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Radio World®

Vol 14, No 4 | Radio's Best Read Newspaper | February 21, 1990

Crew Claims RFR Exposure

by Charles Taylor

Washington DC A broadcast tower maintenance company here has filed a complaint with the FCC and the Occupational Safety and Health Administration (OSHA) charging that "one or more" of its workers were overexposed to RF radiation at the site of an antenna on which they were working.

According to a letter obtained by **Radio World** written by FCC Audio Services Bureau Chief Larry Eads, employees of United States Tower Services, Rockville, MD, were contracted to work on a broadcast tower on the American University campus in Washington. US Tower said employees were assured that RF levels on the tower were safe.

RF radiation is linked in some studies to causing cancer.

After the work was completed, the letter said, "it is claimed one or more workers experienced adverse physical symptoms and discovered that power levels into the antennas mounted on the tower had, in fact, not been lowered to acceptable levels while the workers were in their vicinity."

A source who requested anonymity said one of the workers complained to him of profuse sweating after coming down from the tower.

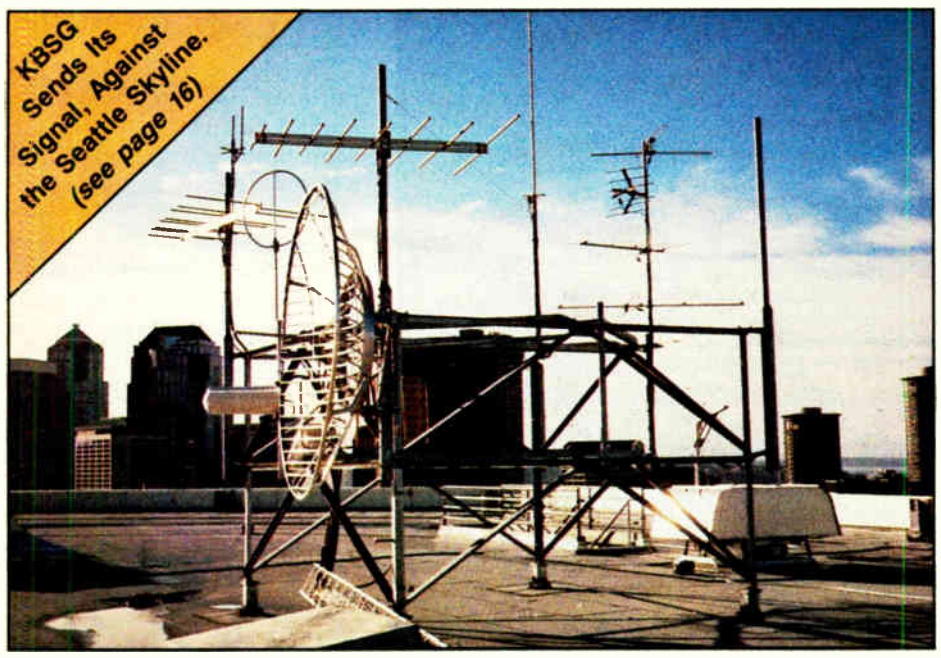
ANSI violation

"If the information we have regarding this incident is correct, it appears as though ANSI guidelines were violated and that excessive exposure(s) occurred," Eads wrote.

The issue is rooted in US Tower's conversion of an antenna for SIN TV in Washington from channel 14 to channel 69 at the tower site at American University on 14, 18 and 19 November, according to a letter **RW** obtained that is from US Tower General Superintendent Thomas Bunk to FCC Mass Media Bureau Chief Roy Stewart.

On each of the dates, Mike Burns, CE of WAMU-FM—which also broadcasts

(continued on page 10)



STL Extension: Tail Wagging the Dog?

by John Gatski

Washington DC Not everyone in the radio industry is pleased with a recent extension granted for type notification of STL gear.

In anticipation of the 1 July 1990 deadline requiring all STLs to be type notified, TFT Inc. spent $160,000 gearing up for upgrades of its older models and promoting special deals on newer ones.

TFT hired new technicians, bought new production machinery and spent thousands of dollars on advertising to alert stations with older STLs what options were available to them.

When the FCC announced a three-year extension on 19 January to 1 July 1993, however, company officials were angry—especially when broadcasters had already had five years to switch to type-notified equipment.

"It was the tail wagging the dog," TFT Marketing Director Jesse Maxenchs said. "The FCC succumbed to the pressure."

The "tail" is the Society of Broadcast Engineers (SBE), NPR, and broadcasters who convinced the FCC to add three additional years, according to Maxenchs.

(continued on page 10)

DAB Sparks Interest

by Alan Carter

Washington DC Just when radio broadcasters have begun integrating CDs and DAT into their operations to satisfy listeners' insatiable desire for high quality audio, another digital application looms on the horizon—one that has the power to become a station's greatest asset or its toughest competitor.

Digital Audio Broadcasting (DAB), under experimentation in Canada and Europe, would be a new, non-compatible, over-the-air service to rival AM and FM. It has a 22 kHz frequency response compared to FM's approximate 15 kHz.

But the situation is further aggravated, from terrestrial broadcasters' perspective, because the service could be delivered to consumers first by direct broadcast satellite (DBS).

"I think the industry would fight the introduction of a third radio service because God knows there are enough radio stations on the air," said Norman Wain, chairman and CEO of Metroplex Communications which owns five AMs and six FMs.

"While I've seen a lot of technological advancement in my lifetime, I don't see this as anything happening soon. I don't know if it is anything the radio broadcasting industry has to worry about," said Wain, who is a NAB Radio Board member.

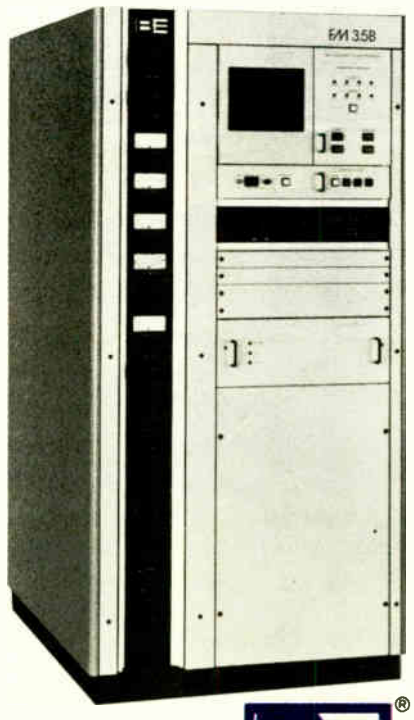
Technology driven world

KANE-AM President and GM Art Suberbielle, also an NAB Radio Board member and chairman of the AM Improvement Committee, called DAB fascinating. "Digital technology is going to come in one form or another," he said. "We live in a world that is technology driven."

Suberbielle said DAB, with stations having equal coverage area and signal strength, would place operations on an equal playing field and turn the industry into a real game of wits. "I would per-

(continued on page 8)

Digital Quality Transmission



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World Radio History

Hiring Freeze Enacted at VOA

by Charles Taylor

Washington DC Voice of America, in trying to slice $1 million from its projected 1990 budget, has initiated a hiring freeze that will prevent the agency from fully staffing its technical department.

The freeze, instituted 16 January, affects about 1700 employees in VOA's programming services division, which includes technicians. Gary Marco, president of the National Federation of Federal Employees' Local 1418, VOA's technical union, said the freeze is not unusual before annual budgets are determined by Congress, though it creates a crunch among the remaining staff.

They're doing it again

"They've done this before and they're doing it again. They freeze the hiring while the budget picture shakes out," Marco said. "When you look at the Voice of America's operations in terms of the technicians, the agency for years has used (fewer technicians than needed)."

Many of the employees end up building numerous hours of overtime to get the job done, he added. "This has been going on for four years because they don't have the money to pay the manpower needed. At some point, those employees run out of gas, they burn out."

. . . the freeze is not unusual before annual budgets are determined by Congress . . .

According to Robert Coonrod, VOA Deputy Director, the technical staff currently comprises 142 full-time and 6 part-time employees, eight fewer than the authorized federal full-time employee ceiling.

Million less than 1989

The freeze is a result of the projected 1990 budget of $170 million that the agency expects Congress to grant—$1 million less than its 1989 budget.

"We're looking at how to live within that budget," Coonrod said. "By initiating the hiring freeze, we believe we can save enough money that we can make it with the amount of money we are going to have appropriated to us in fiscal 1990."

The House Appropriations Subcommittee is to begin hearings for the agency's budget 22 February.

In addition to the $1 million that must be saved, Coonrod anticipates an additional $3.5 million cut in 1991, prompting the agency to look toward long-term cuts in its operations.

Most likely, VOA will be forced to cut back on programming in order to further trim expenses. Likely, the language services division, which provides programming in numerous languages, will be eliminated, he said.

"People are aware of the importance of our broadcasts around the world, yet at the same time we bump up against a government-wide budget crisis," Coonrod said.

"We do what we do as well as we can, but we won't be able to do it in all of the languages and all of the hours that we've been on the air with the budget we have."

For information, contact Voice of America at 202-485-8238.

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World Radio History

NAB Pushes to Amend AM Bill

Association Lobbies for Codification of FCC's Abuse-of-Process Policy

by John Gatski

Washington DC The NAB has decided to push for radio renewal legislation by urging Congress to add an amendment to the AM technical improvements bill (HR 2714) that would codify the FCC's abuse-of-process policy.

The NAB is pushing the technical bill with the codification amendment as an alternative to the proposed radio renewal bill, HR 1136.

The NAB had fully supported both bills, which were drafted by Rep. Matthew Rinaldo (R-NJ) and co-sponsored by 150 other legislators, but the broadcasters' group believes the technical bill has a better chance of passing.

HR 1136 would eliminate the FCC's current two-step renewal process and give broadcasters some expectancy during the renewal process. It also is designed to eliminate third party payoffs, according to the bill's supporters.

The AM improvements bill would legislate several technical provisions to help AM radio. They include requiring AM stereo if a receiver is equipped with FM stereo, mandating the FCC to seek out interference reduction remedies and setting limits on FM translators.

NAB spokesperson Sue Kraus said NAB still supports HR 1136, but combining the technical bill with an amendment codifying the FCC abuse-of-process may be more of an "attractive vehicle" to get the legislation through Congress.

Result of pressure

In 1989, the FCC enacted the abuse-of-process policy in response to pressure that groups were getting into the renewal process to receive payoffs from legitimate applicants. The policy allows the FCC to closely scrutinize finances of parties applying for licenses.

HR 1136 was introduced also as a result of pressure that something needed to be done to stem third party payoffs.

However, based on congressional testimony, HR 2714 has more support in the House than HR 1136.

During the Telecommunications and Finance Subcommittee's hearings on the two bills last fall, members said they were not sure there was a need for the radio renewal bill since the FCC's abuse-of-process policy is working.

Committee members said no abuses were reported from the hundreds of license renewals undertaken after the abuse-of-process was enacted.

Despite NAB and other support of the AM technical improvements bill with the abuse-of-process codification amendment, the technical part of the bill has been criticized by several factions in the broadcast industry.

AM receiver manufacturers have pressured members because they oppose the mandatory AM stereo provision of the bill and translator groups oppose the limiting of FM translators.

. . . there is no guarantee Congress will take action on any radio bills during this session.

Some congressional staff members said there is no guarantee Congress will take action on any radio bills during this session.

During a recent Federal Communications Commission Bar Association press conference, Telecommunications and Finance Subcommittee Senior Counsel Larry Irving said it is possible, but not certain, there will be action on the technical bill during this session.

"Radio improvements is probably doable. That does not mean it will get done," Irving said.

Action on the bill also hinges on higher priority issues within the Energy and Commerce Committee, the subcommittee's parent committee, including clean air legislation, according to committee staff members.

Unknown factor

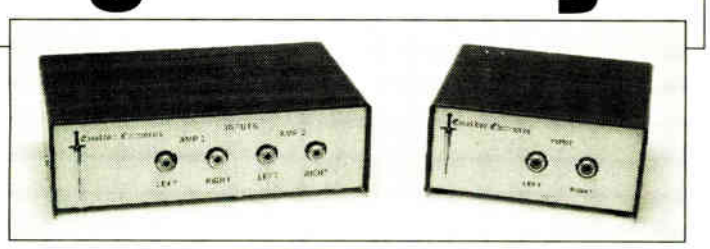
Another factor is Telecommunications and Finance Subcommittee Chairman Rep. Edward Markey (D-MA), who has not yet indicated how strongly he supports the technical bill.

Subcommittee Minority Counsel Terry Haines said Rep. Rinaldo would have no problem supporting a technical improvements/radio renewal combination bill as NAB has urged, but that both HR 1136 and HR 2714 still have a good chance of passing as separate bills.

Haines is more optimistic than Irving that Congress will take action during this session, no matter what form the legislation takes.

For more information about radio legislation, contact Sue Kraus at the NAB, 202-429-5480, Terry Haines at the Telecommunications and Finance Subcommittee Minority Counsel Office or Larry Irving at the Telecommunications and Finance Subcommittee at 202-226-2424.

Going Our Way?



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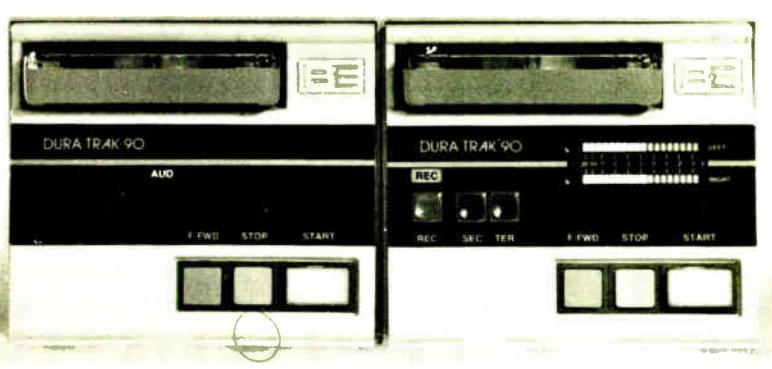

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World Radio History

"DAB"-ling In Digital's Future

by Judith Gross

Falls Church VA Digital from end to end. Sounds like a pipedream, doesn't it? Or maybe something that's years away.

Well listen up, buckaroos. It's **closer** than you think.

It surfaced at the **NAB Board** meeting (you know, the one in Rancho Mirage, with all the golf games and sunshine and warm resort-type weather and so forth. Don't those guys ever meet where it rains or snows?).

It'll surface again down in **Atlanta** at the **NAB convention**.

I'm talking **digital transmission**, true digital radio, and they've already tried it over in Europe, with success.

OK, we heard all about **digital cable radio**, but that isn't exactly the most practical way to go about it. Now we have two other possibilities.

First, there's **terrestrial** digital radio. You take one unused TV channel, put on oh, maybe half a dozen radio stations and you've got the bandwidth to accommodate digital broadcasting. They're calling it **DAB**—digital audio broadcast.

Your station plays a CD and gets the benefit of that **terrific SNR** and **dynamic range** right up into the new radios that will be needed to listen to the new technology.

Then there's satellite—**DBS**. Oh ho, you say, but you can't hear that in your **car**. Wrong. Even as we speak there are companies with the technology to create a car radio which will pick up a high-power **satellite** signal.

Forget the two-meter dish. As my buddy **Gerry LeBow** said, put those on top of the cars and in a high wind we can all go backwards.

Now with all this talk of digital transmission, right away comes all kinds of **questions**. First off, if we go the terrestrial route, where do we get the **spectrum**, the TV channels to accommodate the radio stations? And do we go with new stations, or let **existing** ones homestead?

I can see all kinds of potential for **political snags** developing here. Will **new** stations using digital transmission be unfair competition for those who stay with good old AM and FM? And is this just **one more blow** to already struggling AMs?

But if we let ourselves lag behind in these new technologies, won't folks used to **CDs** and **DAT** and **VCRs** and **satellite services** eventually tune out the traditional media?

Weighty questions, and sure to be hotly debated in the days ahead. We'll keep you posted.

Speaking of my good buddy, Mr. LeBow, he's involved in something nifty in between his VP duties at **Sage Broadcasting**.

You remember **ARI**, the traffic alert system that never really went too far because there were so few receivers out there? Well, meet **Son of ARI**.

No, actually, we're talking about **RDS**, the system which the **EBU** demo'd across the Potomac at **WAVA**. You remember, it IDs a station by call and format, among other attributes.

Well, Gerry points out that there are quite a few other useful, even critical applications in the way of **emergency alert**. Remember, it can override whatever it is you're currently listening to and tune you into something **more important**.

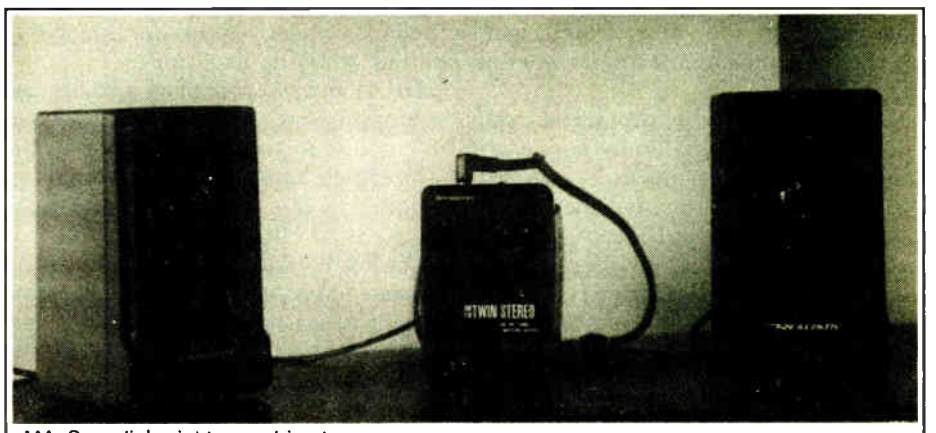
There are **16 manufacturers** who have already committed to making RDS receivers for the European market, among them **Ford** and by now, probably **Delco**, too.

Gerry is heading up a wholly owned subsidiary of Sage called **Sage Alerting Systems** to get the technology implemented in the US and Canada. And you'll be hearing more from him around NAB show time, as well.

You might have guessed we're talking FM here, sorry, not **AM**. But there is an application of the RDS technology of which AMs might avail themselves.

How 'bout **TMC—Traffic Message Channel**? This would give you a traffic alert via voice synthesis, assembled in memory, which **overrides** the music you're diggin' to let you know to turn off at the next exit to avoid that major jam-up three miles ahead.

The possibilities go on and on, but I'll throw one more your way. There's some logging, or recording capability built into all of this new tech. So, how about, instead of **Arbitron** or **Birch** mailing diaries, they mail microcassettes and you flip them into the cassette player attached to your new radio.



AM: Soundin' mighty good in stereo

Then every time you tune in or out to your favorite station, the cassette records your choice. Imagine, PDs would at last get the message **loud and clear** when they put on that "awesome" new cut and 80% of the radios listening to the station switch to another.

That's one I like. As soon as I get one in my car, Anne Murray, David Lee Roth, the Bellamy Brothers and most rap groups better **look out**. Ditto all earsplitting over-processed music. And of course, Howard Stern.

Let me clue you in on the rumors about the so-called sale of **Broadcast Electronics**.

It goes like this. One investor in BE, **Narragansett Capital Corp.** wanted out, so a new holding company with new money, **Cirrus**, was formed to buy everyone's shares in BE. Narragansett gets paid off and the current BE management, including president and majority owner, **Larry Cervon**, become shareholders in Cirrus.

Sale? Well, it's a lot more like the bank selling your mortgage. You and everything else stays put and **nothing changes** except the name of the holder. OK?

All right, it finally arrived! My brand new **Sangean Twin Stereo** (AM and FM) radio. I hooked it up to two amplified speakers from Radio Shack and tuned in first **WCPT** (heart and soul) then **WMZQ** (country) AM.

You two stations sound terrific, you know that? At last, a receiver that makes AM **sound good**. Who said it couldn't be done?

You can get one from either George Riggins, **RW's** *Old Timer* (213-598-7007) or Steve Kravitz (708-576-0554). Get a few, give them away, and then **get your listeners** to rush down to their favorite electronics dealer and **demand** the Twin Stereo radio from Sangean. Go ahead. Make them order it.

And to you non-stereo AMs? Go ahead, make my day.

Heard a juicy tidbit? Spill your guts to **Earwaves** *by faxing JG at 703-998-2966, writing to PO Box 1214, Falls Church VA 22041, or calling 703-998-7600. Who knows, you could win a coveted* **RW** *mug.*

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Lee Waller says "no problem" with Burk

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Shocked at NAB

Dear **RW**:

I was shocked and dismayed to read in the 10 January issue of **Radio World** about the decision by the NAB Executive Committee to bar the press from all NRSC meetings.

I have been a journalist all my working life. I have owned two radio stations and am currently one of the applicants for a new FM station in California, MD. I am in radio because I believe in it as a viable news medium.

A number of years ago the radio station I then owned sued our local county commissioners for not allowing taping of meetings. The argument used for the prohibition was that tape recorders inhibited the participants from full and robust debate.

I have heard that argument used time and time again by public bodies attempting to close meetings. Luckily we won the case against those county commissioners and subsequent commissioners enacted a strict open meetings law locally.

But now to see the same argument being used by the trade association which is supposed to be representing my industry calls to mind the old cliche, "with friends like that, who needs enemies?"

The first analogy which came to mind was that it would be like the Tobacco Institute banning smoking in their offices. Could what we'll be seeing next from NAB be a ban on staff car radios so they can concentrate on their day ahead while driving to work?

I had sincerely looked forward to being actively involved in NAB once I became a station operator again. But now I don't see how I can even be a member of an organization which has policies which strike at the very heart of what I'm about in this wonderful industry.

Let's hope this dastardly policy is overturned quickly and those who have fostered it be given an equally quick boot out the door.

Richard A. Myers, President
Tidewater Broadcasting Co. Inc.
California, MD

Big Brother watching

Dear **RW**:

How can you get so indignant about the NAB shutting the doors on the NRSC meetings?

I mean, anybody that gets the NAB *Info-Pak* knows (as Ed McMahon would say) *"everything* you'd ever want to know about that committee is being covered and written about in the Info-Pak Engineering Report!"

Just check the December '89-January '90 issue! There was almost ¾ of a column devoted to the subject! Apparently, that's more than enough for us slobs—besides, NAB needs the space to hype the 44th Annual Conference and to sell their management seminars.

Hey! Am I the only one (sorry, *JG*) am I one of the only two in shock here? I mean, this was the NAB Executive Committee, right? Aren't these the same "attorney types" who were PO'd up to the armpits when the "Fairness Doctrine" was imposed on radio and TV by the elected?

What the hell is going on? Where did these yahoos come from? Did we allow some of those sneaky henchmen of Ceausescu to infiltrate our NAB . . . or is it indeed no longer "our" NAB? I don't recall anything resembling a danger to our national security being reported—nor did I read anything immoral coming out of those NRSC committee meetings. I thought those were the only two reasons our First Amendment freedoms could be revoked. It always amazes me how quickly some officials can legislate away our freedoms—*your* freedoms.

Ah, but you smirk, this is such a small, inconsequential matter . . . sorta like those NRA people complaining about losing some of their Second Amendment freedoms. Unfortunately, you are missing the point.

How about I put it on a level you can understand—does the phrase "a little bit pregnant" ring a bell with you? Organizations like the NRA aren't just fighting to allow someone to own an automatic rifle, they are fighting to preserve 100% of your Second Amendment rights . . . your *total* freedom, not 98% this year, 96% next year, etc.

Nothing is inconsequential. What was the number of Communists retained in the Hungarian government? Guess what? Given the opportunity, they opted for 100% freedom! They didn't want to remain "a little bit pregnant." Now they are again printing a free, like in "freedom," newspaper.

Gosh, they don't even have a First or Second Amendment . . . yet! I wonder how long it'll take for their elected and appointed officials to start chipping away at those freedoms. Probably 200 years or so.

Shucks, after 200 years, no one remembers what it took to get those freedoms. Besides, this matter is so small and *inconsequential* . . .

Bill Spitzer
WLS Communications
Rapid City, SD

Remember "radio goers"

Dear **RW**:

This is a crossover letter from the other side of the house mix position. I've been reading **Radio World** to try and discern what motivates the folks behind the scenes at the local radio station.

In my job as chief engineer for a touring sound and A/C power company, if my mix were to be unacceptable, more than likely I would have 20,000 irate concert goers venting their displeasure.

Seems to me, by the quality of most of what I hear from my radio, you've forgotten about the "radio goers" out there.

Granted, as a professional concert mixer, my musical tastes may be somewhat broader than the average person. But when I spin the radio dial, I seem to get a lot of the same. (Let's not even talk about the guy who just discovered modulating a noise gate with his Lexicon 448.)

C'mon guys and gals, I thought radio was supposed to show us what's new, or are we who discern what we hear relegated to listening to the AM news broadcast so we can hear a limiter being used without distorting its input signal?

Last question. Why AM stereo? I can't find enough good FM stereo to listen to. For a medium to grow, it seems like it should provide me, the listener, with something I'll listen to.

Take care all you hard-working radio professionals, and take some time off to attend a concert.

John Terry, CE Audio Division
SBP Industries
Cranford, NJ

Who's on first?

Dear **RW**:

Re Mr. Gutmacher's letter in the 24 January issue of **RW**: KDKA's claim to fame is that it was the world's first commercially licensed broadcast station.

It signed on the air with those now famous call letters on 2 November, 1920.

Prior to that date Doctor Frank Conrad, an engineer employed by the Westinghouse Electric and Manufacturing Company—the man responsible for getting Westinghouse into broadcasting—operated the soon to be KDKA facilities under the call letters 8XK.

Jack Layton, Engineering Mgr.
KDKA
Pittsburgh, PA

Editor's note: KDKA's distinction as the first commercial radio station in the US is not as widespread a subject for controversy as the question of which was the first noncommercial radio station. Several calls and letters have come in addressing this issue. Any attempt to mediate such a long-standing debate seems an impossible task and one that would involve extensive hours of research. **RW** *welcomes all viewpoints but will not attempt to come to any conclusive pronouncements to solve this one.*

A New Path to Forge

As the broadcast industry moves into its busiest time of year there's ample reason for excitement about developments on the horizon.

While it's true that "digital" has become almost overused as an industry buzzword, there are some real forward strides and some nascent technologies to lend greater substance to the word.

On the audio side, radio stations are beginning to feel the impact of digital editing, storage and automation along with digital source material such as compact discs and DAT.

In RF and even in non-technical station operations, the ubiquitous computer has changed the way business is conducted.

Now comes word of digital transmission systems through DAB or DBS which open a whole new world of possibilities for broadcasters. It may soon be feasible for stations to give their listeners the level of quality they have grown to expect through home listening—even in their cars.

Before that can happen there will be practical and perhaps political and spectrum allocation issues to be resolved. And, like digital storage media, the cost-benefit question will need to be balanced out.

But while these emerging technologies are still in their infancy, the best approach is one of receptiveness. Engineers and other technical staff should take every opportunity to explore digital audio and the new transmission systems and help adapt them to station use.

And managers and owners should be responsive to engineering requests for the resources to do so.

Companies which offer digital advancements need feedback and encouragement from the industry they are trying to serve. And industry associations need to take a leadership role in bringing the latest advancements to the largest number of people.

While widespread acceptance or major shifts to digital systems may be some way into the future, important groundwork can be laid and attitudes can be forged in the present that will make the final result a benefit to all.

The best way to cross a threshold is to first make sure the door is wide open.

