

FCC Approves NRSC
page 2

Radio World®

Vol 13, No 8

Radio's Best Read Newspaper

April 26, 1989

Patrick To Resign from FCC

by Alan Carter

Washington DC Dennis Patrick, who maintained a marketplace approach to broadcast regulation much to the dismay of some broadcasters and Congress, has resigned as FCC chairman effective with the swearing in of a replacement.

Patrick, 37, submitted his resignation 4 April to President Bush. President Reagan named the California lawyer to the FCC in 1983 and promoted him to chairman in 1987, succeeding Mark Fowler.

Denying that the Bush administration encouraged him to vacate the post, Patrick said it was an "absolutely voluntary" decision. "The White House has been absolutely supportive of me since day one," he said.

Some tied the timing of Patrick's departure to the Commission ruling on price cap regulation for AT&T.

Patrick said he has "no plans" but he ruled out seeking political office in the foreseeable future. He said he would not

conduct a job search until he leaves office.

Patrick also said he did not know how long it would take the White House to nominate a replacement. He said that upon submitting his resignation to the Bush staff, the administration indicated it was not searching for a possible chairman but trying to fill two vacant commissioner seats.

The FCC has been running with only three of five members since December 1987.

Five names surfaced immediately as possible nominees for chairman, according to a source with close ties to the White House.

They include Alfred Sikes, assistant secretary at NTIA; Sherrie Marshall, a

former Patrick aide and attorney for Wiley, Rein & Fielding; Andrew Barrett, a member of the Illinois Commerce Commission; James Smith, an attorney at Reed Smith Shaw & McClay; and Susan Wing, an attorney at Hogan & Hartson who was unsuccessfully nominated by Reagan for a commissioner seat.

In comments to reporters, Patrick cited several radio related issues he considers significant moves by the FCC during his chairmanship.

He noted the initiation of AM technical improvements and relaxation of local ownership rules.

Patrick also pointed to recent reforms designed to stem abuses in the comparative renewal process by limiting the payments licensees can make to challengers.

As for regulating the spectrum, Patrick said he prefers governing the "output parameters" and allowing licensees to control the technology as long as broadcasters don't harm each other.

Citing disappointments, Patrick noted frustration at the control of content forced

(continued on page 17)

Deterrents For Abuses

by Charles Taylor

Washington DC The FCC made what it called significant strides last month in attempts to conquer unethical comparative license renewal practices with two separate actions.

The Commission first imposed severe limitations on payments licensees can make to outside parties who challenge their renewals.

Some challengers are accused of filing competing applications often with the single intention of financial gain, an issue the FCC has investigated for more than a decade.

The move under BC docket 81-742 will make certain "that applications are received from bona fide applicants rather than those using the process to accomplish other objectives," the Commission said.

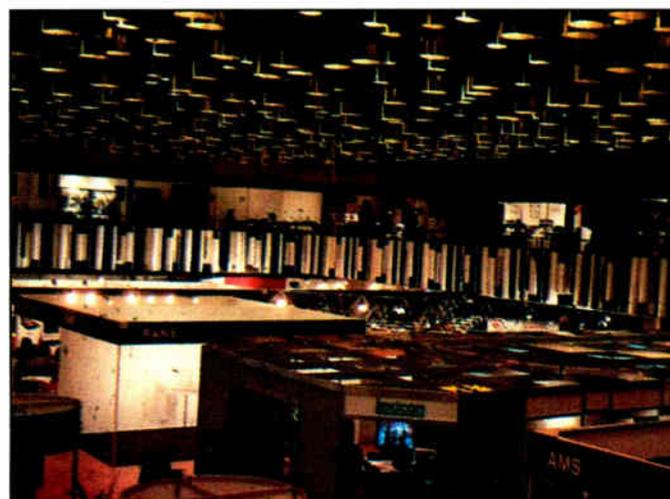
Further disclosure

On a second front, the FCC revised Form 301, contained in Gen. Docket 88-328, which is used when applying to build new commercial broadcast facilities, including those subject to license renewal.

The revision will require financial, ownership and integration information from applicants, which the Commission hopes will further deter abuses of the application process.

The Commission also requested further comment on current renewal stan-

(continued on page 7)



Radio Waves Across The Atlantic:

Germany's RSH gives state-supported radio a run for its money (above), while Hamburg hosts the 86th AES convention. See pp.14-16 for details.

FM Class C3 Is Established

by Charles Taylor

Washington DC The FCC has established a new class of commercial FM stations, which the Commission said would enable a significant number of smaller Class A stations to expand signal coverage areas.

The action establishing Class C3 FM stations was approved at a Commission meeting 30 March.

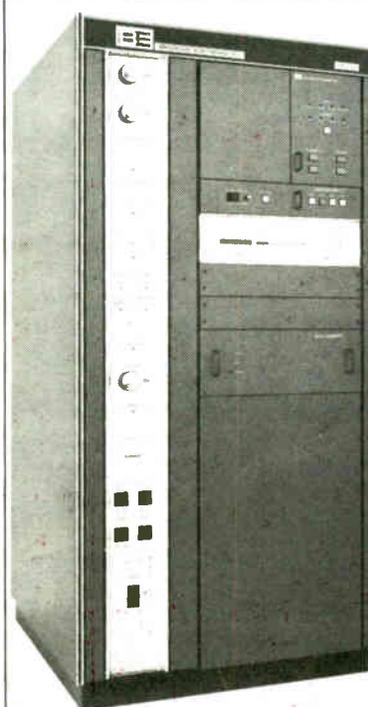
Although initially included as part of MM Docket 88-375 that contains a plea by the New Jersey Class A FM Broadcasters Association for a 3000 W power hike to 6000 W for Class A's, the FCC separated the two issues, saying it needed additional technical analysis of the proposal for the blanket power hike.

Mass Media Bureau Chief Alex Felker told RW the Commission is working to "come up with some creative ideas to meet both sides of concern" in the power increase controversy.

The heart of the Class A battle is between those who want an across-the-

(continued on page 13)

So Many Ways Better...



Broadcast Electronics' FM-3.5A 3500 Watt FM Transmitter

- First with a 4CX3500A one tube design.
- Patented folded half-wave cavity eliminates plate blocking capacitor and sliding contacts.
- Our own solid state broadband IPA in slide out drawer.
- Industry standard FX-30 exciter.
- Emergency 250 watt patching.
- First with automatic power control that maintains constant output power with proportional VSWR foldback protection.
- Ten individual meters.
- Optional microprocessor video display system (MVDS) with diagnostics.

The Model FM-3.5A single tube FM transmitter is the first choice for optimum Class A service. Over seventy on the air in the United States, Canada and overseas.

BE BROADCAST ELECTRONICS INC.

4100 N. 24th ST., P.O. BOX 3606, QUINCY, IL 62305, (217) 224-9600, TELEX: 250142, FAX: (217) 224-9607

Circle 17 on Reader Service Card

FCC Approves NRSC-2

Washington DC Hoping to reduce AM adjacent channel interference, the FCC on 12 April adopted the National Radio Systems Committee RF emission limitation, NRSC-2, effective 30 June, 1990.

However, the Commission gave stations a four-year grace period with a presumptive compliance provision if they use the NRSC-1 preemphasis standard. After 30 June, 1994, stations must establish NRSC-2 compli-

ance through measurements.

NRSC-1 defines a station's preemphasis and reduces occupied bandwidth to 10 kHz through the use of processing filters. NRSC-2 defines a complementary transmission standard, or "RF mask."

Presumptive compliance was a "compromise" endorsed by many broadcasters and the NAB who supported NRSC-1 pending further evaluation of NRSC-2. But the FCC said NRSC-1

alone could not alleviate interference from overmodulation or transmission system anomalies.

NRSC Chairman Charlie Morgan praised the ruling as accomplishing 90% of the committee's goal: "reduction of second adjacent interference," he said.

The action also put receiver manufacturers on notice to make wide band receivers, a key to the success of AM, Morgan said.

NRSC-1 supporters asked the FCC to approve the audio stan-

dard only, because of difficulties in measuring NRSC-2 compliance.

But the Commission's action said that in addition to transmission anomalies, NRSC-1 could be "readily circumvented or abused by adjustments" and that the preemphasis specification of NRSC-1 "restricts the flexibility of licensees" in adjusting processing.

The FCC also said that the presumption of compliance with NRSC-2 by using NRSC-1 processing would be dependent on the absence of any "technical evidence of noncompliance."

NEWS BRIEFS

Ex-MMB Chief Has New Position

Washington DC Former FCC Mass Media Bureau Chief James McKinney, most recently at the Reagan White House as deputy assistant to the president for military affairs, is the new chairman of the Advanced Television Systems Committee (ATSC).

The ATSC was formed in 1983 to develop voluntary standards for advanced television systems, including high definition.

New NAB Radio VP

Washington DC Radio and programming executive Lynn Christian has been named radio senior VP at NAB, replacing David Parnigoni who resigned effective 5 May.

Christian currently is president/CEO of Century National Entertainment Inc., of Los Angeles and Chicago. He also is managing director of Century National Sports Productions.

Prior to joining CNE, Christian was executive VP of Century Broadcasting Corp., Chicago, a major market radio group owner. He also held positions at numerous radio stations and was active in the old NAFMB and NRBA.

Parnigoni resigned after eight years with NAB to return to station operation and ownership.

The Russian Digital Link

Littleton MA Intraplex Inc. said that its T-1 digital multiplexer is being used in the first full-time digital link between the US and the Soviet Union.

IDB Communications Group, a Los Angeles-based satellite transmission provider, announced the completion of the first permanent T-1 digital link between the two countries.

The circuit provides US media and businesses up to 15 kHz audio services as well as normal voice and data circuits.

WHY DIDN'T SOMEONE THINK OF THIS BEFORE?

A FAST-PACED PRODUCTION CONSOLE

THE WHEATSTONE SP-6 AUDIO CONSOLE lets production people quickly accomplish 8 and 16-track work, yet easily handle routine transfers and dubbing operations. With its unique track monitor section it can facilitate simultaneous stereo mixdown during the multitrack session — almost halving typical production time cycles. Input channels are laid out just like an air console, with machine starts below the channel fader, so staff familiar with on-air consoles can quickly become comfortable in the production environment.

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.



Wheatstone Corporation

6720 V.I.P. Parkway, Syracuse, NY 13211

TEL 315 455-7740 FAX 315 454 8104

INDEX

A Switch for Recorder Upkeep by Ken Blake	20
Hiring You: What's In It for the Client? by John Cummuta	21
How Semiconductors Are Made by Ed Montgomery	22
Hard Disk Editing on a Tight Budget by Thomas L. Vernon	24
Designing a Demodulator by Bill Higgs	27
Train Talent in Technical Topics by Barry Mishkind	27
Upgrading Production Values by Ty Ford	28
WXXX Gives Radio The Victorian Touch by Dee McVicker	30

Radio Taino Blanks Out US AMs

by Alan Carter

Norco LA Fidel Castro certainly courted the American media when Soviet Union leader Mikhail Gorbachev was in Havana this month, but the Cuban government is still making enemies among AM broadcasters in the US.

Not until a reporter for syndicated commentator Jack Anderson called Abele duTreil did he think there was any use in complaining about the latest series of Cuban radio broadcasts that blanked out his 750 W nighttime signal into New Orleans on WADU-AM at 830 kHz from Norco, LA.

Outside Miami in Hialeah, FL, Adib Eden Jr. was at his wits' end, especially when the Cubans broadcast around the clock on 830. His 1 kW signal from WRFM-AM could be heard only about five miles from the transmitter and with the transmitter in the everglades, listeners were few and far between.

Chuck Stone is set to move WWMO in Eden, NC, from 1130 to 830 in 60 to 90 days so the station can be on 24 hours. But with Cuba's program coming in crystal clear, the 1000 W nighttime power the FCC granted him would be drowned out.

Caught in the middle

These are only three examples—yet representative—of the plight of AM broadcasters who suffer the consequences of political maneuvering between the US and Cuban governments.

It seems that anytime the US makes a move to increase the prominence of Voice of America's radio programming directed to Cuba, Radio Marti or acts on a promised TV counterpart, TV Marti, the Cuban government blasts its Radio Taino travel programming and an English version of Radio Moscow toward the US.

The result of the illegal broadcasts: US AM broadcasters on 830, 1040 and 1160 are out of luck.

The latest round began 20 March

when the VOA took Radio Marti from 17½ hours to 24 hours. Several days later the House Foreign Affairs Committee approved legislation with \$16 million for each of the next two years for operation of TV Marti.

The Cubans broadcast Radio Taino on 830 kHz 24 hours from 20 March to 27 March, according to Richard Engleman, chief of inspections and investigations for the FCC Field Operations Bureau.

"I believe we must take action immediately to . . . let the Cubans know we will not tolerate such blatantly illegal interference . . ."

But he said the Cubans indicated on the broadcast they would go 24 hours permanently.

The Moscow report

Since 20 March, Radio Taino has been on 24 hours at 1160. Other broadcasts from Cuba include an English version of Radio Moscow on 1040 kHz from 5-7 PM, Monday through Friday; every other Saturday and 7 AM to 5 PM on Sunday, Engleman said. The alternate Saturday is Radio Taino. The Cubans also broadcast on 1160, he said.

The FCC filed a complaint with the Cuban government, Engleman said and also sent a notification to the International Frequency Registration Board.

There has been no response from Cuba, Engleman said, and filing complaints seems to be of no help to AM broadcasters in the US.

WRFM's Eden, president and GM, said he lost 85% of his revenue at the height of the 24 hour broadcasts for his Spanish-language station that went on the air last July. He wrote letters describing the situation to President Bush, Secretary of State James Baker, the FCC

and he contacted a congressman behind the TV Marti plan.

"If something is not done immediately, we're going to be one more station off the air," Eden said.

Hill action

Rep. Dante Fascell (D-FL), chairman of the House Foreign Affairs Committee—which approved the TV Marti funding—and a supporter of TV Marti,

retaliatory action" by the Cuban government for TV Marti.

A State Department spokesman said the agency is "actively pursuing" this latest interference. "We take these matters very seriously," he said. He declined to elaborate further.

Enduring the situation

duTreil, president and GM of WADU said he can hold his own over the daytime Cuban broadcast with his 5 kW. But at night, he said he loses about three-fourths of his coverage area over New Orleans.

"When we lose the amount of listeners we're losing, it hurts the station," he said. Like Eden's, duTreil's station is relatively new, only on the air since December 1987.

Stone said that at 1000 W nighttime, he won't get into his city of license, about five miles from the transmitter site. "It won't be any use to turn it on."

Stone has been to Washington and talked with FCC officials but found little satisfaction.

"I'm hoping we can get a substantial increase in nighttime power," Stone said.

An engineer for Stone measured the Cuban signal at 5 mV. "I would need 50,000 W at night to cover what my coverage area should be," Stone said.

For information on Cuban interference from the FCC, contact Richard Engleman at 202-632-6345.

wrote Secretary Baker requesting government action.

"I believe we must take action immediately to . . . let the Cubans know we will not tolerate such blatantly illegal interference," Fascell stated. "In addition, we must be prepared—either through provision of financial compensation to American broadcasters or strong diplomatic action or both—to react promptly to any greater retaliation as the TV Marti legislation makes its way through the legislative process and is implemented."

Fascell also maintained in his letter that the US must be "fully prepared for



Nobody does it better

The Telos 100 and Telos 10 digital hybrids are the acknowledged leaders in providing the highest quality telephone talk. And now we introduce the most complete family of interfaces and accessories. More than ever, Telos hybrids can provide you with the performance and features required by your installation. Isn't it time for you to experience the pleasure of great phones?

Call Toll Free 800-732-7665



BRADLEY BROADCAST SALES

Where Service and Engineering Make the Difference

8101 Cessna Avenue • Gaithersburg, Maryland 20879-4177
MD & DC: 301-948-0650 • FAX: 301-330-7198 •

*
214-388-5800
*
Service 24 hours a day
*

This number is your link to the service experts at Continental Electronics where the number one priority is keeping you on the air. Our commitment includes:

- Telephone assistance 24 hours a day, 365 days a year;
- Field service engineers skilled at troubleshooting;
- Critical parts orders shipped the same day;
- Technical training for all Continental transmitters available;
- No charge for telephone assistance.

For parts orders call 214-388-3737. Our job is to keep you transmitting.

*

varian
continental electronics division

P.O. Box 270879 Dallas, Texas 75227
Telephone: 214-381-7161 Fax: 214-381-4949

Deutschland: A Radio Frontier

by Judith Groß

Falls Church VA Go east young man (or woman), go east.

Horace Greeley thought the vast, untouched western US frontier was a nifty place for a young American with aspirations to make a go of it.

But in radio, in 1989, the frontier that's opening up is the commercialization and private ownership of radio stations that's begun in Europe.

In some places, like Scandinavia, where there are fewer free market incentives and the politics get in the way, things are creeping along at a snail's pace. But then there's Germany.

You can read about my tour of one of the largest—and first—private radio operations in West Germany in this issue.

☆☆☆

Here is a market hungry for American radio know-how. While over here we may have become jaded with the hot clocks, formula playlists, jingles and promos, over there it's all just beginning.

It's a golden opportunity for someone with radio experience to start out fresh in an atmosphere open enough for new ideas and creativity.

"I could find jobs for engineers and production people today," Alex Zeitelhack said of the West German radio market.

Alex has a company called **Broadcast Consulting International** which helps stations get that commercial sound and build a professional facility. BCI handles everything from building the studio to marketing, formatting to hiring talent.

Alex has discovered that West German private stations want to learn as much as they can about "doing" commercial radio.

What an opportunity there is, also, for US equipment vendors savvy enough to tap a growing market. It's not at all like doing business here in the states, but the doors are swinging wide open.

In the next two years, more and more private stations will be allocated in Germany's 11 states. Then, in 1992 comes the unification of the European economic community—sure to spur the market even further.

And this, just when you thought there were no new frontiers to conquer; just when you were ready to put your pi-

oneering spirit in cold storage.

Thanks to **Fidelipac**, by the way, for putting together such a great tour to the **Hamburg AES**. About 60 broadcasters and equipment dealers made the trip.

Visiting **Radio Schleswig-Holstein** was an eye-opener. The use of processing is new to German radio and our technician friend **Duffy** was explaining about their **Orban Optimods** and **Texar** (now **Gentner**) **Audio Prisms**.

Some of our US radio engineers told Duffy he should put the **Prisms** in front of the **Optimods** for a really "souped up" sound. He replied that doing so would

gal, by the way.

Did any of the group visit that section of town? Well, I really don't know, I had to catch up on my sleep for the rest of the whirlwind tour. Honest. I did. Really.

And that funny little letter in my by-line is a German double "S"—an "SV", known as an "Esset." You see it in words like "Einbahnstrasser," which we saw on a street sign in front of the hotel.

One of our group (not mentioning any names) was lost one time and remembered the sign, so he asked the local authorities how to get back to the boul-

be showing consoles at its booth. Don't be surprised to see a new line of studio furniture from the company as well.

Oh yes, and a reminder, the hours for exhibits in the **Hilton Center**, the **Rotunda** of the convention center and the **outdoor area** begins a half hour earlier than the rest of the convention center.

Okay, I'm going to resist the temptation to say anything at all about the **closing entertainment** for the convention. Hey, it's Vegas. A name act is a name act. Booking these stars is no picnic and all, I know.

But, really, Wayne Newton?

☆☆☆

Can't resist a mention of my old stomping grounds, once again. The original SBE chapter, Chapter 1 in (you guessed it) **Binghamton, NY**, wanted everyone to know that its yearly joint meeting with Chapters 2 and 22 from **Scranton, PA** and **Syracuse, NY** is being held 16 May at the **Owego Treadway**. (Ah yes, along the beautiful **Susquehanna River**, I know it well.) Gets going at 6 PM for dinner and the featured speaker is **Tom Keller** from **BTP** talking about **FMX**.

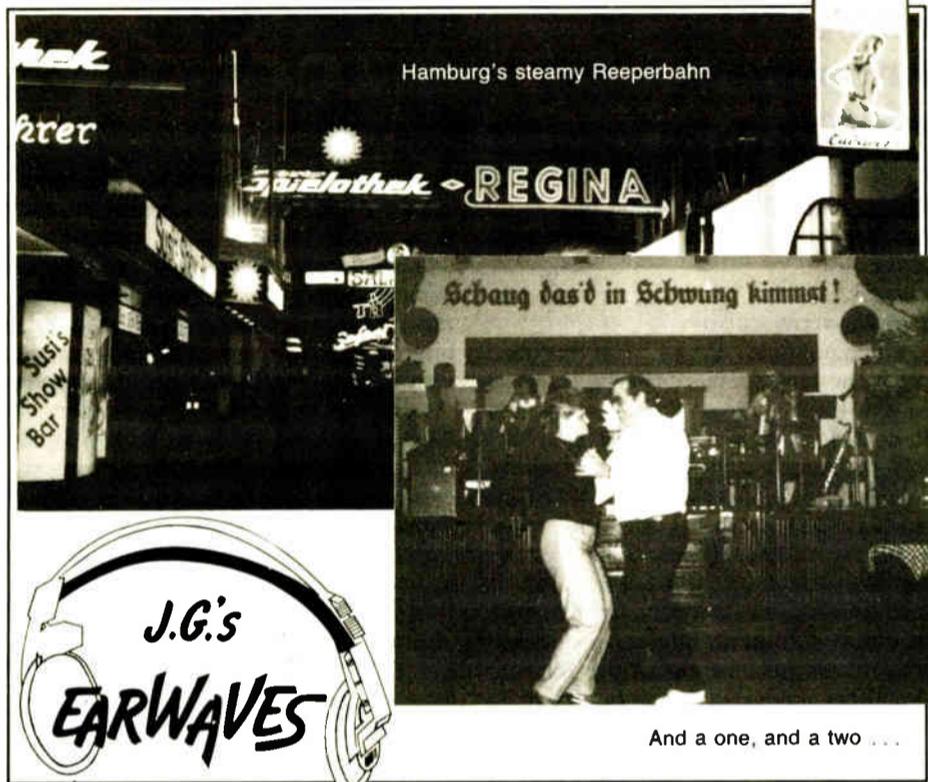
From an update on **AM stereo** comes this quote from a station owner: "We're just waiting for the market to get those radios out there."

What does he think all those Chryslers, Toyotas, Nissans and Delco car radios with the "AM ST" light blinking are, chopped liver? They're out there, pal.

And, talk about talent . . . Did I mention that the same artist who came up with that spiffy design for the cover of the new **Bradley Broadcast** catalog designed the box for **Donkey Kong** cereal? Hmmm, there it is again, that link between food and broadcast equipment. Wonder what it means?

