3600 Jukebox. We have been rockin' and rollin' ever since. UDS2 makes our AM sound like an FM. We use the audio controller and the UDS2 Net Join card to our advantage. WSTU is also an ABC Information Network affiliate. At the top of every hour, UDS2 fades out a song, plays our ID and joins ABC right on time.

Our announcing staff is bilingual—they speak AM and FM. The UDS2 technology enables us to utilize our talented staff on both stations at the same time in various dayparts. Our morning and afternoon drive personalities on AM are live. Our midday, evening and overnight personalities digitally pro..duce their shows on the hard drive for WSTU while performing live on the WHLG. We save on overhead without sacrificing the local sound or control of the radio stations.

UDS2 allows you to become what your license says you are: a public trustee. It gives both our stations a major-market sound and the ability to edge out the competition. The only thing worse than not having a UDS2 from TM Century at your station is competing against one that does.

For information, contact John Schaab in Tex...as at 214-406-6800; fax: 214-406-6890; or circle ***Reader Service 173.***

World Radio History

Products & Services Showcase

For more information on the products shown below, circle the appropriate Reader Service No.(s) on the enclosed Subscription/Reader Service card or contact the advertiser directly.

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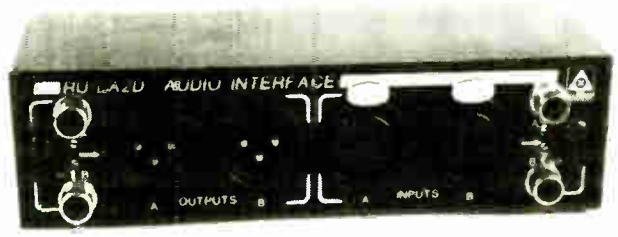

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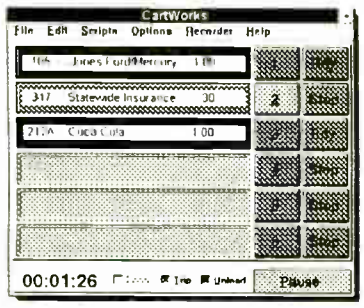

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READER SERVICE NO. 168

World Radio History

USER REPORT

Gemini Replaces Aging Analog Equipment

by Larry Wilkins
Chief Engineer
Colonial Broadcasting

MONTGOMERY, Ala. In past years, new technology usually started out at major-market stations, then worked its way down to medium- and maybe small-market stations. With the digital revolution, this trend has reversed. As aging analog equipment approaches the end of its life, stations of all sizes realize that switching to new digital equipment is more cost effective.

One example of cost-effective digital equipment is the **Arrakis** Gemini control panel. Simply put, this control surface interfaces with a standard Digi-Link and simulates some 250 cart decks, loaded and ready to play at the touch of a button. Like carts, files can be stacked and played. These 250 or so files can be different for each one of up to 40 announcers. Assigning files is as easy as point and click.

Cartwall buttons

These "cartwall buttons" replace cart machines in your studio. The Gemini panel also includes a replacement for your reel-to-reel machines. These are called "smart record" buttons. By selecting a smart record button, you can record anything you like while you are on the air. Once the file is recorded, you can play the file with the same button, or drop it onto the edit screen to cut or splice however you like. These buttons work extremely well for recording phone conversations with listeners.

We use the smart record buttons to record weather forecasts from a local TV station. The feed contains four separate cuts that are recorded on one smart record button. Then the board operator simply drops the file on the edit screen and marks each cut and assigns it to a separate button for playback. All this can be done during one CD cut.

Often you get a great telephone comment that you would like to use on the air edited, but that you also want to save in its original form for use in a promo. Before editing, simply transfer the file to another machine in your station, or copy it to another file name on the cartwall. You then can edit and play it on the air. After your shift, go to the production room and create your promo from the original file.

Two sides

The Gemini control surface is divided into two sides, the left side, or cartwall, contains the cartwall and smart record buttons. Normally, these buttons contain jingles, promo, IDs, etc., that you drop over or between music cuts.

The right side consists of the playlist that normally contains your commercial files and traffic log. As with a standard Digi-Link, you can edit the spot playlist, changing the order or inserting files at either the end or next-to-play. In the standard Gemini setup, each side uses a separate Digi-Link system. Each Digi-Link can use separate audio inputs, allowing cross-fades and level adjustments for each side.

At this year's NAB, Arrakis introduced the Gem1, which runs from one Digi-Link. This unit allows three different audio files to play at the same time.

Options

One of options with the panel is a video switcher. The top of the surface features six selectors, which allow the use of a mouse, keyboard and monitor for up to six separate computers, such as a newswire or your office computer. Five other buttons allow for the control of other Digi-Links. A clear overlay is available to label the buttons; however, we found it was just as easy to put stick-on numbers on the buttons, with a legend sheet posted nearby.

Installation of the Gemini is easy. It comes as a standalone panel in its own table-top cabinet, or it can be installed in the center of an Arrakis console. All necessary cables and power supply are furnished.

The picture shows the panel installed in the Gem6 console. As an added feature, Arrakis can supply individual "smart modules" that fit in a standard 12,000 series console.

We found that the learning curve is very short because the panel operates like a reel-to-reel or cart machine. Editing is simply mark and cut, similar to using a grease pencil and razor blade. Both our FMs have been using the Gemini panel for several months with no failures or complaints.

For more information, contact Jon Young in Colorado at 303-224-2248; fax: 303-493-1076; or circle ***Reader Service 38.***

Larry Wilkins with the Gemini panel, installed in a Gem6 console.

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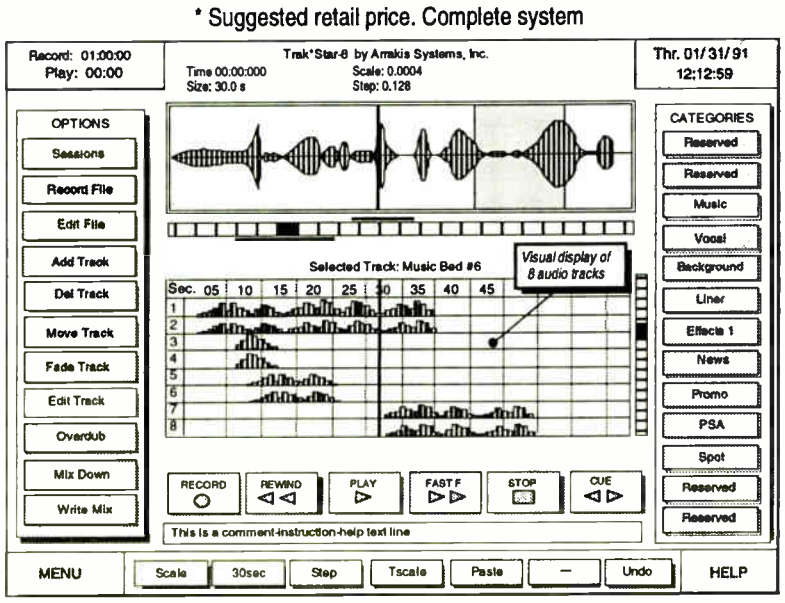

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World Radio History

USER REPORT

Wizard Gives Stations Local Sound

by John Marquis
Operations Manager
KOGA(AM)-FM/KMCX(FM)

OGALLALA, Neb. One of the keys to sounding local is to never think of your stations as anything other than live and not to use satellite programming as a crutch.

We use Westwood One programming for all three of our stations. Our AM, with an adult standards format, uses Westwood One's "AM Only." KOGA-FM is adult contemporary, carrying Westwood One's AC, and KMCX(FM) uses Westwood One's Country. We broadcast a live morning show on our AM. All three 24-hour stations utilize off-premises control evenings and weekends for unattended operation.

We go to great lengths to make sure our satellite announcers sound as if they are sitting in our control room. The Audio Wizard for Windows digital audio system from **Prophet Systems** offers us a variety of ways to achieve this.

Inserting liners

Inserting call letter and image liners is simple with almost every satellite automation system, but not every system is flexible enough to insert special liners in certain dayparts. The Wizard allows us to rotate specific liners with more generic ones to prevent the generic liners from burning out quickly and to add to the local live sound.

For instance, listeners depend on your station for weather forecasts and updates. Your satellite announcers can record liners such as: "We'll have highs in the 80s today. For all the latest weather information, stay with us on KOGA-FM."

Or maybe you want to use liners to promote your local ball game. Simply set up a rotation schedule to rotate these liners with others, and daypart them so they play only at the right time. You can also generate additional revenue by using your image liner availabilities as short commercials. Advertisers love this because it is an effective way of keeping their name before the public and not lost in a spot block.

You can also make your station sound local with temperature announcements. All day every day, even overnight and on weekends when no one is at the station, Audio Wizard for Windows announces

Never think of your stations as anything other than live.

the current temperature. Our local announcers record the complete range of expected temperatures and program the Wizard to play the current temperature after our recorded weather forecast. The Wizard allows us to tie satellite announcer temperature checks to some of the call letter liners.

Time checks

To add time to the mix, our satellite announcers record five-second time checks that can be played at the end of a spot block a couple of times per hour during their shift, or tied to a short image liner call. Also, our IDs at the top of the hour give the time in the satellite announcer's voice.

I cannot imagine any other digital automation system that would allow us to be as flexible with liners. In fact, the satellite DJs are so intrigued by the time and temperature announcements they have cut, they have asked me to record air checks.

There are a number of other features of Audio Wizard for Windows that make life easier, including hard drive automation, voice tracking, a real-time digital editor and digital reel-to-reel.

If you think that satellite radio sounds "canned," then you have not heard a station utilizing all of the Audio Wizard for Windows features. This system is the most flexible and powerful digital automation system on the market.

Before we bought the Wizard, we employed 18 to 20 full-time people and two to three part-timers for two stations. Now we operate three 24-hour stations with a full-time staff of 14 and two part-timers. The Wizard allows us to better utilize our staff, save money, sound better and, ultimately, better serve the community.

For information, contact Kevin Lockhart in Nebraska at 800-658-4396; fax: 308-284-3517; or circle ***Reader Service 158.***

The Power Studio From Roland

The new DM-800 provides power, speed, portability and reliability like no other system available.

Power Eight discrete tracks with 100 layers per track. 12 channel automated mixing and EQ. Time compression and pitch correction. Nondestructive, full featured editing. Sub-frame accurate SMPTE sync. Optional ADAT, DA-88 or RS-422 interface.

Speed The DM-800 is easy, fast and quick to learn, using powerful hardware controls with tape recorder style punch in and out. No computer required.

MIDI Support The DM-800 supports MMC, MTC and dynamic functions like tempo mapping, bar and beat editing, control of external sequencers and trigger mode for instant phrase playback.

Portability All the features and functions you need are contained in a single 12 pound unit. You can literally grab it and take it with you. Uses internal and external SCSI drives. View any level of information on the built-in LCD or plug the DM-800 directly into your video monitor.

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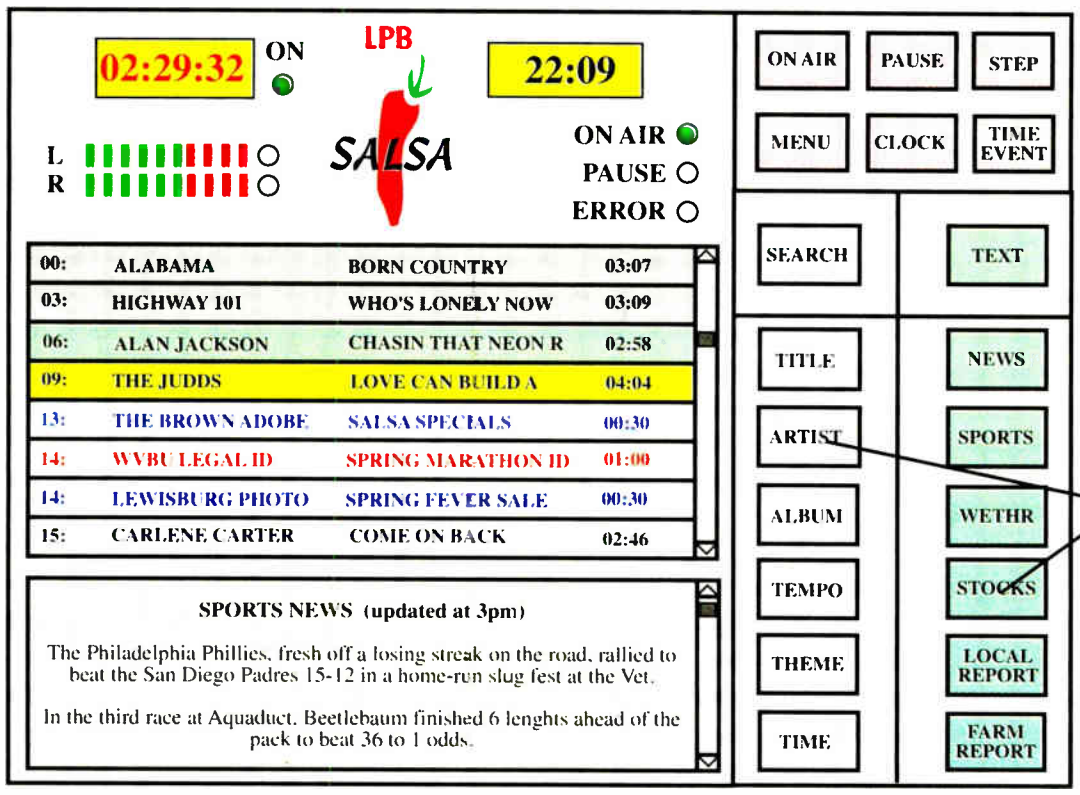

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World Radio History

Move Up from Tapes to Touchscreen Digital Audio

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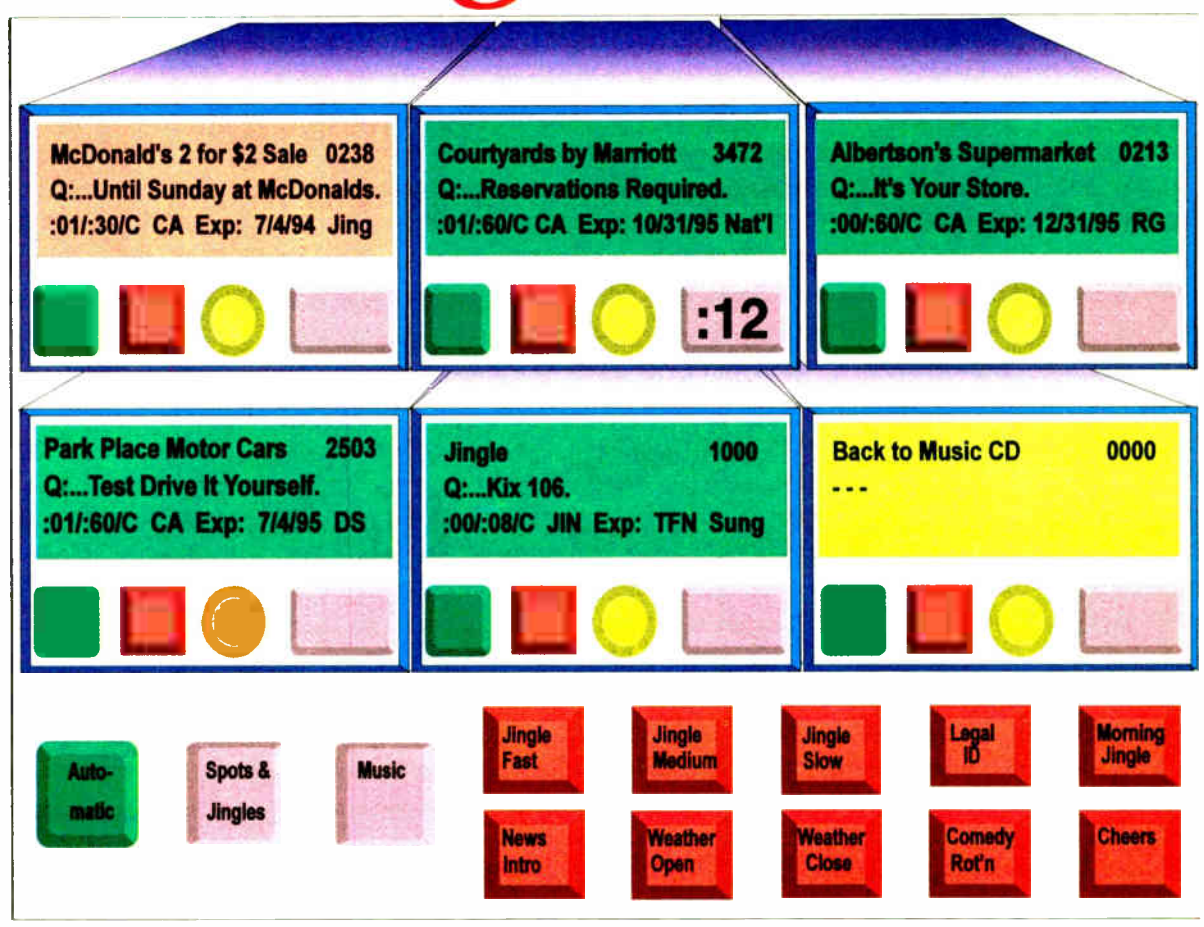
Nothing else makes radio as fast or easy as having all your spots, sounders and sweepers start with your fingertip–*always on-line and ready* to play from hard disk. And *nothing else* makes your station sound as good or as exciting as touchscreen digital and creative talent with Scott Studios' new *CompuCarts!*

If you've used carts, you already *know* how it works: Six "cart decks" on the computer touchscreen play what's on your program log. Scheduled spots, promos, PSAs and jingles come in automatically from your Scott Studios' Production Bank and your traffic computer. You see legible labels for everything, showing full names, intro times, lengths, endings, announcer initials, outcues, posts, and years. Your jocks can rearrange anything easily by touching any cart and moving it to any other cart. Spots with one number that rotate several cuts work just like carts, except additions, deletions and changes are much easier. Large digital timers automatically count down event times, and flash end warnings.