—RW

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Editor, Judith Gross
Associate Editor, Alex Zavistovich
News Editor, Alan Carter
Reporters, Charles Taylor, John Gatski
Benn Kobb, Frank Beacham/L.A.
Technical Advisor, Tom McGinley

Production Director, Judith Chamberlain
Production Manager, Kim Lowe
Jeanne Pearson, James Gillgam,
Bill Spencer

Publisher, Stevan B. Dana
Associate Publishers, Arthur Constantine
Carmel King

Ad Coordination Manager, Simone Leeser
Circulation Manager, Tiana Hickman
Accounts Receivable, Caroline Freeland

Advertising Sales Representatives:

East Coast, Art Constantine
800-336-3045, Fax: 703-998-2966

Midwest, Mike Dahle
914-762-3572, Fax: 914-762-3107

West Coast, Pat Macsata
415-786-2198, Fax: 415-786-2754

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Next Issue
Radio World
March 14, 1990

World Radio History

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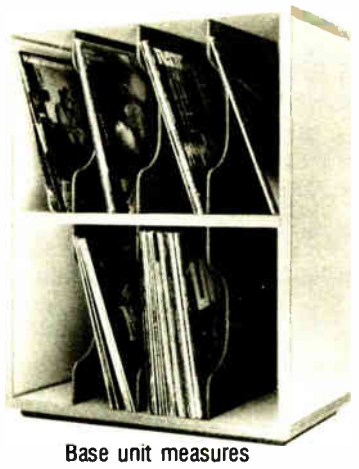

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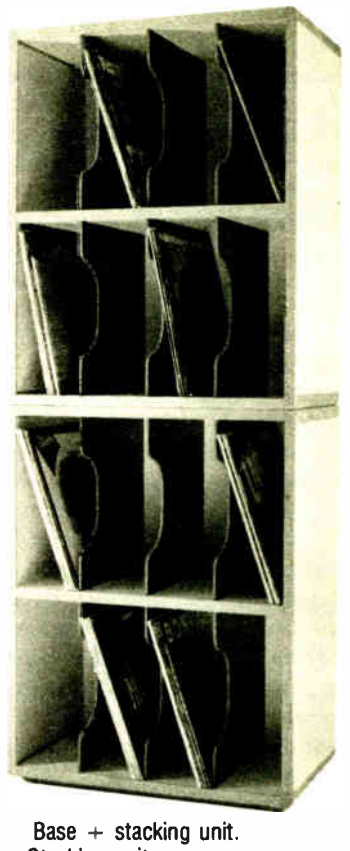

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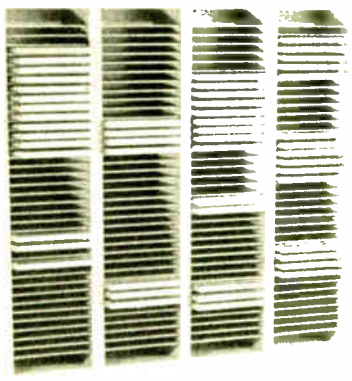

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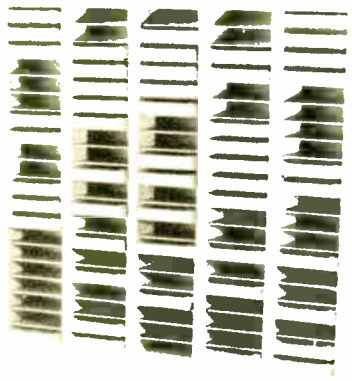

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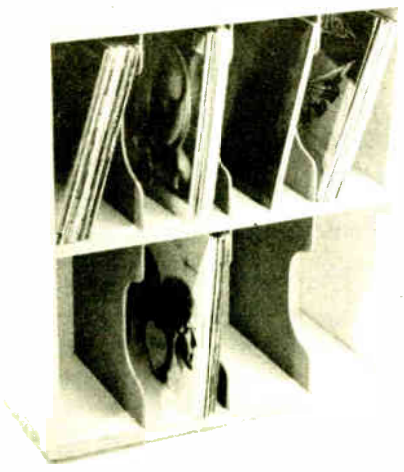
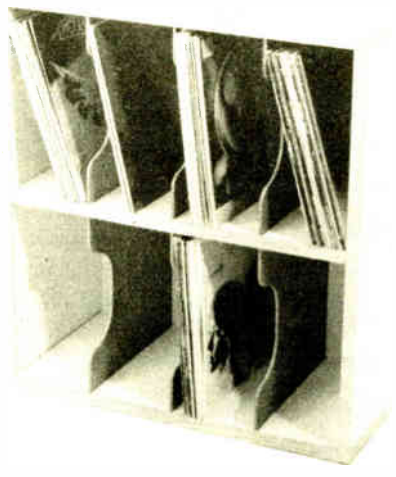


BASE UNIT



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Circle 30 On Reader Service Card

World Radio History

SBE '89 Show Earns Top Marks

by Charles Taylor

Indianapolis IN The Society of Broadcast Engineers (SBE) has released the results of surveys scrutinizing its annual convention 5-8 October, 1989, in Kansas City MO, and most have given the show high marks, according to the organization.

In general, respondents to three surveys showed support of the show's scheduling, site selection and management, SBE said.

Pleased with results

Management also appeared pleased with the results. According to SBE President Bradley Dick, "I think we got an A–. We've looked at it, we've had professionals look at it. We found some little things to tweak, but I'm real proud of it."

In an attendee survey conducted in early December, 92% of the respondents gave the show an excellent or good rating. Eighty-four percent indicated they would attend the 1990 show in St. Louis, MO.

In addition, 93% said they visited exhibits; 65% had attended before and 66% said they were SBE members.

Regarding Saturday show hours, Dick said that while attendees were happy with the times, exhibitors were hoping for more traffic. As a result, SBE intends to move exhibit hours to Saturday morning and sessions to afternoon, the reverse of the 1989 convention.

"It gets everybody up early Saturday morning, gets them into the hall and lets the exhibitors have one last shot at the attendees and gives the attendees a last chance to cross the T's and dot the I's. It also lets the exhibitors get out at a decent hour Saturday," Dick said.

As an extra enticement, SBE will offer a continental breakfast on the show floor Saturday morning and lunch that afternoon.

Reception well received

Another test event this year was the opening reception, which Dick said was well received: "People liked the chance to get together and see that, hey, Joe's here or Sam's here."

For future shows, Dick would like to see the show have a presence on the East Coast.

"We're not convinced that an exclusive midwest location is the best option for the exhibitors and our attendees," he said. "There may be some very good advantages to broadening our horizons to other areas so that the exhibitors will meet new clients and the attendees who normally don't come to this show will find it close enough that they can't say no."

Although the East Coast is in primary contention, Dick said there are no immediate plans to select sites other than those on the calendar.

Overall, Dick commented, "We've got a winning combination of things now. We hesitate to monkey with it. The exhibitors tell us they're happy with the structure of the show and the attendees tell us that they're very happy with the way things are."

For information, contact SBE at 317-842-0836.

AM Mark Tag Names Proposed

by John Gatski

Rancho Mirage CA The NAB AM Receiver Liaison Task Force and Electronic Industries Association (EIA) have recommended four as-of-yet undisclosed names to distinguish an industry certification mark for quality AM receivers.

The four name candidates were discussed during an update that Task force and NAB Radio Board member Tom Kushak gave to the NAB Joint Board of Directors meeting 14-17 January.

Kushak, who is also president and general manager of WMAY and WNNS-FM in Springfield, IL, said the task force and Radio Board will not disclose the four suggested certification mark names until the EIA finds out whether the names are copyrighted by another organization, group or manufacturer

The NAB task force and the EIA are evaluating certification mark criteria, name designation for the mark and a plan to promote it to the industry.

What's in a name

The NAB and EIA believe it is important that an easily identifiable tag name for receivers that meet the mark is critical to its success.

Radio World readers sent in suggestions for a certification mark last year and responses included NRSCAM and AMX among others. The suggestions were forwarded to the NRSC, but Kushak would not confirm whether those names are among the four being considered.

Besides selection of a name, Kushak said the NAB Radio Board and task force will meet in March and then actively target manufacturers to produce receivers that meet the certification mark.

Although the NAB and EIA have not finalized the certification mark criteria, the specifications are likely to include the recently finalized NRSC specifications of a minimum frequency response of 50 to 7500 Hz and possibly a narrow-wide bandwidth switch.

No AM stereo

AM stereo is unlikely to be included as a certification mark qualifier. The NRSC considered it as an option, but did not include it on its finalized recommendation.

Kushak said it is important that all companies are contacted when the NAB and EIA begin lobbying manufacturers to produce receivers that meet the certification mark.

"If we only meet with a limited number of companies, I don't think we will accomplish our goal," Kushak said.

For more information about the certification mark, contact Tom Kushak at 217-629-7077.

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World Radio History

DAB in Testing as 3rd Service

(continued from page 1)

sonally welcome that."

A new radio service would not make life any easier for AM, Suberbielle said. "I think it is just one factor we deal with. We really can't control technology. We have to work along side it and be in tune."

Thomas Kushak, a partner in Mid-West Family Stations, a licensee of 7 AM and 7 FMs, said his initial response to hearing about DAB was fright. But upon retrospect, he called the technology "an exciting new frontier. The question is are we going to be spectators or are we going to be players? I would certainly hope we are going to be players."

Abel predicted a terrestrial service could be available in the US within 10 years and DBS by the mid-1990s.

Major hurdles

DAB has a long road ahead with obstacles such as allocation of spectrum by the FCC for terrestrial delivery and authorization of DBS service and introduction of receivers.

But the NAB found enough merit in DAB to outline the issue during the January joint board meeting with a presentation by NAB Executive Operations VP John Abel.

"It's radio's HDTV. It is higher definition radio," Abel said in an interview.

The NAB will have a closed-circuit DAB demonstration at the upcoming convention and plans an over-the-air demo during the 1991 show in Las Vegas.

NAB Science & Technology VP Michael Rau called DAB an "exciting" technology. The verdict on digital audio transmission is not in, he noted. "I can say this," Rau continued, "I think whether DAB technology becomes a reality . . . depends on whether US radio stations would like to be a party to the technology and I'm sure NAB would do its best to help them."

Only years away

Abel predicted a terrestrial service could be available in the US within 10 years and DBS by the mid-1990s.

While some US cable companies already offer a CD-quality "digital radio service," the Europeans are experimenting with DBS including car receivers. A "couple" of American receiver manufacturers, who Abel declined to identify, also are toying with the idea for the US.

Once broadcasters move past the initial shock of a new service, there are advantages DAB offers for over-the-air delivery.

The higher frequency response is first on the list and second is the elimination of multipath, the dreaded interference that plagues FM.

All transmissions have reflections, but the digital transmission takes advantage of the effect. "The reflections are built as part of the error correction signal," Abel explained. "This reflection is received and the receiver is looking for all kinds of information."

Called Coded Orthogonal Division Multiplex, it is described as a major breakthrough in that the multiplexing uses both frequency and time interleaving together in the coding process. The time-interleaved data stream is split among many narrowband carriers using full digital processing for modulation and demodulation.

The key is that subsequent data travels on different carriers and in non-successive time slots. The orthogonal arrangement of the narrowband carriers leads to high spectrum efficiency. The bit-rate per carrier is very low and therefore the transmission is insensitive to delayed multipath signals. The receiver sensitivity is very high and the transmission power can be kept very low.

The receiver reassembles the original data stream, taking bits where it can find them so multipath contributes positively to the demodulation of the original audio.

"Signal fades do not matter," Rau said. "The receiver always has some information." "The multipath is not combined and demodulated."

Abel said a comparison could be made to data compression. "But it's more than data compression. It is sampling and taking those pieces of information that are necessary to understand this is music."

Subjective assessment

The processing is a subjective evaluation of how much information is necessary to provide the desired frequency response, Abel said.

The third advantage of DAB is the lower power needed to operate, a fact in all digital broadcasting, Abel noted. The effective use of multipath also contributes to less power, he continued, by the receiver using the reflections to its advantage.

For example a frequency of 100 MHz would need an estimated 100 W for terrestrial transmission. Questions on the coverage area have been raised, which Abel said haven't been adequately answered, but he speculated it would be "somewhat less" than a Class B FM.

The fourth advantage is spectrum efficiency; one TV channel could accommodate 12 to 16 DAB channels as opposed to six FMs. The coding scheme allows for a reduction of the bit-rate by a factor of six. The DAB system is approximately four times as spectrum efficient as FM.

But the real question may be where the spectrum comes from, with the reallocation of unused TV frequency for high definition television and land mobile communications.

"There is no obvious place right now where I think spectrum could be used," Abel said, "but we (NAB) believe that if an appropriate spectrum study were conducted, some would be available."

Spectrum, however, exists for DBS delivery, and the FCC has granted video delivery rights, some including proposals for audio services.

Abel noted that no specific studies on the new technologies have been scheduled yet. But money was budgeted to Science & Technology for DAB research, Rau said.

Planning needed

One feature of DAB, a potentially desirable aspect noted by NAB, is that the number of stations must be determined in advance.

The DAB system is a "bundled" system—all stations are made available as part of a single "broadcast" of spectral energy. A "new" station cannot be added once the initial configuration is set.

"That is a totally different concept," Abel said, "and requires a lot more spectrum planning that what we've done in the United States. DAB will not be as spectrum efficient if it has to deal with current allocations where you put . . . a station on (one) part of the spectrum and a station, separated by several channels, on another part of the spectrum."

Abel said he does not believe enough spectrum exists to move all current FMs to a digital service.

In that case, who would go and who would stay is a question for future debate. Another question could be whether the allocations would be limited to new services.

Broadcasters also may ask themselves what effect a service with equal coverage area and equal signal strengths would have on their operations.

The NAB said DAB is "probably a bigger technological development" than FM radio and is "far superior" to current AM or FM.

In essence, NAB maintained, DAB is the first major breakthrough in how terrestrial broadcasting since the late 1940s and '50s.

For information from the NAB, contact the Science and Technology Department at 202-429-5346.

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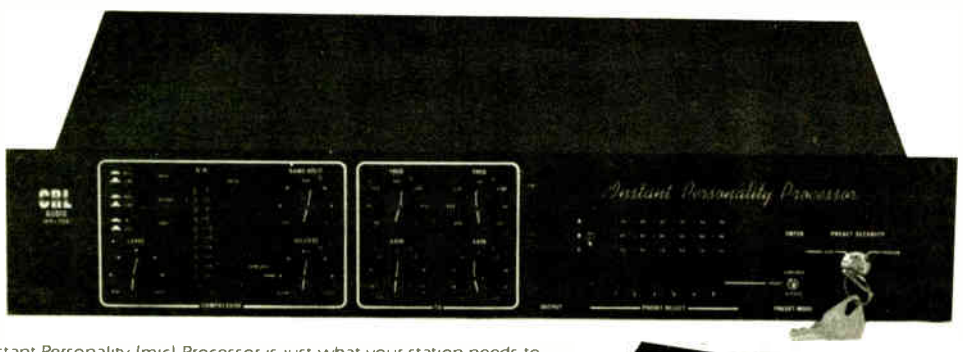

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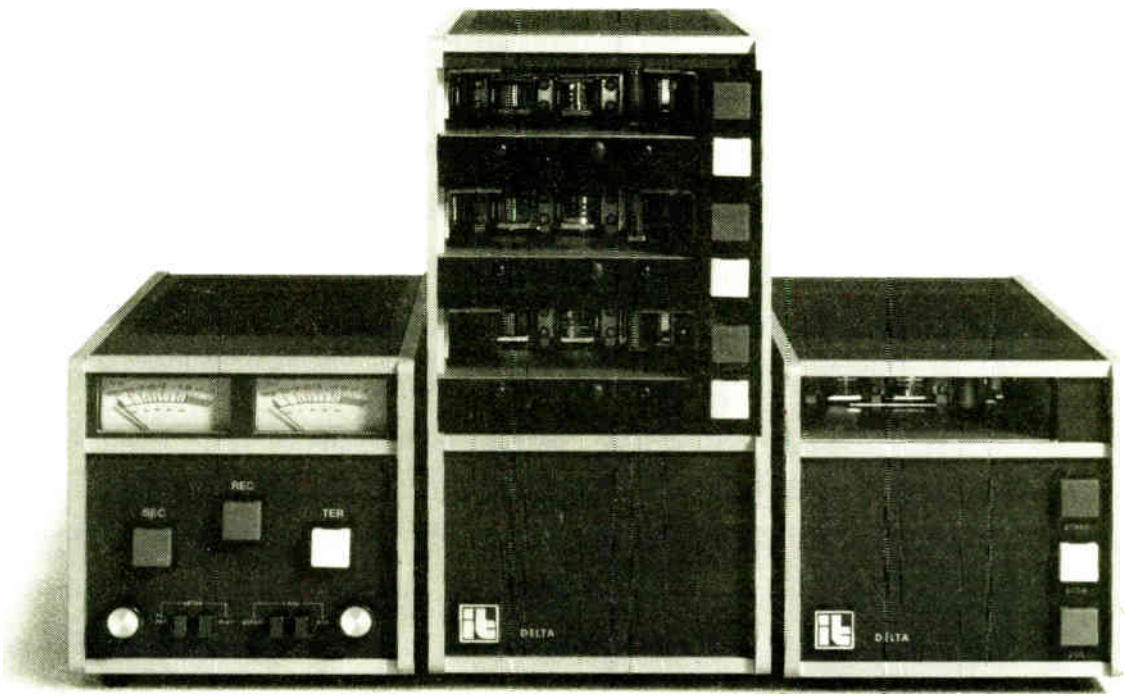

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World Radio History

STL Extension Earns Ire of Some

(continued from page 1)

The request was made because of FCC rule 74.550 enacted in 1985. The rule gave stations five years to use STLs on the 944-952 MHz band that meet tighter frequency emission requirements.

The STL issue boiled over last fall when SBE and NPR wrote to the FCC requesting an extension of the deadline or permanent grandfathering for the thousands of older STLs that do not meet the FCC rules.

NPR claimed its stations would have to pay $4500 to upgrade to type-notified STLs and stations said they were confused about whether they or the STL company should undertake the type notification process.

The FCC has admitted stations did not plan sufficiently to meet the original deadline, but granted the extension anyway based on last fall's concern by SBE, NPR and stations that wrote letters.

A bad decision?

Like TFT, STL company Marti Electronics disagreed with the Commission's decision to extend the deadline. The company, however, expended few dollars preparing for upgrades because all of its STLs are already type notified.

"We are disappointed that the FCC granted the extension. It has thwarted a move toward technically better transmissions in the STL band," Marti Sales and Marketing Director Dan Rau said.

Rau said the "panic" generated over the last few months will reappear in three years as the extended deadline approaches.

"As an industry we had five years to prepare for the July 1, 1990 deadline and neither the other manufacturers nor the broadcasters responded appropriately. It's the nature of the business to procrastinate unless absolutely mandated to make a change," Rau said.

Rau made reference to other companies not being prepared because all Marti transmitters have met the FCC specifications since the 1985 rule went into effect.

Tighter receiver limits

Besides tighter STL transmitter emission limits, Marti also favors the FCC setting stricter receiver selectivity standards.

Other companies are not quite as upset about the deadline extension as TFT and Marti.

"It wasn't totally unexpected," Moseley Associates Sales Manager Dave Chancey said.

Chancey said he concurred with the FCC's decision to extend the deadline if it is an economic hardship on stations.

According to Chancey, Moseley spent a minimal amount of money gearing up for any increase in business, mostly for sending out fliers to alert STL owners about older STLs that could be upgraded and a trade offer for those that could not.

Moseley offered 1975-1985 PCL 505 upgrades ranging in price from $1200-$1900 or $750 trade-ins for STLS that cannot be upgraded economically, according to Chancey.

Moseley has been selling its popular PCL-6010 type-notified STL transmitter for $3700 with a trade-in, he said.

Ad campaign

In contrast to Moseley, TFT's STL campaign has been more visible because of its decision to advertise.

In a recent ad, TFT offered a $505 dollar trade-in on any STL that does not meet FCC specifications toward a Model 9000 for $2245. The offer is good until 8 March.

SBE officials said the organization is pleased the FCC extended the deadline.

SBE attorney Chris Imlay said "I think it's a good idea. A lot of stations were not aware of the (original) deadline."

Although manufacturers expressed disappointment at the extension, Imlay said they will ultimately benefit from sales of newer digital STLs.

Instead of stations having to either upgrade an old STL or buy a new analog STL and then again buy a digital STL, stations now have more time to wait for digital STLs to hit the market, Imlay added.

RF Overexposure Claim

(continued from page 1)

from the tower site—was asked to power down the antennas on the tower, except on the 18th, when US Tower's Joe Burdette assisted, the letter said.

On 22 November, Burdette told Bunk that "at one point while John (Haugen, a crew member) and I were working (on) the tower, one of the FM broadcasters remotely turned their antenna back to full power," according to Bunk's letter.

A letter from an engineer responding to Eads' inquiry said that it was WPFW's antenna that was turned back to full power. The station operates at 50 kW.

Letters sent to stations

In response to the complaint, the FCC sent letters on 11 January to the six stations broadcasting from the tower—WMMJ-FM, WGMS-FM, WPFW-FM, WPGC-FM, SIN-TV and WAMU-FM—asking that they respond to the environmental issue raised by the complaint and to submit "relevant information" by 11 February.

Eads added that such a request to the stations is required in sites where multiple stations share a tower.

In interviews with station officials, comments varied.

Tom McGinley, CE at WPGC, said that the power density contribution of his station at full power is well within Commission guidelines to allow tower maintenance to any area of the tower below the base of the pylon; thus the station was not notified before work was begun.

However, McGinley added, "This incident hopefully will serve as a catalyst to get a little finer focus on the issue of RF, particularly for tower workers, about how much is safe. The guidelines in OST #65 are very vague and don't really apply when a guy is in real close proximity of an antenna. We're working in a real gray area here."

While WGMS GM Mike Farrell had not been informed of the issue, he commented that when the station is requested to down its power, it does so.

"If there's work being done, it's every tenants' obligation to down power," Farrell said.

Our comment is no comment

Bob Porter, PD at WPFW, said, "Our comment is 'no comment.' Because this could involve possible litigation, we're leaving it up to our attorney."

Officials at SIN-TV were not available for comment, and repeated calls to Burns at WAMU and to US Tower were not returned.

For the FCC, the investigation is a responsibility, according to Eads.

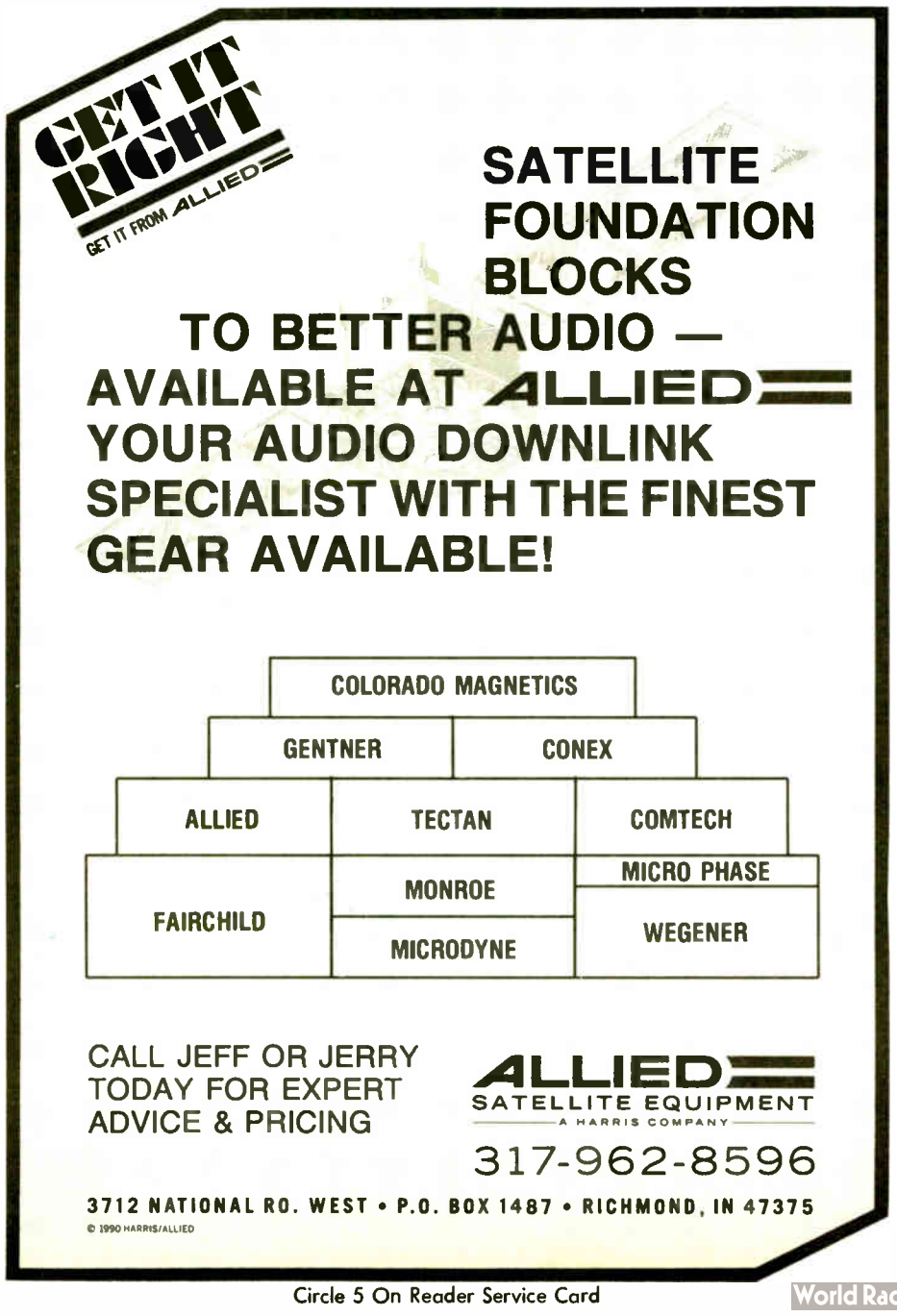
"We require as a condition of the licensing process to remove the possibility of radiation hazards. We also have a responsibility as part of environmental protection not to license someone who is creating a radiation hazard," he said.

He continued that while the FCC is careful to monitor the airwaves, the agency is not responsible for determining what levels of RF radiation that might be hazardous.

"The Commission has a standard—the ANSI standard—and that's what we'll apply in any licensing. The Commission doesn't have the expertise or the jurisdiction to determine what levels are appropriate."

He did not predict when action might be forthcoming. "We'll evaluate the information and decide what further steps are necessary, if any," he said.

Officials at OSHA acknowledged that the complaint was filed and that an investigation is underway. However, they were not willing to discuss the issue until a ruling is issued. The agency's timetable is uncertain.



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Circle 27 On Reader Service Card

World Radio History

VOA Says No to Marti Test Plan

by John Gatski

Washington DC The Voice of America (VOA) has said thanks, but no thanks to the NAB's request to allow an independent engineer to evaluate transmission tests of the Cuba-bound TV Marti service, which are to take place this month.

VOA External Affairs Director Joe O'Connell said the tests will be monitored by VOA engineers and results released after the testing is concluded, but independent engineers will not be used.

O'Connell said the engineers monitoring the tests are competent and no outside expertise is necessary.

NAB International Consultant Bill Haratunian confirmed that VOA has declined to use outside engineers for the evaluation.

During the $7.5 million testing, VOA will beam news and information via satellite to the transmitter, which will be housed in a Aerostat balloon 10,000 feet above Cudjoe Key, Florida. The tests will be conducted for at least 30-60 days.

The transmitter will then broadcast the information to metropolitan Havana on Channel 13.

If the tests are successful and TV Marti gets the final go-ahead, the service will be similar to Radio Marti, broadcasting pro-western news and information to communist Cuba.

The NAB opposes TV Marti because it fears increased jamming against US AM stations and possible jamming of TV stations in Florida.

The NAB believes the use of outside engineers may help foster a TV Marti system which would not result in retaliation to US stations, according to NAB Science and Technology VP Michael Rau.

"We want someone that is independent to observe. The purpose is to make sure the test is conducted fairly," Rau said. "We are very concerned about the interference to US stations—both TV and AM."

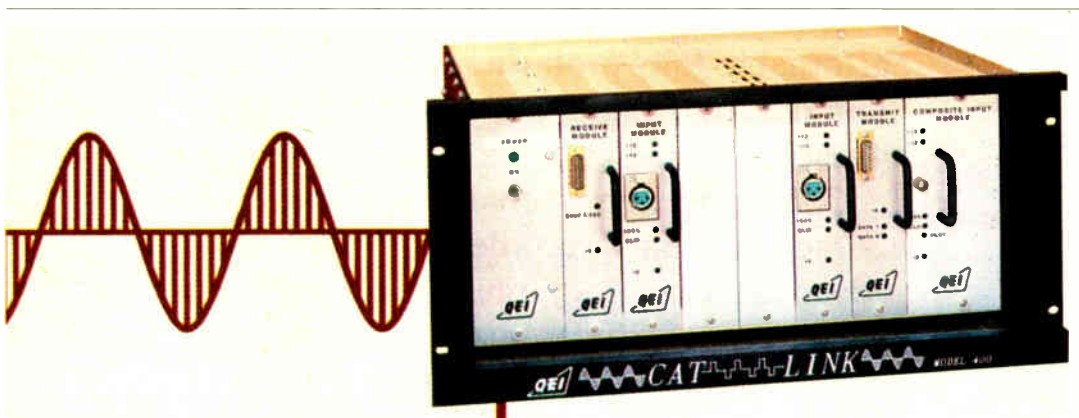
Haratunian said the willingness for VOA to release the test results is some consolation considering the uncertainty of using a balloon-tethered transmitter.

"It's a Mickey Mouse kind of technology. It's untried and untested," he said.

Also, VOA has agreed to share the results of any alternative broadcast tests for TV Marti, although it has not yet planned for any, Haratunian said.

So far, Congress has approved $30 million through Fiscal Year 1991 to operate the TV Marti service, but VOA will not get the final go-ahead until the broadcast tests are evaluated.

For more information about TV Marti, contact Joe O'Connell at VOA, 202-485-8238, Bill Haratunian at 202-231-0568 or Mike Rau at the NAB, 202-429-5339.



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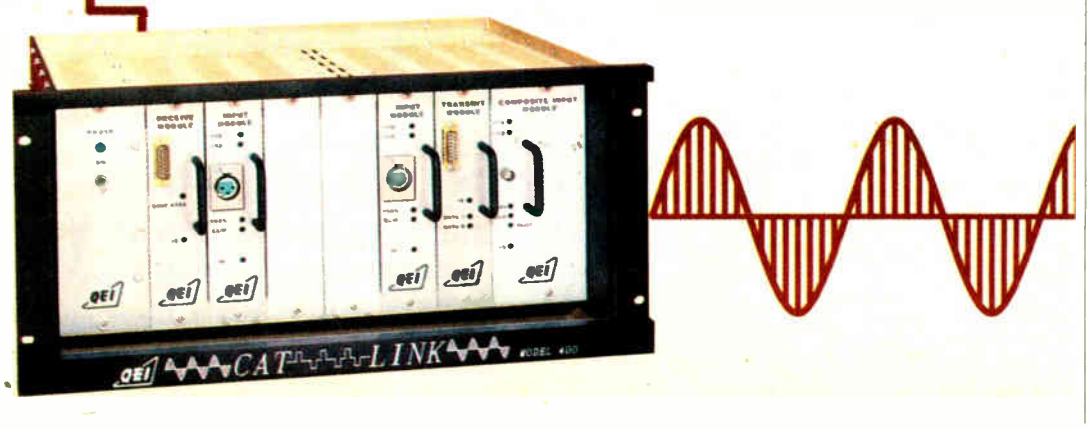


Circle 44 On Reader Service Card

NAB OKs S&T Cash

Washington DC The NAB Joint Board has allocated additional money to the Science and Technology budget for the coming year but S&T VP Michael Rau declined to reveal any specifics.