Oh yes, one more **NAB** reminder. (They're really not kidding, huh? Wayne Newton?) Just wanted to let you know that **RW** is again one of the sponsors of the **Ham Radio Reception** at the **NAB** show this year. So calling all hams, **CQ** for Monday, 1 May, 6 PM, the **Hilton**. Be there. Aloha.

Heard something interesting? Spill your guts to **Earwaves**. Write **PO Box 1214, Falls Church VA 22041**, or call me at **703-998-7600**. Best tidbit of the month wins a coveted 1989 edition **Radio World** mug.



And a one, and a two . . .

make the station's sound "funny."

Our CEs told him their PDs often like their stations to sound so "funny."

"They need to get their ears examined by American doctors," said Duffy.

What would a visit to Germany be like without a **polka**? (You thought I was going to say beer, right? OK, there was that, too.) A few of our group lived it up in **Zillertal**, a beer hall where they have the best sauerkraut I've ever tasted.

As you can see, **Tim Hawks** from **RF Specialties** cut a mean polka to the tunes of a real oom-pah band.

Zillertal was on the edge of Hamburg's famous red light district, the **Reeperbahn**, where just about everything is le-

evard marked "Einbahnstrasser." Turned out it meant "One-Way Street."

☆☆☆

Some late word from the **NAB** show before we flock to Vegas.

In addition to keeping attendees stomachs happy with **Tastykakes**, **Radio Systems** is going to put a little extra something in some of the cakes.

If you get a **free product coupon** in with the cake, you win a **Radio Systems** DA, or timer, or preamp or something like that. But one lucky cake-muncher will get a free 12-channel **RS** console. So get on over there and happy eating!

Wheatstone, meanwhile, won't only

"Touch Me In The Morning" Afternoon, Evening....



Media Touch Systems
50 Northwestern Drive
Salem, NH 03079
603-893-5104
800-321-5104

It's true. From the perspective of the on-air talent, The **Media Touch** integrated control system and touch screen is everything. The program log, audio console, copybook, trivia file, wire service printer, cart machines and ...you decide. The **Media Touch** control systems are advanced and reliable!

So reliable that **WBZ, WCCO, WPAT, WLOW, WEEL, WMAQ, MUZAK, 3M, KSLU, RADIO NEW ZEALAND** and

Broadcasters worldwide all came to **Media Touch Systems** to solve their programming control problems.

If you visit only one booth at **NAB** this year, ...it must be **Media Touch Systems**.

We invite you to put **your** Finger on the Solution

NAB Booth 2105
Suite 776A- Bally's

READERS FORUM

If you have comments for *Radio World*, call us at 800-336-3045 or send a letter to Readers' Forum (Radio World, Box 1214, Falls Church VA 22041 or MCI Mailbox #302-7776). All letters received become the property of Radio World, to be used at our discretion and as space permits.

The real truth

Dear RW:

There's an old aphorism—truth is stranger than fiction. But comments in the 8 March *J.G.'s Earwaves* seem to prove the reverse—fiction is stranger than truth.

Now I know that titillating the readers a little sells papers. And obviously comments about chicken gizzards, creamed corn and cow manure fit nicely in the scope of this particular kind of journalism. What doesn't fit though are snide remarks and innuendos about the NRSC FM subcommittee and how it decides to conduct business.

As you know, or at least *should* know since you have had a reporter at every meeting (all two of them), the purpose of this committee is to *professionally* discuss technical issues pertinent to FM broadcasting. As far as I am concerned, that is exactly what has happened and will continue to happen.

As for the fiction alluded to earlier, I direct your attention to these comments:

"... BTP representatives were welcomed to give their criticism of the Bose study math, but neither Dr. Bose nor William Short were invited in the interest of fairness."

Now the truth:

Everyone was invited. BTP and Bose are both on the NRSC mailing list. The committee meetings are open—anyone can attend. Your reporter was there wasn't he? Additionally, the Bose paper as well as BTP's rebuttal were available at the meeting.

"... the subgroup's attendees were

reluctant to discuss this sticky wicket."

Truth:

Part of anyone's right to freedom of speech is to keep quiet. If a committee member doesn't feel like discussing FMX that's his or her privilege.

Fiction:

"... how independent the subgroup can be when its activities are heavily coordinated, and its meeting space is provided by none other than NAB."

Truth:

So what? Somebody has to do it. No industry engineer I know has time to coordinate a meeting of this magnitude. And no group is "truly independent"—there's a prejudice or two lounging around in all of us.

A final truth:

The NRSC FM technical subgroup is and will continue to be engaged in work that is beneficial to every FM broadcaster. We are already working on two major projects, occupied bandwidth and multipath. Professional and competent people are donating their time and their companies' resources to be involved in these actions. We intend to make the best of all these things and we don't intend to favor any company, group, or individual.

As for FMX, my feeling is this: No one is forcing me to put it on the air. If my company decides to use this technology we will do so. The decision will be based on sound engineering practices, not knee jerk reactions and we will accept the responsibility for determining the effects, good or bad.

Finally, it might be good to remember the bumblebee. Theory says he is unfit for flight. But somewhere during the course of history he decided to try it and has been airborne ever since.

Wes Whiddon, Engineering Manager
FM Stations
Chairman NRSC FM Subcommittee
Group W Radio
Houston, TX

Editor's reply: Whether bumblebees are suited for flight or whether or not the FMX system performs as claimed are not the issues here. There are further truths than the ones cited in the above letter.

It's true that NAB provides the meeting space and coordinates the activities of the NRSC subgroups including the FM technical subgroup. It's also true that FMX and the Bose/MIT Study-BTP reply were included—by NAB Science & Technology staff members—on the agenda for the particular meeting in question.

It's also true that NAB maintains a financial interest in the FMX system. FM subgroup members should have foreseen the potential for conflict of interest even if it escaped NAB staff notice.

And it's true that three representatives of the FMX-promoting Broadcast Technology Partners—including former NAB VP of Science and Technology Tom Keller—were present at the subgroup meeting while representatives of Bose or MIT were not.

Questioning of Bose and MIT representatives by RW news reporters ascertained that they neither received an invitation to the FM subgroup meeting nor were informed that

The changing of the old guard is always an opportunity to consider new directions.

Now, with the resignation of FCC chairman Dennis Patrick added to the already open slots at the Commission, comes the chance for a total reassessment of that agency's philosophy.

The Fowler-Patrick years brought about some welcome relaxing of overly oppressive regulatory burdens on broadcasters and the opening up of the broadcast market to greater competition.

At the same time, the tendency to promote deregulation for deregulation's sake has caused great concern on the industry's technical side.

Now, with an increasingly crowded radio spectrum and crucial allocations issues in both AM and FM to consider, the choice of a new chairman and nominees to the two open Commission slots are more important than ever.

Time For Change?

This may become the perfect chance to reexamine the original mandate of the FCC as set forth in the Communications Act of 1934.

It would also be useful to take a closer look at the marketplace versus public interest argument which has emerged from recent Commission policy.

There has already been a backlash, in Congress as well as in certain segments of the broadcast industry, against the tendency to drop standards and regulations.

The Bush administration would do well to keep all these issues in mind when appointing new members to the FCC.

The chairmanship of this all-important agency should be looked upon as more than a patronage appointment and the President should resist the temptation to treat it as a mere political plum.

It might be a golden opportunity to seek out an appointee with a broadcasting background—perhaps even expertise in technical areas.

Congress would also do well to weigh these concerns and act more swiftly than in the past to confirm appointments.

The questions at stake are too important to be left to a lame-duck Commission, or one with less than a full complement of decision-makers.

—RW

such a meeting was taking place and that the study had been included on the agenda.

Further conversations—on and off the record—with subgroup members revealed an entirely different perspective than the one apparently held by Mr. Whiddon. Perhaps we talked to different members present.

J.G.'s Earwaves stands by its observations and conclusions about the meeting.

Vintage call letters

Dear RW:

In the article on page 26 of the 8 March *Radio World*, in regard to some of the history of WLW, I believe I find an error.

It states that a license was issued for WLW in 1922 by the Federal Radio Commission. However, my memory tells me that the FRC did not exist until about 1927 and that licenses before then were granted by the Department of Commerce.

Also, I wonder about the tube type given as UV 866. The type 866 tube that I am familiar with was a high voltage mercury vapor rectifier that first came on the market around 1927 or so.

These articles on the old history are very interesting as I grew up during this time and while I did not get into commercial radio broadcasting, I did have a Broadcast Operators license issued in 1931.

I enjoy *Radio World* and try to read each issue. Keep it up.

Walter M. Bolinger, CE
KJCR
Keene, TX

Early station nostalgia

Dear RW:

George Riggins' story about the origins

of call letters brought back memories. In 1930 I got my first job in radio, writing what was then called "continuity" for a share-time Chicago station called WGES. In my spare time I took an announcing trick, swept floors and learned to use a soldering iron.

The first big shake-out in Chicago radio had taken place in the '20s. Many stations had changed owners but the original calls remained the same even though their original promotion value had been lost.

WLS, owned by the Prairie Farmer, stood for "World's Largest Store," reflecting the previous Sears Roebuck interest.

WSBC, privately owned, meant "World Storage Battery Company," the original licensee.

WGES, privately owned, was named for Coyne Electrical School's slogan, "World's Greatest Electrical School." (This station is now WGCI.)

Other Chicago stations remained in the same hands and are open for business to this day. Most famous among them:

WGN, "World's Greatest Newspaper," the Chicago Tribune. WEDC meant "Emil Denemark Cadillac" and the studios were located in the Denemark showroom. WCFL was "Chicago Federation of Labor."

WCRW belonged to Clinton R. White. (It is now the property of Ed Jacker, president of the Radio Club at Austin High School 1922-1926, my old school-mate.)

There were undoubtedly others but these old synapses balk when pushed. All the best to *Radio World*!

Arnold Hartley
Key Broadcast Management, Inc.
Garden City, NY

Radio World

Vol 13, No 8

April 26, 1989

Editorial

Editor: Judith Gross

Assistant Editor: Alex Zavistovich

Buyers Guide: Richard Farrell

News Dept.: Alan Carter, Editor
Charles Taylor
John Gatski
Frank Beacham/L.A.

Art/Production

Gina Rosario, Mgr.

Ginger Bamford, James Gillgam,

Kim Lowe, Jeanne Pearson

Business

Publisher: Stevan B. Dana

Assoc. Publisher: Arthur Constantine

Ad Coordinator: Simone Leaser, Mgr.

Robyn Rosenthal

Circulation Mgr.: Marion Alsop

Controller: Anne Clark

Caroline Freeland, A/R



Radio World (ISSN: 0274-8541) is published semimonthly by Industrial Marketing Advisory Services, Inc., 5827 Columbia Pike, Suite 310, Falls Church, VA 22041. Phone: 703-998-7600, Fax: 703-998-2966.

Second-class postage paid at Falls Church VA 22041 and additional mailing offices. POSTMASTER: Send 3579 forms and address changes to Radio World P.O. Box 1214, Falls Church VA 22041. Copyright 1989 by Industrial Marketing Advisory Services, Inc. All rights reserved.

Free subscriptions are available to professional broadcasting and audiovisual equipment users. For address changes, send current and new address to RW a month in advance of the above address. Unsolicited manuscripts are welcomed for review; send to the attention of the appropriate editor.

GOOD NEWS!

marantz[®]

CASSETTE SYSTEMS

The number one newscast in America

The 3-head PMD221 and 2-head PMD201 offer state-of-the-art 2-speed monaural performance in professional-quality field recording.

The PMD221 offers true 3-head performance, for monitoring a tape during the recording process.

To extend the recording time of standard cassettes without print-through or risking tape breakage, both the PMD221 and PMD201 offer half-speed recording (15/16 ips) in addition to normal speed. This slower speed effectively doubles the length of any cassette, and is most valuable when used during voice recording, when ultra high frequency performance isn't necessary.

Both models include a built-in speaker with volume control, and a four-way power source. Both mono decks also come equipped with AC power supply. Your Allied sales professional has all the details.

ALLIED 
Broadcast Equipment

— A HARRIS COMPANY

1-800-622-0022

ATLANTA CHICAGO DALLAS LOS ANGELES RICHMOND

World Radio History



Low Profile Antennas Backed

by John Gatski

Washington DC Support may be growing for cheaper, electrically short AM antennas, known as low profile, but they will not become a reality until the FCC is persuaded to drop antenna efficiency requirements, according to several consulting engineers.

Other alternative AM antenna developments also are progressing, including plans for the long-delayed testing of an anti-skywave antenna by the NAB.

Low profile antennas, ranging in height from 60' to 100', could offer better signal penetration for man AM stations—including daytimers on post sunset power—during nighttime hours because they would be located closer to listeners, according to Ron Rackley, consulting engineer at du Treil, Lundin & Rackley consulting engineers in Washington, DC.

Currently, the NAB is working on a proposal to get the Commission to eliminate its minimum requirements for efficiency, generally 175

mV/m/kW, so low profile antennas can be used.

Performance study

The NAB also has commissioned a low profile performance prediction report from Dr. Richard Adler, an electrical engineering professor at the Naval Post-Graduate School in Berkeley, CA.

The results of that report are to be released during the NAB convention, according to NAB Science and Technology VP Michael Rau.

Because of the minimum efficiency requirements mandated by the FCC, low profile antennas cannot be used, Rackley said, unless those restrictions are relaxed.

The industry is governed by 50-year-old AM rules established when AMs were the dominant broadcasters, he said.

Rackley maintained minimum efficiency requirements for all AM antennas are not necessary because AM is no longer considered the major broadcasting medium.

A low profile antenna would offer sta-

tions the ability to improve post sunset performance at a low cost because the tall towers of 300' or more not necessary, he said.

For example, a station that transmits with 5 kW during the daytime and reduces power to 1 kW at night, also reduces its signal considerably (or even totally) to part of its audience.

Better nighttime signal

With a low profile antenna, Rackley explained, a station could locate the antenna closer to the listening area and provide a stronger nighttime signal with no interference.

Rackley said the low profile antenna concept is not new and dates back to the 1930s. Two older-designed, electrically short antennas include the "T-type" and the "inverted L."

Rackley said a metal light pole with a radial arm could be used as a modern version of the "inverted L" antenna via a shunt-type feed.

The PARAN antenna, a relatively new design, also is an example of a low profile antenna system. It uses four short

towers configured in 90° angles that radiate omni-directionally. Proponents claim there is no skywave with the PARAN antenna.

PARAN and the FCC

The FCC currently has a construction permit application before it from a Washington state company that wants to erect a PARAN antenna. An Oregon company that filed a competing permit is contesting the other application.

The competing applicant claims that the PARAN antenna would not meet FCC antenna efficiency requirements.

There are some potential tradeoffs for a station that transmits with a low profile antenna, Rackley said, including less radiation efficiency, decreased bandwidth impedance and more potential exposure to RF emissions.

Rackley said, however, that the problems can be easily overcome. He said bandwidth limitations can be overcome by adding a correcting network.

To protect humans from higher RF of low profile antennas, Rackley explained that a fence located approximately 10 meters from the structure would provide adequate protection.

Anti-skywave test

Meanwhile the NAB's anti-skywave antenna test project in Beltsville, MD, is still behind schedule because of the bureaucratic red tape involved in getting a Maryland state building permit to construct the tower, according to NAB Staff Engineer Kelly Williams.

The two-element, anti-skywave antenna was designed by engineer Ogden Prestholdt and, when all permits are finally approved and the tower erected, will be tested to determine if it can control the skywave and groundwave signals better than conventional AM antennas.

Williams said the test, which is authorized for as much as 5 kW on 1600 kHz, probably will use about 400 W. The tower will be 295' feet tall and located on land leased from Howard University.

For more information, contact Ron Rackley at 202-223-6700, and Michael Rau or Kelly Williams at 202-429-5346.

FCC Acts to Stem Abusive Practices

(continued from page 1)

dards in an effort to make those standards more concrete and less subject to drawn-out litigation and abuse.

Not far enough

But reaction to the FCC action from a broadcasting community with increasing frustration over the licensing process was less than enthusiastic.

William Potts, general counsel for the Association for Broadcast Engineering Standards and president of the Federal Communications Bar Association said that while the ruling was a positive step, it appeared "more symbolic than practical."

It "makes an already unattractive prospect less attractive. The question is how many overfilings would there have been without it, how many will there be with it?" he said. "The problem the Commission is still wrestling with: in substance, how do you treat the incumbent vis-a-vis the other applicants? They've handled the procedural underbrush. Now they have to handle the dragon."

NAB President and CEO Eddie Fritts issued a statement noting that NAB would have preferred a complete ban on payoffs involving petitions to deny and competing applications.

"However, it appears the FCC made a good faith effort to stem renewal abuses by limiting payoffs at renewal time," he said. The changes will "discourage frivolous applications and those filed for the sole purpose of seeking financial gain..." he continued.

Fritts also said he hoped Congress "can truly reform the renewal process by banning payoffs altogether and eliminating comparative renewals, which the FCC is not empowered to do."

How it works

The move on station renewal bans all settlements in return for withdrawing competing applications prior to the initial decision stage of a comparative hearing. Payments after that stage are limited to legitimate expenses of the withdraw-

ing applicant, the FCC ruled.

The agency limited payments in exchange for withdrawing petitions to deny to the legitimate expenses of the withdrawing petitioner.

The Commission also required prior FCC approval of all agreements reached in exchange for withdrawing petitions to deny to ensure that the agreements are in the public interest and not in conflict with the legitimate expense standard.

Finally, the ruling eliminated the Cameron doctrine, which allowed competing applicants in comparative renewal to assume they could acquire the incumbent licensee's transmitter site, thus avoiding completion of engineering portions of the application form.

Split vote

Commissioners voted 2-1, with Commissioner Patricia Diaz Dennis dissenting because she said she disagreed with certain implications of the changes.

To ban settlements before the initial decision stage, she said, "will prevent applicants from settling their differences and ending a hearing that neither of them wants to pursue. Rather than encouraging those legitimate settlements, we may be causing parties who want to settle to endure a long, pointless hearing through to an initial decision."

But in support Chairman Dennis Patrick said the new informational requirements and limitations will help ensure that comparative applications and petitions to deny are filed "only in a good faith."

Commissioner James Quello said he is "delighted" with the action. "The item was long overdue. This will go down as one of the four or five significant accomplishments of the FCC in the last two years," he said.

Form 301

The revisions to FCC Form 301, according to the Commission, "should deter, or at least permit identification and dismissal of financially unqualified and sham applicants."

New requirements on the application will include the date and place of filing of the applicants' legal charter; identification of all equity owners (unless there are more than 50); disclosure of whether applicants have contracts or understandings regarding future ownership rights and estimation of construction and operations costs for proposed facilities and funding sources.

The Commission also will require applicants to disclose their integration proposals within a specific period, thus deterring last-minute changes intended to disadvantage other competing applicants.

For more information on the Commission's action, contact Marilyn Mohrman-Gillis at the FCC, 202-632-7792.

Emph'asize it!



WITH THE

Emph'asizer™ AUDIO PROCESSOR

- DJ Personality Processor
- Phone Line EQ and Noise Suppressor
- Production Tape Processor
- Room Equalizer and Gated Mike Control
- Gated Recovery Compressor
- Unobtrusive Background Noise Gate
- Four Parametric Equalizers
- Mike and Line Level Inputs and Outputs

Free Detailed Brochure Available



AUDIO TECHNOLOGIES INCORPORATED
328 Maple Avenue, Horsham, PA 19044 • (215) 443-0330

Satellite Use Grows in Radio

by Charles Taylor

Daytona Beach FL When the Motor Racing Network (MRN) headquartered here switched from AT&T line to satellite transmission in 1984, the company had little idea what a difference it would make.

"Before, a lot of our sound was lost in the phone line transmission," said John McMillin, GM/executive producer for MRN, which averages 280 affiliates per event annually.

"Now, our whole broadcast sounds in color for stock car racing. The comments we got after the switch were unbeliev-

able. It's made our broadcast much cleaner and more professional sounding than ever before."

The network, which uses Satcom I and Westar IV/the two primary satellites for radio broadcasters/as well as Galaxy II, transmits about half of its programming digitally.

Looking to the heavens

Motor Racing Network isn't alone in its belief in satellite transmission for radio broadcasting.

Within the past 10 years, use of the birds has expanded nearly six-fold: from 13 radio networks and syndica-

tors in 1981 to 75 such outlets using eight satellites today, according to the NAB.

Users include a broad spectrum from news networks such as ABC, NBC, CBS and CNN to the giant Satellite Music Network with eight 24-hour live radio formats and 1000 affiliates.

Other users are the more demographically targeted customers such as comedy, farm, medical, business, sports and ethnic networks.

Individual stations have accepted those services en masse. NAB statistics cite that 92% of the nation's FM stations have a satellite dish, while 83% of AMs do. Thirty percent of FMs are affiliated with a satellite-delivered program; 32% of AMs are so affiliated.

For some struggling AMs, the use of satellite-delivered automated programming has made a critical difference in the bottom line and the ability to survive.

Receiving dishes average between \$5000 and \$10,000, while transmitting dishes run closer toward the \$100,000 range, sources said.

"There's an awful lot of interest from radio stations looking to provide programming inexpensively to their listeners," said outgoing NAB Senior Radio VP David Parnigoni.

"With the introduction of satellites, you saw the proliferation of new networks springing up because of how inexpensive it was to feed programming to stations. You're now able to get programming delivered fresh every day with excellent quality. Satellites have changed radio dramatically.

increasing availability. Currently, 26 are in orbit.

A majority of radio satellite users are linked with RCA Americom's Satcom F1R. Clients include the major networks, Westwood One, Mutual Broadcasting and the Tribune Radio Networks for agriculture and sports.

"There's no doubt that satellite provides them a very economical means of distribution," Cain said. It also accounts for a "major chunk" of the company's revenue.

"It's something we are definitely not going to walk away from," Cain added.