At the bottom, 10 "hot keys" start *unscheduled* jingles, sounders, effects, comedy bits or promos *on the spur of the moment*.

You also can select audio from lists of all your recordings.



Your jocks ***already know how to use Scott Studios' CompuCarts!*** It's the impressive quality of digital audio without the confusion of keyboards. Each button on the touchscreen plays what you want instantly. Logs come in automatically from your traffic computer.

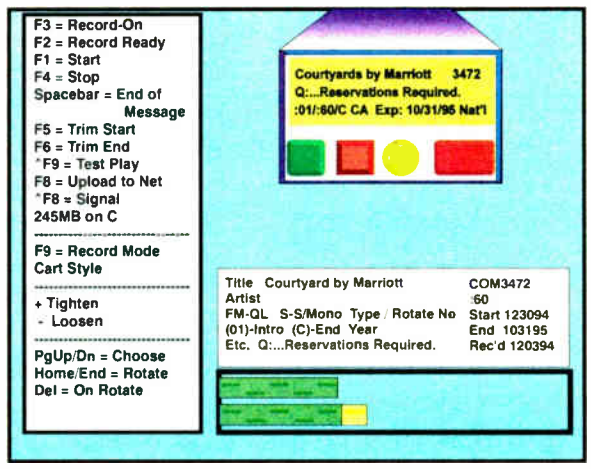
The World's Fastest Playback!

Touch either of the two buttons at the bottom left of the main screen to see our "Wall of Carts" with all your audio *on-line!* Touch the sound, spot, jingle, promo, PSA or comedy you want and it plays *instantly*. Or, you can put it anywhere you want in the next six "cart" machines. Audio is displayed any five ways you like.

Instant Music on Hard Drive

Our most popular option is 9 gigabyte disks with *1,000 songs* pre-dubbed for *free!* The audio quality of digital music from the Scott CompuCart hard drive meets or beats the best CDs. You even get direct digital inputs so you can dub digitally from your CD players!

And nothing could be faster than song requests from Scott Studios' CompuCarts! You also get five "Wall of Carts" with music that plays at a touch! Songs are displayed by title, artist, year, length, category, or any ways you like.

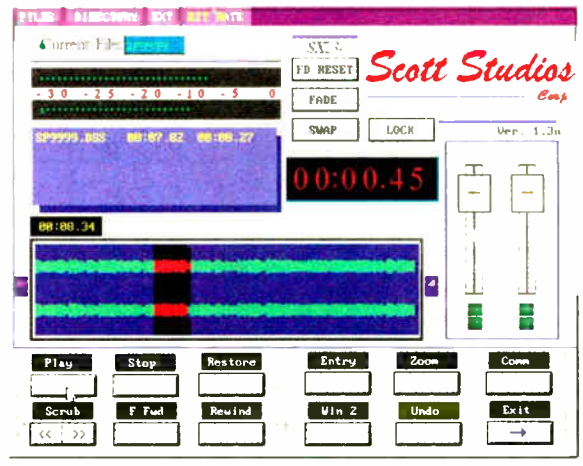


The *Easiest* Digital Audio

CompuCarts not only work like a "cart" player in the air studio, CompuCarts work like a "cart" recorder in your production studio. You get all the features your radio station needs, including start- and end-dates, rotations, out-cues and easy-to-read label information. And when spots, promos, PSAs, or any other digital audio events are recorded, they're immediately playable in *all* your Scott System air studios. Nobody wastes time carrying carts down the hall or redubbing spots for additional stations.

The *Best* Digital Audio

One question you *don't* have to worry about with the Scott System is "What if it breaks?" The Scott CompuCart System comes complete with *every* spot and jingle stored *redundantly* on *two* hard disks with a *split-second* switch to the "hot standby" outputs! You get touchscreen convenience, digital quality, and redundancy for no more than cart machines.



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World Radio History

USER REPORT

WireReady Eliminates Paperwork

by Leroy Dietrich
Chief Operator &
Dir. of Technical Operations
KTSA(AM)-KTFM(FM)

SAN ANTONIO In April 1991, shortly before the NAB spring show in Las Vegas, our AM station KTSA instituted a news/talk format. With the goal of an all-electronic newsroom in mind, I attended the NAB and shopped around for the most cost-efficient electronic newsroom computer system. After visiting several potential vendors, the obvious choice was **WireReady Newswire Systems.**

Piles of paperwork

Operating a 24-hour news facility generated piles of paperwork and lots of trips to the copy machine with stories from one of the three wire printers. The WireReady system, although a new kid on the block in 1991, seemed to have the answers to an almost paperless newsroom, at a low price.

KTSA was one of the first stations, not the first to implement a WireReady system on a Novell computer network. The software was written with a news person in mind. At first the system was no more than a large electronic typewriter that did not require correction tape.

In December 1994 we purchased six CartReady kits for existing WireReady workstations. Once again the software was written for a news person, not an engineer. After two weeks, our cart machines and reel-to-reel recorders started collecting dust.

Tremendous savings

We noticed a number of results from our conversion to WireReady and CartReady. First, there was a tremendous savings on paper and typewriter ribbons. Second, we saved big on copy machine cost, as wire stories were available at all the terminals from the public wire file.

Also, CartReady simplicity improved newsroom productivity. We produced more and better audio cuts for on-air use. We have not bought a razor blade in more than six months, and we no longer search for a blank plastic cart.

Our association with Dave Gerstmann and all the fine folks at WireReady Newswire Systems has remained strong for four years. The 24-hour technical support is aimed at the computer-illiterate news person. The company can call in on our modem workstation and make changes on the fly.

The product has exceeded our expectations. Our conversion to CartReady was completed by WireReady personnel via modem. No paper and no tape, thanks to WireReady.

For information, contact David Gerstmann in Massachusetts at 800-833-4459; fax: 508-879-0080; or circle ***Reader Service 81.***

USER REPORT

Sentry System Solid

by Shannon Milburn
Program Director
KMCQ(FM)

THE DALLES, Ore. In a competitive world, where the bottom line better be good, you sometimes have to make concessions. Although I would prefer to staff our station with live bodies 24 hours a day to keep the sound local, I realize that such a scenario is unrealistic.

KMCQ is one of seven stations serving about 65,000 people in Oregon and Washington in the Columbia River gorge area. The other six stations feature live morning shows, with satellite programming the rest of the day. Our station works live-assist during the day, automating the late evening and overnights.

Dilemma

Four years ago, we were faced with the dilemma of keeping qualified part-time employees. We were also using an old automation system that barely kept running. To solve both problems, we began looking for a new automation system.

What we found was the Sentry Systems Format Sentry Model FS12C and DS-1 hard drive storage and playback unit. The system seemed simple to operate, without the extra features we did not need. The FS12C matched up with the reel-to-reel automation system that was programmed in-house.

Installation and changeover proceeded smoothly, better than anticipated. Our engineer changed the music selectors, our midday guy worked on the music program and I, the computer-illiterate one, started putting commercials on the hard drive.

We hit the air. What we found was a system that was much easier to use than our previous automation system. Our engineer seemed surprised when we said that we encountered no problems. The music segues were much smoother than before, and it sounded as if there were a live body in the studio.

One walk-through

For production use, the DS-1 is simple. Its on-screen instructions make it easy to follow. Any newcomer to the system requires only one walk-through of the recording or playback process.

We can quickly program changes and not miss a beat.

The best part of the changeover was that our commercials were in stereo. Some clients requested that their ads be played in stereo. We could now do this more easily with the DS-1. The DS-1 also allowed us to automate an hour here or there whenever we wanted to hold a staff meeting, or if someone was not feeling well.

It has been wonderful for vacations as well, as I do not have to bring in another person. Someone from the office usually can record a few breaks. We can quickly program changes and not miss a beat.

The only complaint I have is that calls for technical support are not always handled in a timely fashion.

Format change

Last January we decided to make some changes to our format, moving from a softer adult contemporary to one more upbeat. After talking with Broadcast Programming about its Hot AC format, we decided that perhaps we should switch from reel-to-reel automation to CD.

This transition did not go as smoothly as the last. We needed new software for setting up the skeleton and command files. The only problem after that was the network delay for the news, which turned out to be a wiring detail and a computer command that I did not write properly.

The FS12C and DS-1 are a solid system, allowing us flexibility and giving our automated segments a live sound. The units are extremely user friendly; you do not have to be a computer whiz to operate them. If for some reason we have to automate when we are live, we can do so quickly and with little effort. Even more importantly, the system is reliable. It is nice not to be awakened at night by a caller who says that your weather forecast is playing over and over...

For more information, contact Dave Newton in Washington state at 800-426-9082; fax: 206-441-6582; or circle ***Reader Service 11.***

WBS

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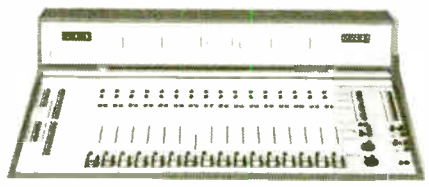

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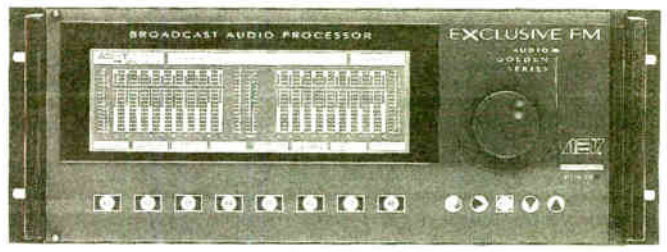

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World Radio History

USER REPORT

Programming Strength of DigiCenter

by John Mackley
General Manager
KIUP(AM)-KRSJ(FM)

DURANGO, Colo. When I made my initial investigation into digital technology I was skeptical, to say the least. I was so cautious, in fact, that I chose to wait a lot longer to purchase a system. Today, I am glad I did. After we closely examined all the systems on the market, we chose the ITC DigiCenter—and that caution has paid off.

After years of working with an antiquated computer system that was event-driven, we began the search for a digital system. Our system was adequate but lacked flexibility and sound.

We started looking into a digital system at least five years ago when digital technology was first starting to come along. We chose the ITC DigiCenter because of its ability to assist KIUP-KRSJ in being more efficient, more flexible and, of course, to provide better sound.

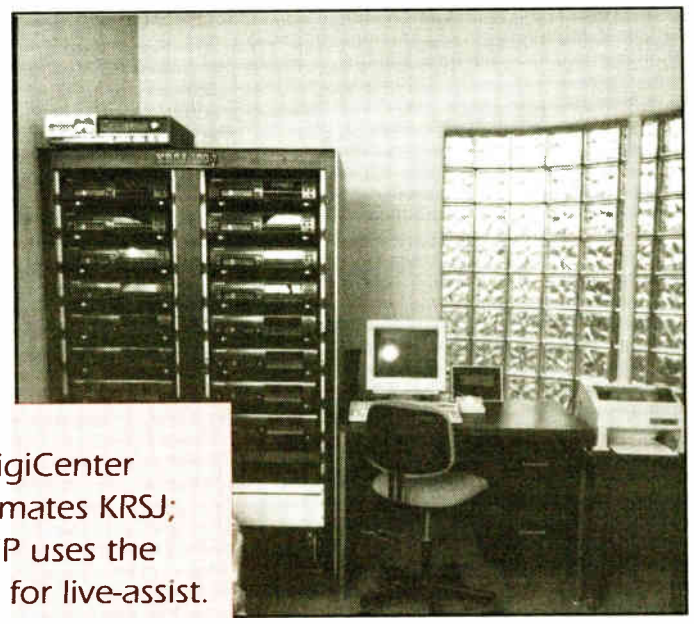
We are particularly pleased with DigiCenter's ability to convert KRSJ into an automated station that allows selected live broadcasts, while converting KIUP into a live-assist station. This added efficiency and flexibility is what I was waiting for in the development of digital technology.

We were not happy with the aspects of audio compression in our early digital investigations, so rather than enter at that point we decided to let the question of audio compression resolve itself through the marketplace. As technology advanced, we found that some players in the business were taking steps to give us the benefits of compression without compressing. We started investigating again.

Our primary goal for the new system was to automate KRSJ with a "live" sound. ITC had a super system and plenty of hard-drive space and flexibility. We felt it was the best way to add intros and outros to songs in advance. And when I say "in advance," I mean a day or even two or three days ahead of time. This is a true time-driven system. We know exactly when a particular song or commercial will play.

On weekends, basically one person runs both stations, so the automated FM station is virtually hands-free. It is extremely efficient and cost-effective for us.

ITC's reputation played a big part in our decision. We did not want to go with a company that perhaps had a great product, but not the track record. It is important to us that 10, 15 or even 20 years down the road, we are guaranteed this company will still be around.



DigiCenter automates KRSJ; KIUP uses the system for live-assist.

Programming unique configurations is a strength of the DigiCenter. The help ITC lent the station during installation and programming was crucial. All of the staff, especially the programmer, Bill Kidd, have been fantastic.

As we dream up other aspects of programming, ITC writes the program and downloads it for us to make the DigiCenter do what we want it to do. It allows us to keep maximizing our system to meet our changing needs.

These changes and special needs have proven a challenge for ITC. Because we wanted it to sound live, there were some intricate programming details the company had to write. Bill spent many nights working on programming. I have other friends in the business, and they have told me other companies have not gone the extra mile to set things up like ITC did.

One of the unique programming designs KRSJ implemented with the DigiCenter is automating the programming, while allowing breaks for live events such as news coverage or sports programming.

Most people are either automated or live, but we keep switching back and forth, which is not always easy. Any time you do something that is non-standard it takes a while.

We are working at becoming more proficient at using this DigiCenter feature. A mistake can result in dead air, two items playing at once, or the person on air sounding unsure of him- or herself. We want to make it easier for the person on the air. If he is thinking about something else, he is not going to be thinking about what he is going to say.

KIUP, on the other hand, is moving away from total live programming to live-assist. DigiCenter allows us to play back spots or a series of liners and promos unattended. If we want to run three commercials in a row, we can just fire up one button and it plays all three in sequence. That takes the pressure off whoever is running things and frees him or her up to do something else.

KIUP is also capturing many network events on AM. We use three different major networks and all these have subsets, so we are recording six different feeds.

The DigiCenter's ability to play back an event before recording is finished is one of its most unique features. As far as I know, DigiCenter is the only system that lets you play something back while you are still recording.

This feature enables us to better incorporate our sports programming. We air a lot of local sports, including Colorado University and Denver Broncos games. Now, if one game ends after the next one starts, we can just start recording the second game and delay it a short period of time. Then we can begin playback before the game is over.

These unique features give us the flexible and efficient system we were looking for. And we are still discovering all the ways we can use it to improve our station.