While an NAB spokesperson said the association does not release a department-by-department budget, *Radio Business Report* quoted the S&T budget as being $862,140, up from $640,000.

A major increase, according to NAB Executive Operations VP John Abel, was the transfer of NAB's contributions to the Advanced Television Test Center. The money previously came from the unbudgeted category.

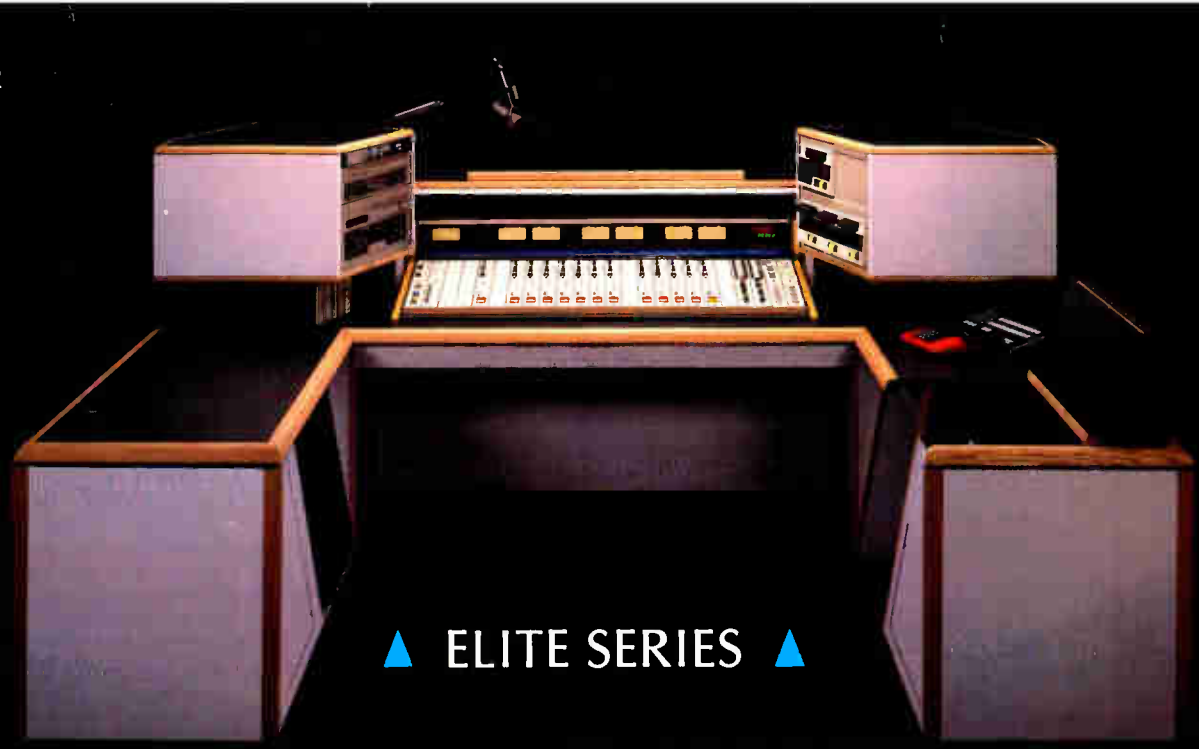
In general, however, Rau said money was allocated to AM improvements, FM technical issues and standards development for preventing electrical interference. He also said the department would more closely monitor the work of the CCIR.

Of special interest may be an allocation for studies in digital audio. In a presentation before the NAB Board, Abel reviewed current trends in other countries towards digital transmission of radio signals both via satellite and terrestrially.

In addition to the S&T budget, *Radio Business Report* also quoted figures showing the radio budget dropping from $1 million to $961,915, while TV increases to $700,340 from $637,078. *RBR* said the decrease was attributed to replacing regional managers with telemarketers, not reduction in services.

World Radio History

ON AIR



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DUB/EDIT STATION

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World Radio History

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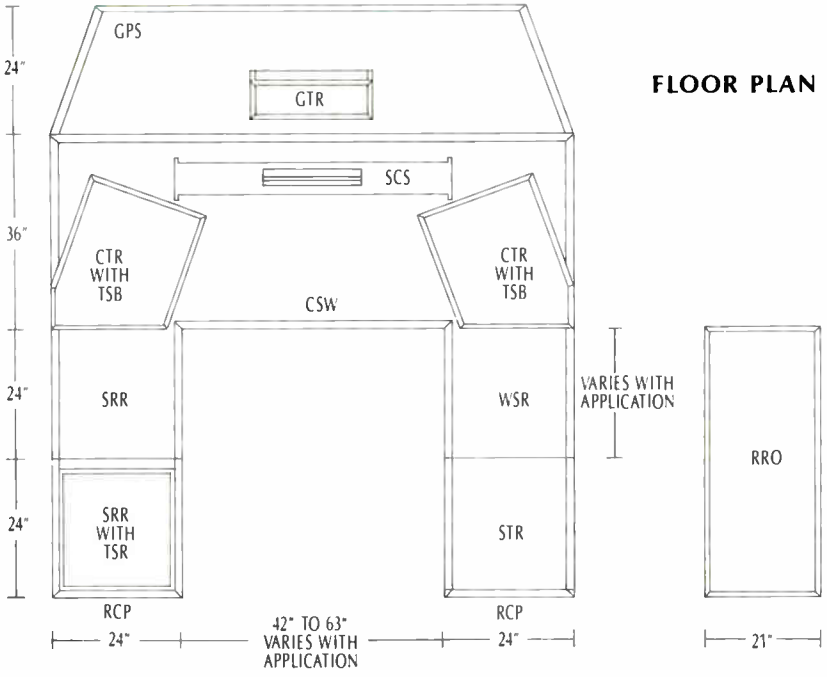

FLOOR PLAN

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SYSTEM COMPONENTS

CSW — CONSOLE SUPPORTS AND WIRE TROUGH — Each console support has a field relocatable, hidden 14 inch rack, covered with a removable smoked plexiglass panel. The panel protects the rack mounted equipment from the operator's feet while allowing a view to the panel lights. Drawers can be added to supports. The center counter and wire trough can be expanded to accommodate larger consoles.

CTR — CORNER TOWER RACK — Sitting on top of the CSW and CTR positions equipment such as cart machines at a 20 degree angle to operator. Standard rack opening is 14 inches. The rack height can be expanded as much as needed.

TSB — TOWER STORAGE BASE — The TSB raises up the CTR to provide storage for 10 hot carts or 15 CD's. This also allows the CTR to cantilever over the control console thereby saving the addition of width to center when using an 18 input console.

SRR — SLOPED RACK RETURN — This return comes standard with a 21 inch rack. This space can be easily converted to media storage or pencil and file drawers.

STR — SINGLE TURNTABLE RETURN — Featuring an easy to see over bifold dust cover this return houses turntables, reel to reel machines and CD players. It comes standard with a 10½ inch rack. An optional sand loaded isolator base can be ordered.

WSR — WORK SURFACE RETURN — Used as a work surface for computers, keyboards and guest positions. This module can be built to custom widths. There is a built in wire pass and it can be ordered with a pencil drawer.

RCP — RETURN COMPLETION PANEL — Used to cover the unfinished end of a return. One panel needed for each return.

GPS — GUEST POSITION SHELF — Used to provide multiple talent positions. This shelf can be mounted anywhere and can be free standing.

SCS — SLIDING COPY STAND — This is a copy holder that features a stick on note surface.

RRO — RAISED RACK OVERBRIDGE — This versatile module use is to provide rack space above the return modules or above transport mounted reel to reel machines. Rack heights and the number of rack bays vary according to your exact needs.

TSR — TOP SLOPED RACK — Used mainly to house reel to reel machines. This rack can be used for patch bays and any other gear that needs to be kept at a low profile on the countertop.

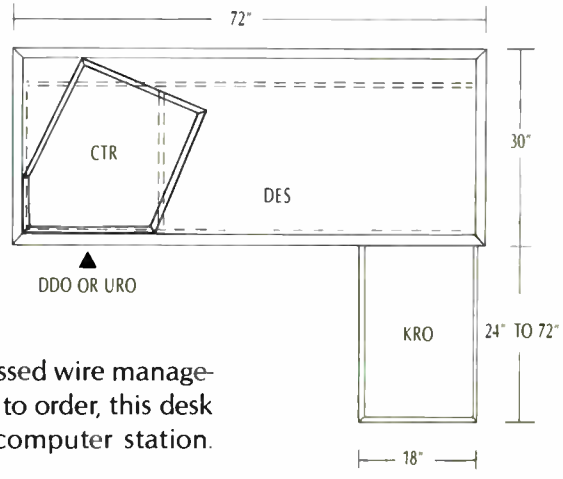
GTR — GUEST TURRET RACK — This panel rack attaches to the top of the Guest Position Shelf. Timers, cough buttons and headphone controls can be mounted in panel face.

RPC — RACK PANEL COVER — These panels cover empty rack space and should be ordered after equipment installation.

▲ DUB/EDIT STATION ▲

SYSTEM COMPONENTS

DES — DUB/EDIT STATION
KRO — KEYBOARD RETURN OPTION
DDO — DOUBLE DRAWER OPTION
URO — UNDERCOUNTER RACK OPTION



This electronic desk system offers a recessed wire management area and flexibility of layout. Built to order, this desk can be used for a dub, edit, CAD or computer station.

World Radio History

TTC's Kitchen Resigns

Louisville CO Television Technology Corp. (TTC) President and CEO Bill Kitchen has resigned in what he described as a move to focus on his radio holdings and form a new broadcast equipment company.

The announcement was made 27 January in a statement from TTC that revealed Dr. Byron and Julie St. Clair have reacquired approximately 40% of outstanding stock Kitchen bought from the St. Clairs in 1988. With the sale of the stock, Kitchen resigned as president, CEO and director. St. Clair will resume active management of the company, according to TTC.

As a result of the transaction, the St. Clairs now own approximately 57% of the outstanding shares of TTC. Kitchen will retain options granted in 1986 to acquire approximately 1,666,000 shares of TTC stock, and in connection with Kitchen's resignation, the options have been extended for three years.

Founded in 1967 by St. Clair, TTC designs, manufactures and markets TV and radio broadcast transmitter products.

"It was his choice to enter into an agreement to leave," St. Clair said. He declined to comment further and referred questions to Kitchen.

Kitchen became president in March 1986 and acquired the stock in 1988.

"I expect to be back in business delivering all solid-state TV and radio transmitters," Kitchen said.

His radio station holdings include KRKY-AM, Granby, CO, and KRKM-FM, Kremmling, CO. Outside the US, Kitchen owns three stations in the Caribbean, and he has a construction permit for a 50,000 W AM in American Samoa in the South Pacific.

For information from TTC call 303-665-8000. Contact Bill Kitchen at 303-665-3767.

BSW Halts Reloading

Tacoma WA Broadcast Supply West (BSW) has ended its cartridge reloading business, citing cost inefficiencies.

BSW President Bernice McCullough said increases in the price of tape, parts and cleaning solutions, a decline in music length carts and difficulty in training and maintaining personnel to handle the specialized job led to the decision.

"The price of a reloaded cartridge came too close to new cartridge prices," McCullough said. "Engineers started asking themselves if it was worth the effort to have their carts reloaded when brand new ones sell for just a bit more."

More stations also are playing compact discs directly on-air, she added, so they are using fewer music length cartridges.

There is no change in BSW's other business activities, McCullough said.

"BSW's business in new equipment sales is growing at an incredible rate," McCullough said.

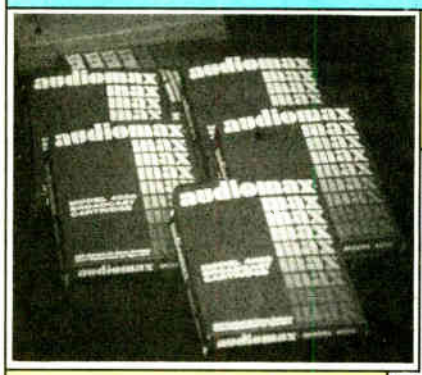
BSW Marketing VP Tim Schwieger said new cartridge sales are solid with a slight downturn mainly in the 3.5- to 5.5-minute lengths.

"Station engineers are demanding better quality cartridges so they will mix in better with compact discs," he said. "The manufacturers of cartridges are incorporating much better tape offering improved frequency response, less noise and more phase and flutter stability."

He also said cartridge machine manufacturers are producing outstanding machines with features for better recording and playback response.

For information from BSW, call 1-800-426-8434.

Scenes from NRB



(left) Fidelipac featured the new Audiomax Model 4000 broadcast cartridge, while Continental's NRB introduction was a line of solid state FM transmitters (center).

(below) FM exciters and monitors, as well as the CAT/LINK digital STL/TSL were prominently displayed at QEI's booth.

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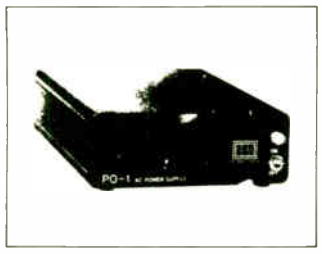

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Circle 24 On Reader Service Card

World Radio History

A Look Inside the NAB Test CD

by Ty Ford

Baltimore MD In the middle of 1988, Stan Salek left his position as Engineering Manager at Circuit Research Labs (CRL) to come to work as a staff engineer for the NAB in Washington. His move put into motion a sequence of events that resulted in the NAB Broadcast and Audio System Test CD.

In case you missed its debut release in November of '88, be advised that while it'll never show up on *Casey Kasem's Countdown*, it will probably be number one on the radio engineering and audio production top ten.

PRODUCER'S FILE

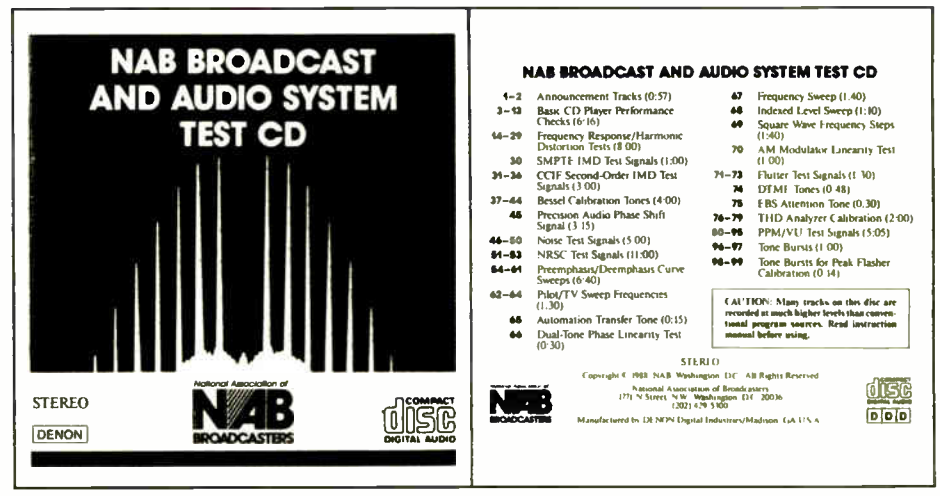
The idea originally came out of a need for simple and affordable NRSC test gear. Salek, who had many AM pet projects while at CRL, found quick acceptance at the NAB for his test CD concept. He then went about the task of researching what other tracks should be included on the disc.

"I surveyed the engineering staff over here (NAB) and also got a lot of help from Geoff Mendenhall, VP of Engineering management at Broadcast Electronics. The BE staff of 27 engineers provided a survey of more than enough tracks to fill the CD."

As the project continued, Salek began looking for someone to produce the final product. At the end of that search, Denon was chosen.

As part of the deal, Denon offered to generate all of the tracks in the digital domain. IBM compatible PCs with special interfaces were used to create the programs. According to Salek, "Most of the material is so precise or so difficult that it's almost impossible to make them up with standard test equipment."

Figure the engineering budget that you'd need to get all the test gear necessary to generate this collection of sounds. Since the test CD costs only $40, you could use that money to give your engineer a raise and be well on the way to a new transmitter. After you got the new transmitter (which would operate at the new NRSC standards) you could use the test CD to keep everything in spec. Although the NAB Broadcast and Audio System Test CD comes with a 21 page booklet that does a good job of explaining everything you need to know, I found the "Use and Applications" paper written by Salek a useful addition, even though it duplicates some of the information. Maybe you can get him to send one along when you order the CD.



terizing composite FM signals.

According to the manual, tracks 31 to 36 provide the necessary tones for CCIF second-order IMD tests. This type of distortion often increases rapidly at frequencies above 10 kHz, causing different products to distort lower audio frequencies.

Typically, the cause relates to transmitters, matching networks and antenna systems that become non-linear at 10 kHz or more removed from the carrier frequency of the station. Several stations that have employed the sharp filtering characteristics of the NRSC-1 standard have reported higher audio quality, even on narrow bandwidth receivers.

Equipment alignment

Although you need a good oscilloscope and a distortion analyzer and a spectrum analyzer for some of the more intricate tests, I found the first 29 tracks very useful for equipment and tape machine alignment.

Tracks 1 to 13 combine channel assignment and phase checks, a variety of reference tones, sine wave frequency and level sweeps, separation tests, phase/delay linearity, infinity zero silence (with all bits set to zero) and silence plus one bit alternating at 22.05 kHz.

The "silence plus one" signal is great for opening the analog mute circuits used to keep residual noise from reaching the output. Tracks 14 to 29B provide mono tones from 20 Hz to 20 kHz for manually sweeping tape systems, audio amplifiers or complete broadcast audio chains.

Track 30 provides SMPTE intermodulation distortion (IMD) test signals for testing both linear systems and characterizing composite FM signals.

According to the manual, tracks 31 to 36 provide the necessary tones for CCIF second-order IMD tests. This type of distortion often increases rapidly at frequencies above 10 kHz, causing different products to distort lower audio frequencies.

Typically, the cause relates to transmitters, matching networks and antenna systems that become non-linear at 10 kHz or more removed from the carrier frequency of the station. Several stations that have employed the sharp filtering characteristics of the NRSC-1 standard have reported higher audio quality, even on narrow bandwidth receivers.

Carrier null checking

Tracks 37 to 44 are Bessel calibration tones for FM systems which provide exact modulating frequencies for checking carrier null at 100% modulation.

They include 82.5 kHz (FM broadcast plus two subcarriers), 75 kHz (FM broad-

(continued on page 25)

Hot Spots Revisited

by Steve Crowley

Washington DC In a move that will make radio frequency radiation (RFR) measurements less of a problem for stations, the FCC has adopted new criteria for the environmental evaluation of RFR "hot-spots" or intense, localized fields.

In addition, the agency has adopted new rules for RFR evaluation when exposure guidelines are exceeded due to the presence of multiple transmitters.

The new criteria, contained in a Report and Order in General Docket No. 88-469, are the culmination of a proceeding dating back to September, 1988. Then, the Commission adopted a Notice of Proposed Rulemaking to consider amending its environmental rules to handle hot-spot and multiple transmitter concerns.

CONSULTANTS CORNER

Best judgement

The Commission has adopted the following guideline (it's not a rule)—they call it their "best judgement" concerning this topic: " . . . it is recommended that during routine measurements of radio frequency fields for compliance purposes, a minimum separation distance of 20 cm be maintained between a re-radiating object and the closest sensing element of a probe. However, as a precautionary measure it is recommended that consideration be given to the presence of intense, localized fields in the range of 10-20 cm from the re-radiating object."

What do they mean by "consideration" of the 10-20 cm range? In its discussion of the new guideline the Commission gives an example where there are excessive fields in the 10-20 cm region. In that case, signs could be posted noting the presence of a localized high field strength and advising that the area should be avoided for periods that exceed the ANSI six-minute averaging period.

The Commission goes on to note that even though the posting of this information will not be required for showing compliance with the ANSI protection guides, it is recommended as a precaution.

(continued on page 19)

Orban's model 464A is a four stage gain control system designed to provide your facility with consistent, high-quality sound while it protects from overload or damage.

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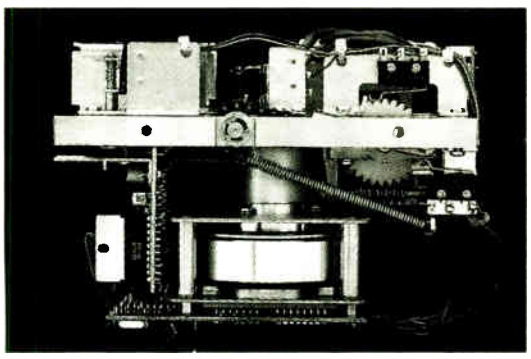
Circle 45 On Reader Service Card

World Radio History

The cart machine with bells and whistles your audience will never hear.

Finally, a cart that delivers the creature comforts that other Otari audio machines have offered for years! And not only does Otari's CTM-10 make your job easier, it also delivers outstanding audio performance, so your output sounds more like a CD player than a cart.



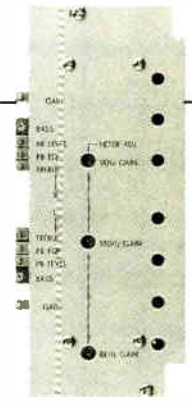
Heavy duty, direct drive capstan provides accuracy and reliability.

You get extensive metering, including dedicated metering for the cue-track. (Now you can verify the cue-tone *before* you go on-air!) And for adjustments to program length, there's a *true* vari-speed control.

You'll also find a record azimuth adjustment system *with phase display* for when you want to make the best recording possible.

But the CTM-10 is not all just bells and whistles. It's the only cart you can buy with HX-Pro.* That means that you can get a really hot signal off the tape, and still keep those high frequencies where they need to be for that crisp, clear sound.

And some things we keep real cool, like we don't use solenoids for our pinchroller because they can generate excess heat. You'll also appreciate the CTM-10's fast start time—it lets you cue up tighter without worrying about wow.



Equalization adjustments are easy to reach and clearly marked, making maintenance and service fast and easy.

And, of course, we give you choice. There are stereo *and* mono record/play decks, *and* a mono/stereo play-only deck.

Call us at (415) 341-5900 for more information about the CTM-10. The cart machine we built for perfectionists.

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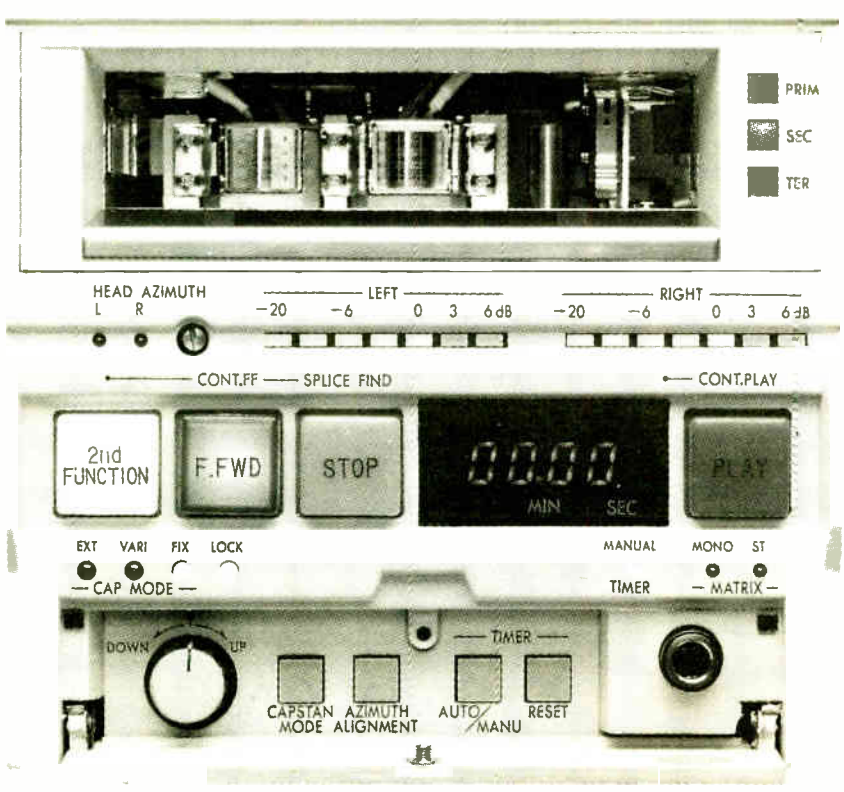

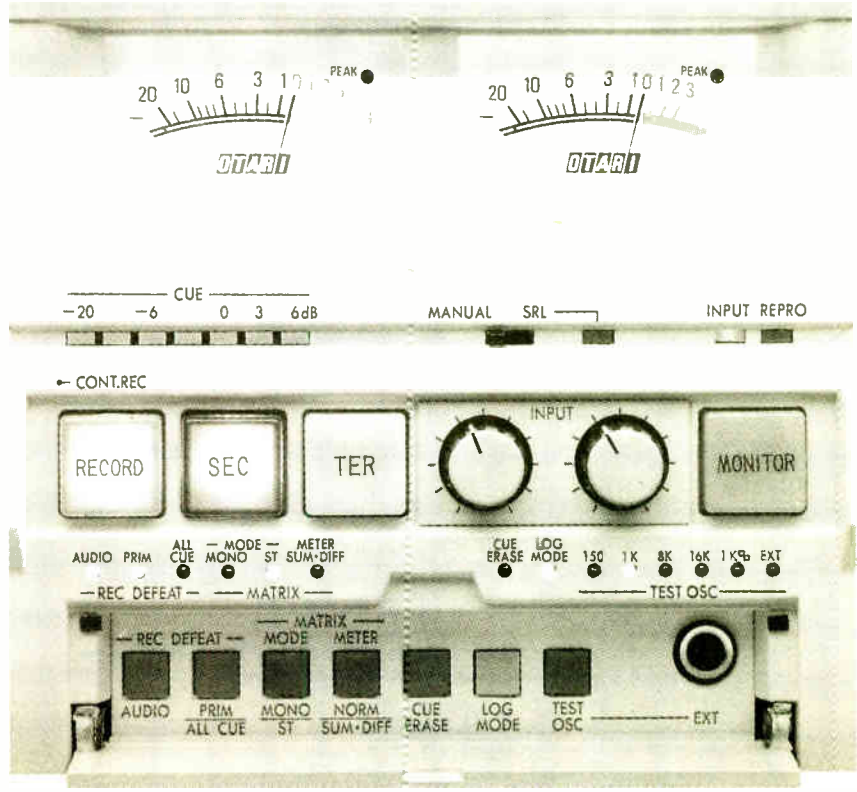

*HX-Pro is a trademark of Dolby Laboratories Licensing Corporation

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Circle 54 On Reader Service Card

KBSG Has a Change of View

by Dee McVicker

Seattle WA In 1948, the Seattle skyline offered a panoramic view of Puget Sound, the Olympic Mountains and the Cascades. It still does. But in that year a large metropolitan skyline wasn't yet on the horizon.

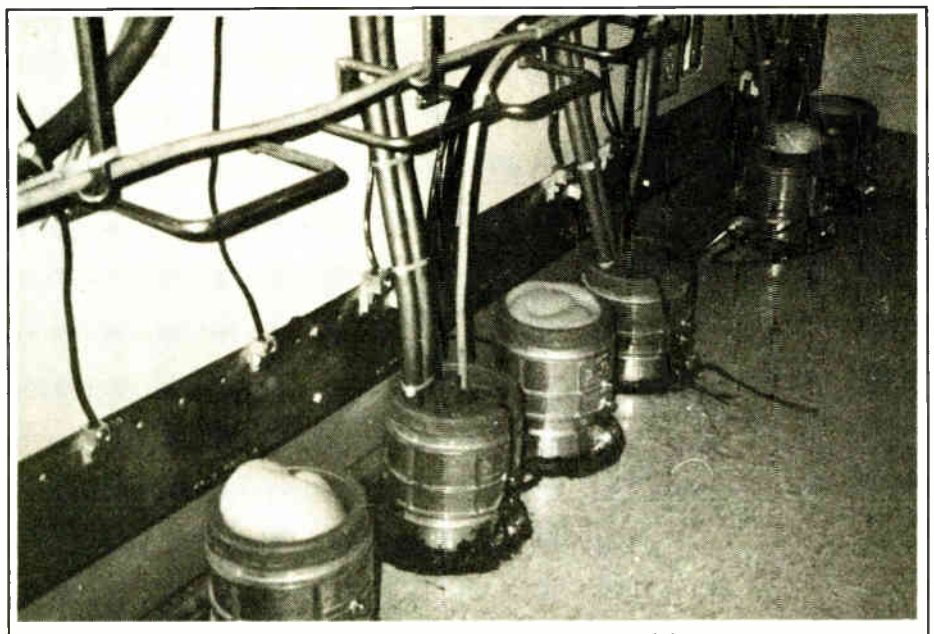
In any case, the founding fathers of KBSG-FM—then KTNT—weren't concerned with the Seattle skyline. They had a new FM station to put up in Tacoma, one of the few FMs built during this era without the omnipresence of a sister AM.

FACILITIES SHOWCASE

Some 30 years later, the skyline and KBSG would have a change of view. On the immediate horizon was one large metropolitan skyline that stretched from Seattle to Tacoma. Also on the immediate horizon was the inevitable retirement of KBSG's founding fathers. Getting up in years, the founders of Tribune Publishing Company wanted to retire from an empire that included not only KBSG-FM, but an AM station, a TV station and two newspapers.

Media giant Viacom Broadcast Group picked up Tribune Publishing Company's FM station in 1987. Recognizing that the old transmitter site in Tacoma, with its peripheral coverage of the Seattle area, did not address current demographics, the group tackled the it first.

CE Clay Freinwald, a KBSG veteran and a broadcaster who had been in the market for 30 years, set to work building a new site on Tiger Mountain, a 3125′ peak located 18 miles east of Seattle. It was by no means a small project, being the first master combiner FM antenna system built in the Pacific Northwest. The tower is now home to four other FM stations in the market.