Replacement project

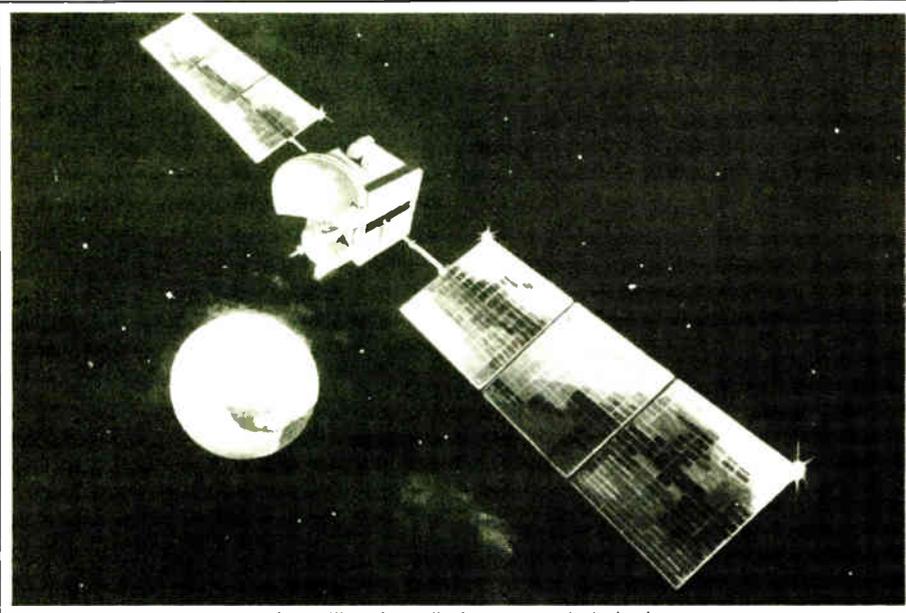
To maintain its command of the industry, RCA plans to launch a replacement for Satcom F1R in May 1991. F1R will expire in 1993, and the new bird is expected to maintain service for 12 years.

"We'll be testing out the replacement and positioning it into its correct orbital position, then will transition the traffic onto the new satellite," said Cain.

Another major radio satellite is Hughes Communications' Westar IV, launched in 1982 and the oldest radio-broadcasting bird still in operation. But that honor is destined to end: The satellite will go dark in 1991.

When it does, clients such as National Public Radio (NPR), United Press International, the Christian Science Monitor and the Corporation for Public Broadcasting (CPB) hopefully will transfer to a replacement satellite.

But CPB, a non-profit, government-sponsored agency that develops non-



In the past 10 years, use of satellites in radio has expanded six times.

CRL SPOTLIGHT

Need AM Stereo Processing?



CRL's AM2S Matrix processing system was designed to give you the fullest stereophonic fidelity while maintaining maximum monophonic compatibility. The two unit system consists of a wide range two band AGC (SGC-800), followed by our patented tri-band matrix limiter, the SMP-950.

AM stereo processing is very different from FM. To provide the best possible AM stereo signal, we developed and patented our own modified matrix limiter. This circuit ensures maximum mono gain support. The NRSC compliant limiter also features low frequency tilt correction and L-R stereo enhance. If you're not stereo yet, a mono output lets you buy the system today. At only \$4,050 the AM2S is a sound investment. Find out what the CRL AM2S can do for your station. We have a two week trial program available. Call or write for details.



CRL Systems
2522 West Geneva Drive
Tempe, Arizona 85282 U.S.A.
(800) 535-7648 (602) 438-0888
TELEX: 350464

To maintain its command of the industry, RCA plans to launch a replacement for Satcom F1R in May 1991.

"It's the exception where you don't have a station that is using satellite to pick up some kind of feed," he added.

Behind the scene

A number of factors prompted the proliferation of satellites in radio over the past five years, according to officials.

For one, increasing land line costs made it difficult for many stations—especially in smaller markets—to continue carrying out-of-studio programming. Satellite transmission, meanwhile, offered better sound quality for less overall money, according to David Cain, manager of audio and TV networks for RCA Americom, which carries the Satcom satellites.

"Earlier in this decade before the break-up of AT&T, they had the lion's share of it, but as their cost structure kept inching upward, after a while it became somewhat of a financial problem (for many stations)," he said.

"Satellites, at that point, offered an economical alternative and I think that holds true today, even with the great expansion in fiber."

Adding to the popularity of satellites was high-quality sound, as well as their

commercial radio and TV services, is enduring a particularly difficult struggle amid the situation.

The organization has asked Congress for a \$143.19 million appropriation in its 1992 fiscal year budget specifically for replacement of its satellite interconnection system once Westar IV goes dark.

Congress has proposed instead to freeze CPB's operating budget at its 1991 appropriation and allow no additional funding specifically for the interconnection system.

Satellite transmission is critical to PBS operations, the network said. Most of PBS's 180 stations nationwide have satellite receive capacity. Twenty-one have satellite uplink capability, allowing transmit and receive.

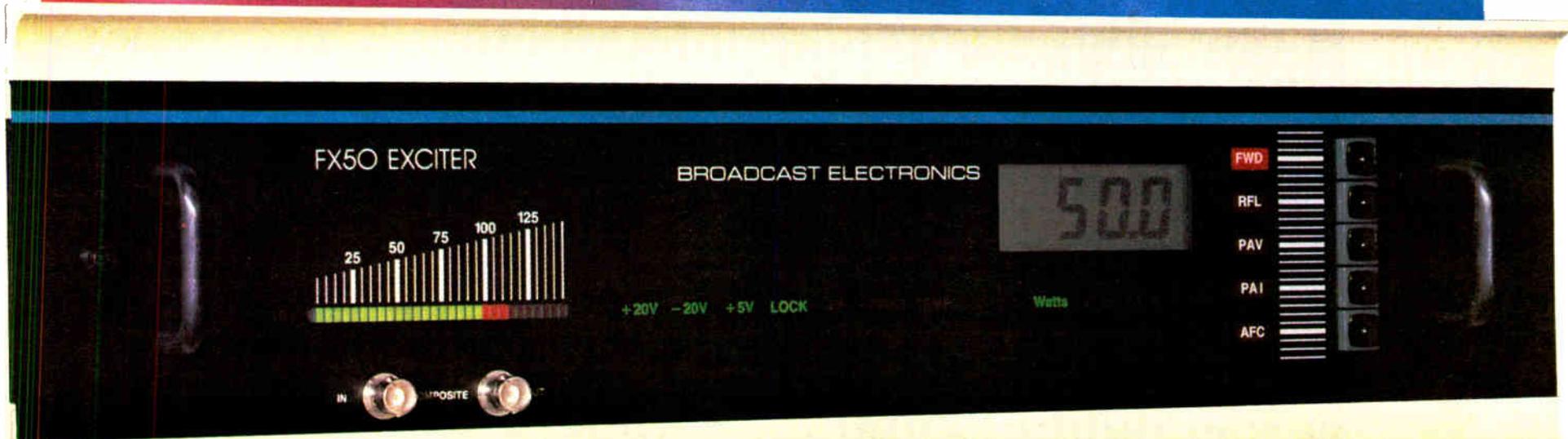
If the funding is not approved, it would prompt PBS to take funds from its programming budget, which would "seriously disrupt and adversely affect public broadcasting's programming nationwide," according to CPB President and CEO Donald Ledwig.

The situation is a prime example of how important satellite communication has become for radio, though other

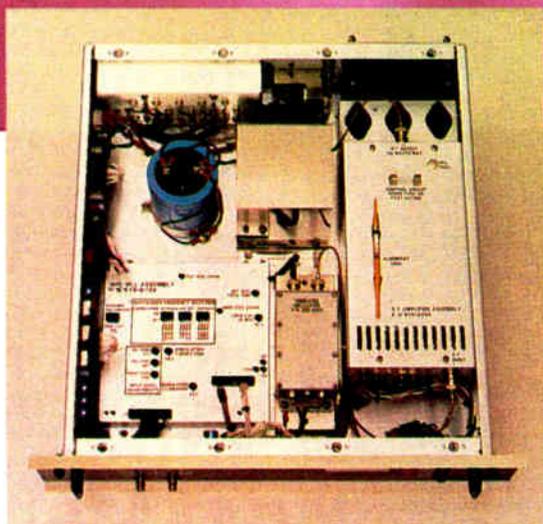
(continued on page 18)

New FX 50 Exciter

Audio Performance That Rivals CD's



THD and IMD 0.003%, 93 dB S/N, 50 Watts



Broadcast Electronics introduces the ultimate FM Exciter - the new FX 50 - with performance even superior to the world standard FX 30.

CD Sound

The new FX 50 Exciter has the lowest distortion of any exciter available with THD and IMD of 0.003%.*

Move Up To CD Standards

Every new "B" Series FM Transmitter incorporates the FX 50 for true CD transparency. And, the FX 50 is the ideal retrofit for your present exciter.

*Typical

CD Dynamic Range

With a signal to noise ratio (S/N) of 93 dB* the FX 50 can handle all of the nuances and power of compact discs.

Set It And Forget It — 50 Watts

Sophisticated automatic control systems assure stable and reliable 50 watt MOSFET power output even under mismatch conditions.

For information on the FX 50 Exciter and on Broadcast Electronics' new "B" Series FM Transmitters which incorporate the new FX 50 Exciter, call Bill Harland or Russ Erickson at 217-224-9600.

BE® **BROADCAST ELECTRONICS INC.**

4100 N. 24th ST., P.O. BOX 3606, QUINCY, IL 62305-3606 U.S.A., PHONE (217) 224-9600, TELEX 250142, FAX (217) 224-9607
Circle 58 On Reader Service Card



RS SERIES CONSOLES.

much more,
for
much less.



RADIO SYSTEMS INC.
110 High Hill Road ■ P.O. Box 458
Bridgeport, New Jersey 08014-0458
609/467-8000 ■ FAX 609/467-3044
800/523-2133

AMs Seek Answers

by Alan Carter

Washington DC Once again, AM broadcasters are going to try to spread the word among their brethren that AM is alive and kicking.

The NAB Executive Committee this month OK'd a majority of recommendations that came from a recent "AM Futures Retreat." The retreat involved a cross section of AM broadcasters and manufacturers of consumer radios and station equipment.

The recommendations, some of which are still in the works, address transmission, interference and reception.

Under transmission, work will proceed on making the NRSC preemphasis standard mandatory, educating station owners and operators concerning the advantages of broadcasting in AM stereo and completing testing of NAB's experimental AM antennas, according to Walt Wurfel, senior VP for public affairs and communications.

AM stereo

The executive committee directed the NAB staff to evaluate what moves the association can take to encourage stations to implement AM stereo, Wurfel said. But he added, "We're not looking to endorse a standard."

Another suggestion the committee approved for follow-up is a proposal, aimed at reducing interference, that existing daytime allocations not be relicensed if the station moves from AM to FM or to another slot on the expanded band.

Another proposal advocated awarding comparative hearing "preference," and for the expanded AM band, a preference or frequency be "set aside" for daytimer "homesteading."

In the area of reception, proposals focused on further development of a certification mark for "high-quality AM receivers" and other marketing efforts for AM radios.

Art Suberbielle, president and general manager of KANE-AM, New Iberia, LA, and chairman of the NAB AM improvement committee, said he believed the proposals from the retreat would result in "substantial efforts being initiated."

No kid gloves

Ted Snider, president of KARN-AM, Little Rock, AR and a member of the NAB Executive Committee, said the retreat with some 29 attendees was "very candid" in recognizing where the problems lie for AM.

First is the "slowness" of AM stations to adopt the NRSC preemphasis standard, Snider said. He added to the list the "slowness" of AMs to broadcast in stereo and the "slowness" of AM broadcasters to recognize that listeners will tune to another station if they do not have a high quality technical sound.

"We took a good look at ourselves," Snider said.

Belief pattern

Suberbielle noted there was a feeling at the retreat that AMers sometimes are victims of falling into the belief pattern that AM is not a viable medium. He, however, referred to the 1989 Jim Duncan Radio Market Guide that found seven of the top billing stations are AMs (two are combos).

"The opportunities are there," Suberbielle said. "So what we have to do is encourage the entrepreneurial opportunities that are there."

Suberbielle and Snider said the actions will take time to have an effect on restoring AM's listeners. After technical areas are addressed, Suberbielle said action must take place in marketing and programming.

"We can't do it in one giant sweep," Snider said.

The retreat was planned at the direction of the NAB Radio Board following its meeting in January.

To contact Art Suberbielle, call 318-365-3434. Contact Ted Snider at 501-661-7510.



NAB Radio Board members Art Suberbielle, Bill Clark and Denise Shoblom were among those representing AM's interests at the recent AM Futures Retreat.

From Radio Systems & Sony

DAT that works... and works and works!



It Works For Automation

Replace a cart carousel or several reel-to-reel decks with one RS-1000 DAT machine.

It Works In the Studio

The RS-1000 works as a live source in your air studio, or for production dubbing.

It Works For Archiving

Put your entire music library onto digital storage. Each tape holds two hours... digitally.

Let the RS-1000 work for you!

The *only* DAT machine with all of these BROADCAST features:

- Full Remote Control
- 44.1 kHz Sampling
- RS-232 Serial Interface
- Automation Interface
- End-of-Message Signals
- Auto Cue-to-cut
- No Cut Play-through
- Large Broadcast Controls
- Balanced Inputs and Outputs
- And Plenty More!



Let Radio Systems and Sony bring the magic of digital audio tape to your radio station.

RADIO SYSTEMS INC.

110 High Hill Road ■ P.O. Box 458 ■ Bridgeport, NJ 08014-0458

609/467-8000 ■ 800/523-2133 ■ FAX 609/467-3044

Solar Activity May Be Culprit

by John Gatski

Milwaukee WI For several days in early March, WZTR-FM CE Ernie Swanson noticed a strange signal degradation he could not explain.

He drove around the Milwaukee Class B's coverage area listening to what sounded like multipath distortion, which he had never noticed before. The station transmits a 34 kW signal on 95.7 MHz.

Then after three days, as mysteriously as the signal problem appeared, it stopped.

Lost to explain those few days of weak and distorted signal, Swanson finally attributed the phenomenon to an intense solar flare and its associated energy that occurred from 6-10 March.

"We did have an event during the last isolated flare," Swanson said.

According to the National Geophysical Data Center in Boulder, CO, the 6-10 March solar flare activity was some of the strongest ever recorded. Its strongest effects were felt on Earth 9 and 10 March.

In Quebec, Canada, a major power outage was blamed on the solar flare,

which left 6 million customers without power for nine hours because the magnetic disturbance triggered a series of circuit breakers in the power distribution system.

Effects noted

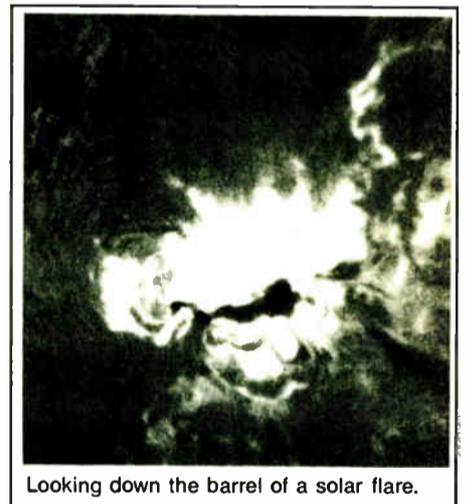
Although there were few reported cases of major solar flare interference to US FM and AM stations, there was significant impact on frequencies lower and higher than the FM band and higher and lower than commercial AM, including ham radio bands and military radio frequencies, according to the Geophysical Data Center and amateur operators.

Solar flare interference to commercial radio signals is possible, however, especially in the northern US and Canada, according to Dr. Ken Davies, senior scientist at the National Oceanic and Atmospheric Administration (NOAA) Space Environment Laboratory.

Davies said the interference that WZTR experienced in early March could easily have been caused by the solar flare.

When the magnetic energy from the flare reaches Earth, it charges a portion of the ionosphere, which can cause an unusual reflection of the radio wave, Davies explained.

"You get these reflections and they interfere with the normal radio wave," he said.



Looking down the barrel of a solar flare.

He said AM signals, especially the nighttime skywave signal, can be absorbed by the charged ionosphere at 60 miles altitude, limiting reception that normally can be heard great distances away.

Unpredictable effects

Davies, however, said the effects of solar flares are unpredictable and while a station may notice some effects in an area, others may not.

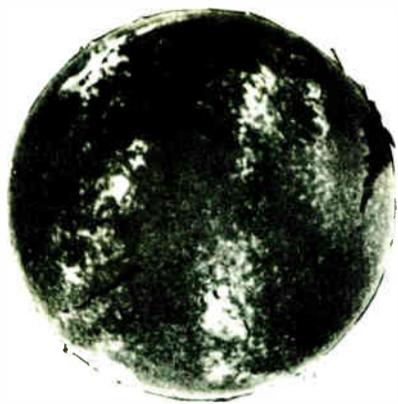
"There was nothing that I knew of that affected us," said Ron Steenwyk, CE at WKLQ-FM, a 50 kW station in Holland, Mich.

Steenwyk, like several other engineers contacted, said he was unaware that solar flares could affect commercial radio broadcasts.

But Swanson maintained there was no other reason for the signal degradation.

"I am convinced it was related to that particular flare," he said.

For information, contact Ernie Swanson at 414-964-8300, Ken Davies at 303-497-3569 and the National Geophysical Data Center at 303-497-6323.



Sunspots may be at the heart of some episodes of interference.

Be prepared.

For the
first real
improvement
in AM sound
in more than
a decade.



The future offers real promise for AM radio. NRSC AM radios are almost here, factory-installed in new cars. Soon, home stereos and portable sets will also be NRSC-equipped.

NRSC (National Radio Systems Committee) has created a voluntary national transmission standard that makes wideband high-fidelity AM radios practical. As broadcasters adopt the NRSC standard, receiver manufacturers can extend and flatten their frequency response without risk of increasing the audibility of interference.

Is your station prepared?

The 9100B NRSC-standard OPTIMOD-AM® is the first choice of AM stations concerned about improving their sound to compete with FM. OPTIMOD-AM sounds great on both the new NRSC receivers *and* on the millions of narrow-band receivers already in the field that will be in use for years to come.

When replacing older-style processors with OPTIMOD-AM, stations experience a significant increase in coverage area. And when replacing any processor, stations experience a dramatic improvement in sound quality, on both *voice* and *music*, with no sacrifice of loudness.

Superior sound is an important part of an overall strategy to increase ratings and profits. With OPTIMOD-AM, your announcers' voices will have presence and impact, while still sounding very clean. Music will have real bass, with punch and warmth, not boom. The highs will seem to open up. And loudness and tonal balance will be consistent from source to source.

OPTIMOD-AM can be configured to operate optimally in mono, C-QUAM® stereo, or Kahn stereo. Mono units can be field-upgraded later to stereo by simply plugging in additional cards.

Be prepared. Call your Orban Broadcast Products Dealer for more information on OPTIMOD-AM 9100B, or call us direct.

orban

Orban Associates

645 Bryant Street, San Francisco, CA 94107 USA

Telex 17-1480 FAX (415) 957-1070

Telephone (415) 957-1067 or (800) 227-4498

® OPTIMOD-AM is a registered trademark of Orban Associates Inc.

® C-QUAM is a registered trademark of Motorola, Inc.

Class A Group To Lobby in DC

by John Gatski

Willimantic CT A group of New England Class A FM broadcasters is trying to schedule meetings with an FCC commissioner and a member of Congress to rally support for the Class A blanket power increase now under consideration by the Commission.

According to Nutmeg Broadcasting President Mike Rice, the group hopes to meet with Commissioner Patricia Diaz Dennis and Rep. Matthew Rinaldo (R-NJ) in May to discuss the power increase, which was proposed by the New Jersey Class A FM Broadcasters Association last year.

The option sought by Class A's would

allow all 2400 Class A stations, now allowed 3 kW maximum power, to double their power to 6 kW.

The Commission may make a decision by late May or early June, according to indications Rice received from FCC staff. The New England stations want to show their support for the blanket power increase.

The Commission also is considering a counterproposal supported by the NAB that would grant a 3 kW increase based on case-by-case evaluation, an option many Class A stations adamantly oppose.

"We feel that a show of solidarity is a good idea," Rice said. "We don't want New Jersey to be standing out there

alone."

Other station presidents and GMs with the group of 13 stations agreed.

"There are quite a few supporters up here in upstate New York," said Don Heckman, president of WENU-FM in Glens Falls, NY.

He said his station faces several signal obstacles at 3 kW including the foothills of the Adirondack Mountains.

Because of the limited power and numerous hills, WENU cannot reach all of adjacent Queensbury, a town of 25,000, he explained.

"Even at 3000 kW and 300 feet, there is so much terrain and so much shadowing," Heckman said. "Something needs to be done real bad. We can't even cover 100 percent of the town."

Charles Dent, vice president and GM of WMDK-FM in Petersborough, NH, said the blanket increase would be very beneficial to his station and he is willing to make a trip to Washington to make his point.

Limited coverage

The terrain and power have limited the station's ability to act in the public interest, he said.

"A couple of towns in the school district (eight miles from the 1120' tower) can't listen to us for school closing and weather information," Dent said.

Class A station owners who supported the 3 kW blanket increase were angry when the NAB proposed a conditional option.

A handful said they resigned their NAB memberships and a small number said they withheld dues. Many stations owners accused the NAB of supporting the conditional power increase to appease the more powerful Class B stations, who also pay higher NAB membership dues.

The NAB has denied such allegations, claiming the association is trying to protect the integrity of the FM spectrum and minimize interference.

Questionable intent

Rice said he is trying to schedule a meeting with Congressman Rinaldo to find out why the NJ representative added language to his recently introduced radio-only bill, calling on the FCC to enact rules that minimize spectrum interference.

Rice said he believes the addition of that section to the bill may be the influence of the NAB, although Rinaldo has stated that he supports the blanket Class A power increase.

With that provision in the radio-only bill, Rice said he and other stations owners cannot support the bill, even though it contains wording that would reform the radio license renewal process.

For more information, contact Mike Rice at 203-456-1111, Don Heckman at 518-793-7733 or Charles Dent at 603-924-7165.

FCC Creates New C3 FMs

(continued from page 1)

board power increase and those who support the hike on a case-by-case basis fearing the addition of interference.

"The short answer: No it's not dead," Felker said. "It just requires some more head scratching."

A delegation of Class A broadcasters was scheduling a trip to Washington to lobby Commissioners. (See separate story this issue.)

During the meeting, Felker said that in addition to allowing the upgrade of Class A stations, the ruling creating C3 stations is expected to allow the creation of between 100 and 200 new stations.

These stations will be appropriate where a larger coverage C2 station cannot be assigned without interference and a smaller Class A facility is not considered economically feasible, the FCC said.

Their protected coverage area—which has a radius of about 24 miles—is nearly midway between Class A and C2, which will "thus fill a gap in the range of commercial FM facilities available in Zone 2," the FCC said.

While Zone 2 includes most of the land area in the US, its coverage omits more populated areas where crowded

airwaves will prevent Class A upgrades. New Jersey Class A's, targeted in the second part of the proceeding, are not included in Zone 2.