For information, contact Charlie Bates in Illinois at 800-447-0414; fax: 309-828-1386; or circle ***Reader Service 104.***

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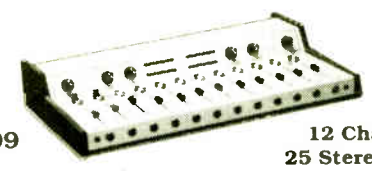

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READER SERVICE NO. 121

World Radio History

USER REPORT

SMARTS Sensitive to Broadcasters

Ray Kassis
Technical Director
& Chief Engineer
WJFP(FM)

FORT PIERCE, Fla. I have been intrigued for a number of years by the thought of building a fully automated and unattended radio station. The opportunity presented itself when the principles of Black Media Works Inc. decided to build a state-of-the-art, low-budget, urban contemporary station in Fort Pierce. Arrangements were made for transmitter readings, EBS and station monitoring to be conducted by on-air personnel of WCNO(FM), Palm City, Fla., 20 miles away.

Selecting a system

After designing all the fail-safe circuits in the studio, microwave and transmitter sites, and interfacing the remote control system to alert WCNO, the next obstacle was selecting an automation system to meet the needs of an unattended station with a professional-sounding format.

Digital was my only choice. Then came the debate. Do we go with a CD playback system, digital cart system or music on hard drive? And then, which vendor could best meet our needs? To my surprise, I called Company "A" only to find that the factory sales and support staff were closed for the Thanksgiving, Christmas and New Year's holiday. In fact, it was after I completed my order for the **SMARTS Broadcast Systems** Smartcaster and

All SMARTS customers have access to a 24-hour support line.

signed the lease purchase contract for financing that I received literature from Company "A." Ironically, the day our Smartcaster was delivered, a salesman from Company "A" called to follow up on our inquiry, made three months earlier.

Broadcast sensitive

I cannot stress enough the importance of dealing with a broadcast-sensitive vendor. My experience with the sales, management and support team of SMARTS Broadcast Systems has been the best relationship I have had in over 30 years of broadcasting. All SMARTS customers have access to a 24-hour support line. They have never failed to call me back within one hour for even a routine question. Even if SMARTS had given me the system, I would still pay the same price for the service and follow-up support.

Our Smartcaster consists of a PC-IBM clone 486 computer with a 100MB hard drive and six 2.4GB hard drives. As of this date, we have over 1,600 songs, and all of our station IDs, liners, spot announcements, etc., run flawlessly. I opted for the Dolby AC-2 card, which gives us CD-quality playback. We have a remote terminal unit PC-386 clone with a 100MB hard drive in our production room for recording music and logging. We utilize the Musicmaster option for selecting our music.

Because this operation is mostly unattended, we have an uninterruptible power supply backup system, which has come in handy in Florida during thunderstorms. I strongly recommend having your SMARTS system unpacked and installed by a SMARTS field technician. The field technician plays a valuable role in introducing the SMARTS system to the staff as well as establishing an overall familiarity with the station setup at the SMARTS home office.

The original manual supplied with our Smartcaster left a lot to be desired. Because the software keeps changing, the manual lagged and, in some cases, was wrong. Of course, having a 24-hour support line helped to immediately resolve any questions. Smartcaster has since authored a new manual that is up to speed with the latest software.

Ultimate test

The ultimate test of support was when a power supply fan failed and our nighttime live-assist DJ turned off the air conditioner to save us money. The main tower holding the motherboard and four hard drives became extremely hot and failed. SMARTS delivered a new power supply overnight and we were up and running unattended again within 14 hours.

When our hard-drive controller board became sensitive to the heat, SMARTS again responded overnight with a new board, all under warranty. I cannot describe the confidence and security in having a system 65 miles away from home and the support of SMARTS any time I need it.

WJFP has a staff of eight sales, production and live-assist DJs. All of them operate the Smartcaster for logging, billing, production and music selection with just basic training. I cannot wait to install another SMARTS system.

For information, contact Dave Potranz in Iowa at 800-498-0487; fax: 800-398-8149; or circle ***Reader Service 119.***

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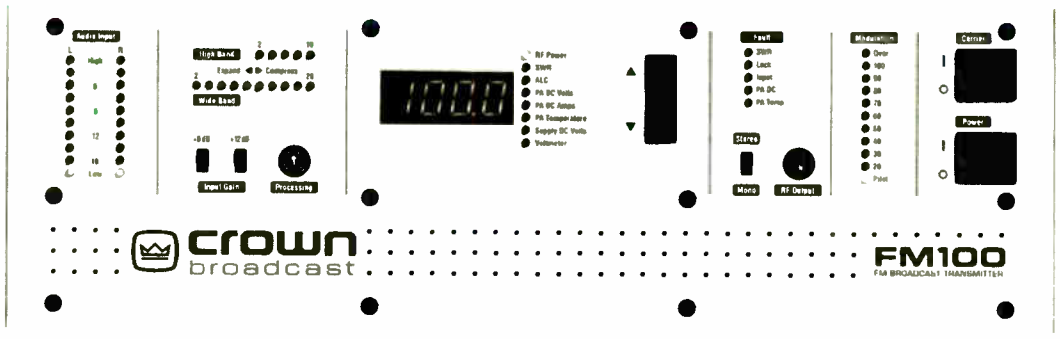

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World Radio History

USER REPORT

CartWorks Built with Eye on Future

by Clint L. Webster
General Manager
Radio Cleveland Inc.

CLEVELAND, Miss. Digital audio automation systems have been around longer than you might think. I purchased my first version of one in February 1991. At least, I thought that was what I was buying. It turned out to be vaporware. Brand "A" was a first-class piece of non-working satellite automation equipment. About one year later, I bought Brand "B"; it too was vaporware.

Dual role

As a broadcaster for 21 years and general manager of a group of radio stations, it is vitally important that my stations have equipment that is simple to use, efficient, versatile and dependable. As part owner, the cost effectiveness of a system is also a major consideration.

We have been using Brand "C" satellite and CD computer automation. The company has now written its software so that I will have to throw away all the computers sold to me if I ever want to get all the features I was promised. It seems that the company should have considered this problem before it began selling its systems.

This brings me to CartWorks from **dbm Systems**. It is the system I have searched for and that will allow me to upgrade in the future without throwing away my computers.

One of the most important aspects of purchasing a system is the installation. This is where dbm Systems excels. After my installation woes with the other brands, I was pleasantly surprised to receive both an installation manual and a manual for operating the system, both of which were up to date.

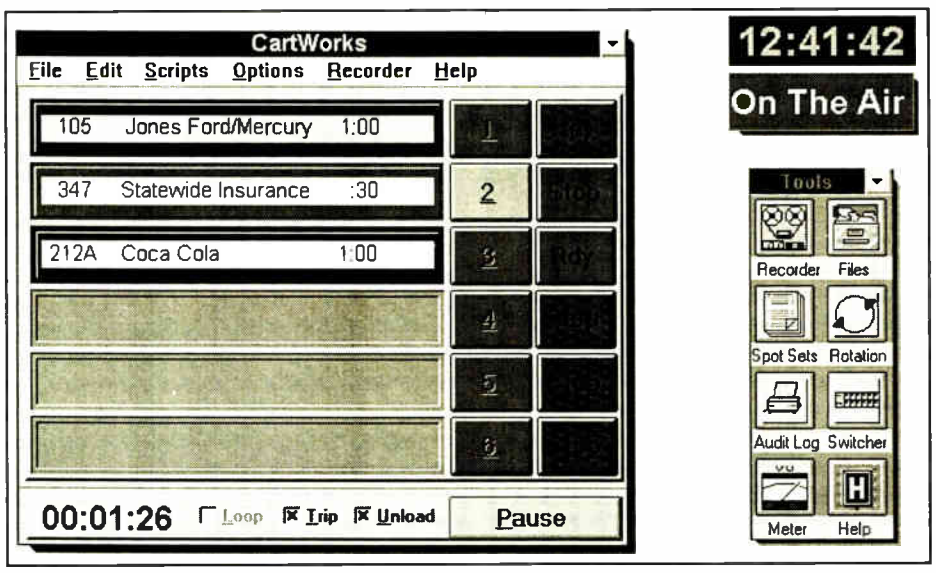
No junk

In just a few hours, the system was installed and running, without junk like quirky connectors or lousy unterminated ribbon cables. Finally, someone did it right. It is immediately obvious from the quality of the supplied hardware that the CartWorks development team comes from the broadcast industry.

The CartWorks system has screens that are clear, uncluttered and do not resemble a database application. CartWorks was developed on sound platforms, too. The 486 DX2-66 MHz computer runs Microsoft Windows for Workgroups and uses apt-X digital audio compression.

For live-assist operation, CartWorks looks and acts exactly like a six-deck cart machine. There is also support for displaying end cues and live tags, as well as a countdown timer. And by simply clicking on the Help icon, instant help is displayed for every item on the screen. My staff was operating the system like pros the first day.

As for satellite automation, this system offers virtually unlimited walkaway time and is far more programmable than the other systems I have tried. This may explain why two radio networks have already chosen CartWorks for their operations.



CartWorks allows for upgrades without discarding existing computers.

Instant access

One of the newest features that CartWorks offers is the Instant Access button panel with 48 pushbuttons that can be preloaded with jingles, liners, bits, effects or whatever you need. At the press of a corresponding button, any of these will play instantly.

> **CartWorks looks and acts exactly like a six-deck cart machine.**

There are so many other features, such as simultaneous record and play with the same audio card, that I cannot describe them all here.

Support after the sale is something a lot of people take for granted. You quickly learn, though, that not everybody in business cares if you are happy or if the product works the way it is supposed to after they have your money. With dbm Systems, if you have a problem or even think you do, the company's support team is there to help. A phone call is all that is necessary.

If you are entering the world of digital audio for the first time, or, like me, are ready to chuck your current system, you could do no better than CartWorks.

For information, contact George Thomas in Mississippi at 601-982-1062; fax: 601-362-1905; or circle ***Reader Service 204.***

USER REPORT

Excellent Service Sets SALSA Apart

by Larry Mikesell
General Manager
KLBA-AM-FM

ALBIA, Iowa I took over the reins of a 500 W AM station in rural southern Iowa in June 1994. The station had a construction permit to build a 25 kW FM. One of the biggest decisions facing me was whether to go all-live or to automate.

If we were to automate, I wanted a system that was flexible, one that could be operated as a cart machine or run by itself. Chris Kreger of RF Specialties mentioned the SALSA from LPB. After a trip to Galesburg, Ill., to see the SALSA in action, along with several other trips around the area to see other automation systems in operation, I chose the SALSA.

This system is flexible and priced right, with all the features necessary in the radio business. I was looking for an automation system that could utilize CDs, go live at a moment's notice, play requests, cover a breaking news story and be left alone overnight or for holiday operations. The SALSA does it all.

Yes, most automation systems perform these functions. The feature that sets SALSA apart from the others is its service, which is available immediately any time. Bob Wille, designer of the unit, is the most patient, understanding and knowledgeable computer and automation systems person I know.

The extent of my computer knowledge was the operation of the Apple IIe. Most radio personalities I know who are putting in their first automation system generally need lots of help. The first two weeks with any automation system are pure havoc. You think it may never work or that you will never figure it out unless you bring in an expensive expert.

With SALSA, a phone call solves whatever problem you might have. Tell Bob what you want your SALSA to do, or what it is doing that you do not like, and he and his staff will take you step by step through the process to correct the problem.

We have experienced a couple problems with our SALSA that required a change of parts. The parts arrived in less than 18 hours. While we waited, Bob walked us through reprogramming, allowing us to stay on the air with the automation still working. When the parts arrived, Bob helped me through the installation. All this service is free for the first 90 days.

Any piece of equipment has its downside; SALSA has two: the internal clock and the installation and programming manual. The internal clock gains a second and a half per hour, and we must do a time sync every hour to keep things running tightly and cleanly. The manual is written for people who already have enough automation and computer knowledge that they probably would not need a manual. First-time automation system users may need a manual that is less technical.

Our system has been in use for about four months, and I am still learning, adjusting and seeking assistance from Bob. The first day of February I would have given the SALSA to someone I did not like. Now, Beulah, as I affectionately call my SALSA unit, is my best friend. It sits there and works, hour after hour; no showing up late for work, no bad-attitude days. If it ever does have a bad day, I know that good service is a phone call away. If I ever need to purchase another automation system, I would start with SALSA from LPB.

For information, contact John Devecka in Pennsylvania at 610-644-1123; fax: 610-644-8651; or circle ***Reader Service 143.***

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World Radio History

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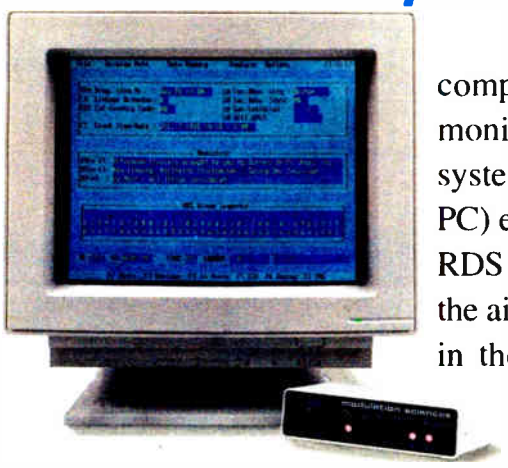

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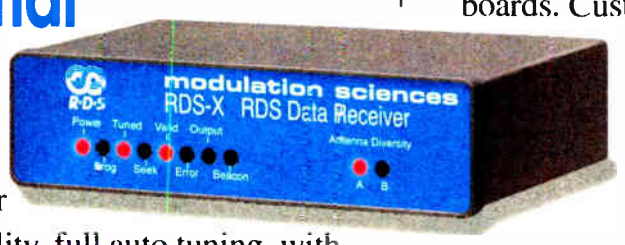

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World Radio History

USER REPORT

No Experience Required with LYNX

by Bill Rogers
VP of Operations
Rogers Broadcasting

FLORENCE, Ala. When I first started looking for a product that would meet my FM translator network needs, I had to keep in mind that I lacked computer experience. I needed a unit that was easy to use, easy to program and reliable. That is when I heard about the LYNX from **Digital Research Corp.**

The LYNX handles insertion of spots on a pre-programmed schedule. It also handles logging, billing and critiquing. In all, the LYNX is the best remote-controlled device I have found for my FM translator needs.

Guinea pig

After seeing the LYNX in operation in Huntsville, Ala., I decided to purchase one. It was being used on a translator system there and was just being developed for commercial use. That is when I met Michael Chunn, president of Digital Research. Michael knew of my lack of computer experience, and he agreed to let me try the LYNX and offer my input on how to continue to develop the product. One of Digital Research's goals was to create a product that was easy to use, and I was the perfect guinea pig.

I purchased a Gateway computer and a wave editor program to produce digital audio for the initial setup of my remote site. After learning some computer lingo and the wave editor, I was in operation in a matter of days with few problems.

Most of the problems I experienced were due to my lack of computer knowledge. However, one problem I had was in the scheduling of my announcements. Because I was doing the schedule differently, the LYNX did not allow me enough room to schedule all my spots. I called the company with the problem and the correction was made to my LYNX the same day by downloading a new code.

Looking ahead

The main reason I bought the LYNX for my FM translator was for local insertion of spots, overlapping those from a full FM broadcast station. Looking ahead to a more advanced application, the LYNX allows a radio station that is functioning as a translator to be controlled as an unmanned broadcast facility.

The LYNX has two fans for cooling, a great feature for FM translators installed in hot places. The LYNX also uses the highest speed modem. Transferring a spot to the LYNX takes only about two to four minutes.

The LYNX was easy to install with the FM translator. You simply hook the audio and switching wires to the LYNX, set your audio to FCC requirements and you are in business.

The schedule of your spots, announcements, PSAs, etc., is easy as well. Provided you follow a few guidelines, you can schedule just about any way you want. If you goof, the LYNX will assist you in correcting your mistakes. The "spots filler" is great to have to fall back on if your daily schedule is not completely filled.