Each studio in KBSG is connected to engineering by two 4" conduits.

In 1988 Freinwald began looking for a new studio location that would put KBSG-FM on the Seattle map. He found it on the north end of Seattle's high-rise core at 20 floors up in a new building structure.

In contrast to the old facility, which had housed a radio legend since 1948, the new building is a tribute to modern architecture. "We've had it described as a Spam™ can," said Freinwald. "It's actually a parallelogram."

It was chosen, said Freinwald half in jest, "because of its spectacular view." The new studios, at the top floor, offer a spectacular view of the mountains, the harbor and a direct line of sight to Tiger Mountain.

Studio trio

Freinwald described the facility's layout as a trio of studios—the on-air, the newsroom and a two-track production—along one wall with an eight-track studio across the hall. But the layout, he said, is secondary to the acoustical properties of the facility.

"The studios had some rather stringent sound criteria they had to meet, and they did," he said. Freinwald, with the guidance of Seattle acoustical consultant firm Michael Yantis and Associates, modeled the acoustical layout from ASTM requirements. All told, the studio complex would be, as Freinwald described it, "a box within a box." Nothing, he explained, touches the outside world.

To give extreme isolation from low frequency noises, the concrete flooring, which was pumped up onto the 20th

(continued on page 20)

KBSG's studios and offices occupy the 20th floor of Seattle's Metropolitan Park East.

It's hard to stop.

It's hard to stop.

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

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World Radio History

Computer Contour Calculations

by Barry Mishkind

Tucson AZ How would you like to have a little program that can tell you how far your FM signal contours will reach?

It might even help you to develop your own converge map. Or deal with a manager who wants to know how far good reception should be expected for the signal. All without going blind on the charts from the Rules.

This month we will discuss such a program, and how you can get it without busting your budget.

COVPRED, a program I designed, is not very complex and it does not give precise figures for use on FCC filings. However, COVPRED does let you see the basic size of your theoretical pattern.

Figure 1.

```
          THEORETICAL COVERAGE CONTOURS FOR FM
        Antenna HAAT in Feet? 300

        ERP in kW? 3

        Contour field strength in dBu/m (-1 = presets)? -1

distance to 70 dBu (3.16 mV) contour:  8.2 miles or 13.2 kilometers
distance to 60 dBu    (1 mV) contour:  14.4 miles or 23.1 kilometers
distance to 50 dBu  (316 µV) contour:  23.9 miles or 38.4 kilometers
distance to 40 dBu  (100 µV) contour:  36.6 miles or 58.9 kilometers
distance to 34 dBu   (50 µV) contour:  45.8 miles or 73.7 kilometers
        change: <H>eight, <P>ower, <D>bu, <E>xit?
```

Figure 2.

```
            THEORETICAL COVERAGE CONTOURS FOR FM
          Antenna HAAT in Feet? 300

          ERP in kW? 3

          Contour field strength in dBu/m (-1 = presets)? 80

    distance to 80 dBu contour:  4.5 miles or 7.2 kilometers

          change: <H>eight, <P>ower, <D>bu, <E>xit?
```

ECLECTIC ENGINEER

And, as you can dynamically manipulate the power, height and desired parameters of interest, you can also see the effects they have upon coverage.

What it is

One of the nice features of COVPRED is that it allows you to zero in on the field strength(s) of interest for your station.

Many times, the contour of interest will be the 3.16 mV (70 dBu) contour, often referred to as a "city grade" signal, or the 1 mV (60 dBu) contour, the more rural coverage.

But, suppose for example you have lots of high rise and other densely constructed buildings you must penetrate? In such a case, you may want to know where your 80 dBu or higher contour reaches.

Conversely, out in open areas, there may well be quite fine reception out to the 50 dbU or 316 µV level. Modern

(continued on poge 27)

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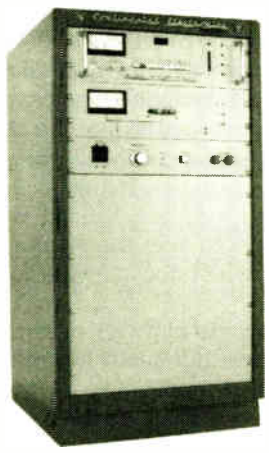
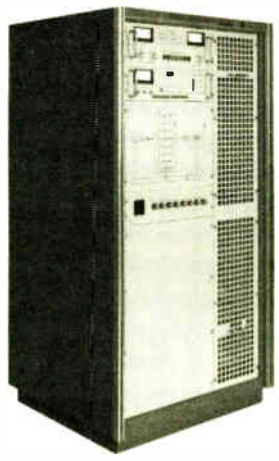
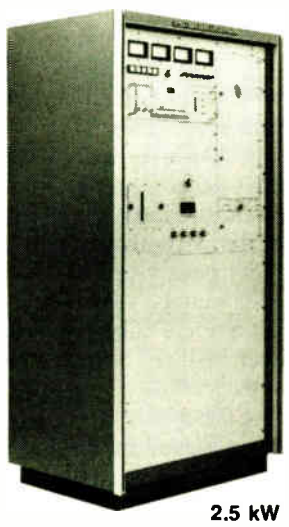


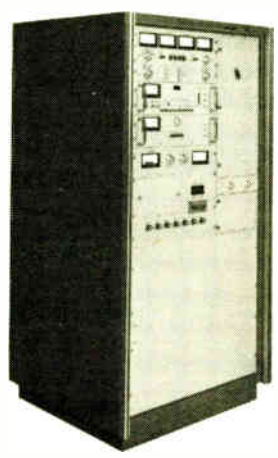
500/1000W



3.8 kW



2.5 kW



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World Radio History

FROM THE TRENCHES

by Alan Peterson

Tricks of the Trade

Dear *JG*—

The report from the ol' trench starts off with my very favorite question, asked by nearly everybody I meet:

"Al, what's your very favorite production trick?"

Well-llll, like magicians, good production rats like to keep their best sounds a secret. But, out of the inkwell come a few gems, trade secrets, so to speak, I wouldn't mind revealing.

Let's start with: pitch shifter before reverb. The ambient effect is a half-octave below normal voice—weird!

How about: subtle chorusing effects to give a shimmer to sound? Much nicer to experience than the mind-numbing *shoop-shoopshoop* of most chorus generators.

We full-scale production types don't like to admit it, but there are *dirty* tricks as well (why do ya think they call us "rats?").

Like loading Little Richard's "Wop-Bop-A-Loo-Bomp" into a sampler and letting it loop ad infinitum all weekend long. Pity the poor weekender who has never seen an Emulator before and has to endure it for five hours.

And when things get really dull, I head to WHYN Springfield, book time in Production "A" and kill time creating Lissajous pretzel pictures on the phase-scope. I figure with five SPX 90s and a little DC offset on each, I may be able to replicate the Olympic logo of five rings.

Like every good razor-head reading this, my most favorite trick of all time is making other razor-heads wonder, "now how the heck did he do that?"

Cruel? Not really. PDs fake out other PDs all the time ... "Hey, guess what kinda signal proc I've got in my line this week? Am I really using CDs on-air or Edison cylinders? Do you hear the big Orban processor on my jock mic or a CBS Audimax? Eat my dust sucker!!! HAHAHAHA!"

What makes it so much fun for me is the element of sophistication my friends enjoy in their positions ... it makes them forget some of the simplest tricks. This drives them batty.

Case in point: I sent an associate a spot I did. Now this guy has a MIDI setup at home which makes my humble four-track rig look like a Muppet Babies cassette player. The spot in question had a "talking synthesizer" stinger and right away he dove in to figure out how I did it.

"Al, I think I've got it figured out. I've set up my MIDI-programmable EQ (I don't own one) to filter sounds the way your mouth does. My sequencer (better than I've ever seen) sends note info to my synth (biggest #$!&* Roland I've come across) and program change data to the EQ. It still sounds pretty rough but I'm onto you...now don't tell me how you did it!"

. . . my favorite trick is the one I haven't done yet . . .

He always tells me that—don't tell me how you did it. Ninety percent of the fun in his life is the thrill of the chase. If he can't do it on his MIDI gear, he'll try speech synthesis. If that doesn't work, he'll try resynthesis, using Fast Fourier Transform to alter the harmonics in his voice. He just doesn't want to hear how I did it.

I'm sorry to blow his dream out of the water Jude, but I can't live with my conscience anymore ...

Paul, here's how it's done. Stick a hose into a cheap speaker driver, put the other end in your mouth, bang on a toy Casio keyboard and say the name of the client. In other words, the old Peter Frampton Talk-Box—a homemade Sonovox (which I believe is a trademark name, so I use it with care), a wah-wah tube ... Paul, I'm talking *low-tech*!

I'm talking days of old when tape was gold and analog was "in," you worked the faders with your toes and reel-flange with your chin.

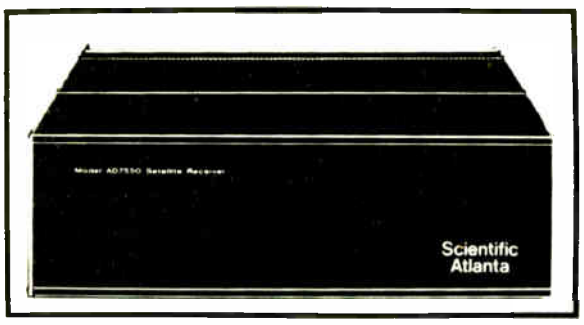
Ain't poetry grand?

This may be a complete one-eighty to most readers of my jottings, but it's true. Never lose the vision, but don't forget the basics.

The fundamentals of what we do must not get buried by the Brave New World of technology. I still flange with my thumbs from time to time, I still keep an oatmeal box handy for mic tricks (hey, it's the right thing to do!) and—to the chagrin of console manufacturers all

(continued on page 28)

Is Your Radio Station Ready for Baseball?



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World Radio History

FCC Revamps Its Old Hot Spot Regulations

(continued from page 14)

Keep in mind that these distances are from the re-radiating object to the closest "sensing element" of the probe. On most probes, the sensing elements are not exposed and are surrounded by a styrofoam shell; the thickness of this shell has to be taken into account. According to OST Bulletin No. 65, most broadband survey instruments have a 5 cm separation built into the probe.

Rule revision

As proposed in 1988, the Commission has revised Section 1.1307(b) of the rules regarding instances in which exposure guidelines are exceeded due to multiple transmitters at a common site.

In such cases, actions necessary to bring an area into compliance shall be the shared responsibility of all licensees, not otherwise categorically excluded (like licensees of land-mobile transmitters or FM boosters with transmitter power of 10 watts or less), whose transmitters contribute more than one percent of exposure limits.

This will help, for example, when a station wants to increase power at a location some distance away from a multiple-transmitter site that already has RFR problems. If that station's field strength at the multiple-transmitter site is less than one percent of its ANSI limit, it should be OK (at least regarding the multiple-transmitter site).

Some parties in this proceeding supported a five percent threshold, which would have provided even greater relief for broadcasters. The Environmental Protection Agency opposed this though, saying five percent of the ANSI iimits "is not a trivial exposure." (This from the same agency that stopped work on developing federal guidelines for RFR exposure because it found no demonstrable harm was caused to the public. Oh well . . .)

A final note. Even if you meet the one percent exclusion criteria, the hot-spot guideline, or are categorically excluded, there is a provision in the rules which states that if any interested person (a competitor?) alleges that a particular action will have a significant environmental effect, the FCC may require the preparation of an environmental assessment.

■ ■ ■

Steve Crowley is a registered professional engineer with the consulting firm of du Treil, Lundin & Rackley, Inc., 1019 19th Street, NW, Third Floor, Washington, DC, 20036. He can be reached at 202-223-6700, or by FAX at 202-466-2042.

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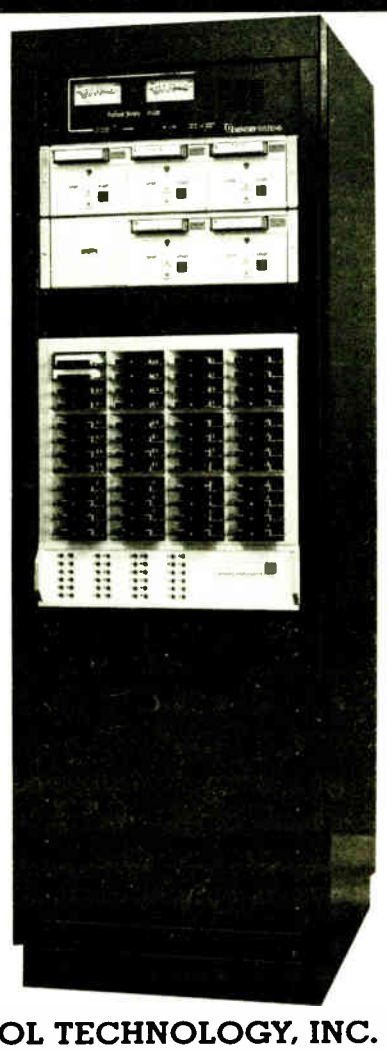

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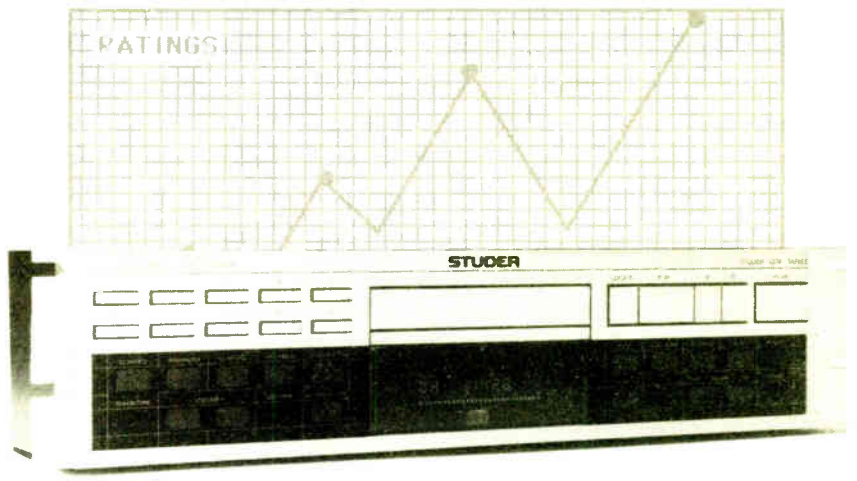
Rack Up Some Points...



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World Radio History

KBSG Settles into New Digs

(continued from page 16)

floor from street level in "one pump," was jacked up an inch and a half. At approximately 4" thick, the flooring is isolated from the building floor on spring isolators.

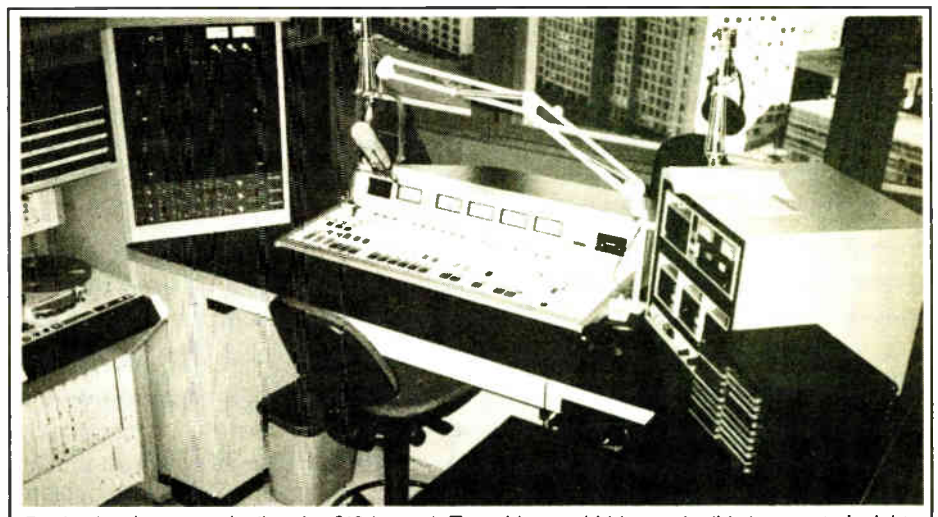
Linking studios to engineering

Freinwald elected to install 4" conduits that provide an interconnection path between the studios and the engineering area, with two conduit penetrations through the studios' floors—one for speakers and one for electrical. This, said Freinwald, "will allow us to change consoles, complete cabinetry—lots of capacity for the future."

Encompassing the conduits is an elastic material that allows movement of sound without transferring the audible effects to the studios. This extreme-measure isolation, said Freinwald, "prohibits transference of vibration from the building floor via the conduit in the floating floor."

Being on the top floor, KBSG was favored with an uncommon 18 feet of floor-to-ceiling clearance. Naturally, Freinwald made good use of the extra footage by suspending the ceiling without space limitations. Described by Freinwald as "relatively standard," the suspended ceiling is three ceilings deep—each doubling up on 5/8" sheetrock.

The studio walls and doors are equally insulated from the outside world, with some doors weighing in at approximately 400 pounds and walls double-layered in sheetrock. And to look out at the outside world, multiple layers of heavy glass were placed between the viewer and the building windows.

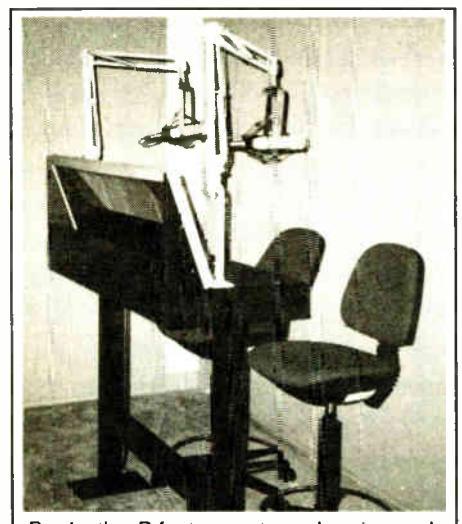


Production A uses an Auditronics 218 (center). Turntables are hidden under lids to operator's right.

All this acoustical preparation was not lost on the studios. Freinwald tackled equipment and furniture requirements with the same enthusiasm for quality.

After reviewing furniture designs by broadcast vendors, Freinwald decided to capitalize on local talent, Master Millwork in Tacoma. Not usually found in broadcasting environments, Master Millwork had recently completed a studio project for another Seattle station and Freinwald was impressed with the firm's work. As for broadcast vendors, said Freinwald, "I didn't find anything in their offerings that addressed specifically what I wanted to do."

What Freinwald wanted to do was build a studio complex free of unsightly wires and metal racks. "I detest two things in studios," said Freinwald, "open metal cabinetry and visible wires."



Production B features a two-mic voice position for talent.

Cabinets to cubbyholes

Freinwald designed cabinet encasings for the equipment racks and even went as far as to design "cubbyholes" for studio telephones. With most of the wires and racks cloaked behind cabinetry, the only visible wires in KBSG's new studios are those that are necessary: the microphone wires, telephone cords and headset wires.

In the eight-track room, built around a 24-input Auditronics 400 console, are one Otari MX-70 reel-to-reel, two Otari MTR-10 reel-to-reels, two Technics 770 CD players, a Teac cassette deck, and three cart machines: an ITC 99 record/playback and two ITC Delta playbacks.

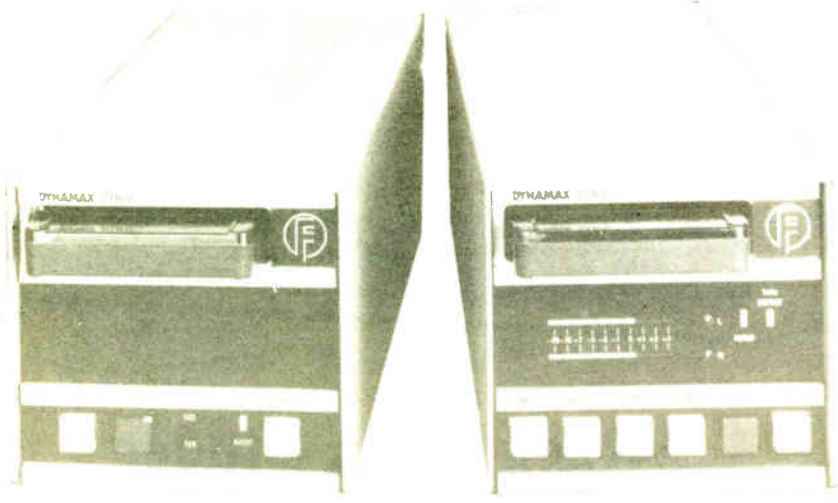
Although the station rarely uses vinyl source, two SP10 Technics turntables are "there if they need them." This approach to redundant source gear can found throughout the facility.

A unique contribution to the eight-track studio is what Freinwald calls a "voice position table." Far removed from console control for sound isolation, this station is where talent do the majority of their multiple voice overdubbing.

The eight-track studio features four

(continued on page 26)

THE LEADERS . . .
from THE LEADERS



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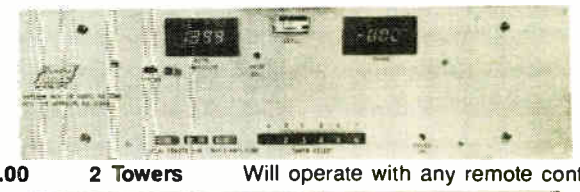

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World Radio History

Modular Studio Construction

by Thomas L. Vernon

Harrisburg PA Let's face it, building new studios can be a nightmare. This is especially true when the budget is limited, as is often the case in many small market stations.

It's tough to find architects experienced with soundproof construction and even tougher to find contractors willing to follow detailed plans necessary to ensure that there are no sound leaks.

Too often the results of this scenario are studios where sounds from one room are plainly audible in the adjacent studio and it's always too hot or too cold to work comfortably for more than a few minutes. But there is an alternative to local on-site construction of soundproof studios—modular enclosures.

Assembling prefabricated studios takes a good collection of hand tools. You may want to have duplicates of some tools, so several people can be working on similar tasks simultaneously. Here's a partial list of what's necessary.

- Air compressor with pop rivet gun
- Several pairs of large, needle-nosed vice grips
- Quarter-inch variable speed reversible drill
- Several 9/32" drill bits
- Several large rubber mallets
- At least two 6' ladders
- Large chassis punch
- Three-foot carpenter level
- Large crow bar
- Hack saw
- Large "C" clamps
- Two caulking guns

Prefabricated rooms are usually custom designed to the user's specifications and include lighting, electrical outlets and ventilation as part of the package. Assembly time for a modest sized room should be no more than three days. Cost is only slightly more than on-site construction and sound isolation specifications are guaranteed.

STATION SKETCHES

Similar preparation

Planning for modular enclosures is similar to that for conventional construction. A rough drawing is prepared by the user indicating inside and outside dimensions, locations of windows, doors and ventilation ducts. As you're planning space allotment, allow about 4" of space between existing walls and the new enclosure.

Additional clearance must be planned for air silencer panels. This spacing is necessary to insure the acoustic integrity of the modular enclosure and to facilitate construction. The only place it should come into contact with the building is via the sound isolation rails on the floor. You may want to bring in an architect to be sure your floors can safely withstand the added weight of these steel enclosures.

An option worth considering is a larger conduit. Normally, an empty 1" conduit is installed for your use. This runs from an opening on top of the roof to a junction box which is usually close to the floor. You may wish to specify a 2" or larger conduit if you need to pull a lot of audio cable.

These plans are submitted to the manufacturer who will supply you with blueprints that must be initialed and returned before construction begins.

It's a good idea to talk with the manufacturer's representatives about any questionable items you notice before "signing off" on the blueprint. After this point, changes may be impossible, or very expensive.

After the blueprints are sent in, plans should be made to unload and store the large crates containing the disassembled walls. Most motor freight companies will only deliver items to the end of the truck. You may need to rent a forklift to take it from there.

Planning the assembly

Plan on having a half dozen of your largest friends on hand to help with the unloading and later with the assembly. Not only will it take longer with fewer people, but there's a real danger of personal injury. Some of the larger wall panels can weigh over 500 pounds and

(continued on page 29)

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World Radio History

A Decision Maker's Checklist

by John Cummuta

Downers Grove IL The room was half lit, as gray began seeping through the blinds. I probed the nightstand for the TV remote control and pressed all the buttons until the screen snapped to life.

As sleep's fog cleared from my eyes, I heard the newsman talking about American troops. The tube flashed images of parachutes, tanks and troops, and they were shooting.

ENGINEERING MANAGER

At first I thought that this was simply a look back at Grenada, or maybe some exercise, but then the President came on. I'll never forget what he said, referencing the injuries to and threats against Americans in Panama:

"I decided that was enough!"

The rest, as we know, took a couple weeks. And now Noriega will get the same right every American enjoys: waiting nearly one, full, natural lifetime for his case to go through the American justice system. But the point I want to focus on is that one man, George Bush, made a management decision; and that's what set all that we saw in motion.

While you're not the President of the United States, and you can't send thousands of troops off with the wave of your pen, you are paid to make calculated decisions as a manager.

So let's look at the elements of successful decision-making, because the ability to make swift and solid decisions is one of the main skills that set leaders apart from people who just have management titles.

Have a method

Ben Franklin had a decision-making process that has been copied by a lot of successful managers over the years and it's simple. He would just draw a line down the center of a sheet of paper. On one side he wrote the reasons why he *should* take a given course of action and on the other side the reasons why he *should not*.

In most cases, if you've given this exercise sufficient effort, the proper decision should be visually evident. One side of the sheet will usually dwarf the other and the better choice becomes obvious.

But, beyond the technical system you use to effect your decision, you should also consider whether to make the choice alone—or with your troops? There are pros and cons for being the democrat and for being the dictator. It depends on the situation and its immediacy.

In most cases, if you have the time, it pays to incorporate your people into the process, because they will be more motivated to accomplish the decision's goals if they have a part in making the choice themselves.

In mentioning the Ben Franklin process above, I gave you an example of an analytical decision-making process. But don't ever lose sight of the value of your intuition. Whenever you're making a decision, listen to your gut. And, unless the facts to the contrary are overwhelming, don't go against your gut feelings.

Your intuition is really your subconscious mind's evaluation of the situation, taking into account every related experience you've ever had. In actuality, your intuitive feeling is really the result of an exhaustive analysis by your subconscious mind.

The legendary Will Rogers once said, "I've experienced many terrible things in my life . . . a few of which actually happened."

He was simply reminding us that the human mind tends to worry and fret about potential problems, well in advance of their reality and usually out of all proportion to their actual dimensions.

Whenever you feel yourself wanting to make a decision, just take a moment to ask yourself whether this decision must be made now. Then ask yourself whether the deadline you're basing your calculations on is real or arbitrary. Many decisions work themselves out, if left alone. Your instinct will help you identify which are which.

Sound advice

Two proverbial thoughts come to mind, when I ponder this question. The first is from the *Bible*: "There is wisdom in a multitude of counselors." That means that, in many cases, getting feedback from many different knowledgeable people will help you reach a wiser decision.

The other saying talks about lawyers, but it could apply to all of us. It goes, "Any lawyer who represents himself has a fool for a client." This also speaks of going outside your own experience for the knowledge and objectivity to make sound decisions.

Does this mean that you should never make an important decision without seeking wise counsel? It depends. It depends on the gravity of the decision, for sure, but also on your own personal and professional weaknesses, limitations and biases.

If you can't be objective about a given situation, or if your expertise or experience is limited in that area, don't hesitate to get input from people who may have faced the same dilemma. Whether or not they were successful when they made the decision they can share the realities of its consequences.

At one point in my journeys I was a Quality Assurance Engineer for Rockwell International. I can't tell you how many times, in engineering, in sales, in programming, in management, in writing, in training and in consulting that I've used some of the principles I learned in Quality Assurance.

All I would do is take a good concept that worked in the manufacturing arena and apply it to a completely different process. It would almost always come together like the chocolate and peanut butter in the candy commercials.

Synergisms

Synergy is the technical term, but what it means is that two or more unrelated concepts, organisms, organizations, people or whatever, come together to form a result that exceeds the value of any of the separate parts. Whenever possible in the decision making process, employ what I call experience synergy.

Look back into your experiences—not only in your present situation or job, but as far back as you can remember. Don't just consider similar or related experiences, but look for situations that had the same kind of pros and cons. And don't just remember times when you made the right decision. The fact is that we tend to learn a lot more from our mistakes than we do from our successes.

If you have the luxury of time, load all those experiences (think about them) into your subconscious mind and let them marinate for a day or two. You'll be amazed at the ideas that can come at you, seemingly out of the blue. They are actually the output of the world's most sophisticated computer and one that works 24 hours a day.

Make the call

The true mark of a leader is the ability to stand up and be counted when the tough calls come along. Many decisions will give you everything from headaches to heartaches, but they must be made. If you can't make them, get out of the way and let someone stand in the gap who can.

Even our kinder and gentler President is occasionally called upon to make some emotionally hard decisions and he appears to be up to the job.

You can be too, if you choose the right method, if the decision really needs to be made right now, if you're honest with yourself about your own limitations, if you draw on all your experiences and—if you have the guts.

■ ■ ■

John Cummuta is president of Advanced Marketing Concepts, Inc., a broadcast management and marketing consulting firm and a regular **RW** *columnist. He can be reached at 312-969-4400.*

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World Radio History

Built to Survive The Morning Zoo

Don't let its stylish chassis fool you: Micromax® is engineered from the inside out to handle everything your crew can throw at it. The way DJs in a hurry sometimes "slam-start" carts, for example. Ordinary cart machines can't always keep up with that kind of treatment. But Micromax's belt drive flywheel/capstan and DC servo pinch roller motor roll with the punches—they deliver smooth, wow-free starts in as little as 60 milliseconds.