The new Class C3 stations will be authorized to transmit using up to 25,000 W with an antenna height above average terrain of 328'.

In a separate notice, the FCC's Mass Media Bureau will release a list of about 150 Class A stations that it will propose upgrading on its own motion, Felker said.

The new Class C3, which was supported unanimously by the three Commissioners, was called "a great item" by Chairman Dennis Patrick.

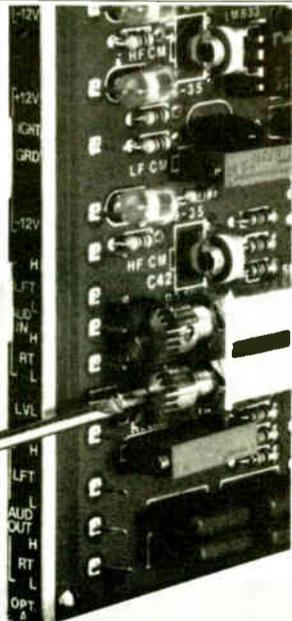
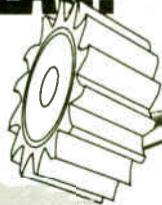
"It's good news for those in a position to upgrade, as well as to the public," he said.

During the action, the Commission also increased the minimum facility requirements for FM station Class 2. Those current licensees whose facilities do not meet or exceed the new requirements will be given two years to apply for increased facilities.

For more information on the action, contact Jay Jackson at the FCC, 202-632-9660.

GET YOUR STEREO AUDIO IN GEAR.

with our precision distribution amplifier!



Model 272 Stereo Audio D.A.

- 3 Stereo outputs
- +/- .05 dB 20 - 60 KHz
- Channel isolation >85 dB
- Tracking <0.1 dB
- +24 dBu output
- -12 to +30 dB gain adj.

Moderately Priced

Model 270 • 1x6 mono D.A. available!



di-tech

48 Jefryn Boulevard, Deer Park, NY 11729
Tel: (516) 667-6300 • Fax: (516) 595-1012

Circle 12 on Reader Service Card

Silence is Golden and less work with telcom c4 for RADIO and TV.



The NR system you just set and forget.

- A product of ANT Telecommunications, Inc.
- No overshooting.
- No pre or post echo.
- No wasting time with lining up — not even for tape exchanges.
- Applications: Cartridge machines, STL, RPU, Reel-to-reels, Cassettes.
- Up to 118dB dynamic range — the widest dynamic range available in any noise reduction system today.
- Over 15,000 channels in use worldwide.
- No breathing or pumping.

telcom c4
Silence by Design

Distributed by:

RAM BROADCAST SYSTEMS INC.

346 W. Colfax Street, Palatine, IL. 60067

New York (516) 832-8080

Chicago (312) 358-3330

Tennessee (615) 689-3030

Hamburg AES Draws US Firms

Hamburg WEST GERMANY American radio equipment vendors are making the transatlantic voyage to Europe's spring AES convention in increasing numbers each year.

The 86th AES show, held 7-10 March in the "free and Hanseatic" city of Hamburg, saw several newcomers to a show which offers as much for the broadcaster as it does for the professional recording market.

The emphasis on radio gear is helped by a changing situation in Germany and in many parts of Europe. As private ownership and commercialization of radio takes hold in many countries, the market is ripe for new equipment ideas and hungry to catch up to its American counterpart.

Throughout the entire industry, glimpses of a digital future prevail, although with the exception of CDs and some movement on the DAT front, tape-based analog systems are still going strong.

Audio editing via computerized workstations is taking firm hold in professional music recording and will be seen in scaled-down versions for broadcast later this year.

Unlike in past years, this show saw few "sneak previews" of introductions which will appear at the NAB show in Las Vegas; there was no real "testing of the waters."

There were, however, a few unexpected faces among the booths lining the Congress



Hamburg's Congress Centrum, flanked appropriately by a telecommunications tower.

reel-to-reel decks at the convention, including its digital recorders.

An AES show is not usually a place where RF companies show their wares, but several such vendors were present at the show.

First-time exhibitors included Broad-

programmable parametric equalizer and its processor for short wave radio.

Fidelipac is another manufacturer with a strong overseas customer base. The company unveiled its CTR30 enhanced series three-deck cart recorder/reproducer at the convention.

Fidelipac also sponsored a lively tour of the show and the surrounding city for a four-day series of gala events. US broadcasters who had purchased one CTR100 recorder and three players received a free trip to the AES and there were about 60 participants in all.

Eventide exhibited its line of products including the UltraHarmonizer. Audiopak was another first-time exhibitor at the convention with its line of cartridges.

Also newly exhibiting at the show was Pacific Recorders & Engineering. The company showed its StereoMixer, BMX and AMX series consoles. Conspicuously absent was the company's new product, the RadioMixer, slated for introduction at the NAB show.

Otari featured its line of tape recorders, as did Tascam, which also showed its CD player and DAT machine.

Firmly entrenched in the DAT market is British-based HHB. The company displayed most of the professional DAT machines available on the market includ-

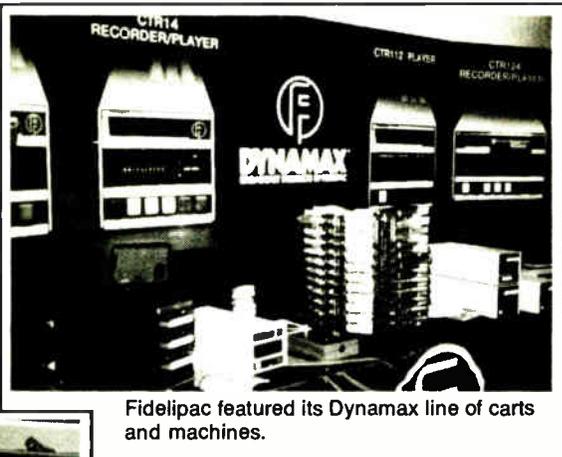
ing Sony, Ramsa, Technics and Radio Systems RsDAT for broadcast use.

The company reported that it had sold 40 Sony portable DATs to the BBC and company officials believe that DAT is going to become accepted more and more. Timecode and electronic editing, they believe, will be a major push for DAT worldwide.

There were many microphone companies exhibiting at the AES show. Among them were Shure, with its automatic mic mixer, HME with its wireless mics, Beyer and AKG.

Noise reduction and processing is another staple product at a professional audio show. ANT featured its noise reduction, and Dolby reported enthusiastic acceptance of switchable SR/A worldwide in recording studios.

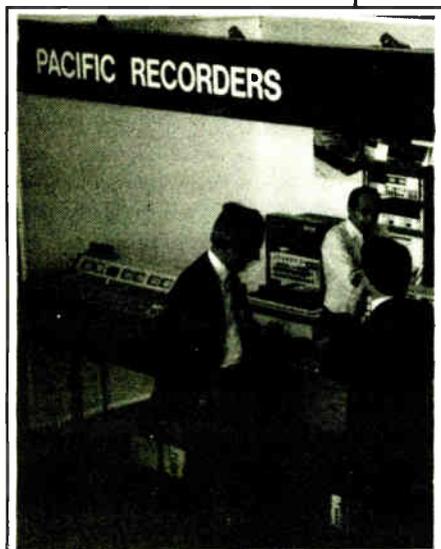
Aphex was one company which did feature some sneak previews of products



Fidelipac featured its Dynamax line of carts and machines.



Audiopak was a first time exhibitor to the convention.



Pacific Recorders & Engineering was another new face at the European AES.

cast Electronics, which concentrated on its Mix Trak 90 console and phase-correcting cart machine, and TFT, which showed its remote gear.

Orban is a company which usually exhibits at the spring European show. The company's Optimods do well in overseas sales and Orban also introduced its

also slated for introduction at the NAB show. In addition to its existing line of studio products, the company introduced the Aphex Impulse 12-input analog-to-MIDI trigger.

Aphex also unveiled the Studio Clock SMPTE-to-MIDI converter and the Feel Factory, the first algorithmic "feel" composer.

Center in this scenic seaport locale.

One surprising announcement made at the show concerned Studer and AEG Olympia, the audio division of that large corporation.

Studer announced that it was taking over AEG's magnetic tape recorder business. Production of the machines was to stay at the AEG operations in Konstanz, Germany, while marketing, repair and parts service would switch over to Studer.

The significance of the takeover is that essentially AEG is departing the tape recorder business and Studer will assume its operations and in effect, close them out.

Studer also announced the naming of Tore Nordahl president of Studer Revox America. Nordahl had been VP and GM.

The company displayed its full line of

Fidelipac Diary



Hamburg's best-known landmark:

Tele-Michel - a nickname for a radio-TV tower with a great revolving restaurant.



Good food, good wine, and not too much "shop" talk on a candlelight cruise of Hamburg's scenic harbor.



Did we do anything but eat? Here it's at a Bavarian inn, with "weisbier," a German wheat beer.

Private Radio Takes Germany By Storm

by Judith Gross

Kiel WEST GERMANY A sign in the lobby of RSH proclaims "Wir sind das Ohoriginal"—"We are the original."

It is not a frivolous boast. Three-year-old Radio Schleswig-Holstein—RSH—is the first all-commercial radio operation in Germany's northern-most state.

And while many "cookie-cutter" type hit stations in the US would like to claim to have revolutionized radio listening in their communities of license, RSH can make that claim and make it stick.

Short history

Radio's "private initiative" began in Germany only five years ago. The state-run stations were receiving about a third of their revenue by airing commercials, but the number of spots they aired were limited and quickly sold out to advertising agencies at the beginning of each year.

Frustrated, and feeling that more radio outlets should be created, the ad agencies began pushing for private ownership and the creation of more stations.

Unlike the US, where the federal government controls the licensing of telecommunications outlets, radio in Germany is state-controlled. The lessons of World War II taught the Allied forces that a unified Germany, especially one unified through its media, was undesirable.

It was natural to defer to a system of states and city-states, which in West Germany have always maintained their strong individual identities.

Up in Schleswig-Holstein, which borders on an extension of the Baltic Sea and touches East Germany on its eastern side, a consortium of 15 newspaper owners got together and procured the rights to all private radio in the state.

The owners renovated a tobacco store in 1986, with only a six-month deadline

to build the facility and round up a format and on-air staff. They finished in July of 1986 and Radio Schleswig-Holstein was born.

Statewide broadcasting

RSH is licensed to serve the whole state through nine FM transmitters and five studios. That means that unlike in the US, you can tune to the station even in remote parts of the state simply by switching frequencies. The "satellite" studios deviate from the main program to bring local news several times throughout the day.

As with other European FMs, RSH is collocated atop a massively high telecommunications tower, boosting propagation by virtue of HAAT alone.

One obstacle private radio in Germany has uncovered which remained obscure all the time state-run radio maintained its monopoly on the airwaves has to do with what happens to the signal from the studio on out.

The Deutsche Bundespost (BP)—German Postal Service—controls telecommunications transmissions in this country as it does through most of Europe. The radio stations "give" their signal to the BP and it is up to the latter how the signal gets to a transmitting tower and finally out to the listening public.

RSH, therefore, simply doesn't know most of the time whether it links to the transmitter and tower via phone lines or microwave. Sometimes the BP decides to switch from one type of studio link to another and the station never knows.



A tobacco store was renovated into a radio station in only six months.



A playback studio free-floats in RSH's central "editorial" room.

directly under the console in the studio which means that the composite output can't be used. But the signal still gets the benefits of multiband processing and compression.

The sound was so different, and the transmission engineers found the loudness peaks so much hotter than they were used to, that neither the traditional state-run stations nor the Bundespost has quite yet figured out how to react.

But the listening public has reacted



RSH PD and one of three GMs Hermann Stumpert talks about marketing the station.

For STL and transmitter manufacturers, the German market is still one that is tightly controlled by the government. But there is another interesting wrinkle to the whole process.

When RSH went on the air, it decided to promote a more commercial sound than had been heard in Germany through the use of audio processing with Orban Optimods. But since the Bundespost owns the signal from the studio on out, the question was, where to put the Optimods?

Technical staff have placed them

with enthusiasm and hunger for a type of radio they never knew they were lacking.

Technically sound

RSH employs a technical staff of seven out of its 20 administrative and its 40 on-air-related personnel. Surprisingly, the station did not steal talent and technical staff from the state-run NDR.

Most of the staff receive on-the-job training; many of them are students.

With a newspaper consortium as ownership, programming at RSH is treated as "editorial." Each show has a board operator, a "moderator"—talent—a news reporter and traffic reporter. There is also an engineer on duty.

There are two on-air studios and one production studio, also a news booth and auxiliary studio. The large production studio is 24-track and produces commercial spots.

RSH has been slow to gear up with higher end equipment. Most of the consoles are EELA audio consoles, and the station started with lower end cart machines and carts. Now they're replacing them with Fidelipac Dynamax decks and Dynamax cobalt carts.

Raef Deblitz, an RSH technician nick-

(continued on page 16)

No radio antenna, but a thatched roof, and a cozy fire inside.

Crocuses in bloom—the moated city of Lubeck.

It wasn't ALL work...

"Roll out the barrel..."

Ach du lieber!

Enough to quench an AES-show thirst.

RSH: Success Story

(continued from page 15)

named "Duffy," told our tour group that nearly everything—spots, jingles and almost all the music—is played from cart.

"We had trouble finding a trouble-free cart machine at first," Duffy said. But now "We clean them every day and check the adjustment every three months and since following preventive maintenance procedures we have had fewer problems."

He also said that RSH is beginning to use CDs for some of its music, but that there is a problem with record companies, which give promotional CDs for free to the state-run stations, but not to RSH because "they think we play the hits too often."

Duffy also said that RSH is using a Sony DAT machine for production but not for on air because of the difficulty in cueing.

The RSH jingles have a flavor US listeners would easily recognize. They were produced by Jam out of Texas and give the station a sound that is totally unique in German radio.

After the music beds were recorded in the US, the jingle package was sent to the Netherlands for the vocals; it seems US singers couldn't get the proper accent to the German words.

The jingles, the music and the use of processed audio give RSH a sound that "listeners don't even have to hear the jingles"

to recognize as Radio Schleswig-Holstein, Duffy said, adding "RSH has changed listening habits with its sound."

Beyond format

"The PD is a little god here," explained Hermann Stumpert, PD and one of three

GMs of RSH. It's the PD who picks out the music, according to a tightly controlled format clock. In concept and execution it's a radical departure from the state-run NDR.

The comparison is analogous to NPR and contemporary hit FM radio. The state run station hires experts in specific areas of music or programming and gives them a block of time to do a show.

In an unprocessed audio environment, without ear-catching jingles or hype, NDR talent makes precise musical selections and expounds on the nuances of each particular show's programming.

Then along came RSH, with its tight formula, souped-up sound and catchy jingles. In its first month of operation, RSH grabbed 42% of the listeners away from NDR.

"Listeners thought they were happy until they heard RSH for the first time," Stumpert said.

The first day, Stumpert was hesitant to let the on-air staff give out the phone number. He did not want a staff who had worked so hard to be disappointed if there were no calls. The second air shift talent got him to relent and the phone



Technician "Duffy" shows RSH's technical side.

★ LEGAL DAT TODAY ★

Your Competition Has The Cutting Edge... Why Don't You?
Enter The True Digital Domain!

Full Line Of Professional Digital Processors, Recording Consoles And Sound Reinforcement Electronics.



SONY PCM-2000
Super production machine

- AES/EBU digital I/O
- Reproduce SMPTE/EBU time code
- Professional portable DAT recorder



SONY PCM-2500
Professional two piece studio standard

- Wireless remote control
- Fully programmable
- Switchable sampling freq. 32/44.1/48 kHz



TECHNICS SV-D1100
18 Bit high resolution DAT

- Full function remote
- 6-speed CRV digital servo system
- Reduce conversion error by 75%



SHARP SX-D100
Professional recording, production and broadcast applications.

- High quality
- 2-channel
- Digital audio tape deck



PANASONIC SV-250
A masterpiece of miniaturization

- 9 · 1 3/4 · 5 1/2, under 4 lbs.
- MASH A/D converter w/ 64X O. Samp.
- Digital-to-digital editing



PANASONIC SV-3500
Years of experience w/ rotary head tech.

- 18 Bit w/ class AA amp circuitry
- Switchable sampling freq. 32/44.1/48 kHz
- Rack mounting kit & remote control

Did You Know: DAT recorders offer you better sound quality than CD players, plus all the benefits of a cassette recorder. DAT cassettes are half the size of standard analog cassettes and are a higher quality tape. DAT recorders are fully programmable, with high speed (up to 300 times playback speed) indexing and music search.

CHOOSE FROM THE FOLLOWING:
Sony • Panasonic • Technics • Tascam
Kenwood • Pioneer • Akai • Sharp • Alpine
Nakamichi • Denon • Yamaha

Knowledgeable, Friendly Customer Service.

American International Audio Video

127 ROUTE 206 TRENTON, NJ 08610

FLEXIBLE LEASING PROGRAMS
START AT

\$69

per month

- NO MONEY DOWN
- QUICK APPROVAL
- COMMERCIAL ACCTS WELCOME

DAT HOTLINE
609-888-4414

609-888-2930
FAX ORDERS

- English Operating Manuals
- All Connecting Cables
- AC Converters



A poster proclaims the station's uniqueness.

number was announced.

The result? Explained Stumpert, "The phone did not stop ringing for a week."

As might be expected, NDR was not happy with the newfound success of commercial radio in this part of Germany. Stumpert tells a story of a billboard promotion RSH did on the side of taxicabs.

NDR employees were told not to ride in cabs with RSH signs on them, Stumpert said.

Nonplussed, RSH's PD procured two elephants, put NDR signs on them and parked them in front of NDR's facility with a sign explaining the beasts were the taxis for NDR employees.

Jingles, billboards, bumper stickers, provocative promos: it's a taste of good-old fashioned American competitive hype in a country that has seen a radio monopoly for too long.

Stumpert concedes that RSH's formula is working. He also knows that competition is down the road as more privately-owned commercial stations come to Germany. And he welcomes it.

"There must be a major change in formatting to ensure the success of more (a greater diversity of) programming," Stumpert says.

Is he worried about the competition? RSH wants to continue to be Schleswig-Holstein's favorite radio station and Stumpert smiles at the question. "They will stay with us if we don't make big mistakes."

Circle 28 on Reader Service Card

World Radio History

Public Interest vs. Marketplace

by Charles Taylor

Washington DC When the FCC adapted its rules in March 1988 to allow the use of translators by the primary owners and operators of noncommercial FM stations, a number of broadcasters raised their eyebrows.

Such an action, some claimed, extended the coverage areas of stations in lieu of clear airwaves of existing stations. The NAB went so far as to call the move "a willingness to open up a Pandora's box."

Likewise, in December, the Commission ruffled feathers when it ruled to allow FM stations to broadcast in short-spaced locations with the use of directional antennas.

Opponents maintained that FM directional antennas cannot be monitored accurately.

"The directional elements may get knocked off or fall off or get taken off and all of a sudden, the station is not directional," said one broadcaster.

An alarming trend

Interference isn't the only negative element the two Commission actions share, say many broadcasters. The rulings also

bring to light an alarming trend where desires of the business arena are being favored over those of the public interest.

Such an inclination not only contradicts the bylaws under which the Commission was founded, but also leads to reduced service to the industry, thanks to a broadcasting pie cut into so many overlapping pieces that no one receives good service, they say.

As one source notes, once rulings are passed supporting marketplace interests, it's often impossible to repeal them after the ill effects are realized. Many believe they should be avoided before damage is done.

"The way I look at it, the Commission should be pretty well standing in place of the public, protecting the public interest in its various decisions," said Wally Johnson, president and executive director of the Association for Broadcast Engineering Standards (ABES) and chairman of the Radio Advisory Committee's technical subcommittee.

"I think they are straying from that. (It appears) that the public no longer has a voice in the decisions that the Commission is making or in whether their needs are being even considered by the Commission," he said.

Many of the concerned broadcasters have put their signatures where their mouths are. A letter from the leaders of six major broadcast organizations—including the NAB, National Public Radio and ABES—was sent by messenger last August to FCC Chairman Dennis Patrick.

In it, the groups complained about what they saw as mounting interference and other forms of technical degradation to broadcast service.

"We must have the capability not only to maintain our current level of service but to match the technical quality of other media through improvements," the letter said. "But our opportunities may be completely undercut if FCC policies in the interim result in eroding the technical integrity of present broadcast signals."

To date, the plea has provoked no response from the chairman's office, leading some to question how seriously the issue is being taken.

A spokesperson with Patrick's office said it is still being circulated through the FCC's Mass Media Bureau. She did not know when a response might be drafted.

FCC Mass Media Bureau Chief Alex Felker said he has had one-on-one discussions regarding the issue with officials of several of the six organizations

who signed the letter. He also said he has presented speeches addressing the concerns.

"I think, clearly, we're going to respond (officially to the letter)," Felker said.

Interference will increase

Meanwhile, those broadcasters unhappy with what they view as the trend favoring a marketplace philosophy over the public interest continue to worry that interference will increase as a result.

Michael Rau, NAB's science and technology VP, said there's "no question that FCC marketplace philosophies have generally been bad for the interference environment of AM and FM broadcasting."

In addition to liberalized rules regarding translators and short spacing, the groups have focused on the Commission's decision in the broad AM standards inquiry, MM docket 87-267, to let stations negotiate between themselves—presumably through payoffs—as to how much interference is tolerable.

"We (do not) believe the Communications Act provides the Commission with the leeway to allow interference protection to become a matter of private negotiation among users of the radio spectrum," asserted the groups' letter.

"We think it's kind of a wacky idea," said William Potts, general counsel for ABES and president of the Federal Communications Bar Association, "because

(continued on page 20)

Patrick To Leave Office

(continued from page 1)

on broadcasters. "I think broadcasters should stand up uniformly for their First Amendment rights," he said.

Upon Patrick's announcement, one of his most noted critics, Rep. Edward Markey (D-MA), chairman of the House Telecommunications Subcommittee, said he hoped there would be a better "balance" between consumer and business under a new chairman, according to Associated Press.

Speaking in an impromptu session with reporters on Capitol Hill, Markey said Patrick turned deregulation into "deregulation for deregulation's sake."



FCC Chairman Dennis Patrick

Bi-directional RPU for \$250 with The Cellular Production Unit™

by The Davis Communications Group

By connecting our \$250.00 Cellular Production Unit™ to your cellular telephone, you get a fully bi-directional RPU system capable of interfacing with any audio gear you own, including frequency extenders. The CPU™ features a separate output for return



audio, and provides you with instant mobile remote capability from any cellular service location, without FCC licensing or RF problems.