The LYNX installed as part of an FM translator

Excellent sound

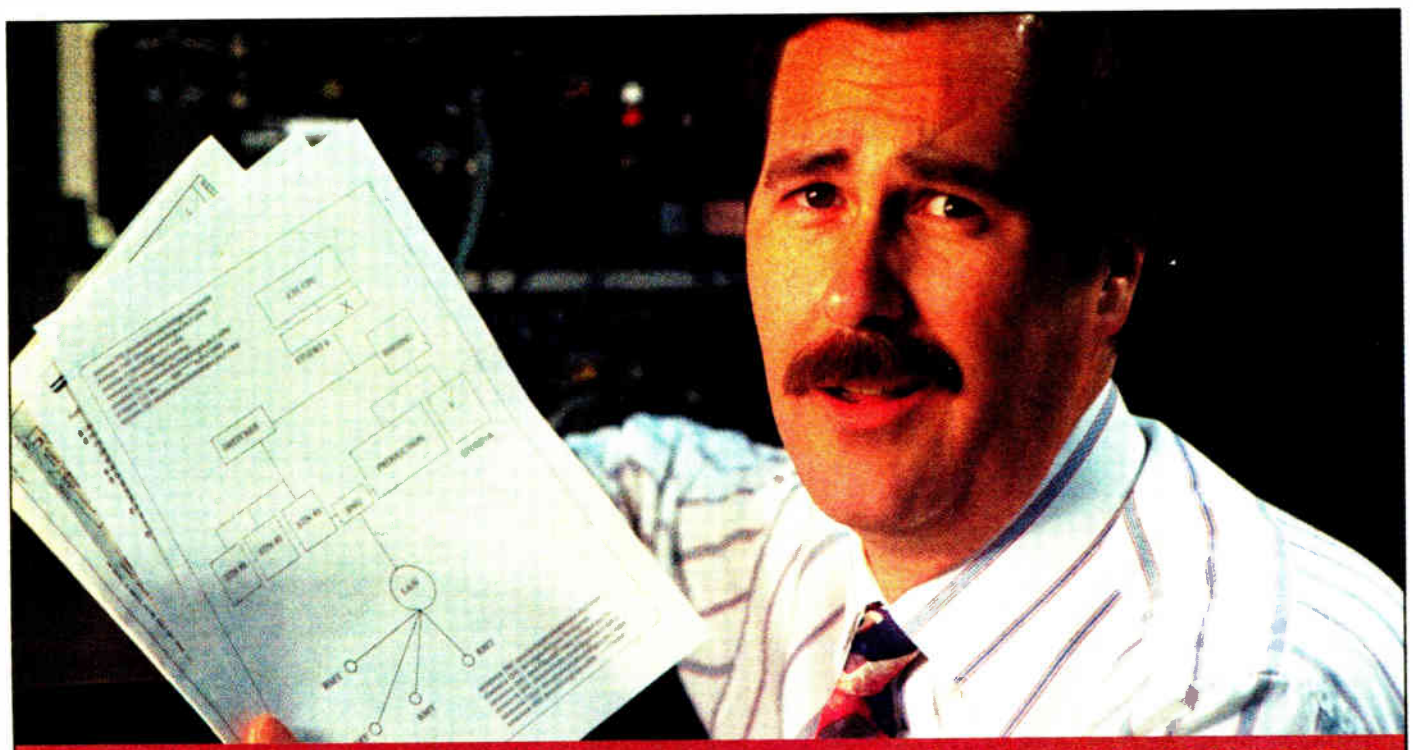
When you connect to your LYNX via phone line, it is easy to monitor what spots have run and what spots will run next, as well as any errors that might come up. Also, the LYNX allows you to change the time your spots will run, your site ID and even the treble and bass of your spots.

The LYNX has excellent sound over the translator. Recently I added stereo to my spots on the translators, and I have had more compliments on the sound than I can remember.

To help me with billing, the LYNX produces a spot log and even prints out each day's log when you want it.

I have been using the LYNX for six months. It has exceeded all expectations at a price lower than you would imagine.

For information, contact Michael Chunn in Alabama at 800-310-5985; fax: 205-837-8320; or circle ***Reader Service 96.***



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Circle (123) On Reader Service Card

World Radio History

USER REPORT

PhoneByte Takes a Pounding at KYNG

by Katie Pruett, Air Personality & Bob Henke, Chief Engineer KYNG(FM)

DALLAS Young Country KYNG is a personality-oriented music station, airing five to 15 phone bits per hour in every daypart. As a result, our needs for quick, easy phone-call editing were formidable when we purchased PhoneByte from **The Blue Group**. We needed an editing system that could weather heavy use and encourage us to edit our bits more.

Two thumbs up

PhoneByte has been installed in our station for over a year. On a scale of one to 10, we give it a 9.5. In Siskel-and-Ebert terms, it gets two thumbs up.

The biggest advantage of PhoneByte is that it enhances Young Country's programming even more than its digital playback enhances our on-air sound.

PhoneByte is a regular, IBM-compatible computer (ours is a 486); the software is DOS-based. It works like a conventional reel-to-reel machine, except that it is controlled by a computer keyboard. The software has some of the same commands that a reel does—play, stop and record—and these command buttons are color-coded on the keyboard.

Each phone call we receive automatically becomes a separate file to be edited on-screen. Calls are manually labeled and can be saved indefinitely. Digital-quality sound reproduction provides mono- or full-stereo output for easy connection to the main studio board.

PhoneByte is beneficial to us in a number of ways. Now we edit our bits more than than we used to on reel-to-reel, mainly because we can edit them more quickly and get them on the air faster. Record and playback are instantaneous. Also, locating a bit on PhoneByte is easier than finding one on tape.

When we first acquired PhoneByte, we were skeptical. The product had no track record. We were one of the first customers and had absolutely no desire to be beta-testers. Every now and then we do find a small bug. But the bad bugs were eradicated before we installed the product.

We were also nervous about training our staff. Teaching DJs to use computers? We wrangled some training from the sales rep (something I recommend), then set up the unit in the production studio for a few days so we could practice.

The easy on-screen layout of the files, coupled with a user-friendly visual graph of each phone call, make it a fairly logical product to use. There are no hidden commands, so a user can simply look at the screen and figure it out. The best testament to its ease of operation is that all our jocks use the heck out of it. In fact, even though we still provide a reel-to-reel for our part-timers, they have generally picked up the system on their own and use PhoneByte instead.

Our station sounds better now. We edit our bits more. We routinely run bits with three and four edits in them. In fact, we probably cut the length of each bit down by about a third. The system allows for an unlimited number of edits, plus the edits are nondestructive, which means that an edit can be undone if a jock changes his mind.

Stacking function

A stacking function allows playback of several calls in a row, in any order, and calls can be saved for an unlimited time. The system can be set up to record every incoming phone call or record them only on command. This feature is extremely convenient when school is out and the request lines are flooded with kids' calls. Each DJ has his or her own file directory, so calls do not get mixed up.

PhoneByte is not without its flaws, but they are small compared to the benefits. The air staff must be disciplined about deleting extra files or the hard drive fills up. We are discussing buying a larger hard drive, and we recommned starting out with the largest hard drive possible. Sound files are large, and we have run out of room on the system several times with our 500MB drive.

PhoneByte comes with a high-quality keyboard with trackball, but with the pounding it gets all day, it is wise to buy a spare. We have had to use ours extensively.

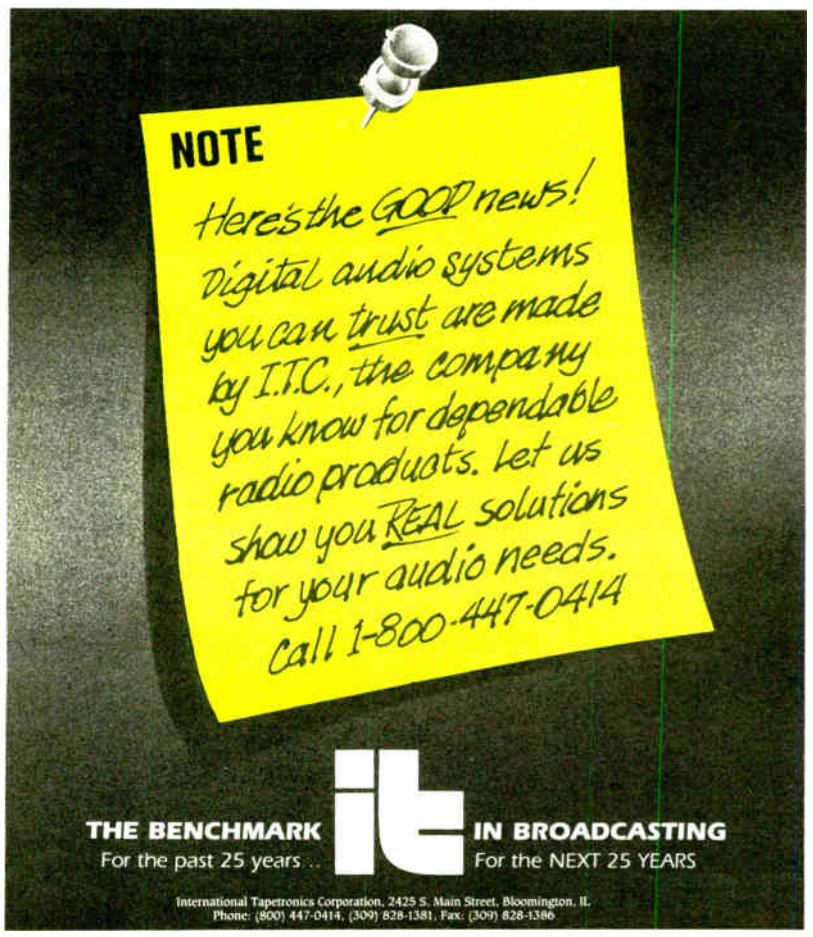
Slaving option

Additional equipment can be purchased to "slave" the system. Slaving allows a producer to edit calls at a separate station. Unfortunately, calls cannot be played on the air while the producer is editing, nor can the system record calls during that time. We set up our slave to feed the production studio, but ultimately we found it easier to use one of our old reel-to-reel machines to record any calls to be included in promos.

Although the unit could use a "pause" feature for call playback, you can begin a call at any point in the playback.

Young Country has become a much better, more efficient radio station because we bought this system, and we recommend it highly. You just can't have ours.

For information, contact Ben Umberger in Florida at 813-442-1665; fax: 813-531-9689; or circle ***Reader Service 115****.*



Circle (152) On Reader Service Card

Circle (161) On Reader Service Card

World Radio History

USER REPORT

Pristine System Fits Any Format

by Mark F. McNeil
President
Guardian Communications Inc.

CINCINNATI Guardian Communications Inc. owns nine stations in Albuquerque, N.M., Baltimore, Cincinnati, Cleveland, and Pueblo, Colo. We began installing **Pristine Systems** automation systems about three years ago, and because they have performed so well, we have just installed our eighth system.

The flexibility of the systems is amazing. Pristine can handle music, talk or satellite formats, live-assist or total walk-away or any combination of the above. If your format changes, so what? Pristine reconfigures easily.

The components of a Pristine system are two 486 personal computers with large hard drives, Pioneer 18-stack or 300-stack CD players, Tascam DAT machines, Antex sound boards, Metrabyte relay boards, LANtastic and finally, the Pristine proprietary controller box and software.

Variety of combinations

The controller box coordinates up to 16 CD and/or DAT machines, and you can use up to three controller boxes in combination. On a basic system, one computer would be used for on-air purposes, the other for production. With a more elaborate setup, such as our four-station operation in Albuquerque, we are using four on-air computers, two production computers, one scheduling computer and one billing computer—all networked together with LANtastic.

Pristine offers a variety of sound boards made by Antex. These are not your puny Sound Blaster models: these sound boards can take a beating and keep on playing. Compression is the key. A Z-1 board can compress a normal .WAV file 4:1. The top-of-the-line Dolby AC-2 board can compress 6:1. A song recorded in stereo at a 48.000 sampling rate with 6:1 compression translates to only 2MB per minute. One 3.5GB hard drive could hold more than 425 four-minute songs. This means instantaneous access (okay, say 12 millisecond access), CD quality and a hard drive whose mean time before failure is 10 years!

On-air computers need two sound boards if you want hard drive audio crossfade capability. Pristine's music scheduler is as sophisticated or as simple as you want. Not only do you have basic artist and song separation, you can control tempo, mood, shading, male/female/group rotation and lots more. If your music director can conceive of it, Pristine can handle it.

The music lists can be created as far as a month in advance with the commercial breaks added the day before airing. The playlists can be changed, modified or edited at a moment's notice, even when on the air. Pristine will also help you transfer CD libraries into the Pristine database, greatly reducing the amount of inputting required.

Spots, liners, etc.

How many spots, liners, sounders, bumpers or jingles can you have cued up ready to play? Two, four, or if you are a Jacor or Infinity powerhouse, eight? Every one of Guardian's stations with Pristine has up to 78 selections on line with instantaneous access. No cart machines to repair; no carts to erase, rethread, lose, misplace or store; zero wait time for re-cue; and CD quality first time, every time.

Technology is changing so rapidly and hard drive prices are dropping so dramatically, you can now replace the DAT machines and most of the CD players with additional large hard drives.

You must be wondering: "OK, Mark, are you telling me I do not need cart machines, turntables or DAT machines? And few, if any, CD players? And that the number of inputs becomes so small, I almost do not need an on-air console anymore?"

Not necessarily, but although you will still need a console, a small one such as a Mackie 1604 will work just fine, and you can use the savings for the better sound boards.

Talks to everyone

Our Albuquerque on-air console setup is as follows: two channels for the on-air microphone, four channels for the two computer sound boards, two channels for eight 18-stack CD players via a Rane SM-82, two channels for the satellite relay board (up to 16 inputs), two channels for a cassette machine to record on-air calls, two channels for the telephone feed and two empty channels.

Remember, the Mackie is a plug-in board (no soldering required) and can be chained with up to two more Mackie boards.

Pristine interfaces with all major traffic software. Guardian uses DARTS at six stations, Marketron at another, and two have old Radio Shack systems. Pristine offers a basic PCM Edit for production software. Five of Guardian's stations use PCM Edit and three have the Session 8 Digidesign. Session 8 is very sophisticated and has a substantial learning curve. PCM is a simple eight-channel production software that can be mastered in 10 minutes.

Frankly, PCM Edit is more than adequate for most applications. And here is the bottom line: $10,000 a studio and you are totally digital and fully automated. It doesn't get much better than this.

For information, contact Boyce Williams in California at 310-670-7500; fax: 310-670-0133; or circle ***Reader Service 155****.*

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World Radio History

USER REPORT

RDS Phantom Creates Happy Union

by Michael H. McDougald, President/CEO
McDougald Broadcasting Corp.
WRGA(AM)-WQTU(FM)

ROME, Ga. When radio broadcasting began in the early 1920s, creative minds conjured up things that would be neat to do over the air. One of the more interesting concepts was to stage a marriage in the broadcast studio.

Atlanta's WSB was credited with the first radio wedding. Not long after that, WRGA in Rome, Ga., teamed up with WJBY(AM) in Gadsden, Ala., each station supplying a participant. And so it was that a deep-voiced announcer and a traffic director vowed their commitment to each other in a flapper-era broadcast.

Today's radio leaves that sort of union to TV shows. However, a different kind of wedding recently took place at WRGA-WQTU in Rome. We married two distinct and viable formats using a computer.

Not that getting computerized is unique. But some of the things we did may be worth noting by broadcasters who find themselves in a similar situation. Perhaps we should set the stage as it was a year ago.

WRGA was a 5 kW full-time AM featuring a mix of news and country music that had made it successful for more than 15 years. WQTU-FM, a 6 kW full-time station, offered an adult contemporary format with strong but limited news.

The objective in combining the two stations was to cut daily operational costs while improving the sound and the bottom line. We also wanted to attract listeners instead of ignoring them as some computer-driven operations have done.

We looked at several digital systems, settling on **Register Data Systems'** Phantom.

Phantom is not the least expensive system, but dollar for dollar, we think we came out ahead. Randy Quick, our operations chief, came to the table with a better-than-average working knowledge of the system. And with RDS' toll-free number, it was fairly easy to iron out the few bugs we found.

We purchased a Phantom for WQTU, one for WRGA, one for production and a server unit for transferring files. For the newsroom, we chose a terminal, which connects to the AM Phantom. All of these units, though in different rooms, are networked together. After one year's experience, we are considering picking up an additional Phantom exclusively for the newsroom. We have encountered a modest amount of wait-time for news personnel who are loading news items and features on their consoles.

Our entire operation and the sound of both stations benefitted from retiring our tired cart machines and getting things on hard disk. Editing and storage is much easier. Traffic loves sending up the logs by floppy, and we have cut down on paper consumption.

So what about the marriage? We used Westwood One's Bright AC as the basis for our adult contemporary sound on the FM, but supplemented it with a strong live and local morning show (6 to 10) and a similar drive-time afternoon show (3 to 7). We feed just enough news coverage to the FM to round out the listening experience. Our engineers improved our processing and enhanced the sound so that it literally leaps out at the listener.