PR&E engineers designed Micromax to the same high standards of dependability and efficiency as a Pacific Recorders console. In fact, it actually runs so efficiently that cooling vents are unnecessary. Cooler components are longer-lived components— and this is the coolest cart machine made.

It's loaded with standard features, too: Replay Inhibit, three cue tones, cue erase, auto fast recue and many more. Including Pacific Recorders' Maxtrax® tape heads* with matched electronics for outstanding audio quality.

On performance, features and reliability, Micromax will go head-to-head with any cart machine you can name (except, of course, our own Tomcat®). Yet its manufacturer-direct price will make extremely efficient use of your equipment budget. So if things sometimes get a little wild in your studio, your next step should be clear. Call PR&E for more detailed information on the cart machine that's engineered to hang tough and stay cool—Micromax.

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World Radio History

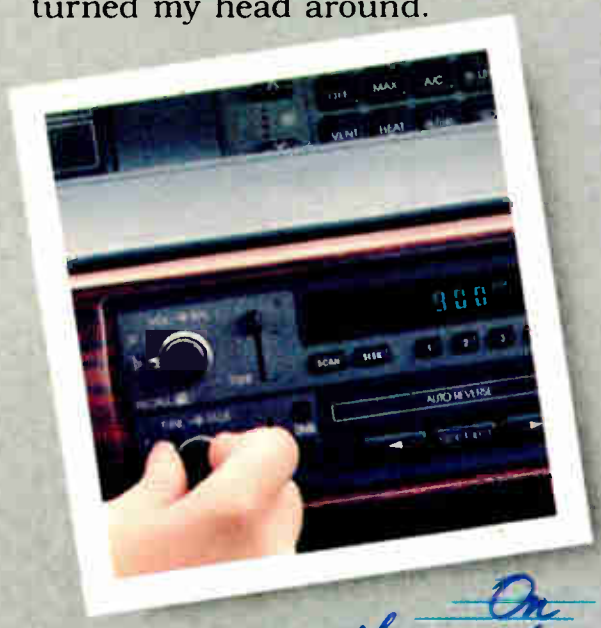
Harris Technology in Action

"We're burning up every other AM in the market with our new DX10."

WSEA AM serves the Delmarva region and South Jersey from Georgetown, Delaware. They recently acquired a 10 kW day/1 kW night directional authorization, a Harris DX 10 digitally modulated solid state AM transmitter—and a new Corporate Chief Engineer, Terry Dalton. "By the time WSEA's owner Great Scott Broadcasting hired me," Terry recalls, "they had already decided on the Harris. I could understand that, since the fifteen year old Gates at WSEA still passes its proof of performance tests. But I needed to be sold on the new Harris transmitter. I'd heard about the DX series' all-solid-state design and its digital modulation, but I didn't expect them to make much difference."

Chief Engineer Terry Dalton... AND "THE BLOWTORCH" WSEA'S NEW HARRIS DX 10 DIGITALLY MODULATED AM TRANSMITTER.

Terry ran his DX 10 into a dummy load at full power continuously for six weeks before putting it on the air. "I was ready to jump on the slightest malfunction," he admits, "but I couldn't find anything. That kind of stability and reliability was one thing that turned my head around.



On the road... OR AT HOME, DX PERFORMANCE IS AUDIBLY SUPERIOR.

The other was performance—in A/B comparisons we ran with the old Gates, the two signals were like day and night. We had NRSC-2 pre-emphasis on both and an Optimod® 9000 with the high end cranked all the way up on the Gates—but the Harris DX was still cleaner and brighter. The low end from the DX 10 was tight and punchy, with none of the old transmitter's boominess."

When WSEA finally put their new DX 10 on the air, they did it with no announcements at all. "That very first day," Terry reports, "we got calls from people picking us up in places where they never could before. Others commented on how much better we were sounding, even on car radios. We were still running 1 kW under our old non-directional authorization. But we were burning up every other AM in the market, including some that put out an audibly overmodulated signal. Our sales department immediately named this new DX 10 'The Blowtorch'."

Terry verified the DX 10's increased coverage personally on a drive to New Jersey. "I used to lose WSEA around Cape May," he says. "This last time, the signal stayed clear all the way to Atlantic City—a 35 mile increase in range without any more power.

Measurements showed me why we're getting out so much further now. The asymmetrics are incredible: I'm running 98/9% negative peaks and 119% positive, with absolutely no distortion or splatter. In tests, I've taken the positive peaks even higher, and it stays clean. Digital modulation and solid state circuitry make a real difference."

"I was ready to find things wrong with the DX 10," Terry admits, "But its performance and reliability have me 100% sold. As far as I'm concerned, any new Great Scott Broadcasting AM stations will have Harris DX transmitters."

We're glad the DX 10 won Terry Dalton over. It shows that DX transmitters are doing everything we expected of them. After all, real innovations should make a difference in the real world.

If you'd like more information on DX series AM transmitters from 10 to 50 kW*, call (217) 222-8200, Ext. 3408. If outside the continental US, fax your request to (217) 224-2764. And for studio equipment to take full advantage of DX transmitter performance, call Allied Broadcast Equipment at (800) 622-0022.

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World Radio History

NAB Puts Test Tones on Disc

(continued from page 14)

cast with no subcarriers), 50 kHz (stereo TV minus pilot and subcarriers), 25 kHz (mono TV subcarrier), 10 kHz (stereo TV SAP subcarrier), 6 and 4 kHz (FM carrier deviations) and 3 kHz (stereo TV PRO subcarrier).

The collection of 1 kHz 0 dB tones on track 45 move through a 360° phase shift, 10° per step. This program is great for checking the phase of tape systems, audio chains or the operation of phase meters.

Calibrated white, pink, USASI, CCIR and synthetic program noises comprise tracks 46 to 50. When used with a real-time/spectrum analyzer, these noises make easy work of system bandwidth and frequency response checks.

There are three tones for alignment and setup of NRSC-1 and NRSC-2 systems on tracks 51 to 53. They include a 200 Hz reference tone for calibration, a 9.5 kHz tone for low pass filter cutoff frequency measurement, and a ten minute long pulsed-USASI noise test.

Tracks 54-61 are commonly used transmission preemphasis and deemphasis curve functions; NRSC, 50 microsecond, 75 microsecond, and 150 microsecond. Sweeping existing curves with the complementary CD track makes life a lot easier.

. . .I found the 29 tracks very useful for equipment and tape machine alignment.

TV pilot and horizontal sweep frequencies for testing receiver/monitor decoder activation functions, as well as broadcasting encoding systems that synchronize to these frequencies, await you on tracks 62 to 64.

Track 65's 25 Hz tone is useful in trouble-shooting tone decoders for automation systems activated by that frequency.

Simultaneous 50 Hz and 15 kHz tones on track 66 provide a test signal to check the phase linearity of a device or system at both low and high frequencies. A 50 Hz and 15 kHz tone exactly aligned at zero crossings can be compared for discrepancies.

The frequency sweeps on track 67 make quick work of checking the frequency response of any piece of audio gear. The two sweeps are 20 to 20 kHz at −10 dB L+R the first time through, then the same sweeps for L−R.

Calibrating levels

The thirteen indexed 400 Hz tones on track 68 are recorded in 5 dB steps from 0 to −60 dB. Use them for calibrating level indicating devices. Each track lasts five seconds.

When used with a scope, Track 69's indexed discrete sweep of square waves, at −10 dB L+R from 20 Hz to 6300 Hz, you can simultaneously measure amplitude and phase errors.

Track 70 offers very precise 100 Hz triangle waves (L+R and L−R) for scope checking AM transmitter modulator linearity.

Do your wow and flutter measurements with the 30 one second tones at 3 kHz, 3.15 kHz and 12.5 kHz (0 dB L+R) on tracks 71 to 73.

Telephone tones

The sixteen Dual-Tone Multiple Frequency (DTMF) tones on track 74 replicate the tones most commonly used in telephone and broadcast remote control systems. Included are the four extra "supervisory" tones.

The EBS attention tone on track 75 can be useful in trouble shooting EBS monitor problems. Don't even think about using it to fool your friends.

Distortion analyzer calibration from .1% to 3% is possible with 0 Hz and 800 Hz calibrated tones on tracks 76 to 79.

Special test signals over a wide range of frequencies and levels from tracks 80 to 95 are used for checking peak program (PPM) and volume unit (VU) meter accuracy.

Short duration tone bursts at 1 kHz, at both −20 dB and 0 dB, make tracks 96 and 97 useful in checking the attack and delay circuitry in dynamic range processors.

The last two tone bursts on tracks 98 and 99 are specifically designed for checking peak flasher accuracy of FM broadcast modulation monitors.

All of the tracks are mastered to CD-ROM specifications, which means they're more accurate than music CDs. For more information on the NAB test CD or any ideas as to what you'd like to hear on volume II, call Stan Salek at 202-429-5391.

■ ■ ■

Ty Ford is an independent audio consultant and regular contributor to **RW**. *He is currently writing an advanced production book for Focal Press. Reach him by phone at 301-889-6201 or by MCI mail #347-6635.*

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"Send me literature." Circle 53.

World Radio History

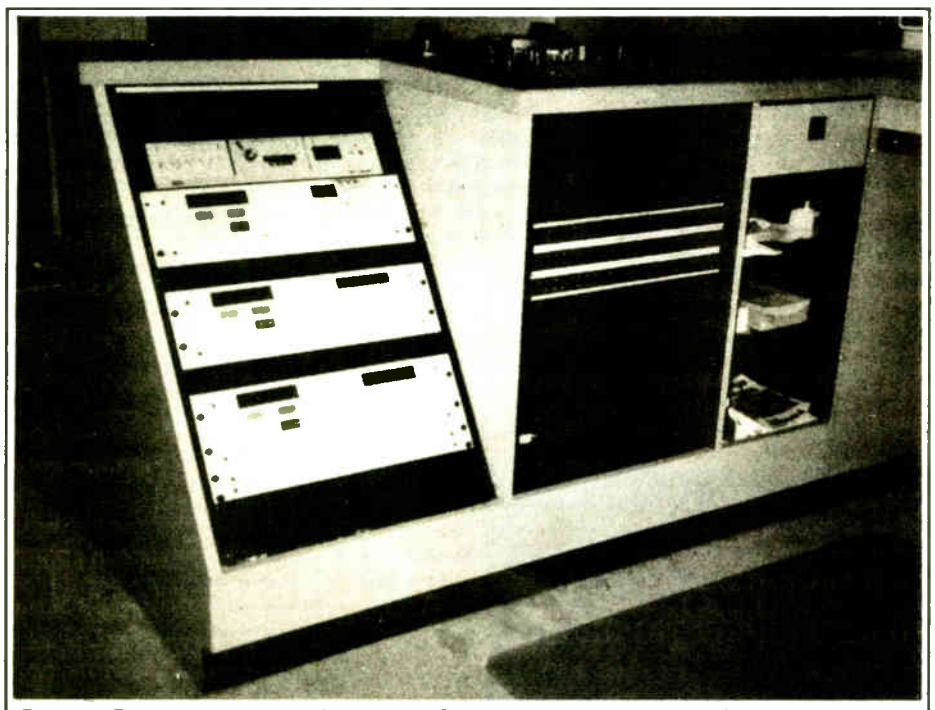
The All-New KBSG

(continued from page 20)

mic positions, which interface to Symetrix 528 microphone processors. Special effects processing, such as a Yamaha SPX, was brought over from the previous facility and mounted in an overbridge above the two-track reel machines.

In the two-track studio, built around an Auditronics 218 console in horseshoe arrangement like the eight-track, Freinwald added the same source gear as that found in the eight-track studio. For intuitive operation, he kept layout consistent from one studio to the next and devised a universal color code for console slider controls.

The on-air studio, which is directed by an Auditronics 218 console, was again equipped with much the same source gear found in the other studios. Freinwald maximized counter space with a turret to the right of the console for cart machines, and kept clutter to a minimum with a cart module. The cart module, he said, does keep carts organized.



Potomac R-16 remote controls for FM, FM Standby and AM are housed in the air studio.

Production B is built around the Auditronics 424 8-track console.

Two computer terminals also reside in the on-air studio for transmitter monitoring. The Potomac RC-16 system keeps a vigil over main and backup transmitters.

Newsroom setup

The smallest of the studios, the newsroom, was built around Autogram's new Pacemaker 828 console. Said Freinwald, "We looked for a console that would operate the same way—on/off push buttons, etc.—as all the other studios.

"We looked and looked and did not find anything. Then, along came Autogram with this brand new offering. Sight unseen, I bought it." Freinwald hasn't regretted it. The new 8-channel console "is recessed (into cabinetry), so it looks like it's a built-in countertop console." Support equipment for the new console includes three cart machines—also ITCs—an Otari MX 5050, AGC amplifier, graphic equalizer, VCR and several police scanners.

After the facility was completed, Viacom dropped yet another shoe. KASY-AM, licensed to Auburn, WA, was purchased by the media empire and integrated into the new studios as KBSG-AM for simulcast broadcasting. In keeping with KBSG-FM's legend as one of the first standalone FM stations with an AM to follow, this order of events seems only fitting for the station's next generation.

■ ■ ■

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

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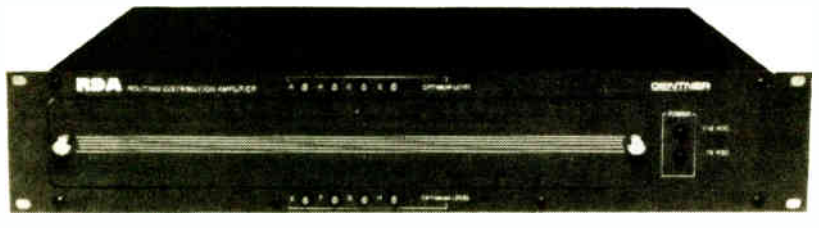

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World Radio History

COVPRED Computes Your Pattern's Size

(continued from page 17)
receivers require much less signal than earlier models, so you can pick the level you need.

By using COVPRED, you can get an idea of how close you may need to move your site to best serve your market. Or, you can see what a change in HAAT or power will do from either location.

I wrote COVPRED a couple of years ago, adapting a formula I got from a manufacturer. My manager had wanted to know what part of an adjacent larger market was in our theoretical coverage.

Sometimes it is hard to explain to a manager the relationship between power and coverage, especially if a class A is concerned. COVPRED made it a lot easier.

Also, we played a lot of "what if?", trying different antenna heights and powers, to see what effect that would have. Eventually, it was decided to seek C2 status.

Running the program

The program is self-contained and can be run by typing its name or by way of a user batch file.

It starts by asking for input of an antenna height over average terrain, power level and contour of interest. A negative number will deliver a preset selection of contours. (See Figure 1.)

As most topo maps are still using contours in feet, I have written the program for entry of HAAT in feet. However, a metric version was also produced for those who prefer to work that way.

If you grab your Application for CP from your engineering files, you will find the HAAT figures listed for eight or nine bearings. They will provide sufficient numbers for running a basic coverage plot.

By using the "H" selection, you can change the HAAT and the program will instantly recalculate the contour distances.

Similarly, if you wanted to know if a shopping mall located four miles away would receive at least 80 dBu of field strength, just choose the "D" selection and then enter 80. (See Figure 2.)

For DA stations, just remember to use the respective effective power for each azimuth of interest.

How much more coverage will you get if you upgrade to a C2? Just plug in the new power level and find out. Although the program does not automatically derate power for antenna heights above "nominal," watching the contour as different powers are plugged in quickly provides the answer.

Would you like to have a copy of COVPRED in your computer? Unfortunately it is just not practical to run the listings here in **RW**. Especially as the programs were written in Quick Basic.

However, if you wish to send me a diskette, I will run copies of both versions onto it and return it to you. I can handle either 5.25" or 3.5" diskettes.

I'll also include a quick summary of the instructions above, but I think you'll find the program simple enough. COVPRED has proven to be a nice time saving utility that I think you'll like.

My address is 2033 S. Augusta Place, Tucson, AZ, 85710. All I ask you is that cover postage and handling with a check or money order for $4.50. And, if I get swamped, your patience; I'll get them turned around as quick as I can.

Once you've had a chance to work with the program, call or write me with your feedback and I'll share some of your comments here.

■ ■ ■

Barry Mishkind, aka **RW***'s "Eclectic Engineer," is a consultant and contract engineer in Tucson. He can be reached at 602-296-3797.*

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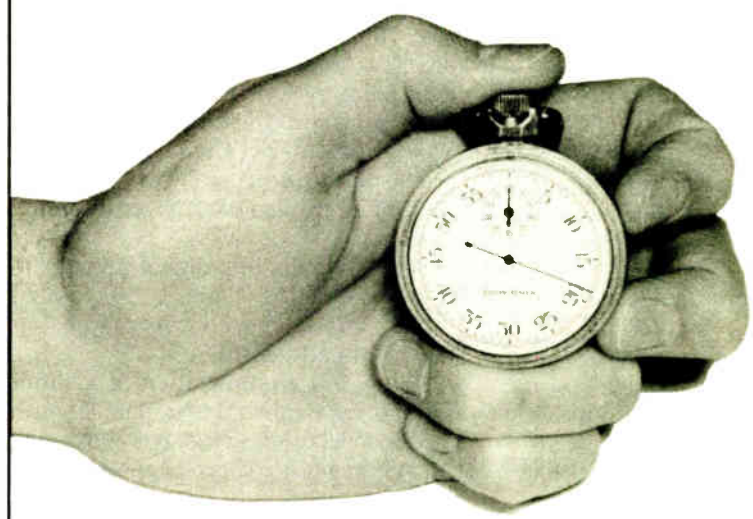

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Circle 87 On Reader Service Card

World Radio History

The Basics of Encoding Data

This is the fourth in a 12-part series called An Introduction to Digital Electronics. *Northern Virginia Community College will offer 1.3 CEUs (continuing education units) to registered students who successfully complete the course and an examination mailed at its conclusion.*

Successful completion of the course and the final exam will also earn 1.3 professional credits toward recertification under the maintenance of certification provisions of the SBE Certification Program. To register contact the Director of Continuing Education, Annandale Campus, 8333 Little River Turnpike, Annandale, VA 22003, or call 703-323-3159. The fee for the course is $20.

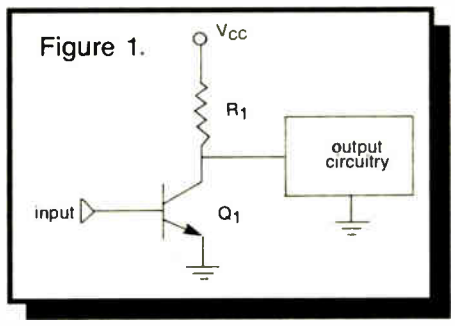
by Ed Montgomery

Part IV of XII

Annadale VA Digital electronics uses two levels of voltage to identify data: low indicating "0" (zero) and high indicating "1." The term "hardware" is used when considering the actual electronic components used to encode a binary number into a sequence of voltage levels. Each binary digit (abbreviated "bit") is a voltage level. Digital information consisting of bits is termed a "byte."

The original computers used vacuum tubes and relays to identify voltage levels. Vacuum tubes could switch levels but memory was maintained through the positions the relays were in: either open "0" or closed "1."

The concept of employing an electronic system of switches that contained information in an open or closed format was developed in 1939 by John



Atanasoff, at that time a professor at Iowa State. Atanasoff's theory of using the binary "base 2" system evolved into the first general-purpose computer: ENIAC, introduced in 1946.

Solid state technology brought the computer's digital technology out of the laboratory and into everyday business life. This technology has replaced magnetic memory systems which were physically large and consumed much power. Most digital devices today use bipolar transistors to do their work, although MOSFETs are also used in representing data.

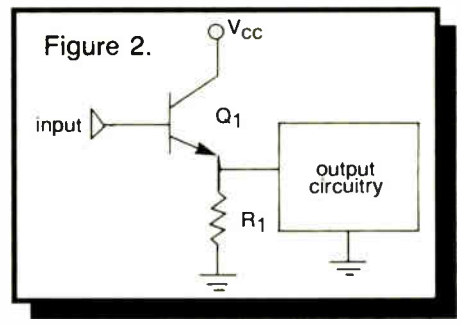
The two levels that digital circuits are concerned with, 0 and 1, are termed "logic" levels. These levels may be attained in various ways.

Figure 1 is an illustration of a shunt switch. Transistor Q1 is in parallel with the next electronics stage it is connected to. When no signal is applied to Q1's base, little or no current will flow and the total collector voltage will appear at the output, resulting in a high logic level "1."

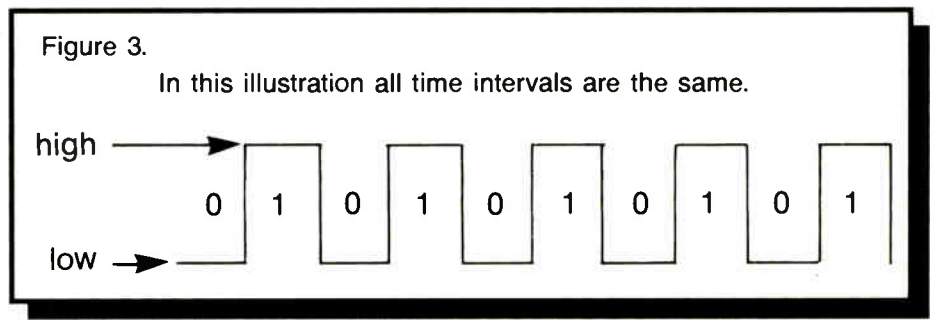
If a signal is applied to the input of Q1 that forward biases the base-emitter junction, the transistor will conduct. Because a conducting transistor's resistance is extremely low, the voltage output at the collector will drop and a "low" logic level will be produced.

Figure 2 illustrates a circuit where the output is in series with the transistor. When no signal is applied at the base, the transistor is cut-off and no voltage is produced across R1. A low logic level exists. When Q1 is forward biased, its resistance drops, current flows and a high voltage or logic level is produced across R1.

The difference between these two circuits is that the circuit in Figure 1 produces a high output with no input while Figure 2 produces a high output with a high input level. Figure 1 is known as an inverter.



Digital information applied to this type of a circuit can be transmitted in various ways. Serial data is information sent in a method similar to the telegraph. A series of high and low logic levels are transmitted with a specific amount of time allotted for each logic level. This is illustrated in Figure 3.



This type of information can be sent on one pair of wires or channel. It is the simplest and most economical approach to data transmission. However, all information must be supplied one bit at a time, slowing down processing.

Parallel data transmission is a method where all bits of a number or word are sent simultaneously. A separate channel or line is required for each bit. This is more expensive than serial transmission, but is superior in terms of speed.

■ ■ ■

Ed Montgomery currently is an electronics teacher at Thomas A. Edison High School in Fairfax County. He has taught broadcast engineering at Northern Virginia Community College and worked as broadcast engineer for several radio stations.

Doing Production Magic

(continued from page 18)

across the US—I still do PA system simulations by jamming a 3×5 card into the mute relay to get that "hung-on-the-edge-of-feedback" sound.

Think that's weird? My all-time favorite guitarist, the legendary Les Paul, used to accomplish treble rolloff by putting a sheet of paper over the playback head of his custom Ampex. Who's gonna tell Les Paul he's not doing it right?

When asked the best way to do anything in the studio—given several alternatives—I normally answer with "whatever works the best for you and gives you the results you know you want."

All told, this may not satisfy folks who want to know the production trick to end all others. But my favorite trick is the one I haven't done yet, the one I've heard on somebody else's reel and wondered, "Now how did she/he do that?"

Wop-Bomp-A-Loo-Bomp,
—Al

■ ■ ■

Al Peterson annoys managers and amazes listeners at WSBS/WBBS Great Barrington and WHYN Springfield, both Massachusetts. Send empty oatmeal boxes to Al c/o **Radio World.**

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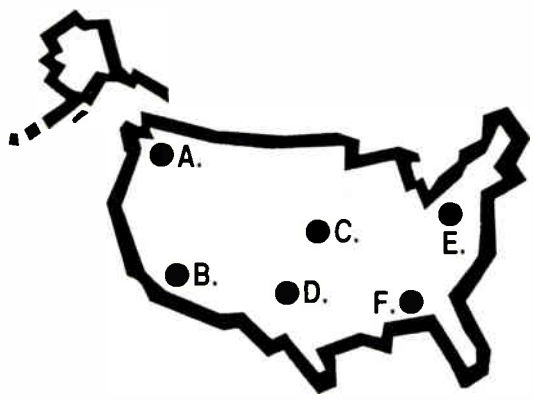

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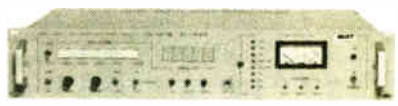

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World Radio History

Building a Do-It-Yourself Studio

(continued from page 21)
have sharp metal edges. Extreme caution must be exercised when setting these walls upright during construction.

Proper tools are also necessary. In addition to the usual collection of hand tools, you'll need vice grips to use as handles when carrying wall panels, heavy work gloves, caulking guns and a pop rivet tool.

Since most modular enclosures are held together with #10 pop rivets, you may want to rent a compressor and air driven rivet gun. Doing over 100 of these large rivets by hand would be tiresome and time consuming.

Assembly itself is pretty straightforward. Once you have the floor isolation rails and floor panels down, channels for the wall panels are installed. Joining most sections of these enclosures together entails laying down a ½" bead of caulking on the felt backing of the channels, putting them in place and securing the sections every 2' with pop rivets.

Wall sections are butt-joined together with wall joiners. Recesses in the top, bottom and sides of the wall panels are packed with fiberglass and the inside corners of the wall joiners are beaded with caulking prior to assembly in the floor channels.

Doing this process carefully and exactly to the manufacturer's specifications will insure compliance with sound isolation specs. Doors must be removed from wall sections prior to their installation. You'll find several pairs of vice grips useful in securing the tops of the wall sections and drawing them up tight until the caulking sets.

With everything set up properly, tolerances should be ¼" or less. Roof channels mount on top of the completed wall in a manner similar to floor channels. Roof sections mount on top of the channels on a bead of caulking.

The next phase

Next, AC wiring between the roof and wall sections is completed. This is just a manner of securing wires in junction boxes with wire nuts. Conduit openings should be packed with duct seal before covering boxes. Any gaps between roof channels and sections should be caulked prior to installing fiberglass and roof aprons.

Mounting doors to completed wall sections can be very difficult. These units must be handled by three people and maneuvered onto the two hinge pins simultaneously. Mishandling them can result in damage to their rubber gaskets, not to mention mangled fingers and toes.

One solution to this problem is to place the door on a pallet mule and jack it up until the hinges are about an inch above the pins. Then your helpers can line it up with the pins as you slowly lower the lift.

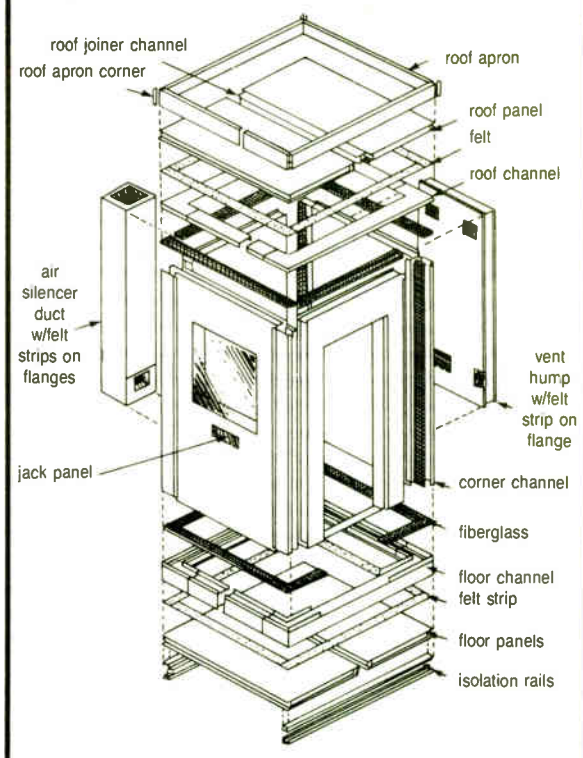
With the construction completed, all that remains is pulling your own wiring, connecting AC and tying into the building's HVAC system. Remember to pack your duct with duct seal and fiberglass before installing cover plates. This will insure the soundproof integrity of the enclosure.

Modular enclosures can make a very messy and time consuming task into one that can be completed in a few days with guaranteed results. The cost difference between modular and on-site construction is fairly small and in rural areas, it may be the only way to build studios where the sound from Studio A doesn't leak into Studio B.

■ ■ ■

Tom Vernon, a regular **RW** *columnist, divides his time among broadcast consulting, computers and instructional technology. He can be reached at 717-249-1230.*

Figure 1.



Exploded diagram of modular enclosure.
Courtesy Acoustic Systems, Austin Texas.