- Sports Events
- Live News Coverage
- On-Site Promotions
- Boom Boxes
- Roving Interviews
- TV IFB/CUE

BROADCAST SERVICES CO.

CPU and Cellular Production Unit are trademarks of The Davis Communications Group.

Neal Davis, Four Oaks, NC, 919 934-6869 • Keith Arnett, Front Royal, VA, 703 635-1413
FAX 919 934-1537

Circle 35 on Reader Service Card

EXTEND YOUR LEVEL OF SUCCESS

The ATS-100 Stereo (dual channel) Extended Range Audio Meter is a self-contained audio measuring system. Dual "VU" meters provide precision visual monitoring. Peak Program Meters offer simultaneous level and peak monitoring.

The ATS-100 input sensitiv-

ity allows for a wide range of levels, from -60 to +30 dBm, and a visual indicator is provided for accurate phase measurement. The reliable, fully solid state amplifier and power supply, coupled with advanced micro-processor control, is assembled in a compact 3 1/2" rack mount frame.

ONLY \$1,980



McCurdy

McCurdy Radio Industries

108 Carnforth Road, Toronto, Ontario
Canada M4A 2L4 Tel: (416) 751-6262
Telex: 06-963533 Telefax: (416) 751-6455
1051 Clinton Street, Buffalo, New York 14206
Tel: (212) 772-0719

Circle 20 on Reader Service Card

Satellite Use Is Increasing

(continued from page 8)

Westar IV users face less difficult challenges once the satellite's useful life dissipates.

Family Stations Inc. for example, is sub-leasing from NPR and will follow its lead in selecting a new bird, according to Family Technical Director Wesley Becker. The company owns nine AM and 42 FM stations.

A third major carrier, GTE, serves the radio industry with its Spacenet I, II and year-old Spacenet III satellites. Current clients include Associated Press, the Satellite Music Network and USA Radio Network.

The company plans to expand its services in the near future with the FCC authorization of three hybrid satellites, which offer C-band and Ku-band capability, according to Harry Mahon, GTE's area manager of broadcast service.

The Commission has authorized the launch of two (the third is a designated spare) though no launch date is projected. GTE also intends to launch an all Ku-band bird in its GStar series, though it won't carry radio services, Mahon said.

Overall, according to Mahon and others, the prominence of the satellite industry has "made radio less expensive, expanded the reach of radio networks and improved the quality and timeliness of music programming."

Eye on the Sky

Radio Service	Satellite/Transponder	Trans.	Format	Radio Service	Satellite/Transponder	Trans.	Format
ABC Radio	Satcom 1R-23	Digital	Varied	NBC Talknet	Satcom 1R-19	Digital	Talk
ABC Talkradio	Satcom 1R-23	Digital	Talk	NBC Source	Satcom 1R-19	Digital	Music/News
Agrinet	Satcom 1R-19/Galaxy II-3	Dig./Ana.	Farm	North Carolina News Network	Westar 4-2X	Analog	News/Sports/Weather
American Public Radio	Westar 4-3	Digital	Music/Talk	New Century Broadcasting	Galaxy II/Satcom 1R/Westar 4	Dig./Ana.	Sports/News
Arkansas Radio Network	Westar 4-1X	Analog	News	Oklahoma News Network	Westar 4-1X	Analog	News/Sports/Agri.
ARN Agriculture	Westar 4-1X	Analog	Farm/News	Olympia Broadcasting Network	Satcom 1R-19	Digital	Sports/Talk
ARN Sports	Westar 4-1X	Analog	Sports	Performance Racing Network	Galaxy II-2/Satcom 1R-19/Westar 4-2D	Dig./Ana.	Auto Racing
Associated Press	Spacenet III-R-1	Analog	News	Public Interest Affiliates	Satcom 1R-3/Galaxy II-3	Dig./Ana.	Talk/Sports
Ed Busch Productions	Satcom 1R-19	Digital	Talk	Premiere Radio Networks	Satcom 1R-3	Digital	Comedy
Business Radio Network	Satcom 1R-21	Analog	Business News	Progressive Music Network	Spacenet III-R-7D	Analog	New A.C. Music
Cadena Radio Centro	Westar 4-2D	Analog	Spanish music	Radio AMEX (AM Stock Exch)	Westar 4-2D	Analog	Business/Financial
Campbell Sports Network	Satcom 1R-21	Analog	Sports	Radio Links	Satcom 1R-19	Digital	Entertainment
Capitol Radio Networks	Westar 4-2X	Analog	News/Sports	Ray Sports	Galaxy II-3	Analog	Sports
Catholic Telecom Network	Satcom 4-2	Analog	Religious	Satellite Music Network	Westar 4-2D/Spacenet III-7D	Analog	Music/News
CBN Radio Network	Galaxy I-11	Analog	News/Music	Seeburg	Galaxy I-3	Analog	Environment Music
CBS Radio Network	Satcom 1-19	Digital	News/Sports	Sheridan Broadcasting Networks	Westar 5-9	Analog	News/Urban Music
CBS RadioRadio	Satcom 1-19	Digital	News/Music	Skylight Satellite Network	Westar 4-2D	Analog	Inspiration/Gospel
Christian Science Monitor	Westar 4-2D	Analog	News	Southern States Network	Westar 4-2	Analog	News/Sports/Agri.
CNN Radio	Satcom 1R-21	Analog	News/Business	Sports Byline USA	Satcom 1R-19/Galaxy II-3	Dig./Ana.	Sports/Talk
Concert Music Consortium	Westar 4-2D	Dig./Ana.	Classical Music	Starstream Comm.Group, Inc.	Satcom 1R-19	Digital	Financial News/Talk
Dow Jones Report	Satcom 1R-19	Digital	Economic/Financial	Sun Radio Network	Galaxy II-3/Spacenet I-5/Satcom 1R-19	Dig./Ana.	News/Talk/Business
Eagle Media Productions, Ltd	Satcom 1R-19	Digital	Medical	Superadio Network	GE Americom K2-12	Analog	Weekend Party
EFM Media	Satcom 1R-23	Digital	Talk/Medical	Tempo Sound	Satcom 3R-6	Analog	Var. Music Formats
Family Stations, Inc.	Westar 4-1D	Analog	Music/Talk/Religious	Texas State Network	Westar 4-1X	Analog	News/Agri./Span.
FNN Business Radio	Satcom 1R-19	Digital	Business/Financial	Tobacco Radio Network	Westar 4-2X	Analog	Farm
Global Satellite Network	Satcom 1R-23	Digital	AOR	Transtar I	Satcom 1R-21	Analog	A/C
Intermountain Network	Satcom 1R-19	Digital	News	Transtar II	Telstar 301-5	Analog	Country
Jameson Broadcast	Satcom 1R-19	Digital	Talk	Transtar III, IV, V	Satcom 1R-21	Analog	Lite AC/Oldies (AM)
Johns Hopkins Medical Ins.	Westar 4-1D/Satcom 1R-23	Dig./Ana.	Medical News	Transtar VI, VII	Satcom 1R-3	Digital	Adult CHR/Easy
Kansas Information Network	Westar 4-1X	Analog	Agri. News/Sports	Tribune Radio Networks	Satcom 1R-3/Galaxy II-3	Analog	Agri./Sports
Learfield Communications	Westar 4-1X/2X	Analog	Farm/Data/News	United Stations	Satcom 1R-19	Digital	News/Music
MJI Broadcasting	Satcom 1R-23	Digital	AOR	UPI	Westar 4-1D	Dig./Ana.	News
MNN Radio Networks	Westar 4-2D	Analog	News/Agri./Sports	USA Radio Network	Spacenet III-7D	Analog	News/Sports/Talk
Money Radio	Westar 4/Satcom 1R	Dig./Ana.	Financial/Business	Wall Street Journal Reports	Satcom 1R-19	Digital	Business/Financial
Moody Broadcasting Net.	Westar 5/Spacenet III-R	Analog	Religious	West Virginia Metronews	Westar 4-2X	Analog	News/Talk/Weather
Motor Racing Network	Satcom 1R-3/Westar 4-2D/Galaxy II-3	Dig./Ana.	Stock Car Racing	Westwood One	Satcom 1R-3	Digital	Music/Sports/News
Mutual Broadcasting	Satcom 1R-19	Digital	Talk/Music/News	WFMT-FM	Galaxy I-3	Analog	Classical Music
The Nashville Network Radio	Galaxy I-2	Analog	Country	Winners News Network	Galaxy II-3/Spacenet I-9D	Analog	Motivation
National Public Radio	Westar 4-2D	Analog	News/Talk/Music				

Copyright 1989 National Association of Broadcasters.

Splatter matters.

Splatter is a form of radio interference that can drive listeners away from AM radio. It creates distortion in your signal, wastes transmitter power on undesired sidebands and interferes with other stations. Even with an NRSC audio filter, misadjustment of the transmitter or audio processing equipment can still produce an RF spectrum that can exceed NRSC or FCC limitations.

That's why routine monitoring of your station's RF spectrum is a must. But it doesn't mean you'll have to bust your budget on a spectrum analyzer. It just means you need the rugged SM-1 AM Splatter Monitor from Delta Electronics.

For just \$2,150 you can now accurately measure your transmitter's spectral output, monitor transmitter IPM levels and make adjustments to improve clarity. An external audio input helps identify splatter sources.

The Splatter Monitor's unique offset feature tunes spectral segments for closer examination 10 kHz to

100 kHz away from the carrier. Unlike a spectrum analyzer, you can listen to the front panel speaker or your own headphones as you measure splatter levels on the front panel meter. The Splatter Monitor also has an alarm output to drive your remote control.

In this day and age where splatter matters, monitoring it doesn't have to cost you a fortune.

To find out more about the new Delta Splatter Monitor, call (703) 354-3350, or write Delta Electronics, Inc., 5730 General Washington Drive, P.O. Box 11268, Alexandria, VA 22312.

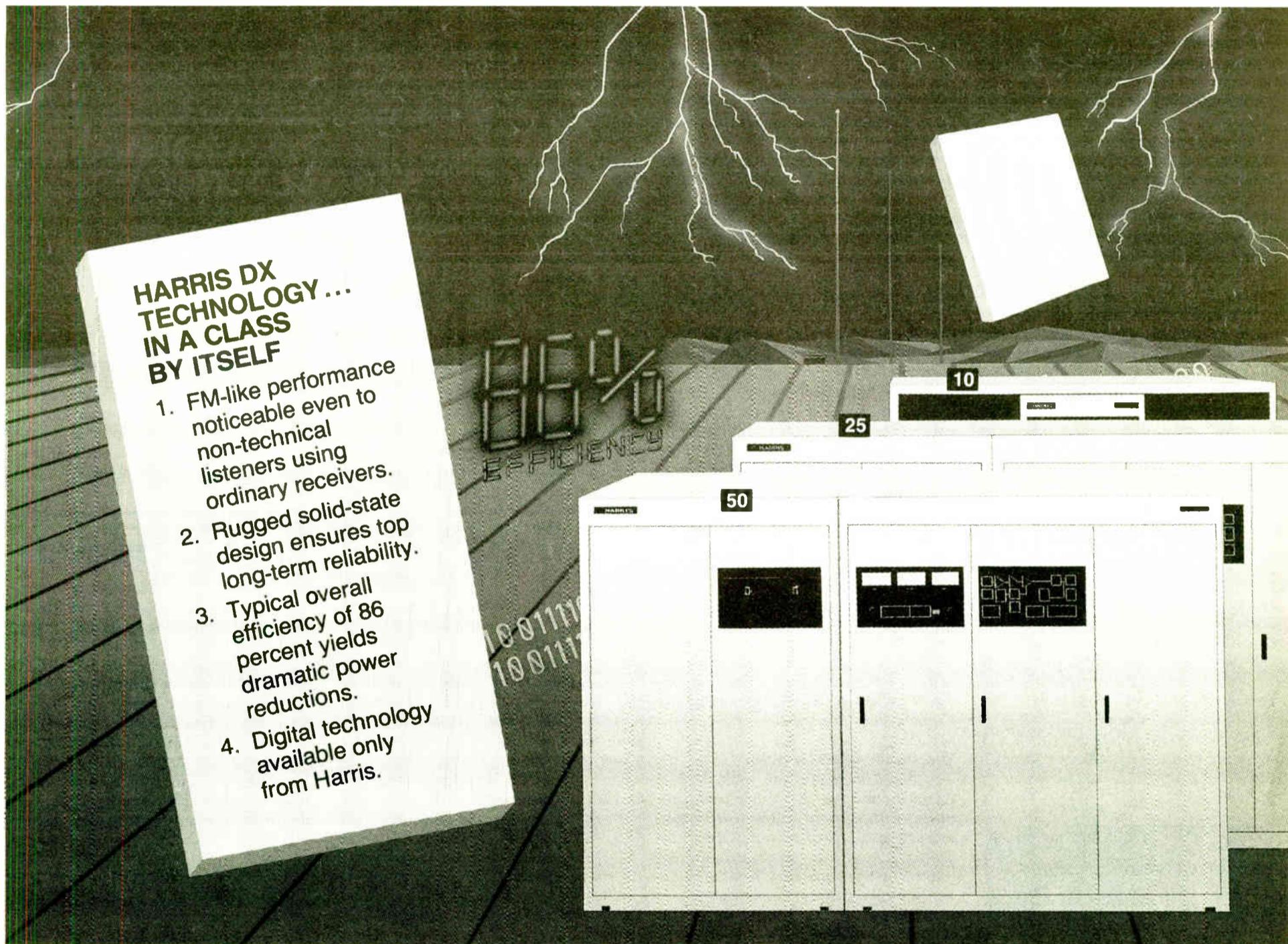
The Above Standard Industry Standard.

DELTA ELECTRONICS



© 1988 Delta Electronics, Inc.

PROVEN DIGITAL TECHNOLOGY DELIVERS UNEQUALLED PERFORMANCE, RELIABILITY AND EFFICIENCY



HARRIS DX TECHNOLOGY ... IN A CLASS BY ITSELF

1. FM-like performance noticeable even to non-technical listeners using ordinary receivers.
2. Rugged solid-state design ensures top long-term reliability.
3. Typical overall efficiency of 86 percent yields dramatic power reductions.
4. Digital technology available only from Harris.

If you believe all transmitters are alike, you owe it to yourself to examine Harris' DX Series of patented, digitally-modulated solid-state transmitters, available in 10, 25* and 50 kW models.

They deliver FM-like sound. They're ruggedly reliable. And they're so efficient they will practically pay for themselves.

Your station's audio performance will improve, even on the fringe. Broadcasters worldwide note that DX transmitters improve sound so dramatically, even non-technical listeners with ordinary receivers comment. Designed to provide superior square wave response, 140% peak capability and audio performance virtually free from overshoot, tilt or ringing, DX transmitters sound so crisp and clear you may think you are listening to FM!

You'll also appreciate top reliability. DX transmitters feature a redundant and highly modular design, use conservatively-rated components, and include such standards as lightning protection, power line fluctuation safeguards and VSWR fold-back. The result is a transmitter that will provide years of dependable service.

What's more, Harris DX transmitters are so efficient they will substantially reduce your power bill. Compare the DX Series' typical overall efficiency of 86 percent to competitive efficiencies of 50 to 73 percent, and you'll find a Harris DX transmitter can lower your transmitter power bill by as much as one-third.

We invite you to learn what users worldwide have discovered about Harris DX Series transmitters. For more informa-

*The Harris DX-25U is upgradable to a DX-50.

tion about the DX-10, 25U or 50, or to discuss even higher power requirements, please write: Harris Broadcast Division, Marketing Department, P.O. Box 4290, Quincy, IL U.S.A. 62305-4290, or contact us at:

Domestic U.S. Phone
TOLL-FREE
1-800-4-HARRIS
Extension 3019
International FAX
217/224-2764



HARRIS

A Switch for Recorder Upkeep

by Ken Blake

Stockton CA The equipment in today's radio station includes various types of tape recorders. We engineers are aware of the maintenance required by each and do our best to allocate time for the needed attention that will result in the proper operation of each recorder and playback unit for which we are responsible.

Assembling the test equipment each time it is needed for a particular project is time consuming. Better planning would suggest a handy location near the bench for these items.

That way time is not wasted in a set-up for each unit requiring attention, whether in routine maintenance or emergency repairs and adjustments.

GREAT IDEA

It makes for a messy bench when we resort to the use of "clip-cords" to carry the oscillator signal to the recorder and to connect the output of the playback to a meter and amplifier; not to mention another pair for the scope and a pair for the load resistor, pink noise generator, etc.

The simple switching arrangement described here has proved to be a very handy and worthwhile tool.

Routing playback

As shown in Figure 1, the switch is utilized to feed left and right channels separately or both in parallel. The unit can route the playback of the channels separately or in parallel by subsequently considering the input as the output.

If you use the limited pink noise method of optimizing head azimuth the switch can also perform this function.

■ ■ ■

Ken Blake is CE of KJOY in Stockton, CA. He can be reached at 110 North El Dorado, Stockton, CA 95202, or by phone at 209-948-5569.

To obviate the extra bulk and bother of power supplies and to preserve portability, an active filter for attenuation of frequencies below 2 kHz is not built in; a simple roll-off filter serves the purpose adequately.

With the capacitor value shown, and with proper circuit loading, the 3 dB point is at 3 kHz, with 2 kHz at -5 dB, 1 kHz at -10 dB, and 100 Hz at 30 dB down. Reference is any frequency above 5.5 kHz.

Switch positions

Following are the functions switch #1 serves when turned to particular positions.

- Position 1: Records left only/plays left only
- Position 2: Records right only/plays right only
- Position 3: Parallels left and right for record or play
- Position 4: Records pink noise at 10 dB on left; right tracks in phase with high-pass filter
- Position 5: Plays recorded pink noise 180° out-of-phase with high-pass filter

This arrangement uses four conductor cable, four feet in length with P2 and J2 attached. When mated with J1 or P1 the cable feeds information from the unit to tape recorder input or; when reversed

(end for end), it can feed playback output for measurement and analysis.

The left-only and right-only positions facilitate adjustment of equal levels from studio stereo playbacks when playing your standard test cart. Plug the cable into the cart playback output and into the switch box with the VU meter connected to TB #1 and the load in circuit.

During recording, the TB #1 terminals are the input terminals; when playing back, they are the output terminals. They may be connected to an oscillator or meter, monitor amplifier and scope.

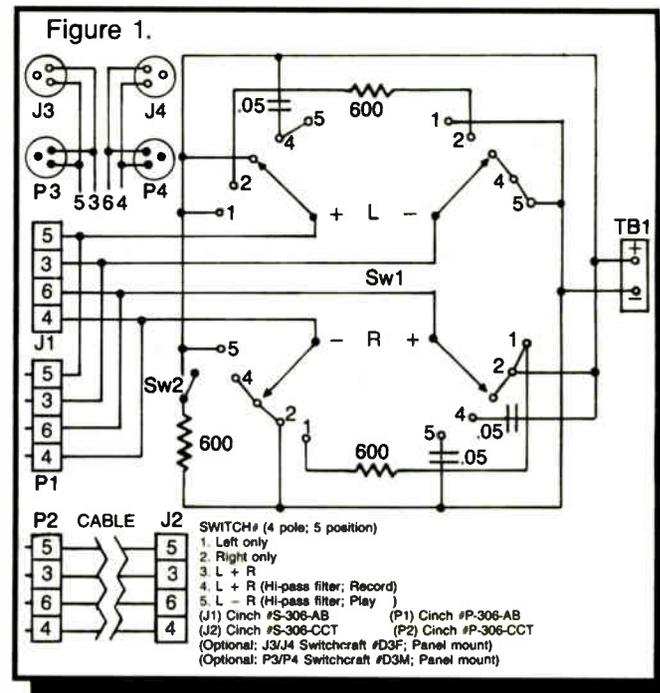
If, on your test cart, you have recorded at equal levels tones of 1 kHz, 10 kHz and 100 Hz, you can quickly perform a check of playback response and equalization adjustment.

Optionally, XLR connectors may be mounted on the switch box. In conjunction with properly phased microphone

cables, these provide the means for duplicating the cart record/play tests on reel-to-reel decks.

Switch #2 provides output loading when checking levels with VU meter or scope.

We gain not only a sense of pride in the proper operation of well-maintained



Recent FCC Rulings Cause Concern

(continued from page 17)

it leaves out the public interest.

"It may not be important to the station if it's not their primary service area, but nevertheless, it is servicing the people out there who are going to lose the signal and they seem to be ignored by the Commission," he said.

The public will complain

Added ABES's Johnson, "Lex (Felker) has a theory that the public will complain, as though the public is informed enough and organized enough to realize that they've lost something and then know what process they have to register their complaints. Chances are you're just going to look for somebody else on the dial and lose that service."

Felker responded that he views listener complaints as a factor in the Commission's analysis of technical rules, but not the only element used in evaluation.

"While certainly not everyone who receives interference is going to complain, if the problem is significant enough, it comes to our attention,"

he said. "The presence or absence of complaints is a useful tool in analyzing whether a particular communications model is valid in analyzing interference."

In addition to rules dealing with interference, the FCC's handling of technical proposals in general has been a consistent point of contention by the groups. And with many of those decisions, noted the NAB's Rau, once they are inked, a reverse opinion is unfeasible.

"With a non-technical rule change like duopoly or political editorializing, if (the FCC) makes a mistake, they can go back to the status quo," he said.

"But with a technical rule proposal, once the interference environment is changed by the FCC, there is no way to go back. Radio station owners and operators make their business and technical decisions on where to locate towers, how high the antennas are to be, how powerful the transmitters and antennas are, in reliance of FCC rules.

"The FCC has never and will never say, 'Look, I think that rule change we made

a few years ago has allowed too much interference. We're going to go back to the status quo from a few years ago,'" Rau continued.

Working in same direction

Said Felker of the NAB's view "We're not going in two different directions. I think we both are interested in some sort of optimum trade-off between the quantity of stations and quality. Where we differ is in perhaps how we get there or in understanding what the Commission is trying to do in achieving that optimum balance."

Despite the assurance, broadcasters continue to look for concrete examples—in the form of rule makings—that the Commission believes in its responsibilities to the public interest.

"What I see are a heck of a lot of proceedings where the Commission seems to be intent upon reducing the standards of protection for both AMs and FM's on the basis that it would produce greater flexibility on the part of licensees to improve their service," Potts said.

"But improving their service isn't necessarily improving the service to their city of license, but instead is improving their service from a commercial point of view," he said.

The trend, Johnson said, is in part a result of the FCC's widespread leaning toward deregulation.