Almost a year later, we are enjoying an Arbitron that makes us the strongest AC in the region, beating the competition by nearly 8 share points. That, however, was only the engagement process. The real wedding came when we made dramatic changes on the AM.

First, we dropped the country music that was woven into our news format to make room for a 24-hour all-news, information and talk combination. This move considerably lowered our licensing fees and allowed us to put money back into our news product.

We knew our future was in providing the market with more news, especially local. News, however, is labor intensive, and we were outspending everybody in the market before we even started. How could we improve our news without spending more money? Or, perhaps, by spending less?

We arranged a three-way partnership between WRGA, the Phantom and the new Associated Press All News Radio.

In any given hour of the day, the computer takes five minutes from ABC Radio News, 15 minutes from CNN Headline News, five minutes from Georgia News Network, 25 minutes from AP All News Radio, and picks up the local newsroom feeds about four times each hour. Plus, the computer injects weather, sports, community calendars and commercials.

To say we get our money's worth out of the AM computer is an understatement. It provides us with 60 local news inserts, 46 sports pieces and 38 business segments during each 24-hour period, plus it switches between satellites and picks up the various news feeds on time.

We are pleased with how live and "with it" the station sounds. And the ratings prove this: we have an AM station audience equal to that of our FM, giving us two of the top three stations in this market.

We conduct both operations most efficiently with 12 full-time people, down from 16 to 18 before the changes.

We really scored by hiring additional news personnel to replace music personnel. We do not miss the music, and apparently neither do our listeners. With the enthusiasm over these two commanding sounds, we are selling more, and our operational costs have dropped dramatically.

We found tremendous community acceptance of our moves, and with fewer people to manage, we get much more efficiency out of the specialists that remain with us. And there is something special about knowing how good we sound. Under our new moniker The News Station, we happily carry the banner of leadership in the community.

Perhaps anybody's computer could do all this, but Register's Phantom seems to have been hand-crafted for us. And we appreciate Lowell, Russell, Brad and Janice, who are always as close as the phone.

For information, contact Brad Harrison in Georgia at 800-521-5222; fax: 912-987-7595; or circle ***Reader Service 85.***

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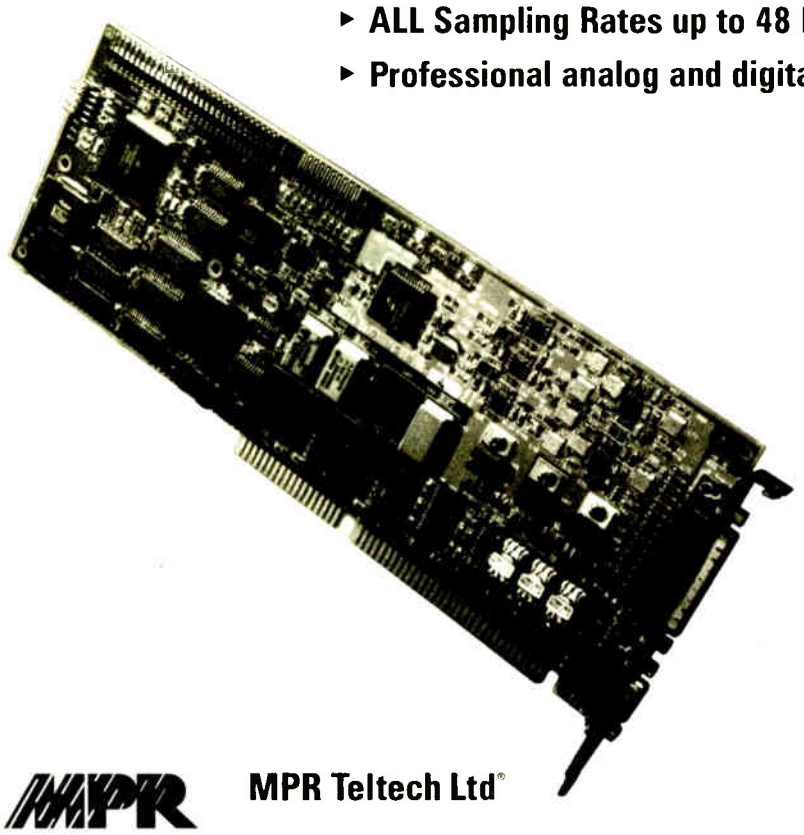

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World Radio History

USER REPORT

AXS Alleviates Traffic Nightmares

by Ted L. Turner
Operations Mgr., Programming Dir. and Chief Engineer
KWCO(AM)

CHICKASHA, Okla. After spending most of the first half of 1994 researching digital audio/automation systems, we finally settled on the **Electric Works** AXS. We were looking for a system that would automatically switch between live local studio audio from our FM station and a couple talk networks, and play spots scheduled by another vendor's traffic system, using both real-time and network cues.

Above the rest

What we got was a system that stands above any similar product in its price range, with capabilities far in excess of what I had expected. Not only does it have the best graphical interface display in the business, but the system is extremely easy to operate, even for our less computer-literate staff members.

Our system is configured as a main studio unit with two apt-X audio cards for playback and background recording, with the DMX-4 digital mixer and internal switcher option. We have an additional unit with one apt-X record/play audio card for production and editing using the AXS Digital Clip editor, which allows for quick digital razor jobs. All of these features are stored on two networked 486 SLC-66 platforms with 535MB drives, VGA monitors and trackballs. Because the system runs on two separate computers, we are able to keep a complete commercial inventory and operating system separate from the main studio unit.

AXS can handle up to 50 rotating spots per "cart," and it rotates liners and IDs flawlessly.

Traffic nightmares

AXS allows us to breeze through the traffic nightmares that are common here. For example: "We can't play the network A spot here because the network B spot needs to run live. So we can record just the spot on the end of one feed and play it immediately after recording. And by the way, we need to write in three 60-second spots this hour. In fact, you'll have to dub those spots onto the system now, while it is playing commercials on the air, because someone is hogging the production room."

AXS can handle up to 50 rotating spots per "cart," and it rotates liners and IDs flawlessly, with the ability to daypart liner and ID lists. Plus, we can edit the log on-screen up to the actual event time. We can play locally produced pre-recorded news and sports blocks while recording back-to-back network feeds for later insertion into the local blocks, with split-second timing between record and playback times. The system consistently hits a half-second window between cue tone and audio start on the ABC network. I can hardly get real-live jocks to do that.

Audio quality

As for audio quality, I cannot tell the difference between CDs and the AXS playing the same cuts. We are presently using the 32 kHz sampling rate, though it can go up to 44.1 kHz. Audio transfers between the production room and studio are accomplished in less than the actual audio cut time.

We can also archive cuts to floppy disk at the rate of roughly three 30-second mono cuts per 1.44MB floppy. If we wanted to store a single 60-second stereo spot floppy, the media cost per cut is pennies compared to carts or tape reels. Floppy storage varies depending on cut length and sampling rate.

The system performs basically every live-assist task I have come up with and features all of the user-programmable audio cut, jingle, liner or ID screens that we might need for instant access, as well as automatic live tag and copy displays. We have already made plans to install an AXS control room system for live-assist and CD playback in our FM studio. One thin piece of coax will then put us on-line with the existing system for unlimited cross-access to audio cuts.

Before you fall prey to the "central server" or "digital floppy cart machine" hype, check out AXS. Get the demo disk and take a look at a working system; then go out and compare.

For more information, contact Pete Charlton in Texas at 800-334-7823; fax: 817-624-9741; or circle ***Reader Service 103.***

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To learn more about exhibiting at World Media Expo, call (202) 775-4988.

World Radio History

TECHNOLOGY UPDATES

COLUMBINE JDS

Columbine JDS Offers Versatile Software

GOLDEN, Colo. The newly merged **Columbine JDS Systems Inc.** provides radio with a choice of flexible, versatile traffic automation solutions. Radio stations of every size, budget and operation style (single, combo and network) are part of the current worldwide client base.

A professional consulting staff assists in determining the current and future requirements of a station to assure both successful hardware and software installation. Technical support is available 24 hours a day, seven days a week.

Traffic software features include contract maintenance, availability, revenue projections, program logs, accounts receivable and sales analysis. Other available software applications include finance, media demographics, archiving, administration and program scheduling.

Columbine JDS automation products were designed by the pioneers of broadcasting software who have been providing technology and service excellence to radio operators for over 30 years.

For information, contact the company in Colorado at 303-237-4000; fax: 303-237-0085; or circle ***Reader Service 163.***

DIGITAL LINK

Digital Link's DAP Features High-quality Compression Algorithms

MIAMI DAP (Digital Audio Processor) from **Digital Link Inc.** is a PC-based MS-DOS software for broadcast applications and full automation of radio stations. Although DAP was introduced six years ago, the company continues to launch improved versions of the system.

Main features of DAP include high-quality audio compression algorithms (ADPCME, apt-X, Dolby AC-2 and MUSICAM), analog/digital in/out, fully automated or manual operation, HDD and magneto-optical storage, automatic crossfades and professional CD-changer control.

The features of ADAS (Advanced Digital Audio Processor), Digital Link's Windows-based system, exceed those of DAP; ADAS also offers powerful graphic design capabilities. Production and air screens were designed separately for networking.

Main on-air features include simultaneous record/play, 800 preset live-assist buttons, automated time/weather events on playlists, full drag and drop, up to eight stereo channels simultaneously, and external control devices, such as multiple CD players, patch panel and control keyboard.

Main production features are LED or needle VU meters, autostart/autostop recording, user-defined subcategories for audio, automatic cue search, time/weather/speech recording, block generator and user-defined crossfade parameters.

For information, contact Carlos Sarraff in Florida at 305-888-4883; fax: 305-888-0812; or circle ***Reader Service 212.***

RADIO SYSTEMS

Digital DDS Looks Like Traditional Cart Machine

BRIDGEPORT, N.J. **Radio Systems Inc.** offers DDS, a digital storage and delivery system. DDS is designed to meet the needs of today's broadcasters, whether their operation is automated, live-assist, multiple-studio LMA or all of the above.

DDS replaces cart decks with familiar-looking, sophisticated digital cart machines. Your talent can immediately air digitally stored music, spots and promos.

DDS does not look or work like digital systems that utilize terminals. The main DDS interface looks like, operates like and fits in the space of a traditional cart machine, so the learning curve is virtually non-existent and the resistance to this technology minimal. In addition, the Sound Slate lets the user put frequently used audio segments at his or her fingertips.

DDS performs in multiple studios simultaneously because it is built on a UNIX-style, multi-user, multitasking, real-time operating system. Unlike other systems that use DOS and rely on multiple CPUs and networks to grow, each DDS server can support many users, multiple studios and up to 16 simultaneous stereo audio channels, with no need to pass audio on a network.

Modular architecture and SCSI drives support up to 36GB of storage per CPU. Each DDS is user-configurable for linear MPEFG-II compressed audio at sample rates of 32 kHz, 44.1 kHz and 48 kHz, resulting in up to 620 hours of stereo.

DDS is also a universal control system and may be used to control CD jukeboxes, audio switchers and satellite decoders.

For information, contact Dan Braverman in New Jersey at 609-467-8000; fax: 609-467-3044; or circle ***Reader Service 128.***

DALET

Dalet Software Entirely Graphics-, Menu-driven

NEW YORK **Dalet Digital Media Systems** offers a wide range of digital audio products for radio. Among Dalet's many hard disk applications for radio are satellite automation, live-assist, music automation, news and multitrack editing. Dalet systems have been installed in over 300 radio stations around the world, from large public broadcasting stations to small private stations.

Dalet software is entirely graphics- and menu-driven. Operations are performed by drag-and-drop actions with the mouse, through fader starts or with remote control keyboards. Switching between live-assist and automation is as easy as pressing one button. DJs and production people can learn to operate the system in just a few hours.

Another advantage of the Windows-based system is the ability to run several applications simultaneously. While a standalone PC is inserting commercials into the satellite program, the user can record and edit audio on a separate audio channel. One on-air workstation can be used for two independent programs, one live and the other automated.

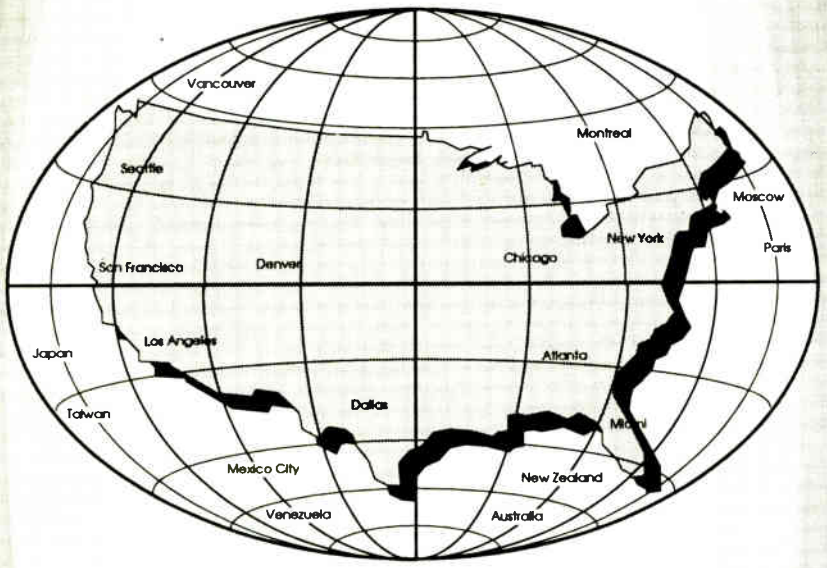
Dalet uses standard PC networks. Audio files and logs are stored on a central server and are immediately accessible to all workstations. The same audio file can be played from several workstations at the same time.

For information, contact Steve Kelley in New York at 212-370-0665; fax: 212-370-9610; or circle ***Reader Service 156.***

Live-assist screen of Dalet software.

WELCOME TO THE DIGITAL WORLD OF DIGILINK

- *Replace cart machines live On Air while adding walkaway CD, Satellite, or Tape automation*
- *On Air Base Price starts under $8,000*
- *8 Track Editor base price starts under $5,500*
- *Smallest systems start at 10 hours stereo audio storage (20 hours mono)*
- *Network more than 15 Digilink workstations*



With over 500 workstations sold worldwide in the last 18 months and more than 400 of those workstations sold in the U.S.A, it is little wonder that Digilink is the #1 choice for a digital audio hard disk workstation for professional radio broadcasting. Whether for On Air, Production, News, or Automation... Digilink does it ALL.

For more information about the #1 selling digital audio workstation for Radio, call or write...

303-224-2248

ARRAKIS

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Circle (172) On Reader Service Card

World Radio History

EUROSON AMERICA

Track Scan Eliminates Handling of CDs, Leaves Talent Free to Run Show

BRENTWOOD, N.Y. Track Scan by **Euroson America** was developed specifically for live radio applications. The desire was to completely eliminate the physical handling of CDs, while allowing manual creative segue control.

Track Scan is easy to use because there are no keyboards to operate and no commands to learn. The day's music is selected using a bar code reader pen. Music for a five-hour shift can be "scanned in" in just minutes. Bar codes can be generated with many popular scheduling programs, or with the system software itself. All that the operator need do is press the start button on the console to start the next song. The rest is automatic.

Music selections can be scanned into the system.

Reliable NSM 3101AC CD changers do the work, leaving the talent free to run the show. The preview function allows cuts to be previewed and re-cued automatically, and real-time RDS data output is standard. Track Scan provides absolute format control and eliminates lost, stolen or damaged CDs.

Tested on the air for over two-and-a-half years in two major-market stations, the system has proven to be virtually flawless. Engineers, air personalities and programming personnel agree that Track Scan is a convenient, reliable system that makes sense.

For information, contact Jon Taylor in New York at 516-273-4200; fax: 516-273-4240; or circle ***Reader Service 179***

McCURDY

McCart System Plays Files Directly from Computers

TORONTO The **McCurdy Radio** McCart digital audio storage system plays files directly from storage computers (audio servers) with millisecond load time. There are no limits on how many channels can play or load files simultaneously. Automatic mirroring between storage machines provides complete data security with fallback against LAN or other hardware failures. Inexpensive control PCs provide multiple operator positions with full edit/record/play capabilities.

The system is cost-effective in sizes ranging from one to hundreds of stereo or mono audio channels, allowing virtually unlimited future expansion or multiple station/network/news origination.