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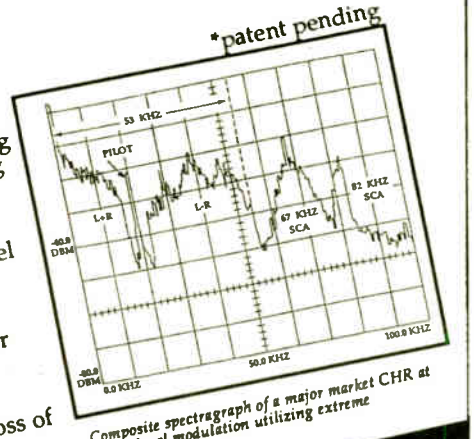

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World Radio History

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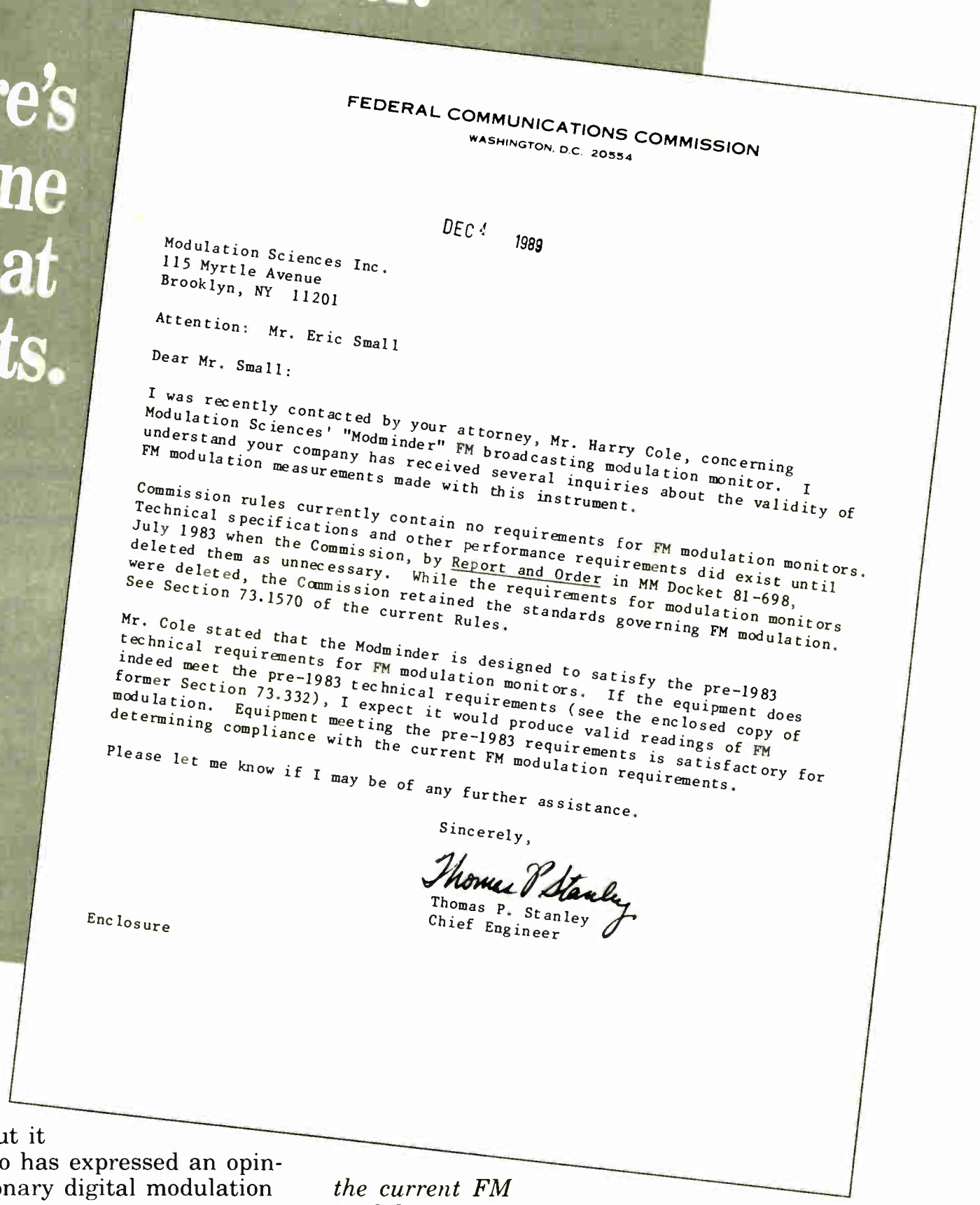

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DEC 4 1989

Modulation Sciences Inc.
115 Myrtle Avenue
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Attention: Mr. Eric Small

Dear Mr. Small:

I was recently contacted by your attorney, Mr. Harry Cole, concerning Modulation Sciences' "Modminder" FM broadcasting modulation monitor. I understand your company has received several inquiries about the validity of FM modulation measurements made with this instrument.

Commission rules currently contain no requirements for FM modulation monitors. Technical specifications and other performance requirements did exist until July 1983 when the Commission, by Report and Order in MM Docket 81-698, deleted them as unnecessary. While the requirements for modulation monitors were deleted, the Commission retained the standards governing FM modulation. See Section 73.1570 of the current Rules.

Mr. Cole stated that the Modminder is designed to satisfy the pre-1983 technical requirements for FM modulation monitors. If the equipment does indeed meet the pre-1983 technical requirements (see the enclosed copy of former Section 73.332), I expect it would produce valid readings of FM modulation. Equipment meeting the pre-1983 requirements is satisfactory for determining compliance with the current FM modulation requirements.

Please let me know if I may be of any further assistance.

Sincerely,

Thomas P. Stanley

Thomas P. Stanley
Chief Engineer

Enclosure

It's only been a short while since we introduced ModMinder™ and changed the rules of the processing wars. But it seems everyone in radio has expressed an opinion about this revolutionary digital modulation measurement instrument.

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Circle 100 On Reader Service Card

World Radio History

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BUYERS GUIDE

Digital Workstations & Automation Equipment

Media Touch Grabs WBZ

Norm Avery, Dir, Radio Eng KABC/KLOS

Los Angeles CA WBZ in Boston was looking for a unit that would provide a convenient way to manage its diverse program elements, scripts and program log control and audio sources in and out of the studio when our station was introduced to Media Touch's Touchstone system.

Frequently, segments of our programming originate from multiple studio and remote locations within the broadcast day. Keeping these locations supplied with an updated log as well as the shuffling of carts and scripts between them was limiting our ability to make changes along the way.

The touchscreen system, however, integrates audio switching, playback machine control and teleprompter style display of scripts with the sequencing of the schedule of daily events as they are aired.

USER REPORT

Ease of control

This sequenced information (the program log) is dynamically displayed on the operator's video monitor, which has been outfitted with a touch-sensitive control surface.

Personal computers, such as IBM-ATs, are used for the network file servers, edit and operating stations. The exact configuration of the hardware is somewhat flexible as to manufacturer and options. The networking software is Novell and all of the Media Touch software is written to maintain Novell compatibility.

The system communicates with individual touchscreen or editing stations through LAN and RS-232 connections. The broadcast equipment and ancillary devices that the system will control are usually connected through RS-232 ports. Printers are the typical exception.

(System access) is also available from our remote van and portable PCs.

Screen leads the way

From the studio or remote site, touch one of the screen's "start" zones adjacent to the description area of the event to be aired. The system switches on the audio source crosspoint and sends a programmed control signal to the selected device. The descriptive area and touch target move to the top of the screen and indicate "On" while a timer displays the event's running time.

A subsequent touch to the now "on" area for this event or an EOM tone from that source resets the audio channel of the switcher to its "off" state. If desired an off command can be mapped to the device. Starting the next event scrolls this event display off the top of the screen.

If the selected source was a cart, the outcue and exact time would be displayed on the screen. If the event was live or a tag were to follow, its script would show up on the teleprompter monitor.

The system acts as a computer-controlled jackfield where the switcher controls carts, studio outputs, satellite feeds, talk show phone lines, traffic-copter reports etc. Nearly every available audio source has been programmed for routing through the touchscreen system. The number of audio sources is limited only by the crosspoints available in the switcher matrix.

Multiple system access

System access and control is available from any of three touchscreen-equipped monitors located in our Talk, News and Master Control studios. But more importantly, it is also available from our remote van and portable PCs. From a remote broadcast site, system access is gained when a phone connection is provided to dial into the system modem. A cellular phone would be suitable for that.

The remote operating environment is identical to that of the studio system. Any source or script event that you display or control with the studio system is available for control from the remote site.

Information that is edited at the studio results in a global revision of all touchscreen terminals whether located in or out of the studio, which is particularly useful during segments of talk show programming.

WBZ's Emily Barsch controls the station's source equipment by touch screen.

The sequence of events to be displayed for on-air control is created by a skeleton log template. The commercial schedule is transferred from the station's traffic system into the system file server and then merged with the template.

The resulting file becomes the source for all of the data concerning monitor display, audio switcher control and text file management.

The schedule can be edited from any network terminal connection. Keyboard entry through menu-selected functions allow for addition or deletion of events and corrections to scripts, as well as system-wide maintenance functions regarding the display labeling, audio and control switching, patching and routing functions. Modem access to the editing features is extremely handy.

Events rearranged quickly

Nearly instant on-line editing from the touchscreen monitors allows for rearrangement of program events.

The talent or producer can move items off the screen and insert others from elsewhere on the log, shuffle the sequence in which call-in listeners wait, etc. The system also has an automation mode, ready to take over the sequencing if called for.

WBZ has been operating the touchscreen activated control system for more than a year now. The system is much more comprehensive than automation designed to sequence your operators through the day's broadcast events.

It integrates traffic, programming, news and engineering operations and management into a single shared resource.

■ ■ ■

Editor's note: Formerly Engineering Manager for Boston's WBZ, Norm Avery is now Director of Radio Engineering at KABC/KLOS in Los Angeles, CA. He can be reached at: 213-840-4945.

For more information on the Media Touch system, contact John Connell at: 603-893-5104, or circle Reader Service 22.

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Also, Technology Updates from New England Digital, AKG and Absolute Broadcast Automation, and a Special Report on DAT automation at the Christian Science Monitor.

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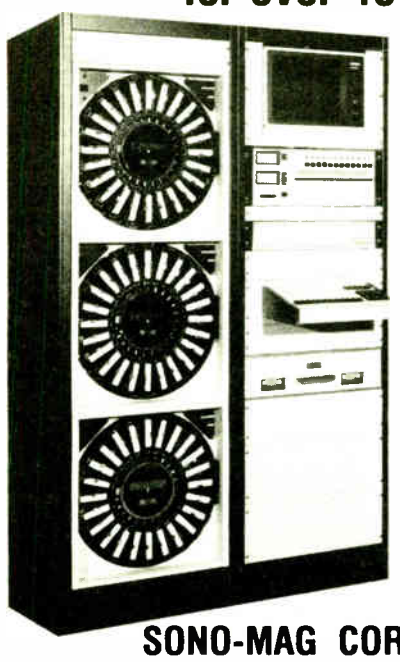

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World Radio History

KCTC Beta-Tests Schafer DAPS

by Dean Cull, CE
KCTC

Sacramento CA Faced with aging audio automation equipment and the need to control music programming on a per-cut basis, KCTC adopted a strategy in the '80s to replace analog audio equipment whenever possible with digital.

In looking for a new automation package, we contacted Paul Schafer for details on the system he was developing.

Paul's use of existing technology, including NEC (IBM compatible) 286 computers, Beta tape decks, 44.1 kHz sampling and SMPTE time code indexing all appeared to be a safe and reliable strategy for the development of a digital control and automation system.

Beta site

In the summer of 1988, KCTC agreed to become a beta test site for the Schafer Digital Broadcast System. We went with the DAPS system employing 16 Sony Beta playback decks for music and three Beta playback decks for commercials, staging and non-music format elements. The system downloads only the non-music elements to a 300 MB hard drive for on-air playback.

By late winter we felt we had the music library and data base ready to begin full operational testing. Then we found out what it's like to be a test site.

The main system simply did not have enough elements cued up in advance to provide a satisfactory margin of change or error.

Consequently, if enough scheduled events were aborted, either by the operator or the system, the result could be a cascading abort of *all* scheduled

USER REPORT

elements and a machine that was dead in the water. There were other weaknesses as well that would not allow live assist operations. To correct these problems, Schafer Digital entered into an agreement with Houston R&D to sell them the company and Houston and Schafer made the commitment to re-

Paul Schafer and KCTC's Kathy Clark stand with the station's system.

design the control cards and re-write the controlling software. The new controller cards were made "smart" with 280 chips and the system now has all tape decks cued and ready for play at all times.

The new software for system control is now stable and operational. We now use the system 24 hours per day, seven days a week. During nights and weekends it runs in a fully automated mode. At all other times, it functions as a live assist digital playback unit.

Up and running

While this system has been on the air full-time for only six months, it has had many hours of test running off air and we have had no Beta tape deck failures. As for durability of the tape, we found Sony 750 HG Series and Ampex #198 BC 30 tape have shown no signs of failure.

We clean the tape heads of the decks in the main system once a week. The best method is to use a dry high quality chamois for the rotating heads and standard liquid tape head cleaner with cotton swabs on the guides, stationary head and capstan, being careful not to touch the pinch roller with head cleaner.

The pinch roller must also be clean and pliable to maintain proper guidance. This should be done at the same time as head cleaning by using a product called Rubber Restorer.

One modification that we made to the tape deck was to cut a hole in the top cover so that head cleaning can be done without removing it. We hinged a plexiglass cover for the cleaning hole. If we were to do this again, we would not hinge the plex but would make it slide backward out of the way for cleaning.

Pre-roll complaint resolved

One of the major early complaints with the system had to do with the need to pre-roll the tape before play. This prevented instant start by the operator and also caused all format elements to

An on-air computer monitor and track-ball enhance the DAPS 800.

be at least 12 seconds in length.

The re-written software cured both of these problems by pre-rolling the decks in advance and then putting them in pause for instant start. This means a format element of any length can be used and the operators can run as tight as they want.

The next hurdle was what to do when the deck was in pause for several minutes, such as during newscasts and other live talk elements, to stop the pos-

(continued on page 33)

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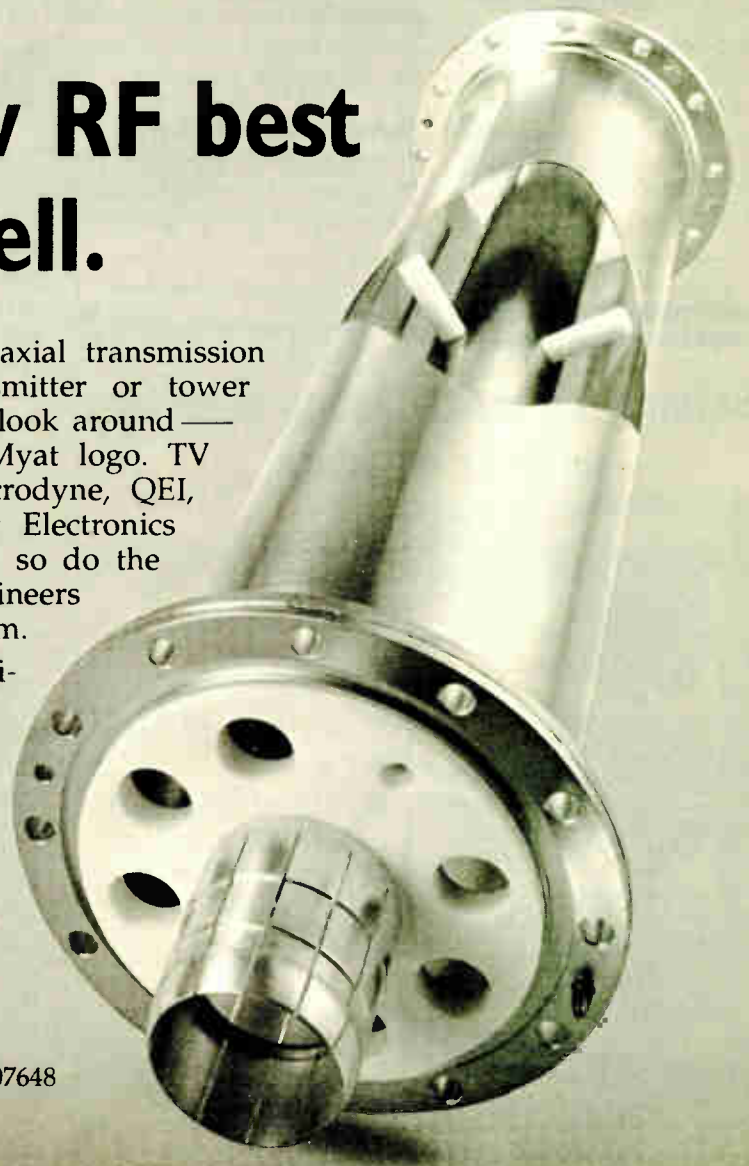


Circle 74 On Reader Service Card

World Radio History

WBWA Automates With Audisk's Help

by Bob Schellenberg, Tech Dir WBWA

USER REPORT

Washburn WI WBWA has used an automation system with music on reel-to-reel tape and commercials on Carousels™ and Tomcats™ in a live assist mode from the time the station first went on the air in 1980. As the automation aged and the original air staff was reduced, however, the owner decided to switch to a satellite music format to increase the walk-away time of the station.

We picked the Transtar (now Unistar) "Format 41" music format. This format required six dedicated cart machines for IDs, liners, etc., and some sort of delivery system for commercials, PSAs and station promos.

But because the network jocks changed every four to five hours, someone would have to change the carts—there went walk-away time. A means also had to be found to record "closed-circuit" feeds of commercials sent during mandatory stopsets—times when the network is normally silent—so maybe the automation system would have to be upgraded after all.

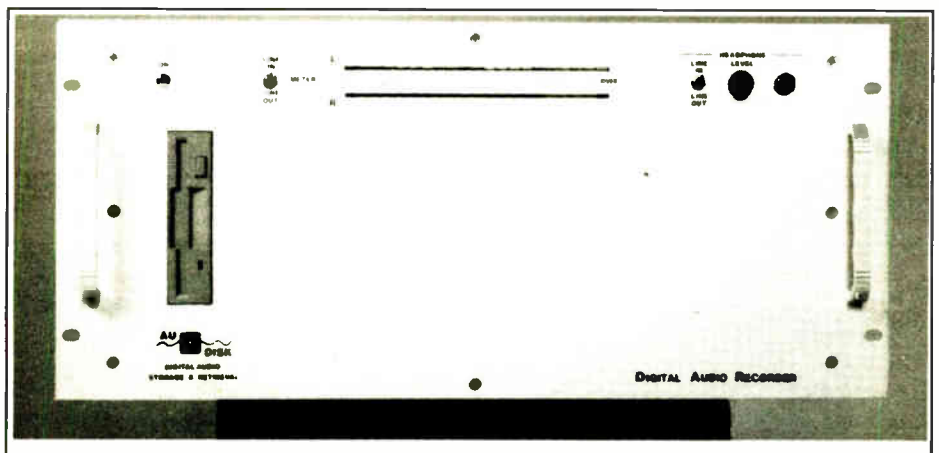
All of this was told to our consulting engineer, Tim Valley, of MacroMedia. He began searching and scouring the countryside for a more efficient device that would increase our walk-away time to a minimum of 24 hours.

The two cart Carousels in the automation system only allowed for a maximum of about six hours without reloading and the maintenance on the units had been steadily increasing. Another system for commercial playback had to be found.

It became apparent that digital storage was the only way to go, based on its inherently low maintenance and fast random access, not to mention superb audio quality. Several people had digital devices in the works, but nothing was ready for use.

Finally, Tim found out about two satellite-uplink engineers that had put together a device to convert analog audio to digital and uses an internal PC clone as a controller to store all of the sound/information on multiple SCSI hard disks. The most attractive features

(continued on page 44)



The Audisk digital audio recorder.

Testing Schafer Digital

(continued from page 32)

sibility of tape burn caused by the rotating head spinning on stationary tape.

The new software, because it was able to count and control the tape to the frame, was told to monitor the deck in pause and, at time intervals necessary to protect the tape, simply jog the tape one or two frames. It works.

During the Christmas season we used special 15-minute programs with a spot cluster going in and coming out, which meant that a tape deck could be held in pause for as long as 22 minutes—we experienced no problems.

The system still had an Achilles' Heel. It was the single hard drive playback system used for the non-music elements. The 300 MB hard drive had no redundancy and was a special purpose device that was not readily serviceable.

The new systems are being delivered with dual hard drives controlled by a PC computer clone. The drives and CPU are computer-standard hardware for the most part and can be replaced and repaired by local technicians when necessary.

The production station for music and non-music elements is a breeze to use; many elements are fully automated. The software is some of the most creative we have seen and is easy to learn.

The frequency response of both the Beta Hi-Fi track and the PCM digital track is flat beyond our ability to measure. Distortion is below the capability of our test equipment to analyze and the noise floor is below the resident noise in our analog test equipment. Crosstalk and phase shift are problems of the past.

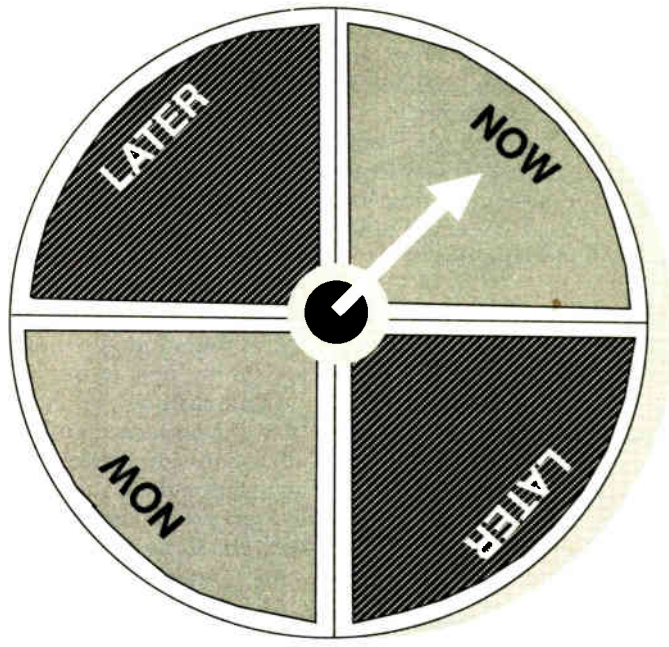
Thus, KCTC's audio quality is affected only by source material or processing and transmission devices that follow the Schafer Digital System.

■ ■ ■

Editor's note: Dean Cull can be reached at 916-441-5282.

For more information on the DAPS system, contact Paul Schafer at Schafer International: 619-456-8000, or circle Reader Service 66.

If The Question is NOW...or LATER



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World Radio History

WVNO Puts Century 21 On Air

by Jim Holmes, Ops. Mgr. WVNO

Mansfield OH A little over a year and a half ago WVNO changed to 100% CD delivery for its music. There's nothing new about that except that we decided to do it completely automated.

Our goal was to have a great mix of music that we could control and tailor to our marketplace and still take advantage of the benefits that we feel automation offers. Reel-to-reel format syndicators just couldn't provide the exact "sound" or mix we wanted.

After a great deal of investigation we decided that a totally random access music delivery system was what we needed—a system that would allow us complete control over the music.

Weighing the pros and cons of CD and DAT, we decided that the best way to go would be CD. The system offered by Century 21 of Dallas, TX seemed to be just what we were looking for.

The Digital Studio

Century 21 was already in the music business and had extended that wealth of knowledge to CD technology. The company had also developed a CD automation system known as the Digital Studio System, consisting of two Sony CDK-006 CD juke boxes, a "black box" that contains the AutoFaders and PC interface, an IBM compatible computer and the Digital Studio software.

But could we interface a compact disc automation system with our current program automation system, an IGM EC, and still utilize the live assist capabilities of Digital Studio? Yes!

USER REPORT

We replaced five reel-to-reels with the Digital Studio system acting as a single source for the IGM EC. When the IGM EC called for music, the music was now going to be supplied by Century 21's Digital Studio. During periods of the day when we required live assist, the Digital Studio System could function there as well.

Software solution

The delivery system for the music was only part of the equation, however. We needed some type of music scheduling software. Having been reliant on reel-to-reel programming sources, this was something new to us.

Century 21 helped us there also. Century 21's SuperScheduler is a music rotation software package that works great as a standalone scheduling package for live operations and interfaces beautifully with the Century 21 Digital Studio system. (Other music software packages such as Selector will interface with the Digital Studio as well.)

The "GoldDiscs" and "HitDiscs," marketed by Century 21, are marked with several index points that allow the Digital Studio System to crossfade or switch to the next event. You can make the song-to-song transitions as tight or as loose as you want. We also can use commercial CDs right from the store or from record companies.

However, commercial discs are not reliably indexed or in most cases not indexed at all. The Digital Studio system allows for this by permitting you to program a "segue at" time. This will switch to the next event whether there is an index at this point or not.

Makeshift remote

While the Digital Studio system does not allow for remote control, we were able to accomplish such control with a keyboard/monitor remote package we found. Using this "remote" capability allows us to keep all of our automation equipment together in the control room while still being able to control it from the studio.

The remote enables us to manually start each CD selection from the studio during live operation. We can also take requests and, using the remote keyboard, program them into the Digital Studio computer.

The Digital Studio System provides a "countdown clock" on the computer screen that shows the air talent how much time they have left when talking over an intro. The Digital Studio screen also provides other helpful information.

The title, artist and album name along with intro time, total length and scheduled time are displayed for the current and upcoming selections. Usually there is enough room on either the title or artist lines for other information such as name pronunciation, special edit information or facts about the selection.

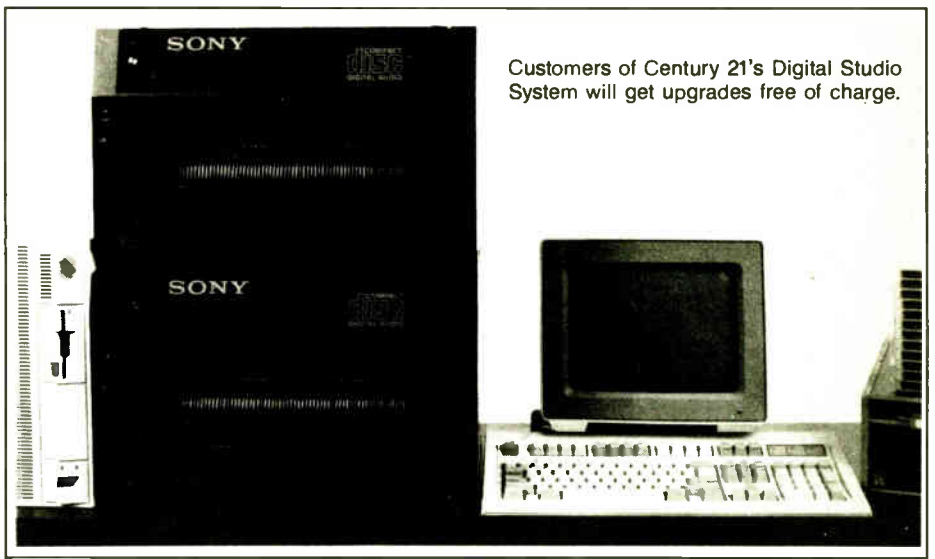
"Sub menus" that allow for other Digital Studio functions can be quickly accessed with a keystroke. A password system provides security for the system by keeping unauthorized persons from areas of the operating program that could get them into trouble.

The on air sound has been super. The technical quality of the Century 21 Gold Discs and Hit Discs has been superb. In the 18 months that we have been using Century 21's discs we have only encountered a couple of problems which were quickly resolved by Century 21.

Anxious moments

I must confess, however, that the software has given us some anxious moments. Most of the time, it operates

(continued on page 45)



Customers of Century 21's Digital Studio System will get upgrades free of charge.

The Next Century is Here

by Dave Scott, President Century 21

Dallas TX All 40 previous customers of Century 21's computerized CD changers will receive new software and interface card at no cost.

Century 21's new Digital Studio System uses an IBM personal computer Model 25 or 30 to play music from Sony CD changers and commercials from broadcast cartridges, DAT or instant access hard disc digital audio recorders.

The new model accesses music more quickly and flexibly, has simpler screens and controls as many as seven CD changers and seven commercial sources (the original unit handled only two CD changers and one commercial source). The new unit also works well with record store CDs, where the old model gave better flow with Century 21 GoldDisc and HitDisc CDs.

If a DJ has a computer password that allows requests, songs can be found quickly using titles, artists, years or lengths. Jocks don't have to remember cart numbers or CD locations. Intro times, song and spot lengths, endings and elapsed times are always on the screen at a glance.

Designated songs can be skipped when there isn't time. If CDs are missing, the new model skips ahead to the best solution where the old computer merely printed out the problem.

When you get Century 21's CD library of GoldDiscs, titles, artists and times will already be in this computer. Management can daypart or "lock out" songs so they won't air.

Songs and spots are scheduled by program and traffic directors Finished logs are brought into the studio on diskettes.

Century 21's Digital Studio System includes two heavy-duty Sony CDK-006 CD changers, PC interfaces and software, cables and AutoFaders, spot start and EOM interface. Other options are also available.

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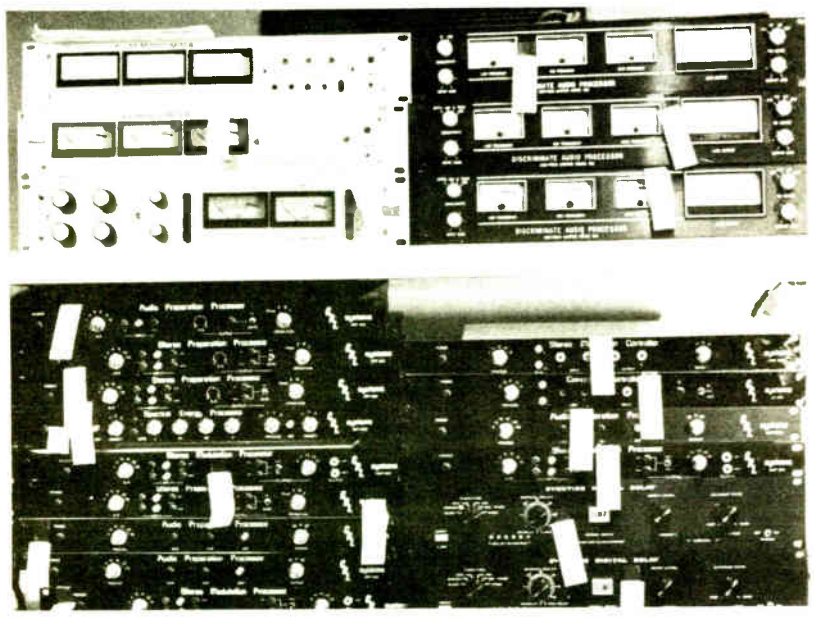

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System Clock in/out	▼	▼	
Digital Output	▼	▼	
Die-cast CD Drive	▼	▼	
Cue Memories		3	

FEATURE	A727	A730	"Brand X" Player
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Varispeed Built-in		▼	
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Monitor Speaker		▼	
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World Radio History

Digital Prepares for the Future

by Alex Zavistovich

Falls Church VA There's no question about it—digital technology is starting to make itself at home in the broadcast industry.