"With deregulation came the marketplace theory," he said. "If we could get the marketplace to determine how stations should operate, then you'd have less infringement as far as the Commission and the government was concerned.

"The question is whether the pendulum has swung too far the other way."



FCC Database

ONLINE SERVICES

- 24-hour Remote Access
- AM, FM, FMTX, NCE-FM, TV, LPTV, ITFS Studies/Searches
- Terrain/Population FAA & FCC Tower Databases
- Predicted Contours
- DATAFLEX – user-specified sort/retrieval programs
- FLAGSM SERVICE – Broadcast site monitoring report


A Service of DW, Inc.

P.O. Box 30730
4827 Rugby Avenue, Suite 200
Bethesda, Maryland 20814
(800) 368-5754 (301) 652-8822

Circle 45 on Reader Service Card

RTW Peak Programme Meter

For Monitoring Peak Level of Analog Audio Signals



Model 1113
With Counter-Plug, All Panel Mount PPM Delivered Horizontal and Vertical Scale.
RTW products are available exclusively in the U.S. from ESL.
120 S.W. 21st Terrace, C-104 Fort Lauderdale, FL 33312
Tel: (305) 791-1501, TLX (WU) 75 3027 ESL FTL UD


Circle 27 on Reader Service Card
World Radio History

Hiring You: What's In It For the Client?

by John Cummuta

Downers Grove IL Last month, this column began a series on marketing your independent engineering service business.

I started with a brief explanation on setting your prices, because there's no sense in building a business that is losing money.

ENGINEERING MANAGER

In this issue we'll begin exploring the wonderful world of marketing and the techniques you can use to build your client base and your income. This is about making money.

What business are you in?

Sound like a silly question? Well, it strikes at the heart of marketing.

People in any business spend most of their day thinking about that business. So it's natural that when it comes time to interact with prospects or customers, they continue to operate from their perspective and they talk about their business in their own terms and from their own perspective.

Every customer's favorite radio station is "WIIFM"—What's In It For Me.

But the customer is looking at your business from a completely different view. Your marketing must communicate your business' image and message in the customers' terms and from their perspectives.

Every customer's favorite radio station is "WIIFM"—What's In It For Me. They don't care about your diploma or your new spectrum analyzer. They care about how you can make their situation better.

For example, no station manager is really looking for an independent engineer. He or she is only interested in solid station technical performance and the absence of technical problems. You never want aspirins, you just want the lack of a headache. So sell what the prospect wants.

Frame your business in their terms, as satisfying their needs. Don't focus on your capabilities until the point where you need to prove your claims.

I remember when I was a general manager. Never did I find myself saying, "What we need around here is a 195-pound, 35-year-old, married engineer with three children."

Yet, I would get floods of resumes that invariably started the same way: name, address, phone, number of dependents, weight, health, marital status, education, licenses—the tedious list goes on.

What I wanted was a package of skills and abilities. I was looking for engineers to tell me what they could do for me, to

make my station better.

The job applicants, however, rarely sold me their abilities (later backing their claims up with educational and experiential evidence). Instead they listed their statistics, which told me nothing about What Was In It For Me.

So, how does that work for your engineering business?

You should see yourself as in something like the keeping-stations-on-the-air-at-peak-efficiency business. Or perhaps the cost-effectively-designing-new-

station-facilities business. Or whatever describes the major benefit that the customer will receive.

A promotional formula

Regardless of what media you might use to reach your prospects, here's what you want your message to accomplish. Just remember AAPPA.

It stands for: Attention, Advantage, Prove, Persuade, Action. That's the sequence of tasks your message must successfully complete.

You have to attract your prospect's attention. You won't do that with an ad that starts with the name of your technical school.

Something like "Higher station technical performance—for less money—means more profit for you," might make a stronger impression.

Next you should state your major advantage over the competition. If you can't frame some sort of unique benefit for your services, you can't give your prospects any good reason to choose you.

You've got to be closer, cheaper, better, more proven or some other comparative beyond your competition or you have no reason to be in business.

Once you've made your lofty benefit claims, you have to prove them. This is where you talk about where you've worked and the name of your school. It's simply justification background for your proposed advantages.

Now, persuade the prospect to take advantage of your offer. Give a special premium or discount to make the deal more enticing. Show as many reasons as possible why hiring you would be more

(continued on page 28)



INTRODUCES THE **TASCAM**

CD-701 CD PLAYER and RC-701 CONTROL UNIT

Designed for production and broadcast professionals. The CD-701's full size turntable and unique clamping system virtually eliminates tracking. Tascam's exclusive "ZD circuit" delivers the absolute best CD sound available. The RC-701 can control up



to 4 CD-701 units and features "frame accurate" search, auto cue, event/link play, pitch control and more. An optional RAM buffer allows instant start from ready and continuous looping between any two points.

CD-701	CD PLAYER UNIT	LIST	1999.00
RC-701	CONTROL UNIT WITH ONE PW5CD	LIST	1249.00
RC-7	BASIC CONTROL FOR SINGLE CD-701	LIST	149.00
RM-701	19" RACK SHELF FOR 2 CD-701S	LIST	40.00
PW5CD	RC-701/CD-701 I/O CABLE	LIST	55.00
BU-1	RAM BUFFER	LIST	399.00

Call PAS for current pricing and delivery



A RETEX INTERNATIONAL COMPANY

5700 E Loop 820 South
Fort Worth, TX 76119-7050
800-433-7668 • 817-483-7474
Fax 817-483-9952

How Semiconductors Are Made

This is the second of a 12-part series on "Introduction to Active Devices," a home-study course in the fundamental operation of transistors and similar electronics components.

by Ed Montgomery

Annandale VA The basis for solid state operation is the control of semiconductor materials and their ability to act as a conductor. The semiconductor can be manufactured to contain the properties of a positive or negative material.

When the semiconductor crystal is grown it is "doped." The outer shells of a few atoms will either gain or lose an electron during this process. A small amount of impurity is added to create the existence of a static charge.

For example, arsenic is known as a donor. If arsenic is added to silicon, the silicon receives an extra electron and becomes what is known as "N" material. The extra electron, which is free to move about the crystal, can act as a current carrier. See Figure 1, which illustrates the extra charge in "N" material.

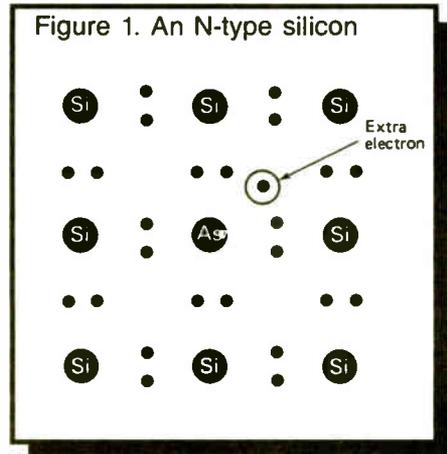
Doping a semiconductor requires amounts as small as one part per million or billion. Only a small trace of impurity containing three or five valence electrons enters a crystal.

If a boron atom is added to silicon it will act as an acceptor. The boron atom's outer shell contains only three electrons;

Ed Montgomery is an electronics teacher at Thomas A. Edison High School in Fairfax County, VA. He also has taught broadcast engineering at Northern Virginia Community College.

thus, it will accept one of the extra silicon electrons. This results in a material with a deficiency of electrons, creating a positive charge or "P" material.

The current carrier in "N" material is



the electron. "P" material carriers are positive charges known as holes—atoms lacking all of their electrons.

Because electrons are considered to be the only charges that move on an atom, hole flow must be considered to be the opposite of electron flow. As electrons flow from negative to positive, holes flow from positive to negative.

Electrons passing from one atom to another leave behind these positively charged atoms or holes. Thus, a positive current flow is apparent.

Unlike vacuum tubes, semiconductors contain majority and minority carriers. Currents can flow in both directions within a semiconductor.

Because semiconductor material cannot be made absolutely pure, unwanted

holes are produced in "N" material and unwanted electrons are generated in "P" material.

These unwanted currents are known as minority carriers and they increase when the temperature of the semiconductor increases. Heat can cause the electrons to break from their covalent bonds, creating even more minority currents. The result of too much heat can cause thermal runaway and semiconductor destruction.

When semiconductors are manufactured or "grown" they are constructed to contain both "P" and "N" material within the same crystal.

At the time of manufacture, the holes and electrons create a junction where electrons and holes come together creating a depletion region. Some electrons line up on the "P" side of the junction, as holes line up on the "N" side. No free carriers of current are left at this time—a "PN" junction has been created.

To make a "PN" junction operate, voltage must be applied. The barrier built up by the extra electrons and holes must first be overcome. An external voltage application—usually about .3 volts—can then reposition the holes and electrons.

If a junction has a voltage applied to it in the polarity indicated in Figure 3, it is considered to be forward biased. The law of static charges forces all holes and

electrons together at the junction, lowering the resistance and permitting electron flow from negative to positive.

If the voltage is applied in the manner displayed in Figure 4, it is considered to be reversed biased. The extra electrons and holes are drawn away from the junction, increasing resistance and limiting

(continued on page 32)

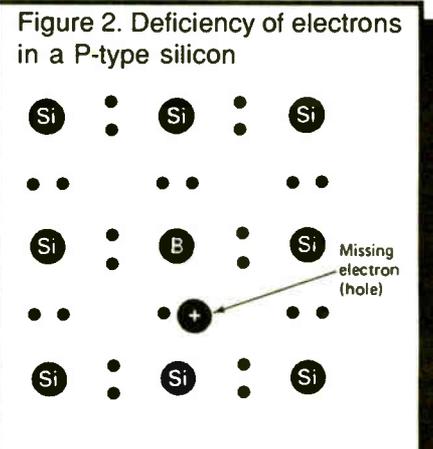
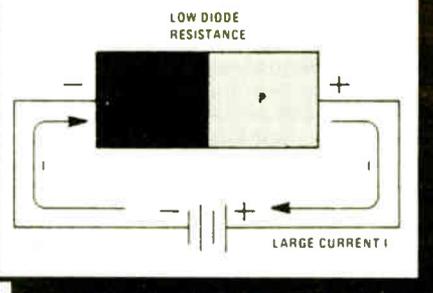


Figure 3. Forward bias



NORTHERN VIRGINIA COMMUNITY COLLEGE
 Director of Continuing Education, Annandale Campus
 8333 Little River Turnpike, Annandale, Virginia 22003
 (703) 323-3159

_____ Social Security No.

Please enroll me in the Community Service Program listed below:

Name _____ Home Phone _____
FIRST NAME MIDDLE INITIAL LAST NAME

Address _____ Business Phone _____

City _____ State _____ Zip Code _____

Course Title Introduction to Active Devices Fee \$ 20.00

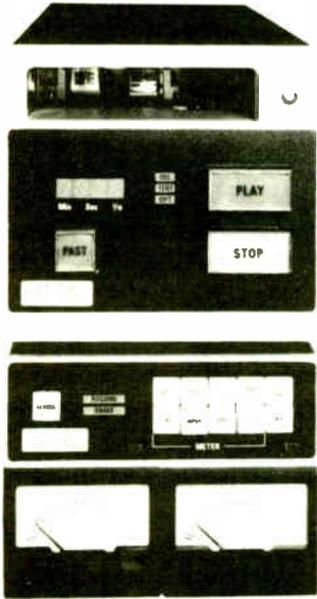
Course Code BCST912.01N Course Date(s) and time _____

How did you learn about this course? _____ Received brochure in mail, _____ Newspaper advertisement, _____ Library, _____ Referral _____ Radio/TV announcement, _____ Other

Enclosed is my check payable to Northern Virginia Community College. I understand that enrollment may be limited and if the course is cancelled for any reason, my check will be refunded in full.

For office use: _____ SA 91 _____ RU 97 _____ SD 91 _____ RU 98





Designed and manufactured in the U.K. the CT 1001 series combines rugged reliable mechanics with State of the Art electronics in an easily serviced, competitively priced package.

■ Automatic Phase Correction
■ Noise Reduction
■ Full Track Erase Head



BROADCAST CARTRIDGE SERVICE (714) 898 7224

15131, Triton Lane, Suite 108,
 Huntington Beach, CA 92649



This and other fine Henry Engineering products are available at Full Compass Systems

HENRY

MATCHED UP!

The Matchbox from Henry Engineering interfaces your consumer and professional studio gear! Active circuitry, direct coupled for sonic transparency, and shielding against magnetic fields keeps the hum and noise out of the signal.

ENGINEERING

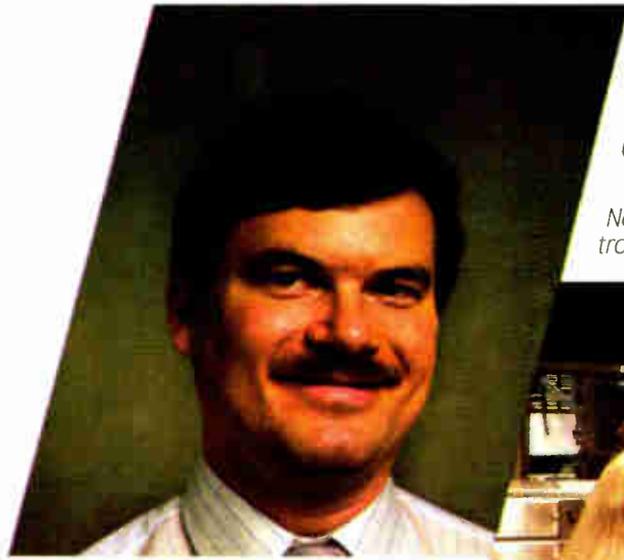
AUDIO & VIDEO EQUIPMENT & SUPPLIES

TOLL FREE (800) 356-5844

LOCAL / CONSULTATION (608) 271-1100



6729 SEYBOLD RD. MADISON, WI 53719



Ron Gaier, Chief Engineer,
WHIO-AM-FM-Dayton, Ohio,
Cox Broadcasting.

News caster Dawn Matthews on the Audi-
tronics 212 in WHIO AM news studio.



**“Reliability
makes
Auditrionics
boards winners
with us”,**



Jim Jones on the Auditrionics 22-1 in W-F-110
production.

says WHIO AM-FM chief engineer Ron Gaier. “Our job in engineering is to keep the station on the air, so our three Auditrionics consoles’ record of zero failures makes me very happy.”

“When we renovated three years ago, I insisted on enough input capacity so every signal source could have its own channel with no switching or patching. So we bought the 224 for production and on-air, and the 212 for news. This also gives us the flexibility to easily reconfigure the boards as our needs change.”

“We got everything we wanted from Auditrionics through our dealer Allied, including timely delivery which was critical to us then.”

“Based on our trouble-free experience with the Auditrionics 200 series thus far, I’d buy them again tomorrow.”

If you’d like to know more about why Ron Gaier specifies Auditrionics consoles, call toll-free 800-638-0977 or circle reader service number.

 **auditrionics, inc.**
3750 Old Getwell Road, Memphis, TN 38118
901-362-1350

Circle 34 On Reader Service Card

Hard Disk Editing On a Tight Budget

by Thomas L. Vernon

Harrisburg PA There's been a lot of material published recently in *Radio World* and other industry publications about intelligent hard disk editing systems.

Most feature the ability to manipulate audio waveforms on a computer screen and add special effects. Maybe you've noticed their price, too—\$6000 and up.

There are, however, some lower cost digitizers that will permit you to get in on the action for about \$200. While they don't stand up feature for feature with their more expensive cousins, they have plenty of creative applications.

Their low cost allows small market stations to get involved with digital sound editing.

This month we'll look at such a system—the Farallon MacRecorder—and

If you want to get involved with sound effects, you may want to purchase a package such as the STAX Sound Effects Studio, which has an extensive collection of prerecorded sounds along with the capability to add more.

Space does not permit an all-encompassing description of MacRecorder functions, only a mention of the high points.

The MacRecorder is both a hardware and software package. Included is a digitizer with a built-in microphone, external mic, and line in jacks. It plugs into the modem port on the Mac (for stereo you'll need two digitizers).

STATION SKETCHES

Three 3.5" disks are included: Start-up/SoundEdit, HyperSound and a demo disk. Of course, there's a manual as well.

Interfacing in the production studio is fairly easy (see Figure 1). Just be sure not to connect the digitizer to speakers or other high level outputs, as it will be damaged.

The Mac II has a stereo mini output jack. You'll have to fabricate your own interface box to get into the balanced 600 ohm broadcast world.

Bringing the world into PCs

The first step is to get sound from the outside world into the computer. With the MacRecorder, this is done via SoundEdit.

SoundEdit allows you to record and play back sounds, add special effects, create new sounds and mix up to four pre-existing sounds using the built-in mixer.

When you start up SoundEdit, a window appears which will display the sound graphically, as in Figure 2. Options are available in this window to display a spectrum analysis of recorded sounds, set the loopback location and display waveform length.

If the waveform is too long to fit in the

Figure 3. Recorded sounds may be modified with the parametric equalizer. The range of each band can be changed by clicking on the vertical lines and dragging them left or right. In a similar manner, the horizontal sliders can be adjusted.

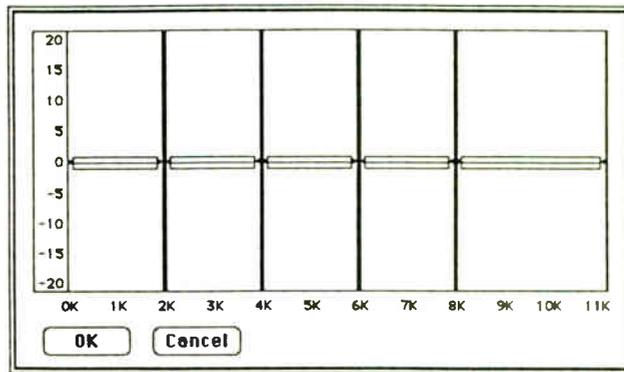
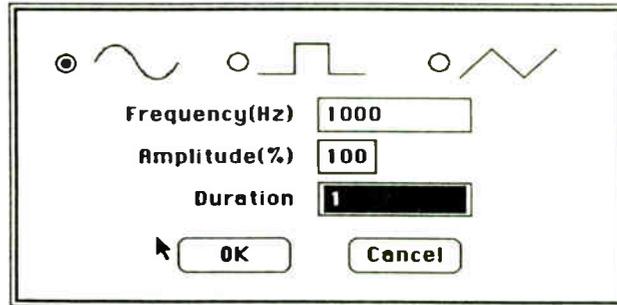


Figure 4. A built-in tone generator is provided with the MacRecorder. Some interesting sounds can be created by running tones through special effects.



©1987 Farallon Computing Inc.

window, there's a horizontal scroll bar in the bottom of the window to display the portion you want to see.

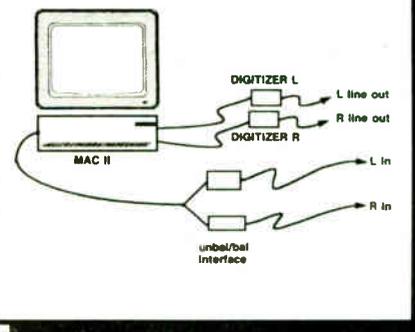
Navigating and selecting in the SoundEdit environment is very similar to working with a text document in a Macintosh

word processor.

The blinking vertical line on the waveform is the insertion point. Clicking and dragging across portions of the waveform selects them to edit, play or apply

(continued on page 32)

Figure 1. To interface two digitizers into the production studio, one connects to the printer port, the other to the modem port.

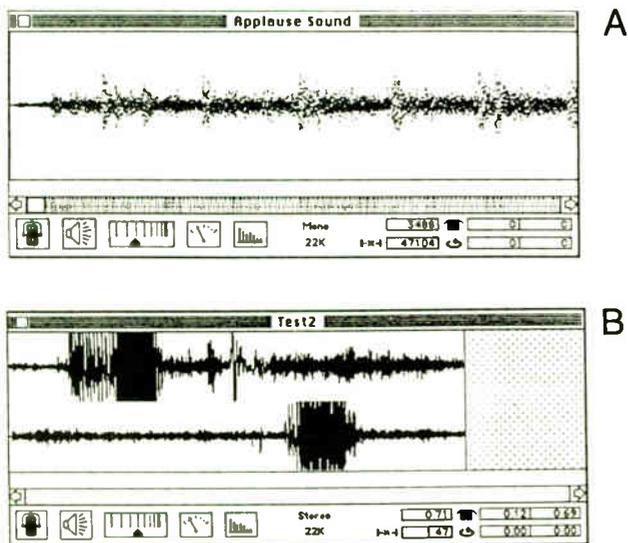


discuss its applications in a radio station environment. The descriptions will also apply to other small computer editing systems, as well.

Getting started

To jump into desktop audio, you'll need a Macintosh II with a hard disk drive, a package such as the Farallon MacRecorder and convenient 600 ohm in/out patch points in your production room. To use HyperSound (included with the MacRecorder) you'll need HyperCard.

Figure 2. Opening the SoundEdit window reveals a graphic representation of recorded sounds. Mono (A) and Stereo (B) are displayed in a similar fashion.



©1987 Farallon Computing, Inc.

EVERYTHING WE SELL IS FOR LEASE, TOO!

Let's say you need an ITC 99BRPSE and 3 Delta I cart machines. An Allied leasing program will permit this for as little as \$340 a month.

Any combination of ITC cartridge machines is subject to leasing. Everything we sell is subject to leasing.

LEASING:

1. Conserves cash,
2. Can be written as a business expense,
3. Avoids depreciation, and
4. Preserves other lines of credit.

ITC ... Better from

HARRIS ALLIED

1-800-622-0022

CALL TODAY! WE'LL TELL YOU EVERYTHING WE KNOW ABOUT LEASING & ITC.

Leasing rates subject to change and to credit approval.

ALLIED is an authorized 3M International Tapetronics dealer.



WE'RE REALLY INTO ITC



99B



DELTA



OMEGA

ALLIED is an authorized 3M International Tapetronics dealer.



HARRIS

800-622-0022



THE CART YOU CAN COUNT ON...



Mike Malo, C.E.
KNIX, Phoenix, AZ

"Getting to #1 is tough, but staying #1 is tougher. It requires consistently outstanding performance. We depend exclusively on the AA-4."