Storage options are available from 4.5 hours stereo (9 hours mono) to thousands of hours. Audio may be compressed (apt-X) or uncompressed. A fully documented automation protocol operates with McCurdy's M/2000 broadcast automation system, capable of originating one to over 200 audio channels from a single integrated system.

For information, contact the company in Canada at 800-267-8800; fax: 416-248-6155; or circle ***Reader Service 186.***

DATACOUNT

Revised DARTS Makes Doing Traffic More Efficient

OPELIKA, Ala. The new revision 7 of DARTS from **Datacount Inc.** takes advantage of a new programming language to maximize the benefits of computers with faster CPUs and expanded file sizes. DARTS 7 is compatible with 286-through-486 and Pentium microprocessors. The MS-DOS-based system is entirely menu-driven and provides on-screen help and online documentation.

DARTS 7 also has many features that make doing traffic easier and more efficient. DARTS handles up to 21 logs at one time. DARTS 7 allows traffic operators to do multistation combined traffic for up to eight stations, as well as customized history reporting, user-defined credit coding, inventory frontloading/scheduling, data exports to spreadsheets, and expanded on-screen customer statement history reporting.

Datacount goes even further to make automation interfacing more flexible by offering downloads as well as automatic log reconciliation to more major digital automation systems.

DARTS 7 is fully compatible with Novell and Lantastic networks and may be purchased in multistation and multiterminal versions. Network versions provide data security features. DARTS supports multiple printer control both for dot matrix and laser printers. Reports and logs may be spooled for later printing or on-screen viewing.

For information, contact Debbie Hamby at 334-749-5641; fax: 334-749-5666; or circle ***Reader Service 68.***

Still think it's the future? Hurry, it is now.

The AEQ MAR System

- Transmission control can be totally or partially automated (night broadcasting, weekends, etc.).
- Touch-screen interface with proper graphics environment. Virtual keys "on screen" invite you to operate the System in an intuitive and friendly way.

Specifications and requirements:

- Audio coding and decoding in conformity with ISO/MPEG Layer II algorithm.
- DTMF or Continuous Data Channel telecommand permitting control of single or grouped remote stations.
- Automatic News Recording System, DTMF activated.
- Requires DOS 5.0 or later version. Also operates under NOVELL Netware 3.11 or later.
- Drivers for Touch-screen, mouse or track-ball included.
- AES-EBU format digital inputs and outputs.
- Storage capacity from 5 to 80 hours of stereo audio on hard disk.
- Unlimited storage on optical rewriteable disks.

Features:

- Selectable working language.
- Access for authorized users by password as assigned by supervisor.
- Selectable file sort criteria.
- Automatic News Recording remote controlled by users or journalists, using a pre-assigned password.
- Incorporates automatic news edition, audio file management and multi-track edition.
- Manual and automatic play lists and multiple templates (up to 24 simultaneous immediate access keys).
- Printable transmitted advertisement log lists.
- Every workstation associated with the System is multitask, enabling the management of recording, play list and template edition, automatic transmission, etc. from any of them.
- Audio resources stored in a common server, enables real time access to any audio file from any workstation, even from several simultaneously.

AEQ

AEQ AMERICA: 2211 South 48th Street, Suite H - Tempe, AZ USA 85282
Phone: (1 602) 431 0334 - Fax: (1 602) 431 0497

Circle (215) On Reader Service Card

World Radio History

CBSI

CBSI Classic Traffic and Billing Software Suits Operation of Any Size

REEDSPORT, Ore. **CBSI/Custom Business Systems Inc.** offers software solutions for traffic, billing, account and sales analysis for single or multiple stations, consolidations and duopolies. Nearly 2,000 stations worldwide now use CBSI systems.

CBSI's Classic traffic and billing system provides versatility and flexibility for every size operation. Classic is available in DOS and Windows applications for IBM PC-compatible computers in single or multiterminal configurations. The Elite traffic and billing system is streamlined for the budget-minded operator.

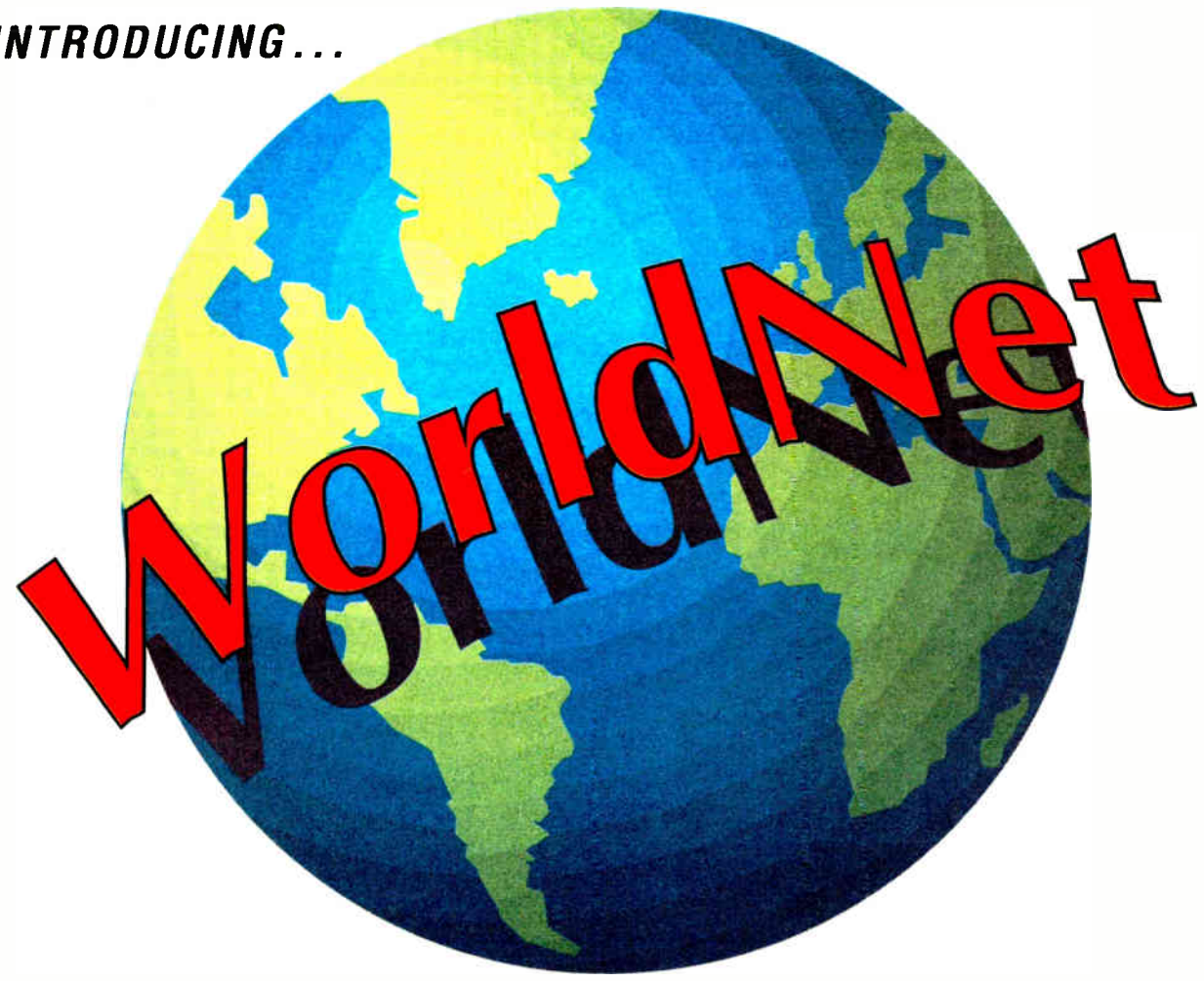
InterAcct is the company's complete, interactive accounting system, ideal for duopoly and consolidated operations, LMAs, multistations and single-station operations. InterAcct is easy to use and includes General Ledger, Accounts Payable and a powerful report generator. It interacts with CBSI's Accounts Receivable and Payroll systems, and third-party spreadsheet software. Other CBSI software solutions include CustomRemote, CustomReports, PowerPlus, CustomNet, CustomMusic and Sales Analyzer.

Digital Universe, the advanced digital audio storage and management system, is under development at CBSI. Digital Universe is easy to operate and is built around a low-cost computer platform using MicroSoft Windows NT.

Operate one or more radio stations from a single control point, perform multiple tasks simultaneously and access stored audio from any, or all, studios instantly. Digital Universe also handles compressed and uncompressed audio.

For information, contact Bob Lundstrom in Oregon at 800-547-3930; fax: 503-271-5721; or circle ***Reader Service 131.***

INTRODUCING...



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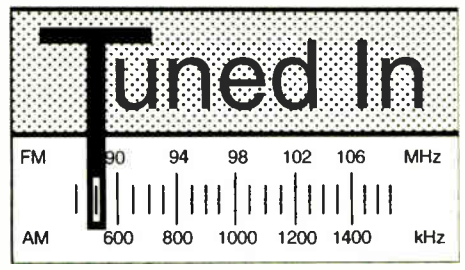

People, Promotions & Appointments

Nigel P. Fountaine was appointed to the position of sales manager, Pacific Region, for **Mobile Satellite Products**. Fountaine will operate from Lomita, Calif., serving the West Coast, Hawaii, Asia and the Pacific Rim.

Constance E. English, formerly of Grand Pro Audio, joined **Neotek Corp.** as director of sales and marketing. English will oversee all sales and marketing activities for the company's domestic and international markets.

Sabine appointed **Frank Bougher** to its sales and marketing department. Bougher comes to Sabine from Lipham Music Co., where he worked as a retail sales manager. Bougher is responsible for generating sales, offering technical support and helping set company policies and marketing strategies.

Premiere Radio Networks announced an exclusive three-year consulting agreement with **Ben Hoberman**, former president of ABC Radio, to advise Premiere on its entry into short- and long-form talk radio programming. Under the terms of the agreement, Hoberman will also serve as a member of Premiere's board of directors.

Continental Electronics Corp. added **Gale Gilbreath** to its domestic broadcast sales team. Gilbreath brings 34 years of experience in radio broadcast engineering to his new position. Based in New York, he can be reached at 914-687-9101.

The Arbitron Co. announced the appointment of **Dr. Thomas C.N. Evans** as vice president of research communications and market development. Evans' first task will be to coordinate the Electronic Media Ratings Council (EMRC) accreditation process for Arbitron's personal computer software.

Cal Vandegrift rejoined **Harris Allied** as a sales representative in the Pacific Northwest. Based in Seattle, Cal will represent Harris in Washington, Oregon, Idaho and Alaska. Broadcasters may contact Cal at 800-566-0773.

Crown International announced the appointment of **Bruce Peterson** as director of marketing for its audio division. Peterson was most recently head of marketing at Heath Zenith, a consumer division of Zenith Computer Group.

John I. Klusendorf joined **Lawrence Behr Associates Inc.** as shielding program manager. Klusendorf's background is in electronics design, service and program management. He will serve as principal interface with telecommunications clients requiring shielded sites and facilities.

continued on next page ▶

World Radio History

Belden Wire & Cable Co. announced the appointment of **Stephen H. Lampen** to the newly created position of technology development manager. Lampen spent the last three years in field sales for the company.

Varian Associates Inc. named **Frank R. Blaha** business development manager for its microwave equipment products (MEP) business unit. Blaha will be responsible for MEP's worldwide sales, marketing and customer support.

Company News

Varian Associates Inc. and Leonard Green & Partners, L.P.(LGP), reached an agreement under which Varian will sell its Electron Devices business to LGP on behalf of its equity fund, Green Equity Investors II, L.P. for approximately $200 million in cash, plus the assumption of certain liabilities.

Dynair Electronics Inc., manufacturer of switching and distribution systems and fiber optic transmission products, was acquired by Osicom Technologies Inc. of Santa Monica, Calif., for an undisclosed sum. Dynair is now a subsidiary of Osicom.

Ashly Audio Inc. of Rochester, N.Y., announced its new Internet service. The service offers color images and general product information, as well as a company history. Customers can request additional information and leave comments on-line.

Basic Measuring Instruments (BMI) of Santa Clara, Calif., purchased **Electrotek Concepts Inc.** of Mountain View, Calif. Under the agreement, the two companies will become subsidiaries of World Power Technologies and operate as separate firms.

Differential Corrections Inc. (DCI) of Cupertino, Calif., signed a public partnership agreement with the Minnesota Department of Transportation (Mn/DOT) to provide radio broadcast data system traffic message channel (RBDS-TMC) broadcast services for the federally-funded Mn/DOT Guidestar/Trilogy Operational Test. The objective of the project is to test innovative means of providing real-time traffic and travel information to drivers en route.

FSR Inc., manufacturer of electronic switching and control products, appointed the Burcaw Co. to cover the territory of Michigan. The Burcaw Co. can be reached at 810-616-9800.

Control Concepts Corp., a subsidiary of Liebert Corp. and a manufacturer of power protection products, was awarded ISO 9001 certification.

New Frontier Electronics, in developing a national representative network, appointed Ron Tunks Sales Inc. sales representative for the southeastern United States and Puerto Rico. In addition, Audio Associates of Columbia, Md., was appointed representative in Pennsylvania, southern New Jersey, Delaware, the District of Columbia, Maryland and Virginia. **Mya L. Mitchell** was appointed director of administration.

Marti Electronics of Cleburne, Texas, was named a member of the 1995 Tarrant Export 40, the group of companies achieving the highest growth in export sales of all Fort Worth, Texas, area businesses. Marti was chosen for charting an increase of 17.61 percent in export sales from 1993 to 1994.

DGS Pro-Audio Inc. appointed Yale Electronics of Hollywood, Calif., as its southern California distributor.

Trompeter Electronics, supplier of RF interconnect products, was awarded ISO 9001 certification.

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The Reel-To-Reel Replacement™

VoxPro™ is the first digital sound editing system specifically designed to replace reel-to-reel tape recorders used on the air.

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traffic and billing systems

DATACOUNT

The DARTS traffic system can help you make a better connection to your automation system . . .

DARTS is a traffic system that handles all facets of traffic, billing, management reporting and collections. It's also a system that supports digital audio interfacing like no other traffic system.

Datacount not only provides seamless downloads to automation systems but is also one of the only traffic systems to provide automatic log reconciliation from automation play logs back to the DARTS system.

Automatic Log Reconciliation (ALR) can provide tremendous time savings by eliminating the manual verification of your automation log. You could save hours and spot dollars with the accuracy of the DARTS ALR program.

How will DARTS and the automation interface benefit your station?

DARTS can easily provide a complete daily log that has been edited and finalized. The log can then be "downloaded" to the automation unit via diskette or over a LAN.

The benefit of the DARTS automation interface is twofold. It provides the ability to transfer error free data from the traffic program log to the automation unit and to transfer it in less time. Time once spent manually entering logs into the automation unit can be significantly reduced. An interface also reduces the human error factor and can eliminate missed or misplaced spots.

The DARTS system also features . . .

- Flexible traffic scheduler
- Inventory Front Loading
- Data Exports and Imports
- Multi-Station version
- Sports Packages
- Management Reporting
- Integrated Billing Module
- Co-op Billing and Copy
- Multi-User version
- Entry Level version
- Satellite Format Compatible
- Music Scheduler
- Affordable quality Support and Enhancements

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Datacount Accounts Receivable and Traffic System

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World Radio History

RadioWorld

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"Broadcast Equipment Exchange" accepts no responsibility for the condition of the equipment listed or for the specifics of transactions made between buyers and sellers.

RADIO RESOURCES

- Over the last 2 years we have purchased $1 million of quality pre-owned equipment from broadcasters. Fax or call us with a list of your excess equipment and we will let you know how we can increase your cash flow.
- Looking to save dollars by purchasing a piece of quality pre-owned equipment? We have a variety of items available from turntables to transmitters. A partial list of available equipment can be obtained via fax by calling toll free 1 800 832 2329 ext 737, or call us with your specific requirements.
- NRSC Splatter Measurements are coming again! Call early to reserve your rental of the Tektronix Spectrum Analyzer. We also have Potomac field strength meters (AM & FM), and a Delta impedance bridge plus receiver/generator for rent.
- For competitive prices on new equipment items just give us a call for a price quote.

Call Steve or Chuck
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AMPLIFIERS

Want To Sell

Ramsa WP 9055 50 W stereo audio amp, needs work on 1 chnl, $50. A McCarthy, 707-446-0200.

RCA/Belar stereo RF amp, $395. Jose, 809-895-2725.