From automation systems employing digital source material to digital workstations that allow lightning-fast non-destructive editing capability, the new technology is getting the attention of radio stations that want to stay ahead of competition, and abreast of the latest trends.

The future is now

For automation companies, of course, the advent of digital has already taken place. Dave Scott, President, Century 21, notes that, "Based on market penetration, storing music on digital media is not only coming, it's already here."

That's fine for music, but what about the other aspects of broadcast audio? Scott concedes that, "If broadcasters could buy a digital cart machine or functional equivalent for anywhere near the same kind of money as an analog cart machine, they would.

"But at present, there's not a reasonably priced, cost effective digital replacement for the cart machine," Scott adds. "People aren't going to buy a Rolls Royce when their Chevrolet gets them there just fine."

Paul Schafer, who markets the Schafer Digital automation system, agrees, noting, "I think we're a long way from there being any storage medium that would be economically feasible other than tape for storage or digital storage."

Affordable mass storage

On the other side of the fence, you have people like John Connell, president of Media Touch, and developer of touchscreen technology for automation.

INDUSTRY ROUNDUP

According to Connell, "One of the problems with digital audio is that it has been designed, over the past few years, primarily for production studios. Nothing was designed for mass storage at a radio station. When Digital Audio Mass Storage (DAMS) came along, it seemed to me that that was the system. It's what I've been waiting for."

DAMS is based on hard disk, Connell explains. He adds that "the price has dropped nearly in half over these past years—cost is coming down dramatically."

Ted Pine, marketing manager for New England Digital, concurs with Connell. He sees it in terms of performance.

"There are three different parameters in evaluating digital storage: density (how big is the drive), speed, and robustness or reliability. Hard disk technology is fairly mature. There's a lot of newer technology out there, like erasable writable optical, where the price and the speed and robustness aren't quite there yet. But I think when you're talking about digitizing information and storing it to hard disk, that's getting to be a cost effective medium," Pine explains.

Why go digital now?

New England Digital manufactures the PostPro digital audio workstation. While it does offer some useful features for a radio station in terms of editing speed, the cost per unit is hardly a small-ticket item—due in part to the cost of hard disk technology.

So, if storage costs are still comparatively high, why buy now?

According to Pine, "Depending on how competitve the market is, the access to new capability can be very important. Workstations today offer the ability to do kinds of work you can't do effectively in the analog domain. The technology is already there with digital workstations to help them distinguish a (radio) station from the guy down the block."

In other cases, market competition *is* a factor, but start-up costs also come into play.

John Connell points to KBET, a 1000 watt AM in Canyon Country, CA. "It has NED for editing, has DAMS for storage and Media Touch. They didn't 'old' technology—they wanted

(continued on page 43)

AKG's DSE 7000.
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Have you ever used your last track and wished you had more? The DSE 7000 provides 8 tracks plus lossless digital bounce to give you all the freedom of multi-track, and more.

Have you ever wished for a sound editor that's as powerful and easy-to-use as your word processor with controls as familiar as your mixer and tape deck? With the DSE 7000, you can easily cut, copy, move, slip and adjust sound elements. It's an AT compatible-based, digital sound editor that combines both record and mix functions together in one convenient unit — with ease, speed and flexibility.

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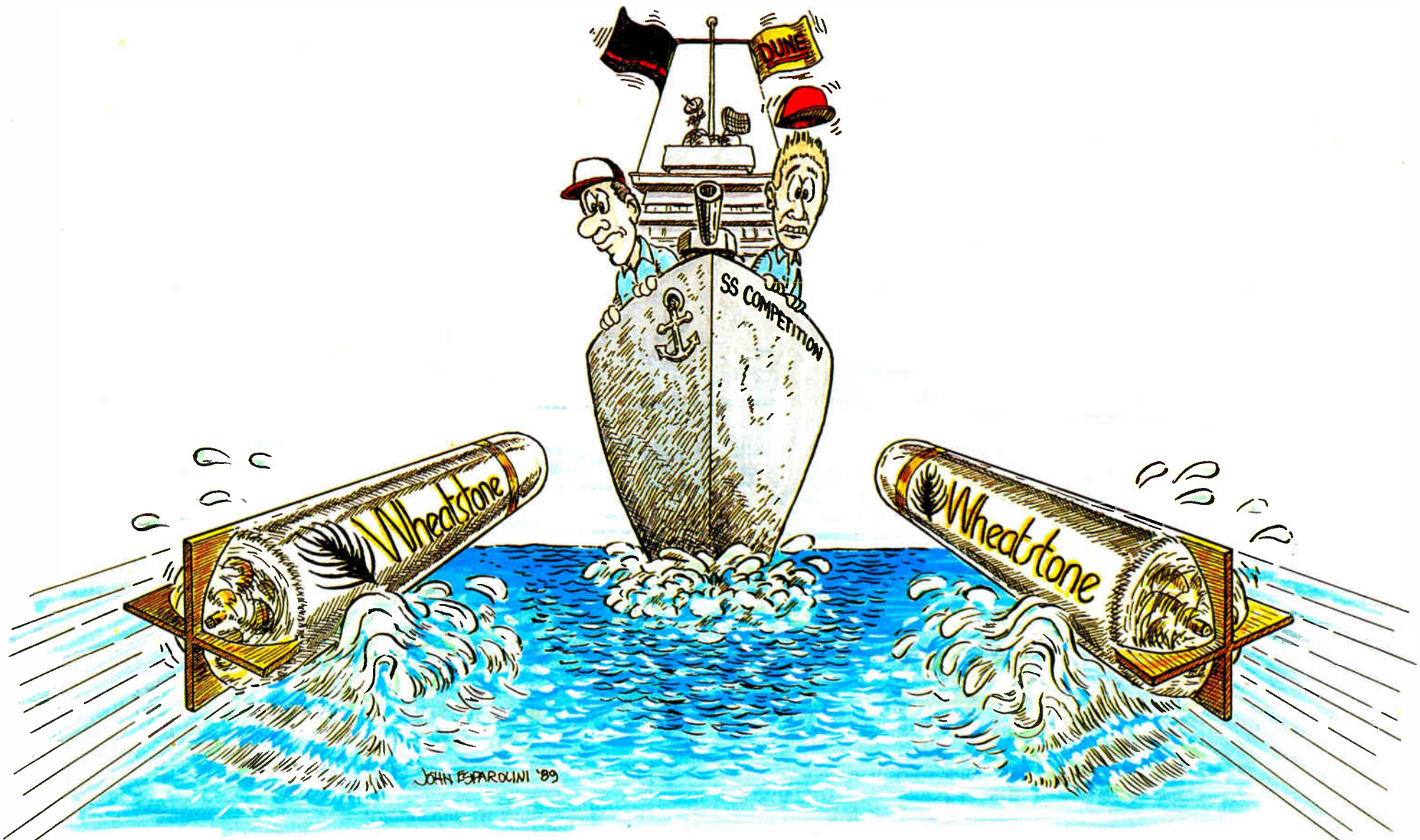

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World Radio History

Monitor Rolls it Over with DAT

by William Spurlin, Radio Ops. Mgr. Christian Science Monitor

Boston MA While the sonic qualities of the DAT machine are astonishing, fidelity is not the reason for the use of the Sony DTC-300 ES DAT machine at the Christian Science Monitor. The near-perfect timing and ease of computer control have led us to install DAT machines in an on-air network automation system integrated with a Utah Scientific router, Network Generation software and IBM PC clones.

Why automation? The Monitor is known for its daily radio news programs—Early Edition and Daily Monitoradio—and operates a worldwide shortwave network.

In 1988, as the Monitor planned the expansion of its shortwave network, it became apparent that some form of program automation would be necessary.

SPECIAL REPORT

As many as five different, simultaneous programs, in different languages, are originated from the Monitor's Boston studios and transmitted from the shortwave stations.

With the initiation of broadcasting from two shortwave transmitters at WSHB, in South Carolina in March of 1989 it was no longer feasible to roll the programs, produced on cart and ¼" tape, by hand. There were too many different programs going too many different places at the same time.

Choosing DAT

DAT machines were chosen over ¼" analog tape machines for automation because of the ¼" machines' size, cost and the DAT machines' relatively good timing characteristics. Also, ¼" would have required the use of 25 Hz tones and foil sensing tape—unnecessary with DAT.

The Sony DTC-300 ES is a high-end consumer machine. It shares the same remote control format as the Sony PCM-500, Sony PCM-2500 and Harris XD100H. These machines are interchangeable when used in automation.

The audio fidelity of DATs used in shortwave service is unimportant. Programs are transmitted to the shortwave sites by digital audio satellite link. The 5 kHz audio bandwidth of the Monitor's shortwave transmitters and the 54 dB signal to quantization noise ratio of the satellite link are the limiting factors in fidelity. The DATs are used in mono.

For use in domestic radio, the superior audio fidelity of the Sony DTC-300 ES DAT machines would be a large consideration. The DAT machine is optimal for fidelity as well as ease of use under automatic control. Network Generation software running on an IBM PC clone is used at the Monitor to start cart and ¼" machines, make router takes and control DATs.

As everything runs on Universal Coordinated Time (UTC) and has to be started and finished to within 300 milliseconds of real time, software modules update the PCs internal clock by calling up a Leitch atomic time base over the dial-up network.

In addition to routing programs to the shortwave network, the automation routes audio to studio headsets and to WQTV, Channel 68 operated in Boston by The Christian Science Monitor.

An integral part of the automation system is a Utah Scientific AVS1-B two plane audio router. Since a single program may go to as many as ten different destinations simultaneously, some kind of audio routing is necessary. The Utah Scientific lines of audio and video routers, with their well defined serial interface protocol, are ideal for this kind of automation.

Good performance record

Eight or more Sony DTC-300 ES DAT machines can easily fit in a single rack. Maintenance on the DAT machines has been confined, so far, to cleaning the heads. A head change has yet to be required. Although a single DAT tape is typically played twelve times in a 24-hour period, no problems due to tape wear have as yet been encountered.

In eight months of continuous operation, there have been two cueing errors attributable to DAT malfunction or to the computer interface. There have been three instances of tape malfunction due to moisture condensing inside the tape cassette. A lamp on the control panel of the Sony DTC-300 ES warns of this condition.

Network Generation software provides test modules for use with DAT machines on the bench. Under test conditions, the Sony DTC-300 ES fails to cue up to the desired cut about one time out of five thousand, or a failure rate of 0.02%. This failure rate compares favorably with that of the cart machine.

The software cues the Sony DAT machines to any of 99 program segments on a single tape. The machines can also be programmed to record, pause, open and close their doors, etc. At the Monitor as many as 44 cuts are put on a single DAT tape.

Operators can scroll around the daily lists, adding, deleting and changing events as necessary. A floppy disk-based system, the software requires a new data disk to be inserted in the PC every 24 hours, at 00:00 UTC. Format changes require data entry. Approximately 1000 events per day are entered into the system.

One disadvantage of using DAT is that dubs have to be made from ¼" tape, the radio production format at the Monitor. It has been found that this dub operation requires the attention of a technician for approximately an hour a day.

The dub operation is simplified by the use of auto start IDs (a feature of DAT). The auto start ID can be laid down automatically at the beginning of program audio, so no preroll has to be introduced during the cueing process. The DAT tape cues to the beginning of program audio. The tightness of the cueing point, using Network Generation Ready commands, is equivalent to that obtained with ¼" analog cart or reel-to-reel machines.

■ ■ ■

Editor's note: William Spurlin can be reached at 617-450-2074.

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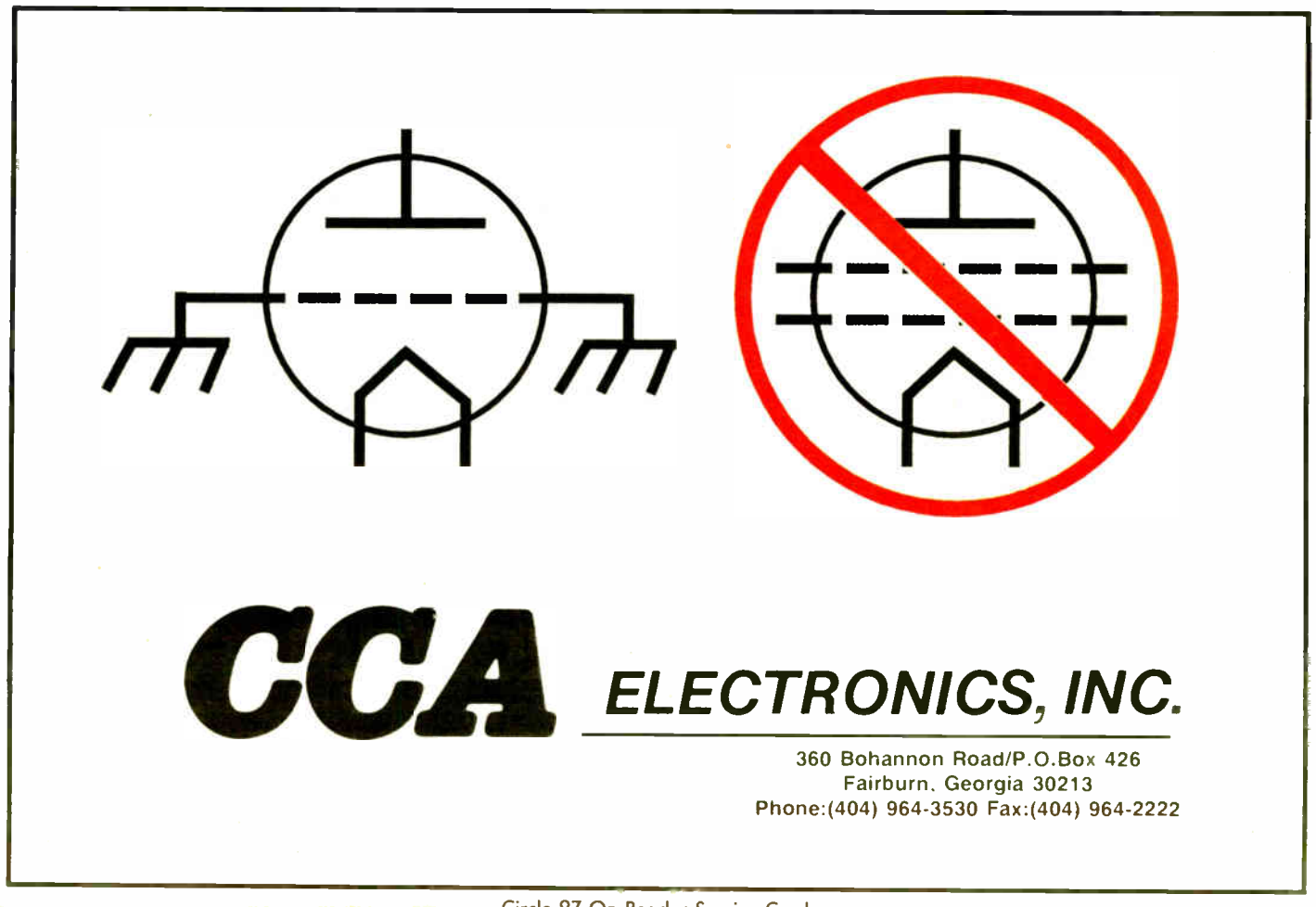

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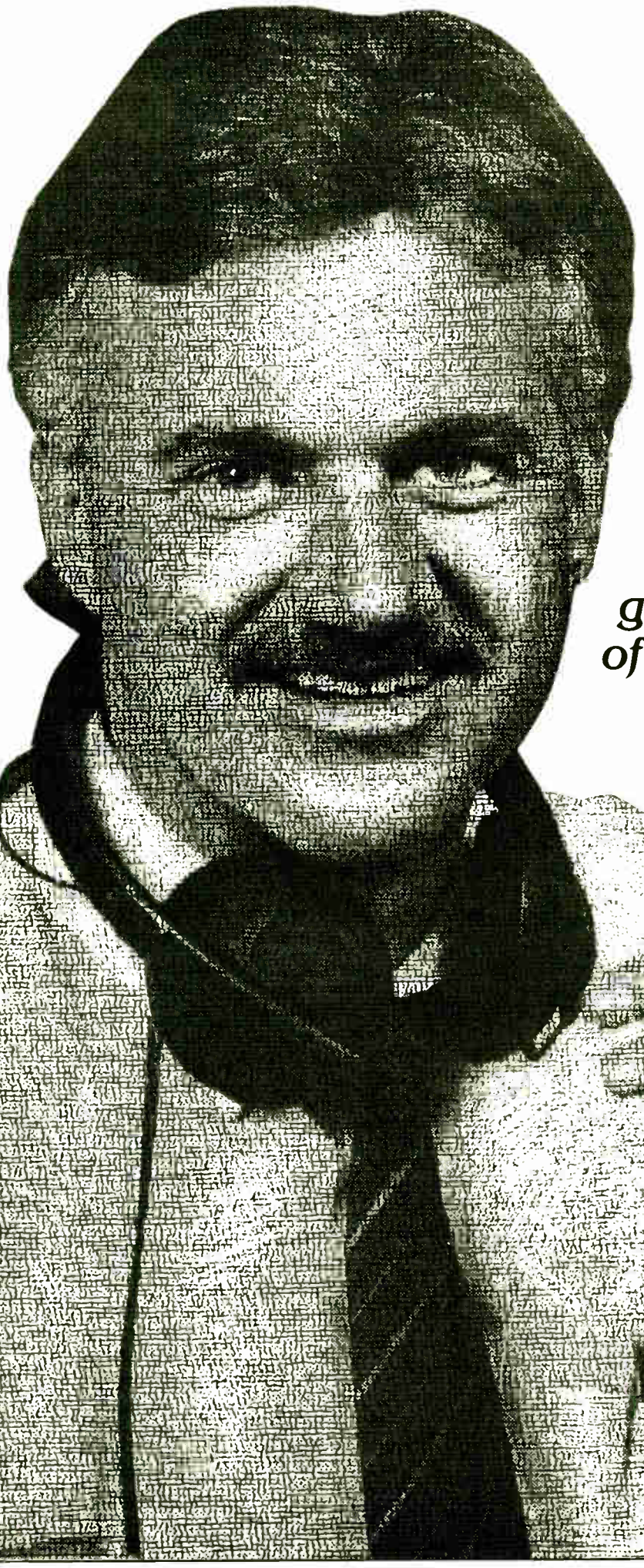

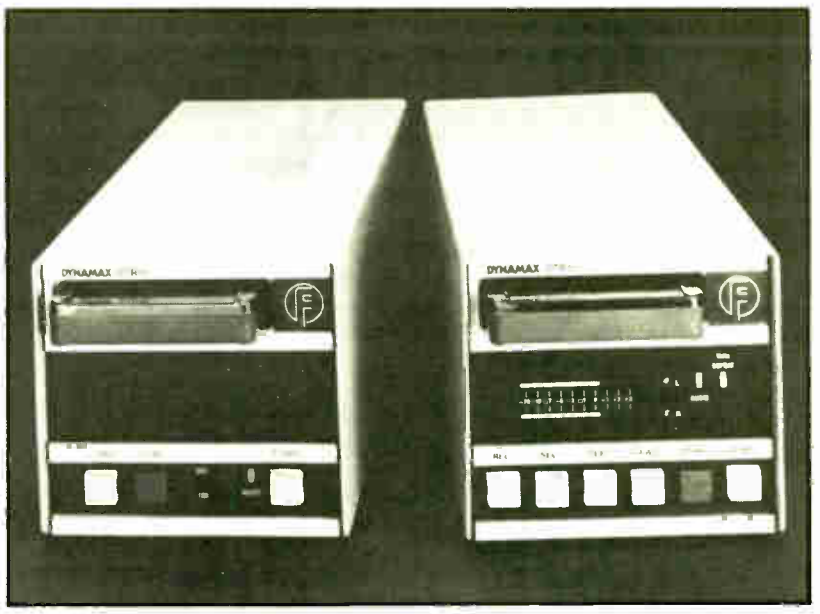

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World Radio History

KUHF Cuts Classics with Dyaxis

by David E. Knodel, CE
KUHF

Houston TX A digital audio workstation takes program production a step beyond the automated editing which has previously been available only to video editing.

Digital audio editing leaves the original recording intact yet suffers no generational loss and gives random access to segments, allowing complete flexibility. Editing in the digital domain further enhances production with the advantages of digital manipulation and precisely repeatable settings and edit points.

USER REPORT

On the job at KUHF

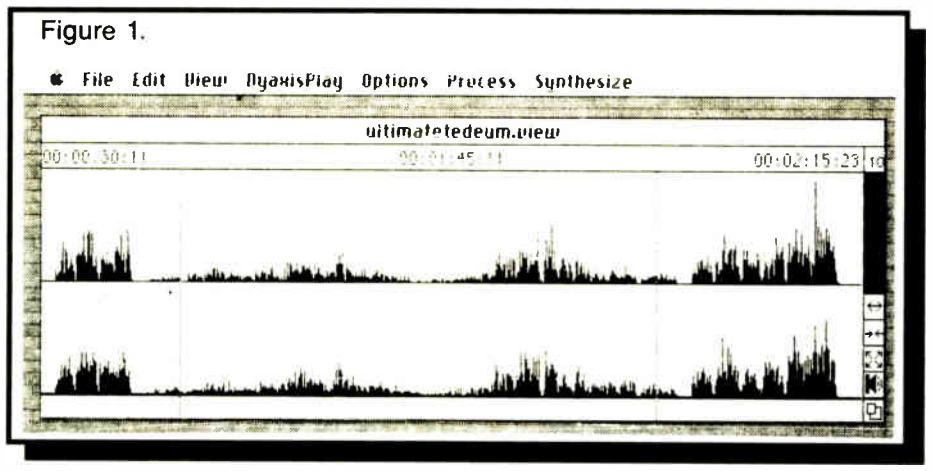
The Dyaxis Digital Audio System consists of three basic units: the audio processor, disk drives and a Macintosh computer using MacMix software.

KUHF uses the Dyaxis workstation to edit classical music captured live on digital audio tape.

The 1.75"-high audio processor provides the system interface, with AES, SPDIF and SDIF digital and analog inputs and outputs. The processor also provides SCSI interfaces for the disk drives and Macintosh computer and a serial control port for the Macintosh. The 5.5"-high 320 MB fixed disk drives store some 28 minutes of stereo audio sampled at 48 kHz.

KUHF uses five drives for the maximum total storage of 1.6 gigabytes or approximately 2.5 hours of stereo 48 kHz audio. Faster drives with twice this audio storage will be available presently. The Macintosh computer provides the user interface by running MacMix v2.3 software and includes a CPU, keyboard, display and mouse.

Figure 1.



Although the software will run on the more compact Macintosh SE, the Macintosh II is faster, has more accessory slots and has a larger display, which is helpful when using the many windows available in MacMix. The processor and disk drives mount in racks and must be near the Macintosh CPU. The keyboard and display can be remotely located.

Editing is done by manipulating on-screen "objects" with a mouse. The software is a faithful implementation of the Macintosh interface and supports multiple windows and selections, grow-boxes, keyboard shortcuts and even MultiFinder.

Manipulating data

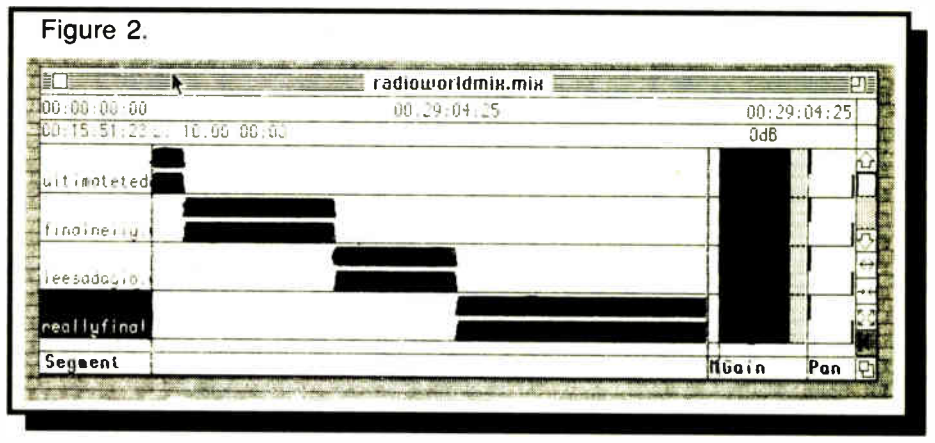
The system has few bugs, although we wish it would remember options-menu settings and window size and magnification between sessions. The software is intuitive enough that an experienced editor can become comfortable with it in about a week—even less if familiar with a Macintosh.

After recording from either analog or digital inputs, the sound resides in a large sound file on disk. It is shown on screen in a View window, which displays a graphic representation of sample amplitudes in the sound file. The amplitude can be magnified and the view can be zoomed in—for precise editing—or out to an overall scale at will—to locate segments.

The in- and out-edit points and any cuts (skips) within the segment are marked by moving cursors and playing the sound before, between or after them as needed to judge the edit points.

When the edit points sound correct the segment is pasted into a Mix window. The Mix window displays a linear table of the cuts in order, graphically indicating cuts, fades, cross-fades and fader and pan-pot settings for the segments in the edit list.

Figure 2.



Two or more views (tracks) can be mixed simultaneously in addition to the standard cross-fades and cuts to the next segment. Segments can be easily swapped, slipped in time or seamlessly looped and stereo panning and gain can be adjusted. Edits are auditioned using Fastmix, which conserves time and disk space but doesn't show changes in volume other than fades and cross-fades.

Short segments across edits can be slow-mixed to hear gain changes. When the editing is done, the slow-mix feature is used off-line to create a new sound file based on the edit list in the Mix window. The completed sound file is then an original which can be edited or clocked-out for recording on external equipment.

Editing the classics

KUHF uses the Dyaxis workstation to edit classical music captured live on digital audio tape. This editing requires manipulating segments as long as a symphonic movement or as short as a single note, with precise attention to such detail as spacing and preservation of background sound. We've certainly found the Dyaxis workstation to be up to the task.

We have edited Houston Symphony Orchestra performances of the *Shostakovich 5th Symphony* to produce a compact disc for a symphony membership incentive. KUHF regularly makes detailed changes in Houston Symphony concerts for broadcast, some at the request of conductor Christoph Eschenbach.

Currently in production are commercial CDs featuring violinist Freddell Lack and cellist Anthony Elliott, both artists in residence at the University of Houston. Also in production is a series of CDs of American chamber music with the Lyric Art Quartet of the University of Houston. The first CD of this series is already available on Bay Cities Music #1009, for those who would like to hear a sample of Dyaxis editing.

The unit has performed well. We have had some minor problems, notably with pops in fast mix and snow on playback, but we have found both IMS and Studer to be responsive and we are confident of solutions. Loaner equipment has been available during servicing.

We enjoy using the system and look forward to coming enhancements such as the larger disk drives, digital audio processing and full standards conversion from 48 to 44.1 kHz sampling.

■ ■ ■

Editor's note: David Knodel can be reached at 713-749-7186.

For more information on the Dyaxis Digital Audio System, contact Gerry Kearby at Studer Editech: 415-326-7030, or circle Reader Service 61.

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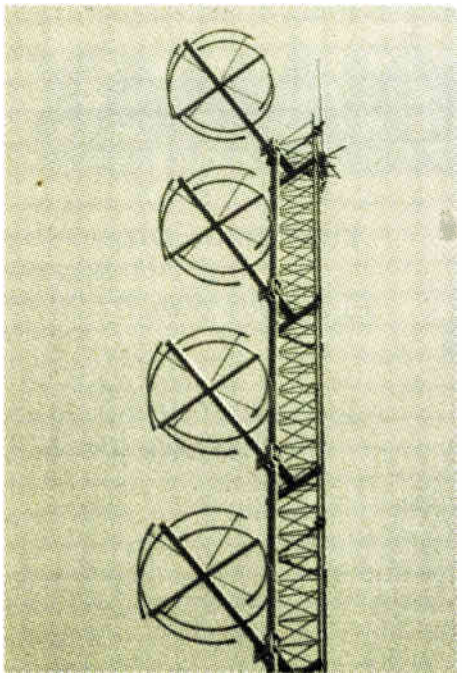

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Circle 7 On Reader Service Card

World Radio History

PostPro Adapts to Its User's Demands

by Ted Pine, Mktg. Mgr.
New England Digital

White River Junction VT Digital production in the radio industry is growing at a quickening pace and New England Digital's PostPro™ eight-track disk-based recording and editing system is in the vanguard of this trend.

TECHNOLOGY UPDATE

In Canada, for example, Winnipeg-based Moffat Communications Ltd. is converting its eight stations to PostPro workstations for in-house production.

Specially configured for radio use through software, the PostPro system is designed to meet the needs of digital broadcast users, today and in the future.

NED's PostPro system features a dedicated remote and editing system (left).

Capable of a 96 dB signal to noise ratio, the PostPro's non-destructive editing (audio data is never physically altered during the editing process) can be especially useful in the short lead-time world of radio broadcasting.

In addition, the editing and sequencing capability of the PostPro's random access system allows music, dialogue and sound effects to be assembled much faster than via analog systems.

History of innovation

Since its introduction, the PostPro has been recognized for its ability to rehearse and reverse every edit, slip any event on any track and edit with ten-microsecond accuracy. Today's PostPro features innovative capabilities such as time compression and direct digital transfer.