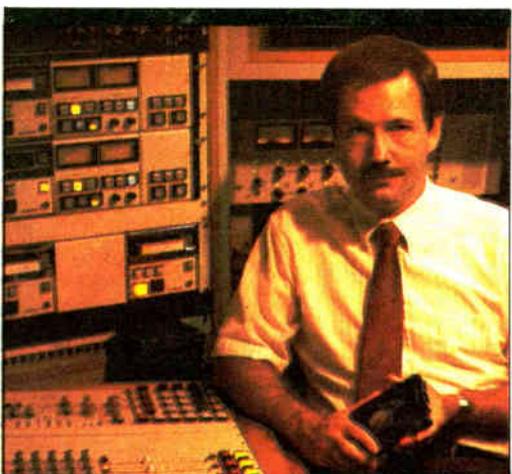
Mike Callaghan, C.E.
KIIS, Los Angeles, CA

"From time to time we evaluate other carts, but we've never found anything as consistent or dependable as AA-4s. We're very happy with them."



Gerry Dalton, C.E.
KKDA, Dallas TX

"We've used AA-4s for years. The highs are cleaner than other carts we've tried, and the response is more consistent."



Ray Klotz, C.E.
KZLA/KLAC, Burbank, CA

"We've been using AA-4s ever since we built our current studio in 1984. We tested several different carts and machines, and AA-4s were our choice. We're very satisfied."



Don Cook, C.E.
WOVV/WIRA, Ft. Pierce, FL

"In the tests I've run, Audiopak carts give the best performance consistently. They're also simpler to maintain and re-load. We dub a lot of music off of CDs. Quite honestly, when the machine's in good shape, I can't tell the difference. They definitely do the job."



Ray Pollard, G.M.
KSKG, Salinas, KS

"We've used AA-4s since 1986, and they perform flawlessly. We've had no phasing problems at all—they just work great. They're the only cart we use."



... CART AFTER CART AFTER CART AFTER CART ...

... the "new Audiopak" continues to lead the way. "Workhorse" A-2s, "stereo" AA-3s or "digital-ready" AA-4s—all deliver the reliable performance you need. If you'd like to feel as good about your carts as these radio pros do, now's the time to do something about it. Pick up your phone and dial (800) 522-CART for the name of the Audiopak dealer nearest you.

audiopak
Tel: (800) 522-CART or (703) 667-8125 Fax: (703) 667-6379

audiopak inc.
P.O. Box 3100
Winchester, VA 22601

Circle 47 On Reader Service Card

Designing a Demodulator

by Bill Higgs

Louisville KY Last month I let out my frustration with satellite delivery services, including dealing with the hardware necessary to receive them.

As I noted, most demodulators on the market are fixed-frequency, and require internal retuning in order to move to a different channel. I then described a tunable local oscillator, which covered an appropriate range for a SPCP demodulator.

BOTTOMLINE BROADCASTER

This month we will look at the input and mixer circuitry necessary for a tunable satellite demodulator. The circuit is fairly simple, as can be seen in Figure 1, and layout is not terribly critical as long as it is in a reasonably straight line.

I built mine the same way I built the oscillator—on a piece of doublesided PC board. This allows for easy construction, and also for easy experimentation. Believe me, it took a lot of experimentation!

The circuit is straightforward. The input resistor is there only to prevent loading of the receiver output and may not be necessary in your application.

Actually, my satellite receiver output is routed through a video DA (See my "idea" article a couple of issues back), which has a very low impedance output.

In fact, during testing, I could short the coax to this unit without killing my main demodulator! That's a low impedance output.

Q1 and Q2 on the schematic are general purpose NPN transistors; 2N2222As are just fine here. The Q1 acts as an emitter follower, primarily to obtain additional isolation, while the Q2 is a voltage amplifier, needed to drive the gate of Q3.

The Q3 is a 3N211, 40673, 3SK40, or similar dual-gate MOSFET in the role of active mixer. Although these transistors are gate-protected, use care in handling and soldering.

Don't forget the 47 ufd capacitor from the supply rail to ground. Since the baseband feed is, in essence, an un-

balanced input, ground currents can flow and introduce hum. The capacitor helps decouple it from the mixer circuit.

Note: The tiny little .1 ufd capacitors from surplus computer boards are lousy for RF, in spite of their appearance—I tried. Use disks instead.

Variable audio output

T1 is the first IF can of a small portable FM radio. The radio is used as the complete IF, discriminator and audio stage. I am allergic to building more than is necessary and this approach met the need nicely.

Choose a radio with decent sensitivity and good selectivity (at least one ceramic filter) and make sure that the IF frequency is the standard 10.7 MHz. Mono is fine, and in fact, preferable.

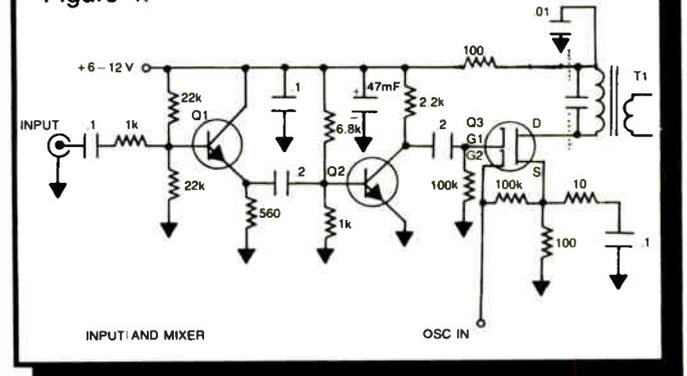
If possible, try to find a radio that uses

either a ULN2111 (LM2111) or CA3089 IC for detection, as these chips give you a bit more control over linearity and deviation than some others. Discrete components are OK, but I have found the ICs easier to work with.

Don't even think about using the speaker output of these small radios for audio unless your application is very casual. The output transformers in these units are usually tin can iron or something similar, and the fidelity is about that of a car horn.

Tap off the volume control, and you will have a variable audio output of about 5 kilohms impedance.

Figure 1.



One other thing: make sure the radio you choose has a negative ground. Most imported radios have a small (read "microscopic") schematic either in the manual or on the back cover. Take my advice, and take a magnifying glass with you when you shop.

It is a good idea to build the unit in a metal box of some sort for shielding, (continued on page 33)

Train Talent in Technical Topics

by Barry Mishkind

Tucson AZ It happened again! The new program director has arrived from afar with a new crew of disc jockies who are just dying to get their chance to be stars.

Your problem is how to communicate successfully with the program director and his staff. Oh yes, did I tell you that the entire air staff just graduated from

trying to get some small amount of caring for the station's equipment may seem a lost cause.

Of course in some markets, those with high talent costs and spot rates, it is cheaper to replace a cart machine, for example, than to lose a spot by trying to have the air staff baby a sick machine. That however, is not the lot of most of us.

On the other hand, there are some

things that you can do to reduce your frustration level a bit.

The first meeting

As with any any time people meet, first impressions are vitally important.

When we first meet with a new staff member we should be quick to emphasize our desire to develop a team spirit and to make the "new kid on the block" (continued on page 33)

ECLECTIC ENGINEER

the Good School of Broadcasting (not affiliated with "Good Broadcasting")?

Although we are in the communication business, it is amazing how little actual communication occurs between staff and engineer in some stations. When there is only a contract engineer, it can be almost non-existent.

Or, perhaps your station is blessed with great stability. Some stations keep a staff intact for ten years or even longer. Training and communication with the staff is not a problem.

However, in the years since the FCC started deregulating our industry, a whole new breed of air personalities has arrived. The focus of their interests is rather different from that of "old-timers."

Sparking some interest

Of course, we don't want to imply that in the past every DJ was smarter by virtue of holding an FCC license. There were enough "six week wonders" to provide each station with someone just smart enough to be dangerous.

On the other hand, at least the Third Phone did mean the desire to be on the air had been there long enough to stir the individual to take the test.

In the case of those with a First Phone, there was a stronger desire, even if most of the knowledge leaked out of their heads 12 minutes after the test.

Much more trying to the souls of engineers is the new breed of "post card" permit holders, who seem to hold any technical considerations in contempt—a mere inconvenience on the road to becoming a star.

Communicating with these people or



BUY!! SELL!! TRADE!!



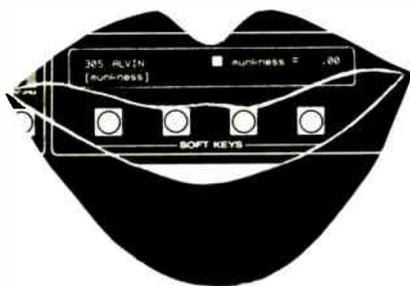
Since the late 1960's, Allied has been addressing the needs of broadcasters for used radio equipment. We can also furnish you with new equipment from over 300 manufacturers. Accordingly, Allied accepts TRADE-INS, SELLS new and used gear and selectively BUYS used equipment.

Call Jim or Chuck — our veteran broadcast personnel — and discuss what Allied Equipment Exchange can do for you! TODAY!!

FAX US AT 317-966-6321

P.O. BOX 1487
RICHMOND, IN 47375
317-962-1471

The effects are all digital. The grins are only natural.



Alvin vocal shift program—one of 70+ Eventide Broadcast Ultra-Harmonizer™ digital audio effects designed to stretch your imagination (and your smile). And when you have fun, so do your listeners.

RADIO'S MOST COLORFUL BLACK BOX
EVENTIDE INC
ONE ALSAN WAY
LITTLE FERRY, NJ 07643
TEL: 201-641-1200 • TWX: 710-991-8715 • FAX: 201-641-1640

Eventide

the next step

Circle 71 on Reader Service Card

Upgrading Production Values

by Ty Ford

Baltimore MD The idea for this month's *Producer's File* comes from recently having spoken to a number of people about basic production studio designs and how to free up the main production studio for more creative work while getting the everyday work done in a timely fashion.

Whether you're faced with upgrading an existing facility or starting from scratch, *where* the studio is situated, *how* it is used, *by whom*, for *what* kinds of production, *how* much it will cost and *why*, are all questions that need to be addressed.

The first question to ask is why? Until recently one production studio was more than enough. The answer is ... competition.

Docket 80-90 upgrades and move-ins have effectively encroached on small cities and major markets to the extent that everybody is getting a smaller piece of the revenue pie.

The initial programming reaction to this competition is to tighten the playlist, play more music and trim the liners.

The need to sound different has never been greater and an excellent way to establish that difference is with great production.

Another answer to "why?" is "Because the technology to improve production values already exists." The music industry and professional recording markets are both well out in front of radio in terms of production gear, R&D investment and returns.

This isn't a condemnation of broadcasting, because the primary purpose of broadcasting is the distribution of pro-

gramming to an audience. Broadcasting doesn't exist to support the equipment industry.

Nonetheless, it's still linked to those industries and the TV and video industries by virtue of their classification as entertainment media. As a result, comparisons are inevitable. A discrepancy in production values leads to a devalued perception of the lesser competitor.

PRODUCERS FILE

The third answer to "why?" is "Because if you don't, and your competition does, you run the risk of falling behind."

The human element

Don't get snowed by all of the hardware and software babble. The most important element of a production upgrade is the person who does the work. Without strong writing, performance, operating and organizing skills the fanciest digital workstation on the market becomes little more than a low quality space heater.

Great production people are often more difficult to find than good "morning zoo" teams. The work done on the great demo reel belonging to the person you're about to hire may have been produced in a studio that's light years ahead of yours.

If you are planning a production studio upgrade, consider including input from the leading applicants as to what equipment they're using or would like to use. Have them break down the list of equipment into "basics" and "extras."

Although studio designers and con-

sultants like myself will happily accept the job of designing and equipping a studio, it's important that the person who works in the studio be comfortable. It's also important to know how much the equipment responsible for their "sound" costs.

Hiring the pros from Dover

In some cases you may find you can afford the production person or the gear, but not both. If this happens, don't rule out the option of hiring someone on a contract basis.

There are several ways to work this kind of deal. Provided their present employer agrees to the arrangement, contractors can provide you with writing, voice tracks, music effects or complete productions. Most of the time the writing becomes a collaborative effort involving someone at your station.

Prerecorded liners or positioning statements voiced by someone from outside

the market give your station an exclusive sound. Be careful, though, when shopping for these voices.

If your "exclusive" station voice starts popping up on commercials aired on other stations in the market, the exclusive position will be lost.

There are two ways these voice/production deals are normally made: on a continuing retainer basis and as a one-shot deal. Most providers of these kinds of service protect themselves by limiting the use period of any material to a specific length of time—say, six months or a year.

The one-shot deal may sound like the most economical way to go, especially if you've done your homework and have a list of 20 or 30 "bits" you want done. Remember, however, that a lot can happen in a year's time.

The standard deal calls for payment of the first flight of material up front, with a monthly retainer covering additional work. This allows you the flexibility to add timely new material.

If you've realized the importance of
(continued on next page)

Market Yourself Properly

(continued from page 21)

profitable than leaving things the way they are now.

Finally, tell your prospect or customer what *action* you want them to take. If it's returning a response card or calling you on the phone—tell them.

Make responding as easy as possible. You may just tell them that you will be calling them later. Whatever you want them to do, don't expect them to figure it out for themselves.

Image consistency

The level of impact you have on a prospect or customer is the net result of all the impressions your business has made on them. So, doesn't it make sense to control the content and quality of those impressions and to make them reinforce rather than dilute each other?

The message and logo on your ad should be the same one on your letterhead and envelopes. And if you have an office, the logo should be visible there too. Logos don't make anybody buy from you, but they should be consistent.

The slogan on your letterhead should be the same phrase you or your secretary or answering service use when answering your phone. It should be on your invoices and the side of your truck.

The point is that if you have consistency in your message transmission, your marketing impressions will accumulate and amplify each other in your customer's subconscious.

But, if the messages are all different, they'll clash and just add to the information clutter of your prospect's daily life.

Another facet of image management is a term called verisimilitude. It means,

"the appearance of truth." In the context of marketing your engineering business it means that everything about you and your business should jive with the image you're trying to project.

In other words, if you claim to be the classy, high-priced type of contract engineer, you had better look and act the part. If you come in wearing ragged old work clothes, carrying a dufflebag full of raunchy-looking tools, your customer will not believe your superiority claims.

On the other hand, if you're claiming to be the cost-effective economy version of an engineer, don't wear \$300 shoes and drive up in a Mercedes.

Your customer will jump to the conclusion that you probably did not inherit the shoes and car from a rich uncle. And he or she will have no intention of helping you make next month's payment.

Be yourself

The best marketing advice I can give you is to be exactly who you are. Don't try to manufacture an alter ego that you feel will sell better. The folks running stations are just regular people, and regular people always respond better to regular people.

So don't get so technical in your marketing techniques that you're not sure what worked and what didn't.

Next month we'll talk about one of the most important marketing tools ever devised: the letter.

■ ■ ■

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

Do you have a Class A FM Construction Permit and \$100,000?

GOOD !!

We can build your station COMPLETE for \$100,000.
We can make this exceptional offer because we do everything,
including erecting a new 300 foot tower with all accessories.

OUR PACKAGE INCLUDES:

- * Modular transmitter/studio/office building delivered and completely installed at your site
- * Tower, antenna, and transmission line installed
- * Complete transmitter and monitoring system
- * Stereo control room complete down to clock on the wall
- * Complete production room
- * Fully furnished reception area, manager's office and work, refreshment areas

If the high costs of construction have delayed

launching your Class A,

WAIT NO LONGER !

— Financing Now Available —

Call Today: Fred at (817) 697-2462
or Don at (512) 448-2420

PARITY RADIO CORPORATION OF TEXAS

Call us about your Class C2 or Directional AM construction, too!

NEW TEX 20 **SAME** OLD PRICE

BEXT INC.

BEXT Introduces The New '89 TEX 20 FM EXCITER (20W). Still For Only \$2,795



- With improved performance (i.e. dist. under 0.1)
- New direct capability for synchronous phase locking
- New faster programmability, now in 10 KHz steps
- New terminal board for full remote controllability
- New totally modular construction for easy access

BEXT INC. 619-239-8462
739 Fifth Ave. San Diego CA 92101
TLX 229882 FAX 619-239-8474

ZH-1

ZERO-HYSTERESIS CLIPPER

- Precise peak control for AM & FM
- Adds 2dB of discrete loudness without composite clipping
- NRSC overshoot protection for AM

Unique circuitry, low cost, many applications
Contact your dealer or call us direct.

hnat hinders inc

42 Elaine Street-R.R. 1 Thompson, Connecticut 06277
(203) 935-9066, (203) 935-9242

Upgrades

(continued from previous page)

production, but have limited space, consider a simple dubbing studio.

In its simplest form, the dubbing studio requires a reel-to-reel deck, a record/play cart machine, a small power amplifier and a set of studio monitors. For this system to be worthwhile you have to have a lot of prerecorded spots coming in that don't need tags or donut inserts.

In its most elegant form, the dubbing studio can be constructed in a small room, by itself. If the format of the station requires dubbing music to cart or reel, a turntable, CD player and patch bay and/or switch box can be added to the setup.

The dubbing studio is a great way to take the pressure off the main production studio. Adding a mic and small mixer for recording tags and donuts is an obvious next step.

Variations on a theme

There are other variations of the dubbing studio which have been tried with varying results. The first involves creating another traffic department where in-

Great production people are often more difficult to find than good "morning zoo" teams.

coming spots often land. Unless union contracts prohibit this kind of work, traffic personnel can cart the spots which need no additional production.

One caution: Don't use the broken down reel-to-reel machine, the 5 watt PA and the "cheapo" car speakers currently in the traffic department. Unless you do a quality job, you're asking for trouble.

Another likely site for a "dub station" is the production director's office, provided there is one and he/she has enough room. The same "quality" rules apply here as did in the traffic department.

Although you're liable to get some heat from the news director, a "dub station" also could be set up in the newsroom. This setup works particularly well if you are a network affiliate and need to record spots from the net to be used later.

But don't expect the ancient cart machine that was put in the newsroom because it was "good enough" for voice quality news actualities to do the job.

The old Peek-and-Shriek

But what about the main production studio? Maybe you've gotten accustomed to the archival collection of crumpled up McDonald's french fry bags on the floor. Maybe you'd forgotten that the production console used to be the air console, before the last flood made it sound "a little funny."

If you're not a hands-on kind of person, ask the production director, the program director and a few of the air people what's wrong with the studio and what they would like to see in there, besides an industrial-strength air freshener. Keep an engineer nearby to

translate, or take copious notes and call me to talk it over.

If the studio really is trashed, be prepared to drop at least \$20K for a modest makeover.

If your basic equipment is intact and up to specs, consider some basic processing gear. A multi-effect reverb/delay unit and an equalizer rack-mounted with a patch bay, or even a four-track reel deck is not too exotic. Try trading them out with a local music store.

I know you don't want to hear this, but there's a good chance you may have to get a new console. Extra gear means extra inputs and while a patch bay can add flexibility to keep you going, when you're spending more time patching than producing it's time to get a new console.

Consoles have probably come a long way since you last had to buy one. Their input strips sport all kinds of EQ and their back panels have a multitude of input and output configurations.

It's a good idea to spend some time plotting audio flow through any consoles you may be considering to make sure you'll have the operational flexibility you need.

Spend some time thinking through your worst-case production scenario. Make sure the console you're considering can handle the job. It is not a stupid idea to get slightly more console than you think you need, especially when counting inputs.

A place for everything . . .

This is as good a time as any to consider proper cabinetry. Most broadcast supply companies have well constructed modular prefab studio cabinetry. The trick here is to figure out how much gear you have and how much you intend to have.

Plan the studio layout so the gear you use the most is within arm's reach of the main chair. Remote starts will work in some cases, but there's always a trade-off.

If money is no object and you have computers in traffic or billing, consider mounting a computer video monitor and keyboard within comfortable reading distance of the console. Putting copy and production info in the computer will allow you to reduce the volume of paper (waste and expense) you deal with.

If you don't already have a synthesizer or two, try to create an area where some can be set up in the future. Visit a local music store and take a look at the racks that support a keyboard and several additional pieces. There will probably be some sort of MIDI keyboard system in most stations within the next five years.

Putting your money in the right place is the key to a successful upgrade. Buying an equalizer to "straighten out" the EQ problems in a production studio with a substandard monitor system, in my opinion, is a poor use of money.

In most radio production studios monitoring is near-field. The room itself has minimal effect on the sound projected from speakers up to six feet from the sweet spot. A better use of money would be the purchase of a good pair of studio monitors and/or a good power amp of at least 30 watts per channel RMS. Call me if you'd like some recommendations about this kind of gear.

■ ■ ■

Ty Ford, audio production consultant and voice talent, can be reached at 301-889-6201 or by MCI Mail #347-6635.

Sometimes We're Judged



By The Companies We Keep

Over 200 manufacturers put their trust and confidence in BSW to represent their products. We have earned their respect by servicing the needs of thousands of broadcasters for over 17 years.

How about you? If you're fed up with the "song and dance", the hassles, and proverbial runaround from your present audio equipment supplier, please give us a try. At BSW, we work 12 hours daily, to give you the best possible service and competitive pricing. We invite you to be the judge. Call us toll free and allow us an opportunity to earn your trust and confidence for all your audio equipment needs.

BSW

BROADCAST SUPPLY WEST

America's Full-Time Broadcast Supplier

1-800-426-8434

ORDERS • INFORMATION • SPECIFICATIONS
BSW • 7012 27th Street W • Tacoma, WA 98466 • FAX 206-565-8114

WXXK Gives Radio The Victorian Touch

by Dee McVicker

Tempe AZ When folks around Newport, New Hampshire, talk about traffic on West Street, it is possible that they're referring to the old Victorian mansion that borders Sugar River. The mansion is, after all, home to WXXK-FM radio.

But, when Radio Active Group's owner Bruce Lyons talks about traffic on West Street, he's referring to the motorized sort that at one time could be heard through the station's drafty Victorian walls and unfortunately over the air. The 100-or-so-year-old mansion, it seems, doesn't lend itself to the gadgetry of modern civilization.

For years, WXXK-FM and its sister AM were house guests in an aging construction that had been around longer than the first waves of radio. "It was just an old house that someone moved equipment into," said Lyons, who had no intentions of conducting turn-of-the-century radio.

When Radio Active Group purchased the AM/FM combo, Lyons decided against moving radio out and instead elected to move high technology in.

This old house

William Wohl and Andy Lovell with Radio Systems arrived in New Hampshire to evaluate the technology residing at WXXK, as well as the structure housing that technology. Lovell, the com-

pany's turnkey installation expert, was drawn immediately to several nuances in the mansion's construction.

Standing at the stairwell leading to the second floor, Lovell noticed that doorway access to the studios—at one time bedrooms—was uncommonly narrow. Measurements showed doorway access to be only 28" wide; modern office building codes stipulate a width of 36" to 38" for handicapped access.

FACILITIES SHOWCASE

Lovell's measurements were well worth noting, the on-air and production studios would require furniture that would fit through those small, 28" spaces.