QEI amplifiers, exciters and stereo generators. All are reconditioned and are tuned and tested on your frequency. 6 month warranty is included. If you want quality used equipment, call or fax 609-232-1625 and ask for Bob Brown.

Want To Buy

Tube HiFi/Commercial amplifiers, preamplifiers, compressors, speakers etc. Altec, JBL, McIntosh, Marantz, Western Electric, Pultec, Ampex, etc. 405-737-3312 FAX: 405-737-3355.

ANTENNAS/ TOWERS/CABLES

Want To Sell

Bogen MO-100A tube 100 W booster amp, 2 ea 8417 (666) pwr tubes, 1 ea 7247 (12AX7) driver, $100+shpg. R Evans, 704-524-7983.

3" HELIAX STANDARD COAXIAL CABLE
50-Ohm, unused, cut to length. Priced below market. Shipped instantly.
Call Basic Wire & Cable
(NANCY) 800-227-4292
FAX: 312-539-3500

6-bay medium pwr CP on or tunable to 100.1 MHz. D Michaels, 916-938-2833.

50 plus sections of 3 inch rigid transmission line, excel cond, will sell any quantity. 806-372-5130.

Moseley ICU-1D 940-960 MHz isocoupler, $175. Paul, 912-632-1000.

Phelps-Dodge 2-bay antenna, hor/vert (CFM-LP2), 97.7 w/brackets, BO. Vern, 916-533-1340.

Jampro JLLP-2 antenna, less than 5 years old, with heaters, tuned to 94.5, can be retuned in field with factory instructions, $2200. 505-538-3396.

Jampro JLCP-7 7-bay circular polarized, tuned to 106.3 MHz, BO. R Meyers, Sound Masters Rec, 4700 SW 75 Ave, Miami FL 33155. 305-264-5963.

Cablewave A 10R 50507 1 5/8 in coax foam filled, 6-approx 275' rolls w/connectors, $1100/per roll. S Ross, Quinn Bdctg, 733 N Green St, Brownsburg IN 46112. 317-852-9119.

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Photoelectric controls that conform to FAA requirements for airway obstruction lighting. A wide variety of models also available on a custom basis.
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PRECISION MULTIPLE CONTROLS, INC.
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Rohn 45 G tower sections, $125/BO. Rick, KBZO, Lubbock TX, 806-763-6051.

Want To Buy

3 or more bay class A size antenna on 105.9 wanted to trade for cash or huge 4-bay Phelps-Dodge CFM-HP-4, end fed with 3 1/8" interbay line, prefer heaters, low wind load. K Tuckerman, WMMC, 217-826-8017.

Scala 5 or 10 element antenna on or near 98.9 FM or broadbanded log periodoic, McMartin or similar FM composite receiver. J Hart, KDAB, POB 949, Prairie Grove AR 72753. 501-846-0949.

AUDIO PRODUCTION

Want To Sell

Avcom Inc EBS-1000, BO; Belar FM & AM FM amps (2), BO; RF mod GTN 88S Gates radio component, BO; Yesco Music Syst 8-track model 820, BO. WYKS-FM, 904-331-2200.

Roland SRV 2000, $525; dbx 503 expander/comp, $290; Orban 414-A stereo compressor, $425/BO; UA 565-filter, BO. T Coffman, 619-571-5031.

Symetrix 528 voice proc, brand new in box, $425 J Johnson, KHTR, 509-332-6551.

Yamaha 2031 graphic EQ, $175; Otari MX-5050BII 2-trk, $1100. Tascam 22-4 4-trk, $450; Aphex M-120 dist amp, $100; Mod Assoc dist amp, $100; Micro-trak 6411 phono preamp, $50; Sennheiser MD-421, $200. 510-895-6358.

Adams/Smith 605 resolver/synch to interface with videotape recorder & audio tape recorders utilizing SMPTE. $300. G Zelinger, 213-953-5310.

Digidesign ProTools 2.51, 4-chnl workstation, cinl disk I/O card, 4-chnl audio interface, cable & software for both ProTools & Sound Designer, $4500. Paul, Pissaurus Prod, 402-341-9153.

Good used studio tape 1/2" $15, 1" $30, 2" $55. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

Fostex 3180 24 msec pre-delay, will trade for old UREI "Cooper Time Cube"; AKG R-25 remote control with connector & 33' cable, will trade for Teac RC-170 or RC-90 remote control. J Roper, Imperial Sound, 383 N Studio St, Terre Haute IN 47803-9773. 812-877-2663.

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ADC 1/4" patchbays and cords, NEW, UNDER HALF PRICE, ADC TT patchbays, $129 up, NEW cords, $9.95. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

Bulk eraser, $49; Stewart 4 ch D-box, $95; Cue command decoder, $125; NEW Tascam midilizer MTS1000, $450; Infonics 7" reel copier 1-3 copies, 2@ $125 ea; Furman elec crossovers, $95; Peavey M2600 power amp, $375; Crest FA800 PWR AMP, $475. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

Want To Buy

MXR-Neve-API EQs, mic-pres, delay, etc. T Coffman, 619-571-5031.

Ampex tube mixers, plug-in mic preamp modules for PR10's, Altec or other tube compressors, Mackie mixers. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

AUTOMATION EQUIPMENT

Want To Sell

BE Cntrl 16 compl, or will sell components separately, incl 5 Revox R-Rs, 3 16m Go-Carts, 2 triple-deck cart machines, BO. B Stanley, 616-925-9300.

Lowest Cost SATELLITE automation. The Auto-Mate Version 2.0 is here! Use for satellite or music on hard drive. Software works with your IBM(tm) compatible computer and SoundBlaster(tm) audio card. Save thousands of $$$! Call for more information: (503)-769-2886.

Harris 7002 Instacart, 5 ITC 750's, 3 single plays, floppy disc backup, incl sample AC music library on 90+ reels, no monthly fees, BO. J David, KMPC/KSTG, POB 907, Skiston MI 63801. 314-471-1520.

Harris 9000 (5) ITC 750, Carousels, dual floppy drives, single cart deck, plus more, currently on-air, available 7/95, $2500. Tom, 715-234-9059.

Schafer 7000 with Audiofiles, lvl 1A software, DAT backup, extras, good condition, $3500. Jim, 814-255-4186.

Harris 9002 Instacart, 5 ITC 750s, 2 sngl plys, floppy disk back-up, incl compl AC music library on 90+ reels, no monthly fees, BO. J David, KMPL, POB 907, Sikeston MO 63801. 314-471-1520.

ITC 750 reel plybk only, as is, 5 decks avail, $10+shpg. A McCarthy, 707-446-0200.

Sentry FS-12B compl automation system, good condition, including 2-stereo 48 Instacart 4 stereo Go-Carts, 2-24s, 1-48 & 1-42 computer, interfaces, manuals & cables, BO; IGM-EC compl automation system, good condition, including 2 stereo Instacart 48s & 1 stereo Go-Cart 24, computer, interfaces, manuals & cables, BO. C Mandel, 619-352-2277.

SMC Carousels (4), mono, BO. GM, KWED-AM, 210-379-2234.

CART MACHINES

Want To Sell

BE 5400C PB stereos (2), excellent condition, $2500/ea. S Cooper, WRIC-FM, POB 838, Richmond VA 24641. 703-964-4066.

Scully L50313-9 not working, probably parts only, record/play with roller cabinet, BO; ITC triple deck mono cart machine, heads OK, motor weak, $300. R Wittick, 916-283-1370.

SpotMaster stereo plyr, BO; Tapecaster 700RP, BO; ITC stereo rcdr, BO; ITC mono rcdr, BO; ITC ESL-4 plyr, BO; ITC Encore RP, BO; ITC SP, BO. WYKS-FM, 904-331-2200.

Roland DEP-5 (5), all work fine, $225/ea-$1000/all. S Russell, 616-782-9258.

Tapecaster cart machines (2), 1 R/P & 1 ply only, both have new motors with about 25 hours use, BO. D Kirby, Rhapsody Productions, POB 1543, Palm Springs CA 92263-1543. 619-320-1782.

Tapecaster X-701 mono PB, excellent condition, very clean, guaranteed with manual, $295. K Lamson, 510-447-7405.

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BE 5400C 3 stack stereo PB cart machine, 3 tones, excellent condition, low hrs, $1295; Fidelipac CTR10 R&P stereo, 3 tones, $900. Jose, 809-895-2725.

BE 5504B 5 deck stereo PB w/cue tones, good condition, duro-heads, no wear, meets factory specs, $950. G Garcia, KPEZ Radio, 811 Barton Springs #967, Austin TX 78704. 512-474-9233.

BE 5400C 3 stack stereo PB, 3 tones, excellent condition, low hrs, $1295; Fidelipac CTR10 R/P stereo, 3 tones, $900. Jose, 809-895-2725.

BE 5300C tripledeck AB, clean, $450; Harris PB, mono, works, $185. Paul, 912-632-1000.

BE 3000A mono PB/delay recorder, rack mount, new, $500; Dynamax ESD 10 eraser splice finder, good condition, $400; BE 3000A stereo R/P with tones, very good condition, $850; BE 3000 mono R/P with tones, good condition, $650; B.E. 3000 2 ea mono PB with ones, $450/ea. D Kelly, 402-372-5423.

ITC Delta mono cart plyrs (3), excellent condition, $450/ea. G Zelinger, 213-953-5310.

Ramko Primus stereo R/PB w/manuals, excellent condition, almost new, $1200. R Trumbo, New Life Bdct/KNLF, POB 117, Quincy CA 95971-0117. 800-397-4146.

Audicord mono cart machine, excellent condition, $650, 806-372-5130.

BE 5300C tripledeck, stereo, PB, mint less than 50 hrs, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

BE 3 deck, $275. G Perry, 915-550-0558.

ITC System 99B stereo record/play: tones, ELSA, auto head: $1200/firm. C Scott, WKYU-FM, (502) 745-5489.

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Want To Buy

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ITC, BE, Fidelipac cart machines: single, triple, mono, stereo, play & record/play. Call M O'Drobinak @ 619-758-0888.

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World Radio History

CD PLAYERS

Want To Sell

Sony CDK-006 juke boxes (3), 2 totally refurbed to factory specs, 3rd in svc & wkg properly, $1395/ea for refurbed units, $995 for other. Jim, 717-692-2193.

Otari ARS 1000 open reel machine, Best Offer. C Mandel, 619-352-2277.

Otari 7308 8-trk 1" rcdr, very lw hrs, heads excellent, 1513/30 ips, w/remote, $1500; Studer/Revox PR99 2-track tape deck, 7 1/2 & 15 ips, lw hrs, excellent cond, $1400; Ampex 440 tape decks, 2-track, $250-$500; Ampex 300 & 440 exports, motors & parts, $100-$200; Teac A-2000 tape deck, 1/4-trk record & play, 7 1/2 & 3 3/4 ips, excellent cond, $200. L Wagner, 407-299-1299.

Pioneer 300 deck jukeboxes (3), $3500/ea; 18 deck Pioneer CD jukebox, $450; 60 deck Sony jukeboxes (3), $1000/ea; Digicart early model, $2500; 16 source 360 System router w/stereo expander, $650. R Lockhart, KOGA-AM/FM, Box 509, Ogallala NE 69153. 308-284-3633.

Studer B-67 recorder, 7.5, 15, 30 ips, 1/4" 2-track, compl w/rem cntrl, owners manual & export cover, fully serviced, excel cond gd heads, $1600. R Streicher, 818-359-8012.

Want To Buy

Marantz 610 CD (red/orange book) recorder, perfect working order, manuals. Sound Dynamics, Box 278, Dennisport MA 02639-0278.

COMPUTERS

Want To Sell

Alesis MMT-8 & Datadisk, excel cond, MIDI sequencer & universal MIDI data storage to standard DSDD floppy disks, $320. E Scholl, TGT Rcdg, 829 Seymour, Lansing MI 48906. 517-371-2226.

CONSOLES

Want To Sell

Autogram AC-8 stereo, excellent condition, $2000. 510-895-6358.

Russco 50G mono, $300; Ramko DC5AR, like new, $200. J Parsons, 904-532-0192.

Gates Yard board, recently gone thru with new switches & condensers, has had proof, also complete set of new connectors to connect all inputs to board, Best Offer. D Kirby, Rhapsody Productions, POB 1543, Palm Springs CA 92263-1543. 619-320-1782.

Shure M267 4-chnl mic mixer, XLR inputs, good condition, $275. B Taylor, 617-266-4220.

Soundtrax 16-channel prod console, $950/Best Offer. B Pitts, WJBY, POB 930, Gadsen AL 35950. 205-442-1222.

Tascam 4-chnl mixer, recorder model ministudio, Porta-One, excellent condition, guaranteed with manual, $295. K Lamson, 510-447-7405.

BE 5M250 5-input stereo broadcast console with audition buss, excel cond, $450; Yamaha M512 12-input, 4-output production mixing console, excel cond, $250; Stevenson-Interface 8 mic/line input 4 output buss port mixer in Zero case, $250. G Zelinger, 213-953-5310.

Collins IC 6 audio console, BO. C Mandel, 619-352-2277.

McMartin stereo console, 8 pots, $895. Jose, 809-895-2725.

Opamp Labs 2008-RS board, 20 input, 8 buss + stereo out, 2 16x2 remix/cue sections, $1200. L Wagner, 407-299-1299.

Ramko DC 8-MS 8 pot solid-state stereo on-air console, 18 inputs, fully functional, gd cond w/book, $900. J Cunningham, KEOR/KHKC, Rt 2 Box 113B, Stonewall OK 74871. 405-265-4496.

Snake 16 phantom-pwrd inputs w/ext ps, 250' Belden 19-pr cable/mil connectors/ss strain reliefs, 10' Neumann XLR snake mates w/box or Belden snake, $750. R Katz, FAX 818-505-0149.

Spotmaster, clean solid-state mono board, 16x2. looks & works great, lightly used, $500+shpg. G Kirby, Gray Fox Video Prod, 13613 US 36, Marysville OH 43040. 614-261-8871.

Ramsa 820 20x8x16 with meter bridge, $1795; Quantum 23x16x24 as used by LA Philharmonic, $3750. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

Ampro Microtouch 5-chnl stereo, gd cond, $500; Russco 505 5-chnl mono, gd cond, $400. M Persons, KLKS Radio, 402 Buffalo Hills Ln, Brainerd MN 56401.

Soundcraft 3200 32x24x2 with patch bay, 5 yrs old, excellent condition, $56,000/BO. Jeff, 312-559-1845.

Sparta AS-30B 5 channel stereo, $250. G Perry, 915-550-0558.

Want To Buy

API, Neve whole or parts, working or not. T Coffman, 619-571-5031.

Howe 7500 manual. G Jacques, KBZR-FM, 7434 E Stetson Dr #265, Phoenix AZ 85251. 602-423-9255.

Manual &/or parts for Micro-Trak 6509 5-chnl stereo Ditty Desk console. Steve, 214-491-2804.

DISCO-PRO SOUND EQUIPMENT

Want To Sell

Fostex 3180 reverb unit, will trade for UREI, Cooper Time Cube model #920-16. E O'Brien, Imperial Sound, 383 N Studio St, Terre Haute IN 47803-9773. 812-877-2663.

JBL 4410A(L) 3-way studio monitor speaker, used approximately 8 hrs, mint with warranty card, $298+shpg. R Evans, 704-524-7983.

EV MTS speakers (1 PR), pulse 18" subs (1 PR), QSC 1700 amp, QSC USA 850 amp, EV 7300 amp, Crown D150A-2 amp, Technics SLP6340 CD players (2), Mackie 1604 mixer, DOD 3-way crossover, EV EX 18 crossover, Yamaha EQ, dbx 160 XT limiters (2), Furman FL plus pwr conds (3), Optimus cass deck, Shure SM 58 mic, 2 Stagecraft PAR 56 light trees, dimmers & 8-chnl lite desk, over 1000' A/C assorted audio cabling, all equip road racked & only 1 yo, $13,900/BO. 614-591-6874.

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Kenwood D-5 pair of carrying handles, new in box, BO. J Roper, Imperial Sound, 383 N Studio St, Terre Haute IN 47803-9773. 812-877-2663.

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LIMITERS

Want To Sell

Orban 424A gated compressor/limiter/de-esser, $325. J Mueller, Family Stations Inc, 290 Hegenberger Rd, Oakland CA 94621. 510-568-6200 x240.

Texar Audio Prisms (2) w/Optimod card, will trade for S/A 7300 Sedat 4 card, BO. D Solinske, WWRM, 877 Exec Ctr Dr W, St Petersburg FL 33702. 813-576-1073.