Time compression allows PostPro users to change the length of a piece of music, sound effect or spoken word segment without altering the material's pitch. Compression/expansion ratios between 50% to 200% are possible. Separate processing algorithms for speech and music ensure high audio quality.

The Direct Digital Transfer module allows users to load audio data to and from Sony, Mitsubishi and AES/EBU format recorders without leaving the digital domain.

The standard PostPro system consists of four 300 MB Winchester hard drives offering eight discrete tracks with more than 28 minutes of recording time at 44.1 kHz. This makes the PostPro suitable as a replacement for a standard analog eight-track deck. The system's multirate sampling gives the user flexibility and control over recording time and fidelity.

Projects and programming demanding the highest standard of sonic quality may be recorded at 100 kHz, with 12.5 minutes per track. Less critical material, such as speech, might be recorded at 32 kHz, with a better than three-fold gain in recording time.

User-friendly control

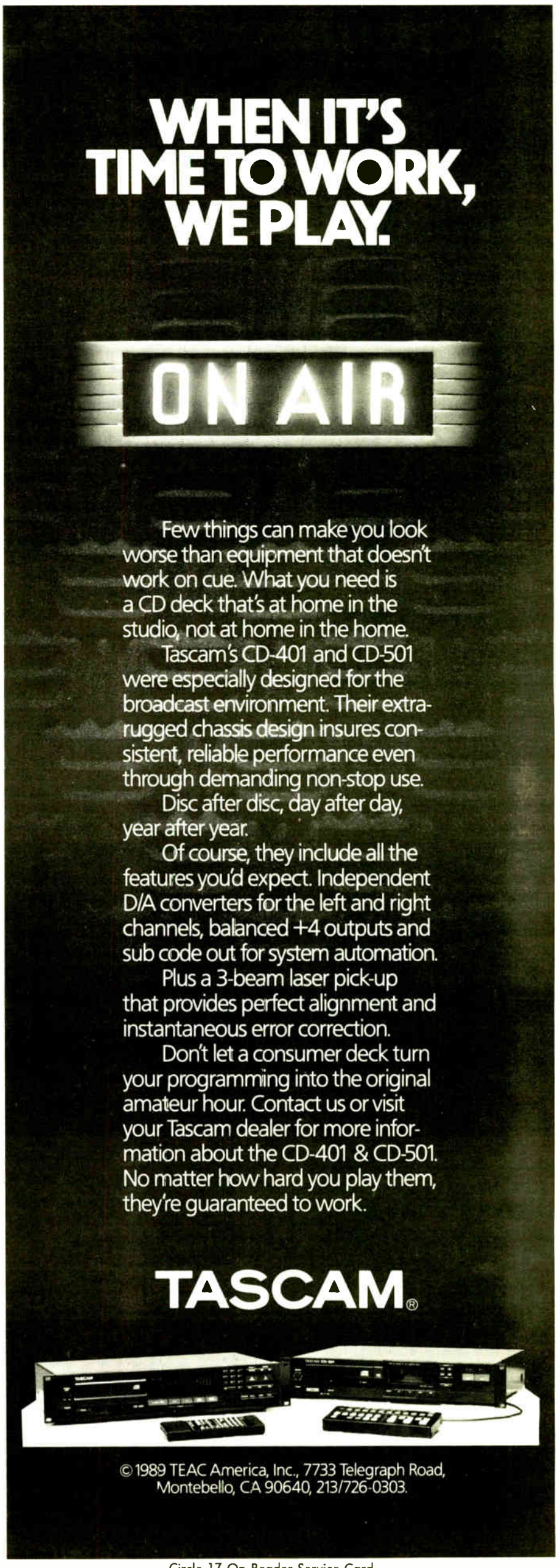
All of this editing and recording power is controlled with a user-friendly Macintosh II, devoted exclusively to information display.

The remote controller/editor/locator allows users to define and edit cues, scrub audio in real time to quickly locate in and out points and chain cues onto sequences.

New England Digital products are software-based. New features and updates are offered on a regular basis, allowing systems to stay state-of-the-art. The modular architecture of these systems maximizes the positive aspects of changing technology while minimizing obsolescence and protecting our broadcast customers' investments.

■ ■ ■

Editor's note: For more information on the PostPro digital audio workstation, contact Ted Pine at New England Digital Corporation: 802-295-5800, or circle Reader Service 81.



Circle 17 On Reader Service Card

World Radio History

DSE 7000 Makes Editing Fast

by Christopher Moore, Exec VP, AKG Acoustics, Inc.

Stamford CT The DSE 7000 is a digital audio system for broadcast production that incorporates a multitrack recorder, an on-screen editor with word processor-like functions and a digital mixer. It is optimized for the production of the shorter recordings required in radio stations—commercials, jingles, PSAs, sweepers and modifications of agency spots.

The system records audio in a digital format into banks of dynamic RAM (DRAM) chips instead of hard disk. The DSE 7000 components include a 386 PC AT computer filled with AKG DSP, ADC/DAC and memory circuitry; a dedicated hardware controller for user interface; a color monitor and a computer keyboard.

Product development

The DSE project began with a request by a radio production engineer for a digital recorder that would make it easy to prepare exactly-timed announcements.

We refined a preliminary specification of a more advanced system by watching production engineers at half a dozen Boston radio stations as they made commercials using tape recorders, razor blades and mixing consoles.

Before we actually began hardware or software design, we wrote the DSE's owner's manual and took it to the engineers for comment. Finally, we froze our owner's manual and used it as a product design specification.

TECHNOLOGY UPDATE

Unlike many other digital workstations, the DSE 7000 features a full-size control panel with the familiar buttons and faders of conventional production room equipment. There are dedicated control groups for tape motion, track play and record-ready and editing. This makes the DSE easy to learn and operate.

The DSE 7000 is built for speed. In contrast with disk-based systems that are optimized for longer recordings, the DSE records and plays back from DRAM chips. The use of these chips gives rapid response to the user. The DSE can locate to anywhere in the recording immediately and can play all eight tracks in fast forward or rewind with naturally simulated spooling audio.

Because the DSE preserves the audible characteristics of analog transports, including reel rocking and high speed search, it allows the production engineer to use the most valuable skill—critical listening. While the DSE also provides a very informative visual display of the audio recorded on each track, this is intended to support critical listening, not substitute for it.

The DSE 7000 utilizes custom designed time-aligned 16 bit stereo ADCs and quad DACs operating at user-selectable sampling rates of 44.1/48 kHz or 32 kHz. Audio is handled in a full 16 bit format throughout the processing chain, with no data compression or companding. The ADCs are dithered to produce extremely good low level performance.

The DSE 7000 digital workstation from AKG

Typical uses

To make a commercial with the DSE, the engineer first gathers the necessary sound elements and records them onto the various tracks of the DSE until good takes of each are in place at roughly the right times. Next, the engineer edits, adjusting the timing of the various sound elements, trimming their in or out points and copying portions of takes or sound effects.

Once editing is complete, the engineer can proceed to do a final mixdown of the production, using the DSE's own internal digital mixer and memory or onto an external recorder. If special effects are needed, they can be performed using outboard equipment via the DSE's two effects send and return channels.

Editing on the DSE is easy because, while it is based on the familiar concepts of razor blade editing, it is faster and has the advantage that any edit, recording, erasure or punch-in can be immediately undone. This capability should give the engineer a high degree of confidence. DSE editing also follows most of the metaphors of word processing, including on-screen highlighting of selected portions of audio material.

Another advantage of DSE-style editing is that only the tracks selected by the user are affected. This allows portions of audio to be slipped relative to the underlying production spread across all the tracks.

System details

The DSE 7000 features two inputs for recording or effects returns, two outputs for stereo monitoring and recording and two outputs for effects sends. A basic system comes with one 16 MB memory card for 4.4 track minutes of recording time, while an advanced system can be fitted with up to 17.5 track-minutes of memory.

Typical eight-track productions of 30- or 60-second length can easily be done on a one- or two-card system due to the efficient and intelligent use of memory in the DSE. The DSE only uses memory when actually recording; all other operations, such as leadering and copying, do not use memory. Since the unused portions of tracks also do not require any storage, memory goes a long way.

■ ■ ■

Editor's note: Christopher Moore directs AKG's Digital Products Division in Boston. For additional information on the DSE 7000, contact him at 617-924-7697 or circle Reader Service 9.

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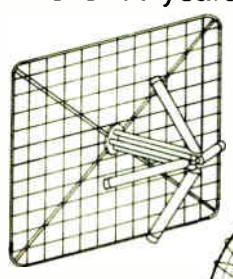
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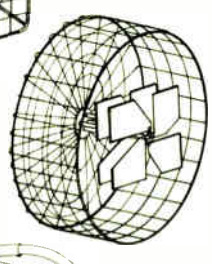
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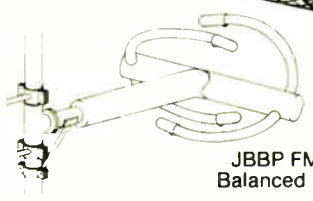
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Circle 99 On Reader Service Card

World Radio History

WNBI Gets Concept

by Steve Walrath, GM
WNBI-AM/FM

Park Falls WI What can a small market radio station do when record companies are discontinuing the 45 RPM record, there is no space for a conventional automation system that takes three or four racks and the price tag on most new automation equipment is double or triple what your budget can handle?

That was WNBI's dilemma. WNBI is a Class A FM/AM simulcast operation in a town of 3200. It has been 100% live, with 45s and albums, since going on the air in 1953. But with record companies dropping the 45 and new technology available, it was time for a change.

USER REPORT

Being a small market station, we were faced with two difficulties. Physical space is at a premium and automation systems requiring three or more racks were out of the question. And of course the price tag in many instances would make or break a proposal.

Extensive search

First, I conducted an extensive, four-month search of every available automation system on the market, including reels, carousels, cassettes, CDs and 8mm video decks. In my search, I came across a couple of companies that made DAT decks, but did not provide the programming or software for broadcast operation. Concept Productions in Roseville, CA provided both the hardware and software for a complete on-air package.

After reviewing the advantages of DAT and Concept's programming formats, WNBI chose the Adult Contemporary format with the CAPS I system, thus becoming one of only two radio stations in the country to go 100% DAT.

The CAPS I DAT system is fully contained in a single rack. It consists of 10 DAT decks which are used for every element of on-air programming including music, voice tracks, commercials, jingles and network recording and playback. The system is as easy to install as hooking up a VCR to your TV—just plug the pre-assembled patch cords to the appropriate decks, integrate the output to your studio board and limiter and you're set to go.

Well, almost. There are some sample hours you have to build in the computer and you have to download your present commercials into the system, but really, the start-up time is quite minimal.

Outstanding quality

Training for the on-air staff consisted of a two-hour evening session with a couple more hours for each person to try everything out. And with that, on 1 July 1989, WNBI went on the air with DAT.

(continued on page 46)

Digital Comes of Age

(continued from page 36)

to be totally digital. There's no paper, no tape in the studio. It's deceiving who can afford it. You think it's only the big stations."

Where will the future lead as digital technology comes in line more with the budgets of radio stations?

Looking ahead

Christopher Moore, executive VP of AKG, manufacturer of the DSE 7000 workstation, says the concern right now is the number of different audio sources.

"In the future, though, we can look toward a station being served by a central scheduling and automation system with a central store of audio on some media that has quick access to a lot of little pieces of audio," says Moore.

Moore notes, however, that "for a number of years, not all things will be in a digitally interfaceable medium. There will need to be a 'gateway' by which this material gets into and can be accessed from this central store. AKG sees itself in the production gateway."

The larger question, of course, remains. Can we expect to see a single system solution that encompasses the production process, the central storage and automation?

Moore speculates that "it could be very difficult. Needs of users are diverse and the number of players involved in the various systems is high enough that (over the years) there will be loyalties to particular ways of doing things.

"It may be that people will continue to put systems together themselves from more than one supplier. Then the challenge for the industry will be a Tower of Babel, where none of the systems easily talk to each other," he adds.

Others are more upbeat. Asks Connell, "Who's going to go into the year 2000 with everything still on tape?"

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Circle 33 On Reader Service Card

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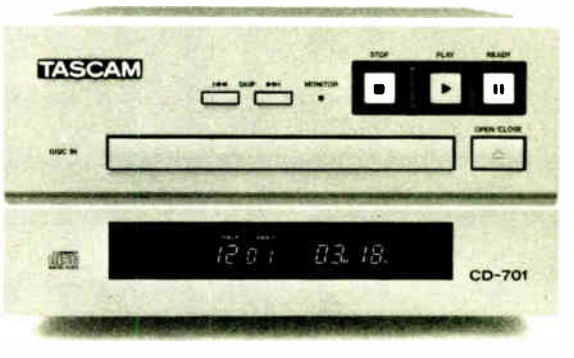

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*Radio Technology Component Grand Prix '88, CD Division, Stereo Sound Component of the Year (1988) & Best Buy (1988)

Circle 88 On Reader Service Card

World Radio History

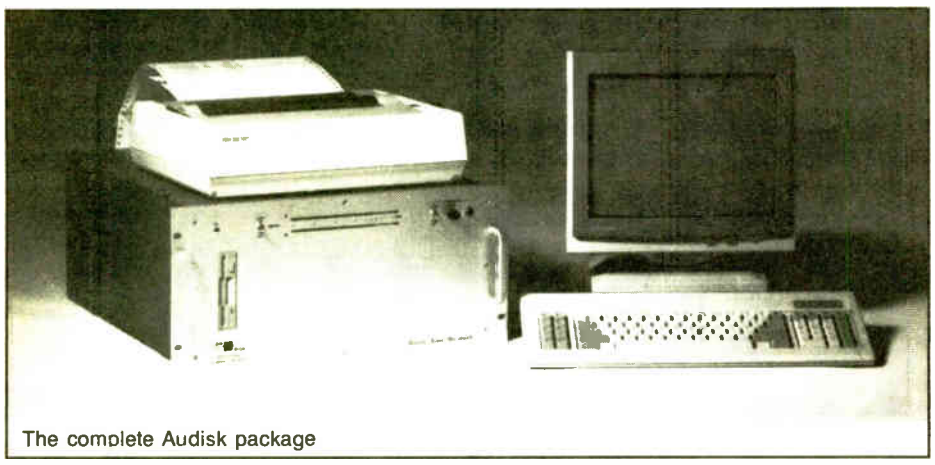
Audisk an Aid in Automation

(continued from page 33)

were its low cost and simplicity.

Tim began working directly with the two engineers to come up with a practical satellite format automation/audio storage device.

He converted a prototype of the device to be more compatible with radio's needs, adding balanced inputs and outputs, an audio switcher, optically isolated control inputs, RF immunity and so on. He also began writing and revising the software to make it run more smoothly and added error-checking and "friendliness."



The complete Audisk package

On line without problems

On 20 April, 1989, WBWA was up and running on the "Audisk."

Except for program updates to increase the unit's functions and useability, the Audisk has been on line since that date and remains on line running without problems.

During the last eight months, while feeling a lot like a guinea pig and not knowing whether to trust this non-tangible way of delivering sound, it has grown on me.

The device processes almost 4 million bytes of information to produce just one minute of audio; it requires nearly zero maintenance and it can record and play back simultaneously with only two moving parts, the hard disk and a blower.

All this, while keeping track of kill-dates for the 180 minutes of on-line commercials/promos/PSAs and logging IDs and spots to a printer as they are played. And while this is going on it's automatically loading and playing jock liners and IDs in milliseconds, based on a network jock schedule.

Five or six hours of network breaks (commercial stopsets) can be programmed in five minutes at the terminal, with walk-away times that exceeded our greatest expectations. Except for recording updated weather breaks, we could program the system, not for just 24 hours, but for at least seven days before rescheduling!

Even the closed-circuit feeds are automatically recorded onto the hard disk and the stopset timing is checked for errors as you make out the schedule. We have an ATS system to watch the transmitter when we're on the satellite, so we can literally "walk away" for days at a time.

Other advantages

There are other less obvious advantages to Audisk, like its ability to rotate liners and IDs at random; no rewinding or waiting for a cart to cue; schedules that are remembered from week to week; EOM "tones" that can be changed at any time without re-recording, etc.

Audisk can even act as an infinite network news delay, where it automatically begins recording the news, but you can start playback at any time, from milliseconds after it begins recording to hours (or years) later—no more "walking" on the news at the top of the hour!

Our Audisk has also been interfaced with the automation system, so that the same commercials that are available while on the satellite format are also available during live times. It appears just like a Carousel to the automation system.

While Tim had originally developed the Audisk system and software just for WBWA, the concept turned out so well that he decided to market it through his consulting company, MacroMedia.

Even the closed-circuit feeds are automatically recorded onto the hard disk . . .

A basic 15 kHz stereo system has 180 minutes on one hard disk. With up to seven hard disks, there can be as much as 1260 minutes, or 21 hours on line.

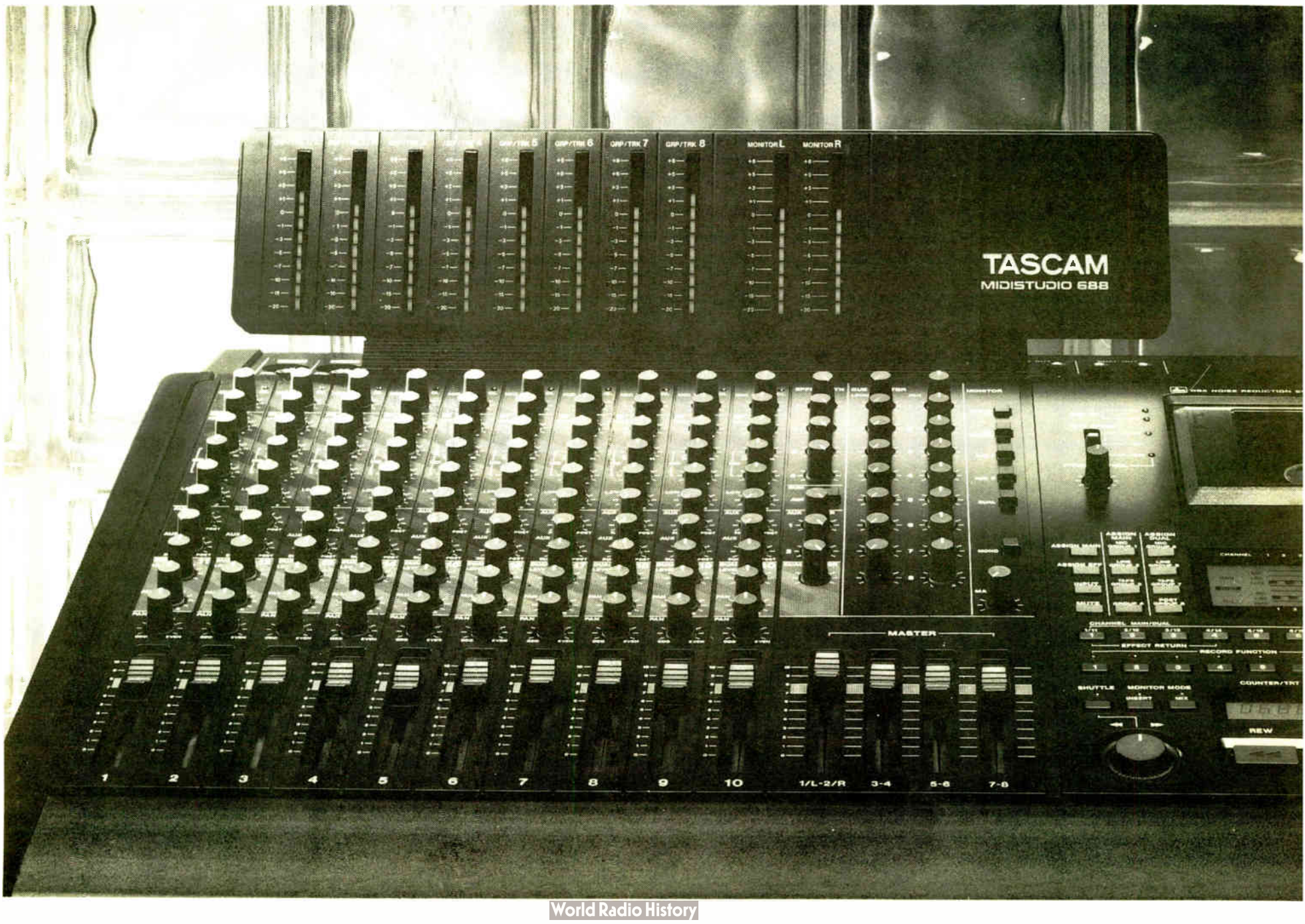
Mono and 8 kHz systems are available, each of which doubles the storage time; therefore the same basic system could hold 720 minutes, and seven disks can hold 5040 minutes—three and a half days of instantly-accessible digital audio!

With Audisk, it's time for a remake of *Shootout at the OK Corral*. Saddle up, buccaroos! "Eliminate tape" is the battle cry and let's banish phasing, wow & flutter, head and tape wear and mechanical contraptions forever.

■ ■ ■

Editor's note: Bob Schellenberg can be reached at WBWA: 715-373-5151.

For more information on Audisk, contact Tim Valley at MacroMedia: 507-645-5970, or circle Reader Service 29.



World Radio History

Absolute Broadcast Upgrades

by Jack Mullen, VP
Absolute Broadcast Automation

Westernport MD Absolute Broadcast Automation (ABA), has upgraded its family of systems to include operation with IBM compatible host machines. Using MS-DOS based computers, System 100 can now support networking of two or more host machines.

TECHNOLOGY UPDATE

The automation controlling computer and the schedule generating business operations computer are now linked full time with the System 100 Networker. This permits transfers of data between the automation computer and the business system.

Automatic transfer of the next day's schedule, remote tape allocation, as well as access to the automation controlling computer's main menu are now possible.

A limited version of the network environment software will permit long distance communications with the system via modem. New software features include context sensitive on-line help, upgraded music management, scheduling and business software.

The improved hardware permits the use of hard disks instead of floppy disk drives along with other new features. The basic Satellite System 100 will control all available satellite programming services.

New systems on tap

In addition to the new features mentioned above, two new systems are slated for delivery to stations in 1990. These systems feature total digital domain operation.

The first system introduced will be the new Satellite System 100-D, a low-priced, completely digital satellite support system that will be upwardly compatible with all existing analog based systems.

The host computer system will be based on the IBM family of computers and will support most compatible 8088 XTs and 80×86 machines compatible with the IBM AT machines. All program material will be stored on high density digital storage devices. Long term storage of commercials, liners etc. will be placed on one to three DAT machines.

Optical storage devices will be used for short term storage of "next up" commercial breaks and will provide a scratch pad area for commercials waiting to be downloaded to the long term storage devices.

The Satellite System 100-D will also include the newly upgraded networking software developed by ABA which permits the Business Computer and the Automation Computer to be in constant direct connection.

The Satellite System 100-D will use the upgraded version of the System 100 business package and features a full integration of automation and business systems.

Digital music automation

Absolute Broadcast Automation is also developing a totally digital version of their music automation system.

This unit will be called System 100-D and will feature on-line storage of more than 1000 library songs as well as all commercials, jingles, etc. The system will be be based entirely on Read Write optical device storage.

System 100-D will include the integrated business networking environment—the newly upgraded System 100 Music Management Software. As always, System 100-D will feature 30-day walk-away time and Real Time Scheduling for generating Real Time Talk.

■ ■ ■

Editor's note: For more information on Absolute Broadcast Automation products, contact Jack Mullen at 301-359-3033, or circle Reader Service 3.

Century 21 Wins Praise

(continued from page 34)

properly. But, on occasion, it will just quit.

Most of these problems have been attributed to timing problems associated with the Digital Studio software "talking" with the Sony disc players. Rebooting the computer usually solves this problem. On other occasions it will start a selection and then, several seconds into the song, switch to another.

We have been through several versions of software. Each one narrows in on the problem a little more and our downtime is lessening. As I write this, Century 21 is supposed to be sending us new software that should correct all of the existing bugs and provide a few bells and whistles that will really enhance the Digital Studio (see sidebar item).

The new software, we are told, will control more than two Sony CDK-006 machines (a real plus in our opinion) and will provide for on-screen liners for jocks, weather forecasts, promos, etc., with a single keystroke. We look forward to its arrival. Even with the "bugs" in our older Digital Studio's software, it's still the only way to fly.

■ ■ ■

Editor's note: Jim Holmes can be reached at 419-529-5900. For information on the Digital Studio System, contact Dave Scott at Century 21: 214-934-2121, or circle Reader Service 50.

Circle 37 On Reader Service Card

World Radio History

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Assessing the CAPS I

(continued from page 43)

Reaction to the DAT system has been interesting. With everything digitally recorded and played back, the sound quality is outstanding, especially the match between the voice tracks and music. You just can't tell the difference between live studio work and the digital system.

Songs can be added or deleted with a touch of the keyboard. Remote broadcasts, integrated with pre-recorded hand-offs by the announcers, sound totally live with the major market personalities. All news, weather and special programs can be put into the system for later playback.

Concept is presently working on additional improvements, including the recognition of end dates on commercials in the system, so an outdated ad will never play. The company is also working on a program to integrate CAPS I with other standard traffic computers for the automatic downloading of the next day's log.

■ ■ ■

Editor's note: Steve Walrath, GM for WNBI in Park Falls, WI, has also worked as OM for Nicolet Communications and PD for WJJQ, Tomahawk, WI and WTIQ in Manistique, MI. He can be reached at 715-762-3221.

For more information, contact Renee Montero at Concept Productions: 916-782-7754, or circle Reader Service 71.

TUNED IN

People ... Concept Productions has selected Dick Good to head its marketing and sales management efforts. Good was former GM for KLAD-AM/FM and KOTI-TV, Klamath Falls, OR; CBSI marketing and part owner of KDUN in Reedsport, OR; GM of KFMI, Eureka, CA and a long-time member of the International Broadcasters Idea Bank.

ABC Radio Networks' engineering department recently promoted four executives. Richard Martinez was upped to VP of Engineering from GM of Engineering and Program Operations. Mark Kalman succeeds him in the latter position, a promotion from Director of Technical Operations. Robert Donnelly has assumed the title of GM of Satellite Systems from Director of Satellite Systems, and Brenda Morgan has been elevated to Director of Broadcast Services from Manager of Broadcast Services.

Meanwhile, **Telecommunications Techniques Corporation** reports that Kenneth C. McAlpin has been named Group Controller for **Dynatech's Test Technologies Group.** McAlpin was formerly the Assistant Group Controller for Dynatech Corporation at Dynatech Communications in Woodbridge, VA.

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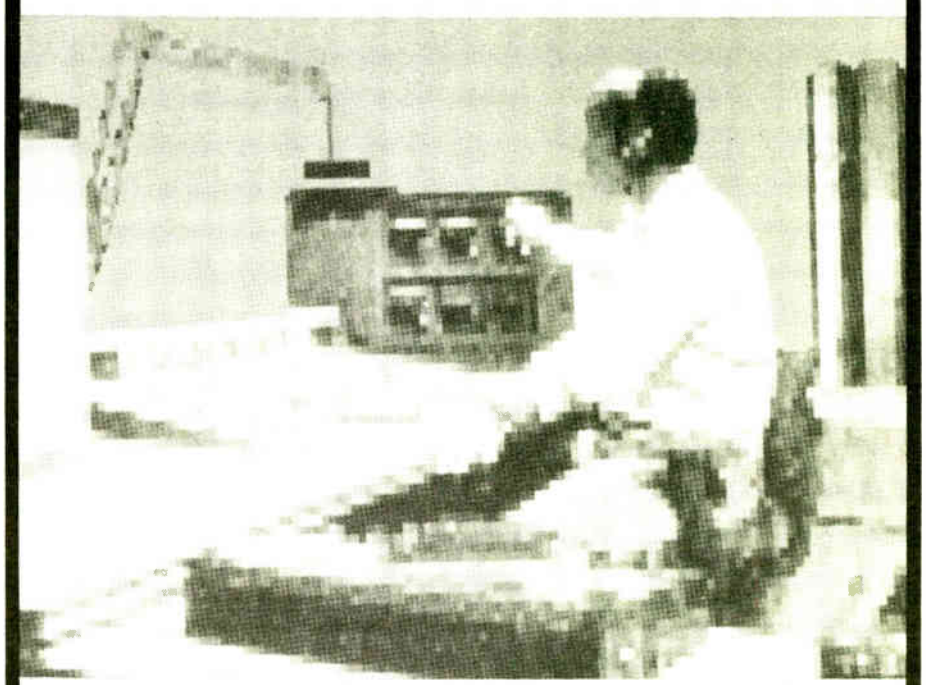

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For those interested in more advanced techniques, the SP-6 employs a powerful talent monitor section designed to rapidly call up live mic and track combinations, making difficult punch-ins a breeze. Standard SP-6 input channel equalizers are more comprehensive than those supplied as optional items on competing products, allowing much greater creative freedom. Input channel auxiliary send sections are designed to be the most versatile in the industry, providing 4 different auxiliary buses to allow digital delay, reverb, talent foldback, and mix-minus feeds. Stereo input channels can provide either mono or stereo effects sends. Even more, the SP-6 has 4 auxiliary effects return inputs that allow effects to be recorded onto the multitrack or sent to the monitor buses.

The SP-6 provides independent headphone, control room and studio monitor feeds, as well as stereo cue/solo. Control room and studio mute and tally functions are independently dipswitch selectable on individual input channels. Additional studio modules may be ordered to accommodate larger, multi-studio installations. The SP-6 may be configured with any combination of mono and stereo input modules, in mainframe sizes ranging from 16 to 32 or more inputs. The console is available in either an 8-track production format or a 4 stereo subgroup TV master control configuration. So why not profit from Wheatstone's experience and reputation? Call us today and learn more.

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