Aphex II pro broadcast aural exciter, works OK, $400; BBE 202-R audio processor, works OK, $200; SAE Mark 7 stereo octave EQ, good condition, $100. G Barnett, 619-328-1104.

CRL PMC 300A, $500; CRL SMP 400A, $500; CRL SMP 400B, $500; CRL NRSC pre-emphasis/filter, $300; CRL NRSC de-emphasis/filters (2), $300/ea. GM, KWED-AM, 210-379-2234.

Want To Buy

Gates, Inovonics, Fairchild, RCA, UREI, Teletronics, all types, solid state & tube. T Coffman, 619-571-5031.

Fairchild 670 or 660 tube compressor/limiter, Teletronics LA-2A tube compressor/limiter or UREI LA-3A solid state compressor/limiter, call after 3PM CST. 214-271-7625.

MICROPHONES

Want To Sell

AKG D-140 dynamic cardioid mics, $225/pair. R Streicher, 818-359-8012.

AKG C414 TL II, mint cond, orig box, case & manuals, $1200. Mark S, 605-374-3424.

Electro-Voice 635A dynamic, omnidirectional mic with stand adapter, $95. B Taylor, 617-266-4220.

Shure 330 uni-directional ribbon, very clean, in red Shure bag, $75. G Hultman, Hultman Media Svcs, 300 Limpy Creek Rd, Grants Pass OR 97527. 503-474-6466.

Shure 561 mic on Shure 540A desk stands, many avail, fair to good condition. $10-$50/ea. Al, 712-362-4119.

AKG 190E, excel, BO; EV 664 Judge lto mic, excel, BO. Steve. 214-491-2804.

E/V RE-20 recond & new paint, $300. M Miller, WSDM Radio, POB 650, Brazil IN 47834. 812-446-2507.

Telefunken/Schoeps CM61 tube mic, extremely rare & compl, uses std 6AU6 plug-in tube, original ps, new cable, mint condition, BO/trade for C24. R Katz, FAX 818-505-0149.

NEW EQUIPMENT CHEAP! OR ALMOST FREE! Sennheiser HD44011 headphones; Electro Voice microphone; Shure M268 mixer series. Call Kim at 1-800-422-9997.

Sony ECM377 large dia. cond mic, $495; RCA 77DX with new ribbon, Crown GLM200 lavalier like new, $125. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

Want To Buy

AKG 451-EB, AKG 460-EB, EV RE-27, more. T Coffman, 619-571-5031.

Inexpensive hand-held wireless mic w/receiver. Al, 712-362-4119.

Old mics, call plates, on-air lights. J Phillips, 414 Washington Ave, Defiance OH 43512. 419-782-8591.

AKG C24 mic. R Katz, FAX 818-505-0149.

77-DX's, 44-BX's, WE KU-3A's On-Air lights, recording lights & audition lights. Top price paid. Fast response. Bill Bryant Mgmt, 2601 Hillsboro Rd, G12, Nashville TN 37212. 615-269-6131, FAX: 615-292-3434.

RCA 77DXs/44BXs ribbon, chrome/TV grey, good cond, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

RCA ribbons, AKG 451's, Neumann KM84's, U87's AKG 414's. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

MISCELLANEOUS

Want To Sell

Radio bdct booth w/A/C on 16' tandem tlr, $1795. Randy, 816-885-6141.

IBM System 36 mainframes (2), BO; Telrad office phone system with 30+ phones, BO; RCA 10-bay FM antenna (95.7) with radomes, BO K Alford, 206-285-2295.

Onan/Cummins 30 kW gensets (2) diesel, one 800 hrs, $7500; one 1500 hrs, $9500; day tank w/auto oil level cntrl, $16,000/all. R Wittick, 916-283-1370.

Singamo G4 .00062/30kV mica capacitor for transmitter or ATU, $45+shpg; General Radio Type 5 3 ganged Variac, 5 amp, 0-135VAC, $35+shpg. R Evans, 704-524-7983.

Spring cleaning has arrived, 3 page list of equipment including R-Rs, audio proc & tape NR for sale, call fax or e-mail for list & method of reply. C Scherer, CBRE, WMMS/WHK/WMJI, 216-781-9667, 216-771-1007 FAX, chriss@wmms.com.

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A-Line rotating cart racks (2), very good cond, one holds 800 carts, one 400. Barry, KDES Radio, 619-325-1211.

Andrews HJ7-50A 1 5/8" coaxial heliax, 100', new on shipping reel with connectors & hanging accessories, $1500. S Hill, KZZE-FM, 1016 Court St, Medford OR 97501. 503-857-1063.

Rotron Blowers for Elcom, Harris, CCA, CSI, McMartin, rebuilt & new. Goodrich Enterprises Inc. 11435 Manderson St Omaha, NE 68164 402 493 1886 FAX 402 493 6821

Aristocart A W 20 110 cart racks, holds 20 carts ea, $550. D Kelly, 402-372-5423.

QEI Cat Link w/composite & 3 audio lines, CSU. works great, $7000. A McCarthy, 707-446-0200.

Road cases, 24"x27"x15" suitcase style, double handles, hvy duty, military spec, $100/ea. L Wagner, 407-299-1299.

Want To Buy

Altec 9067A or 9069A hi-lo pass filter or equiv 600-ohm type adj hi-lo pass filter set. D Dintenfass, 206-784-4803.

Collins 831 D2, 5kV 1A secondary 220 V 10 plate xformer. A McCarthy, 707-446-0200

Jazz record collections, 10" LP/12" LP be-bop, swing, dixie. highest prices paid. B Rose, Program Recordings. 228 East 10th, NYNY 10003. 212-674-3060.

MONITORS

Want To Sell

Belar AMM-2 mod monitor w/remote meter panel, works fine, $1000. R Wittick, 916-283-1370.

TFT 730-A SCA monitor, $100; 7610/7630 remote, $200. D Gilliam, 1435 S Dobson, Mesa AZ 85202. 602-969-3413.

Collins 54-2 AM freq monitor, digital readout, frequency agile with manual, $75/Best Offer. G Barnett, 619-328-1104.

RCA/Belar SCA FM monitor, $550; RCA/Belar FMM-15 stereo monitor, $550. Jose, 809-895-2725.

TFT 724/734 stereo mod monitor, needs work, $200. Paul, 912-632-1000.

Motorola AM stereo monitor, on your frequency, $3500. 806-372-5130.

RECEIVERS & TRANSCEIVERS

Want To Sell

Motorola P100 VHF 2-chnl 5 W, 5 radios, 7 batts, six pack charger parts, radio package only, 4 speaker mics, $750. A McCarthy, 707-446-0200.

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Want To Sell

MCI JH110A stereo rcdrs (2) in variable profile cabinets, excellent condition, $800/ea. G Zelinger, 213-953-5310.

Ampex 351 decks with Inovonics electronics, mono, BO; Ampex 351 deck with original tube electronics, mono, BO. GM, KWED-AM, 210-379-2234.

Ampex 600 1/2-trk 7.5 ips 7" reel, gd cond, will trade for Magnecord 748 or 1048 10.5" reel in gd cond, $100+shpg. E Lightman, WEDL Radio, 550 Merchant St, Ambridge PA 15003-2463. 412-266-2802.

Ampex 440 1/2" 4-trks (2) w/stands, BO; Ampex 440 stereos (2) in stands, BO; Ampex 400 monos (2) in stands, BO; Ampex ATR 800 for parts w/stand, BO; Ampex 440 exports (3), BO; Ampex 440 wood stands (3), BO. K Alford, 206-285-2295.

MCI JH-110B stereo in roll-around console, BO; Otari MX-5050 MKIII 8-track, BO; Otari MX-70-16 with compl remote. BO; Scully 280 stereo in roll-around, BO. B Hildebrand, 314-427-2727.

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Sony TC-630 early 70s stereo. vgc, sound wkg order, $175+shpg. M Tam, Multi Path Prod, 7110 Cody St, Shawnee KS 66203-4332. 913-631-9638.

Tascam 32 2-chnl rcdrs/repros (2). vgc, $1000/ea/BO. R Wittick, 916-283-1370.

Tascam DA-30 DAT recorder, like new cond, less than 100 hrs, never rack mounted, BO. T Alexander, WDOK-WRMR, 1 Radio Ln, Cleveland OH 44114. 216-696-0123.

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World Radio History

RECORDERS...WTS

Teac X7R R-R, like new, $400. B Pitts, WJBY, POB 930, Gadsen AL 35950. 205-442-1222.

Telex stereo Copyette 1 to 1 cassette copier, new PB head, manuals, good condition, $300. F Radeaux, The Musik Factory, 1812 Procter St, Port Arthur TX 77604-6746. 409-982-7121.

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Pentagon C4322 & C4422 hi speed cass duper, master & slave units, 7 copies per run, erase heads, auto rew, very good cond, $2500/both. S Omlas, Zoo Prod, 1228 E 10 St, Brooklyn NY 11230-4719. 718-252-5274.

Revox PR-99 ply R-Rs (4), $1495. Jose, 809-895-2725.

Studer B-67 rcdr, 7.5, 15, 30 ips 1/4" 2-trk, complete w/rem cntrl, manual & export cover, fully svcd, excel cond, gd heads, $1600. R Streicher, 818-359-8012.

Studer C270/2, low hrs, $2950/BO; Revox HS77 Mk IV full-track mono, 10 hrs use, $750/BO/trade; port case for A77 with mon speakers & power amps, $450. R Katz, FAX 818-505-0149.

Teac A7030SL, 40 hrs use, very clean mastering deck, $700; Teac X3R, $300; Realistic/Teac X3, $300; Ampex AG-440C, $550; Akai GX77, $200; Inovonics 370 rcd amps (2), $1250/ea. J Parsons, 904-532-0192.

Technics RS-M273 stereo cassette recorders (3), good condition, little use, semi-pro, newly overhauled, new manual, $350/all. G Barnett, 619-328-1104.

Scully '100' recorders, record/play amplifiers, 8, 16, 24 track heads. Sequoia Electronics, 4646 Houndshaven Way, San Jose CA 95111. 408-363-1646.

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Ampex ATR100 tape recorders for parts. Circuit cards, heads, motors, machine parts, or electronic parts. Call 818-907-5161.

Otari 5050-SHD 8 track 1/2" newly rebuilt, heads have full, life left, $1800. W Gunn 619-320-0728.

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Otari Mark II-IV 1/2" 4-trk, multi-track, mint, less than 50 hrs, BO R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

Tascam ATR 60 8 trk w/tand, remote, $2250; Otari 5050-8 new heads, rebuilt, $1595; Ampex 440B-8, $1950; Tascam 25-2, $495; Ampex ATR700, $495; Scully 16 trk 2", $2950; Tascam 52 top of line, $650; M79-24 fully rebuilt, $9,500; Tascam locator for 85-16, $375; Fostex E22 1/2" timecode deck, $950; Fostex A80 8 trk w/450 mixer, $995. W Gunn, POB 2902, Palm Springs, CA 92263. 619-320-0728.

Want To Buy

Stereo Nagra w/NAB heads. R Katz, FAX 818-505-0149.

Elmo DR-1 & SR-1 cassette tape recorders; Almo GS-1200 stereo projectors; Fisher Price PXL-1000 video recorders; Bolex & Arriflex 16mm cine equipment. Henry, 914-949-5920.

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Burke ARC-16 studio control unit, Best Offer. J David, KMPL/KS98, POB 907, Sikeston MO 63801. 314-471-1520.

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BE VMC-16 transmitter rem cntrl, voice responsive, brand new, still in box, $2000. C Walmer, WTHU, 10 Radio Ln, Thurmont MD 21788. 301-271-2188.

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Tektronix 492 10MHz-40GHz spectrum analyzer, port w/all mixers & antennas, $900. B Nagy, KOOP, 505 San Jacinto, Austin TX 78765. 512-471-4286.

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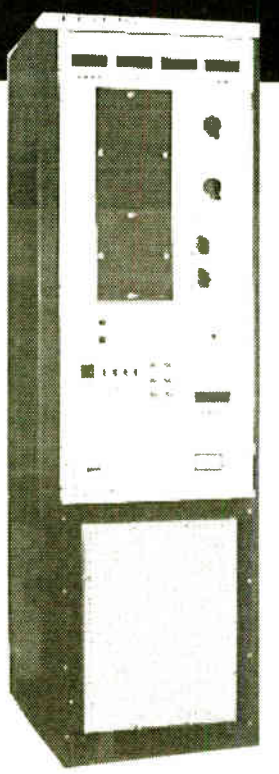

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Sparta/Bauer 602 1500 W FM xmtr, $4595; BE FX-30 30 kW, $3495. Jose, 809-895-2725

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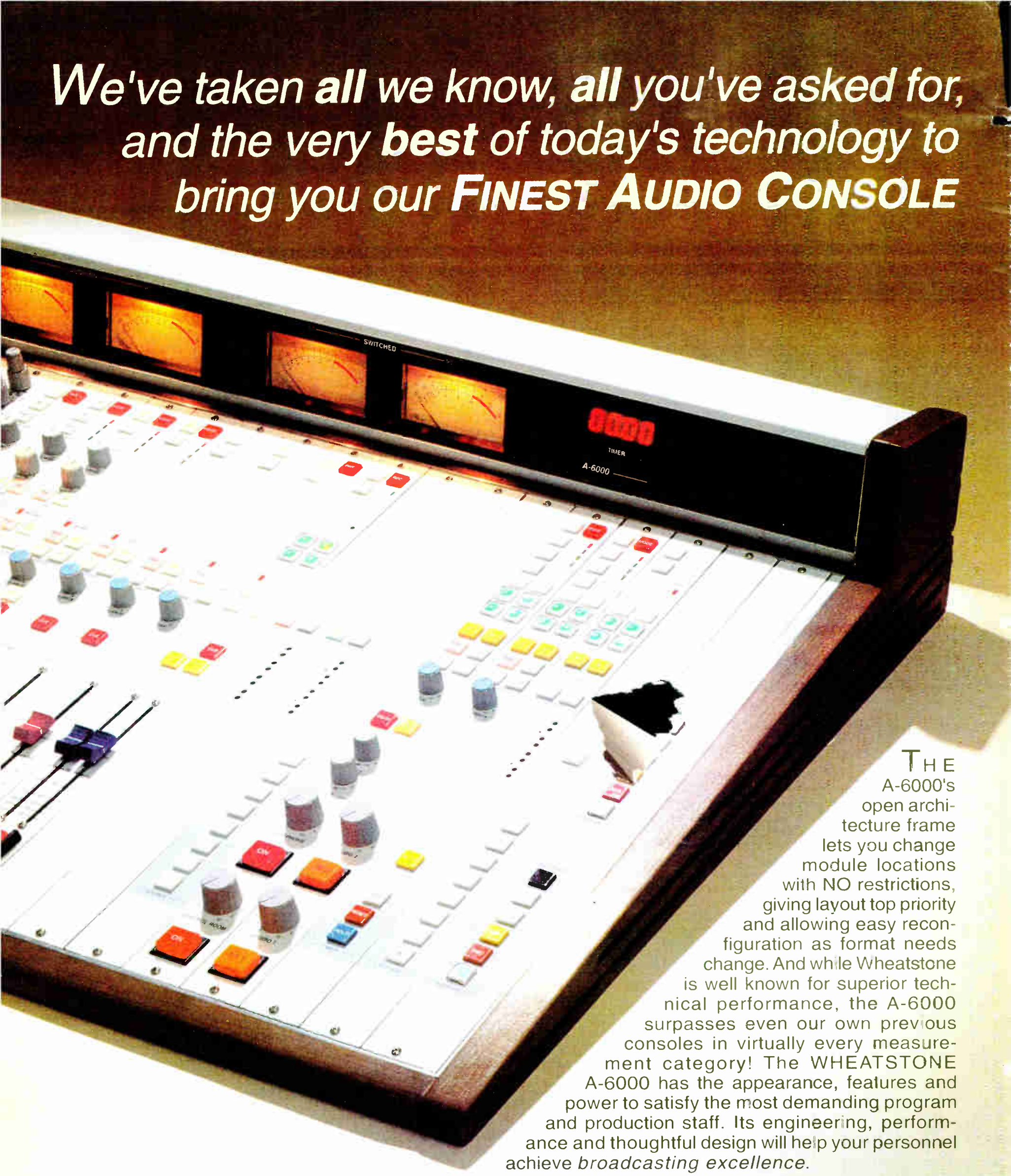

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