Lovell also noted that the structure was not built to modern proportions. Ceiling height was well above average in some rooms, and instead of square rooms he found five, sometimes six sided rooms. The echo, he commented later, was reminiscent of talking in a basement.

Since it was nearing the summer months in New Hampshire when Lovell and Wohl visited the station, they couldn't help but notice the heat. The old mansion, of course, did not have the modern convenience of air conditioning and it was doubtful its 60 amp service could power such a luxury.

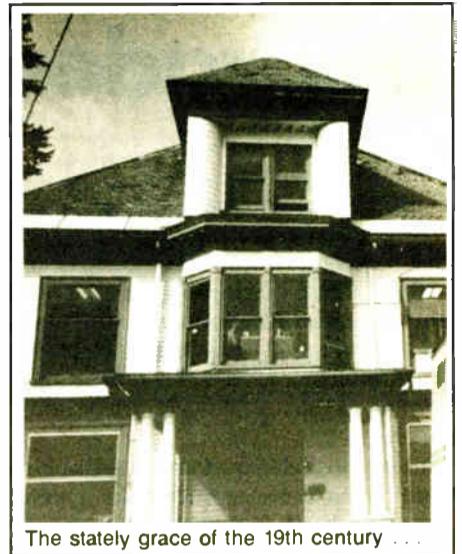
Increasing the 60 amp service to 150 amps, however, wasn't what concerned Lovell. He was occupied with the unmistakable absence of duct work—another modern invention that the old mansion had never found a need for with localized, steam heated radiators.

Putting turn-of-the-century construction aside, at least for the moment, Lovell along with Wohl began an extensive evaluation of the station's studio needs.

Back to the drawing board

With the exception of a rare piece or two, both Wohl and Lovell agreed that existing equipment would not fit the goals of the station. WXXK was piping in quality Transtar programming, and the group's goal was to match what was being programmed locally with what was coming in off the satellite. With this in mind, Lovell and Wohl went to the drawing board.

At the Radio Systems facility, Lovell and Wohl worked closely with a staff



The stately grace of the 19th century . . .

Once the studios were staged, installation personnel added AC power and conduit wire runs according to blueprint specifications. Console harnesses were then moved into cabinetry, and audio and remote control connectors were



. . . meets the state of the art in turnkey operations, courtesy of Radio Systems.

draftsperson to design a new on-air studio and a new production studio for WXXK. Working from measurements of two of the mansion's oddly shaped rooms, they came up with a serviceable plan.

After the plan met the group's approval, Radio Systems went into what can only be described as full turnkey action. Armed with blueprints, the wood-working shop began carpentry work and in another part of the company the installation department began wiring console harnesses.

Next, the completed furniture was moved to Radio Systems' staging area, where it was met by installation personnel with console harnesses in tow.

"Our approach," said Wohl, "is to build and test everything in our facility first. It allows us to build the studio under controlled conditions, an inexpensive approach for the customer."

made up in anticipation of the equipment that would be fitted into place.

The equipment they fitted into place for the on-air studio included an RS-12 12 channel console, two Broadcast Electronics 5402C triple deck cart machines and four single-play Fidelipac CTRLII cart machines.

"The on-air studio was built for basic satellite operation," said Wohl. "The two triple deckers were for the commercial load and the four single-play cart machines were dedicated to Transtar."

In the production studio, they fitted into place an RS-18 18 channel console, two Fidelipac CTRL13s, a Technics SP-25 turntable with RS PA-1 phono preamp, an Orban 414A compressor/limiter, an Orban 622B parametric equalizer, two Otari Mark III-2s, a Symetrix telephone interface, an Eventide Harmonizer and the Technics SLP1300 CD player for the

(continued on page 32)



THINK MLW-1

- Three stereo inputs, one stereo output
- Automatic switch to secondary or tertiary inputs on primary loss of channel
- Automatic switch to secondary or tertiary inputs on primary loss of audio
- Automatic loss of channel correction
- Automatic audio polarity correction
- User programmed sequence and time delays
- On-line audio monitoring and switching
- Microprocessor based
- Audio error alarms and level matching

AND MORE . . . CALL OR WRITE FOR COMPLETE DETAILS

TITUS TECHNOLOGICAL LABORATORIES

1134 Neipsic Rd., Glastonbury, CT 06033
(203) 633-5472

Circle 66 on Reader Service Card

SCA RECEIVERS



Clearly the industry's most advanced receiver.

ERKO TECHNOLOGIES

7616 Burlington Omaha NE 68127
402-331-2632

Circle 37 on Reader Service Card

COMPACT DISCS

NEED TO BE CLEANED TO PREVENT "ON AIR" DISASTERS



Nitty Gritty makes the only motorized, professional-grade CD cleaning machine that is capable of "perfectly" cleaning your station's valuable collection. \$170 in vinyl \$230 in oak. Four models of record cleaners also available. Priced from \$270. Nitty Gritty, 4850 Arrow Hwy. #F4, Montclair, CA 91763
714/625-5525

Circle 22 on Reader Service Card

STATUS



When your transmitter's down you're out of business. That's why you need the VRC-2000 Remote Control to let you know what's happening with your transmitter 24 hours a day. And, once you know the status of your system, the VRC-2000 lets you make adjustments quickly and efficiently at the touch of a button.

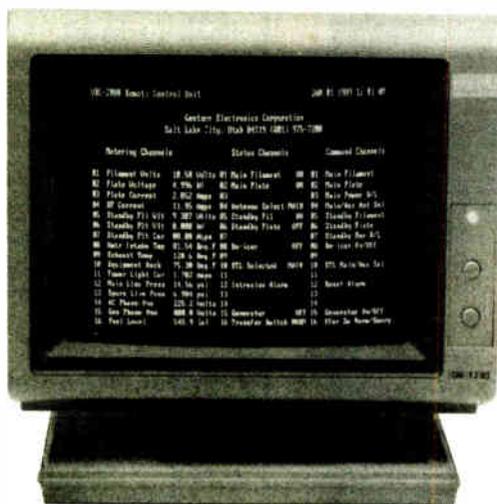
With the data interface, status reports are displayed on-screen and adjustments can be initiated directly from your PC. When you're away from the plant, status reports can be called up by phone using your personal access code. Once your ID code is recognized, a synthesized voice relays transmitter status. Adjustments may be made immediately via your Touch-Tone™ phone, or maintenance personnel may be dispatched to the transmitter site.

With options like the 2400 bps stand alone modem, temperature

SYMBOLS

probe, computer printer and automatic dialer, the VRC-2000 becomes an extremely powerful monitoring and control system. Conditions at the remote site are continuously monitored and reports are logged and printed on command. Corrective action can be initiated based on monitor conditions. In the event of an emergency, the VRC-2000 dials a series of numbers until a human operator is reached.

Whether you're broadcasting AM, FM or Television, your transmitter is a critical link. The VRC-2000 is designed to provide vital 'round-the-clock status even when man-hours are limited. Extensive diagnostics and complete remote control keep you up and running and on schedule. Check with Allied and find out how the VRC-2000 can help you maintain the status quo *and* help KEEP you LEGAL.



VRC-2000 REMOTE CONTROL

Your present remote control could be worth \$ toward the VRC-2000.
We take selected trade-ins.

ATLANTA, GA CHICAGO, IL DALLAS, TX
LOS ANGELES, CA RICHMOND, IN

1-800-622-0022

ALLIED
Broadcast Equipment

— A HARRIS COMPANY

The Victorian Touch

(continued from page 30)
production library.

In both studios, Radio Systems installed ElectroVoice RE20 microphones with dedicated Valley International 400 processing.

"We carried mic processing throughout," said Wohl. "No microphone can go on the air unprocessed, either from the on-air studio or production studio." The reason, Wohl explained, is to adjust for the unique characteristics in each voice and each microphone.

Radio Systems also devised simple, yet flexible routing for the studios. Noted Wohl, "Our philosophy is that the studio should operate like an air studio when no patch cords are in place.

"The bottom line is that when the part-time guy walks in to dub off his spots, all he has to do is pull all the patch cords out and he knows the studio operates as a simple, two channel production studio."

To accomplish this, Radio Systems used its own pre-wired patch bays to configure equipment inputs and outputs into the studios' audio feeds.

After all the equipment was installed and tested for potential problems, WXXK's new studios were disassembled, wrapped up and taken via truck to where they would reside permanently.

Lovell's earlier observation of the mansion's doorway construction, fortunately, left them with no surprises when they arrived at the station with a studio truckload. Lovell's other observations during

his initial visit were just as easy to solve.

The lack of ducting in the old house, as Lovell had observed earlier, offered little hope for centralized air conditioning. The alternative was noisy, localized air conditioning units in offices and studios.

Lovell decided to solve this problem by triggering (with relays) the on/off switches of air conditioning units with the on/off switches of microphones. "When the microphone goes on, the air conditioner goes off," said Lyons.

Next, Lovell went to work on the acoustics of late 1800 construction.

Rather than adding insulation and plaster board to already undersized studios, Lovell and Wohl advised the sta-

tion to apply Sonex acoustical foam. Sonex was applied liberally to exposed walls to absorb the echo that Lovell observed and to also cut down on the traffic noise outside.

Putting it all together

With the old mansion at least tolerable for radio, Lovell and his team of installers moved in the new studios. Since the bulk of the work had already been done, including the wiring of Siemens telephone punch blocks, the installers simply assembled the new studios and interfaced them to the mansion.

Lyons, who contracts Radio Systems for most—if not all—the group's new studio projects, commented he is always amazed at this process. "The last station they did for us, they got there at noon (on Saturday) and at a quarter to one

Sunday night, Monday morning, we were on the air," exclaimed Lyons.

Lyons also liked what the company left behind during their short visit to the station. Said Lyons, "(Some of the equipment) is built into cubes that swivel like a lazy susan. And they even made signs for the inside of the building with our logo on them."

The old Victorian mansion, meanwhile, seems to agree with the changes. The old house, having survived the traffic of civilization and now the traffic of radio, appears to be content with adding a bit of radio to its hundred-year-old personality.

■ ■ ■

Dee McVicker is a free-lance writer with a long record in equipment sales. Comments on articles and inquiries about her writing service can be taken at 602-899-8916.

Low Cost Hard Disk Audio Editing

(continued from page 24)

special effects. Selected portions are highlighted in black.

Double-clicking anywhere within the waveform selects the entire segment. Undo, cut, copy and paste functions are all similar in function to their word processing counterparts.

Effects du jour

The most exciting functions, however, lie in the Effects Menu. Here existing sounds can be modified in a number of ways. These include playing selected portions of the waveform backwards, applying echo with controllable delay and

strength and modifying response with a parametric equalizer.

You can create spatial aberrations with a flanger, and bounce stereo sounds from left to right with the ping pong effect. The bender function can be used to continuously adjust the pitch of a sound. Segments of silence can be punched in, you can smooth waveforms to remove harshness and swap channels.

If by some remote chance you tire of modifying your pre-recorded sounds, there are also built-in functions to create new sounds from scratch.

The noise generator will create white noise for you. While this doesn't sound too exciting in itself, white noise applied to a flanger allows you to create the "jet take off" sounds you hear on new wave jingle packages.

There's also a tone generator that will generate sine, square and triangle waveforms. You select the frequency, amplitude and duration.

The FM synthesis function allows users to develop sirens, bird calls, buzzers and other indescribable sounds. The carrier frequency, modulating frequency and duration are all user-selectable.

System limitations

I would be remiss if I didn't mention some of the limitations of lower cost digitizing packages. The most notable are that response is limited to 10 kHz and time to about 35 seconds.

Still, with the loopback capability, longer sounds can be created. Also, editing time is greatly reduced, as is the need for multiple generations of tape before the final mix is ready to be carted.

There is enough creative potential in this package to keep even the most ardent "production rat" entertained for quite some time and probably swear off the razor blade and splice block permanently.

Low cost digitizers allow small market stations to get involved with desktop audio right now. While they won't rival intelligent hard disk editing systems, their many effects may make them an attractive asset in the production studio or newsroom.

■ ■ ■

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

Course

(continued from page 22)
current flow.

Minority current will flow in the opposite direction due to the impurities inherent within the crystal. Attention must be given to component design to radiate heat away from the junction preventing destruction from covalent bonds breaking down.



Nothing But The Best.

The Studer A730 can identify up to 100 CD's and store up to three start and stop times for each. Playing a pre-selected track on a disc is as easy as loading and hitting a single button. The A730 adds auto-cue, varispeed, auto-pause, a monitor speaker, the widest choice of audio and control interfaces, and rock solid construction.

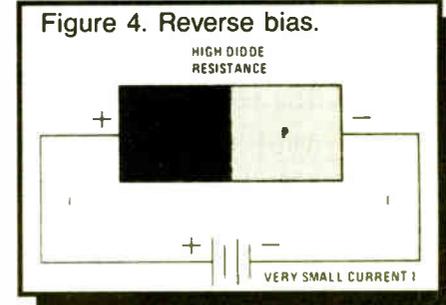
Call Toll Free 800-732-7665



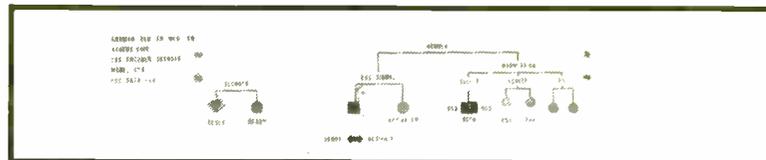
**BRADLEY
BROADCAST
SALES**

Where Service and Engineering Make the Difference

8101 Cessna Avenue • Gaithersburg, Maryland 20879-4177
MD & DC: 301-948-0650 • FAX: 301-330-7198



EBS EQUIPMENT



	Price
Model CEB Encoder-Decoder	\$540
Model CE Encoder Only	\$375
Model CE With Stereo Option	\$405
Model CD Decoder Only (REQUIRED FOR LPTV)	\$320
Receiver can be supplied to drive Decoder	\$100

- Encoder FCC Type Accepted • Decoder FCC Certified •
- Exceeds FCC Specifications •

All interconnections to the EBS equipment are made through a barrier terminal block. No special connectors necessary. In stock—available for immediate delivery.

GORMAN REDLICH MFG. CO

257 W. Union St. • Athens OH 45701 • 614-593-3150

Teaching Technology

(continued from page 27)
feel welcome.

While we need to impress upon the staff the care we put toward the station's equipment and how important it is that they treat it well, we shouldn't come off like military dictators. That just invites resistance.

The same applies to the operating logs, in whatever form you now keep them. No amount of pressure or threats will get the staff to keep a neat, accurate log. They must be willing to cooperate. They must acknowledge and care that the log entries help you help them.

Usually, I try to set a tone of partnership with the staff. Together we are going to have a great station; we will be winners if we work together.

Even the most technically careless DJs will normally respond somewhat favorably to this approach.

Of course, anytime there is a new person in the station there are many things to learn, things that we take for granted, like how to run an EBS test, how to read tower lights or what scale to use in reading the remote control antenna current.

The answer is to have an operator's manual covering various aspects of station operation.

The operator's manual

While it can seem imposing to hand a pile of paper to a staff member along with a firm comment about reading it, a well thought out operator's manual can be of great help.

For example, reading that remote control unit accurately may be difficult for some. The different scales and division units can seem like a foreign language.

One way to combat this is with illustrations or even pictures of normal readings with notations to help understand the scales.

Many times I even include pictures of the transmitter. This and short DJ tours of the transmitter may make the remote control readings a bit more real to them.

Step by step procedures for EBS tests, checking the receiver, tower light observations, etc. will prevent a lot of strange calls in the evening.

Does your staff know what to do and whom to call if the power goes off? The phone number of the electric company can be quite valuable in reducing their response time if the DJ calls them instead of just paging the engineer.

Can the staff distinguish between power failure and phone line failure at the transmitter? Instructions, flow charts and the like can speed resolution or even prevent the 3 AM phone call.

A quick tutorial on FCC requirements and station policy on logs will go a long way to taking the logs from scratch paper to valid representations of transmitter operation.

In combination with the programming department and production department, the operator's manual would do well to

include operation of the control room and production room.

Again, while you may know exactly how to bring up the remote link, or that remote B4 is the production room, the

ble. It really does reduce down time.

One last point. Don't only give a copy of the manual to each staff member as a gift from both PD and CE, but also put a copy in the control room next to the

A quick tutorial on FCC requirements and station policy on logs will go a long way to taking the logs from scratch paper to valid representations of transmitter operation.

Sunday morning person may not know that. The result could be a wake up call.

Similarly, tips and hints on running the various pieces of production gear can document any number of connections that you might not think to point out in an orientation session.

Whether it is the air check machine or a special network line or how to change to the auxiliary transmitter, it is to the station's and engineer's benefit if each staff member knows as much as possi-

licenses, or right in the license book. That way the instructions are always available.

Well then, crank up your trusty word processor and see how much information you can communicate to your fellow staff members. Everyone will be better off for the effort.

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

Designing a Tunable Demodulator

(continued from page 27)

otherwise harmonics of the oscillator may mix with local stations and give you birdies. Type "F" connectors are fine and cheaper than BNC.

If you want to "deluxe" your unit, consider one of the inexpensive imported vernier dials. Or, if you cannibalize an old AC-DC set as I did, you may be able to use the old dial cord arrangement.

You might ask why a three-transistor input stage is needed when you are using an FM radio for an IF anyway. I asked the same question. My original lash-up attempted to retune the radio's input stage for broadband operation with the internal oscillator disabled and my own substituted.

The unit I used did not have enough gain and this attempt had to be abandoned. If you start out with a better radio than I did you may be able to make

this trick work.

Some of the more clever among you may get more creative still and eliminate the separate oscillator altogether. Examining the circuit of an AM-FM portable reveals an AM oscillator that covers from approximately 1 to 2.2 kHz.

A bit of tweaking and rerouting, maybe a coil change or two, and you may be able to come up with a demod built simply by modifying the radio itself. Such is the nature of experimenting!

After everything is together and bench tested, tune in the desired channel with the oscillator. Peak up the radio's IF stages with this signal and adjust the discriminator coil for best fidelity.

If you can beg or borrow a data sheet on the demodulator chip, look for any other tweaks you can make regarding deviation, deemphasis, etc.

One word of caution: 10.7 MHz is a

relative frequency in most sets and the actual IF may be a bit above or below. Some of the filters are marked with color dots and some are not. Use an actual signal rather than a fixed generator for alignment.

Admittedly, the performance of this gadget pales in comparison with commercial demodulators. It has no audio expansion and no balanced audio output.

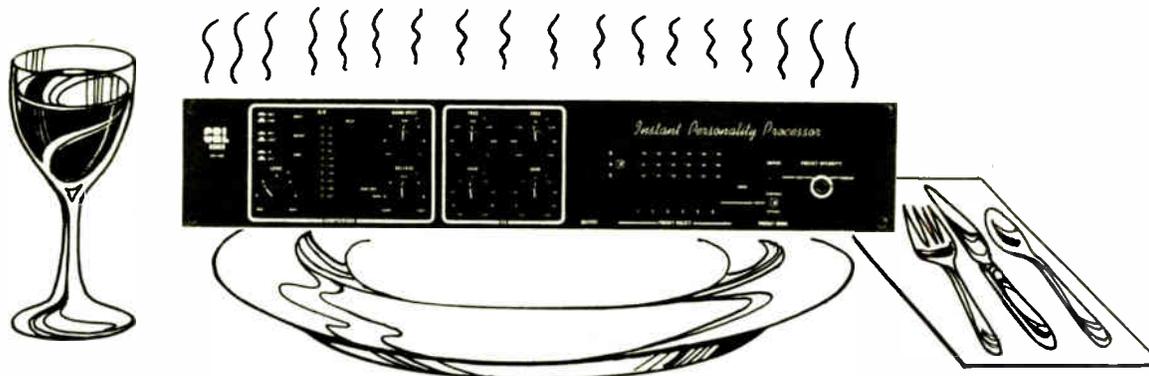
But for its intended purposes, browsing and emergency use, it works. And heck, it's cheap, and you learn something about carriers and FM demodulation in the process!

Bill Higgs has been CE for WXLN/WFLA for six years and has also done station consulting work. He has a PhD. in Theology which helps explain his patience with small market radio. He can be reached at 502-583-4811.

This is what's been cooking at CRL!

CRL's IPP-100 Programmable Microphone Processor — Digital Control at the Touch of a Knob

The IPP-100 is a fully integrated broadcast microphone processor with 18 pre-set memory positions. A powerful two band, parametric equalizer drives a two band compressor with adjustable band splitting. Mic or line level input and outputs, key lock security system, LED status system, and easy to use analog controls make the IPP-100 simple for anyone to use. Plus the IPP-100 features an external audio loop for special effects processors, and full remote control capability. Best yet, get all of this digitally controlled power for only \$1295.



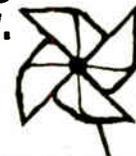
SEE US AT BOOTH 1009 NAB



CRL Systems
2522 West Geneva Drive
Tempe, Arizona 85282 USA
(602) 438-0888
(800) 535-7648 (For USA Use Only)
TELEX: 350464 FAX (602) 438-8227

Next Issue RW May 10

Summon a windstorm with one finger: Press below.



Windstorm—one of 70+ Broadcast Ultra-Harmonizer™ digital audio effects designed to give you fresh ideas, without letting you go stale trying to make them happen. Put the "special effects department in a box" to work for you.

RADIO'S MOST COLORFUL BLACK BOX
EVENTIDE INC
ONE ALSAN WAY
LITTLE FERRY, NJ 07643
TEL: 201-641-1200 • TWX: 710-991-8715 • FAX: 201-641-1640

Eventide
the next step

MARKETPLACE

Send us your new product info. Be sure to include a black and white photo. Send all submissions to Radio World Marketplace, P.O. Box 1214, Falls Church, VA 22041



RPU receiver

Marti Electronics has announced the availability of the new DR-10 broadcast remote pickup receiver.

The DR-10 includes features such as adaptive filtering and optional internal companding to enable broadcast quality audio to be delivered from weak multipath signals.

Marti's RPU receiver is available on domestic and international RPU frequencies with 25 kHz spacing.

Optional tone decoding and companding are compatible with current Marti RPU transmitters.

The unit sells for \$895.

For information, contact **Selene Nix at Marti: 817-645-9163**, or circle **Reader Service 81**.



CD controller

The A729 CD System Controller is Studer's latest addition to its family of professional CD components.

Up to four A727 and/or A730 CD players can be controlled as an integrated system, via the players' ES interfaces, simultaneously and in any operating mode.

Studer's CD controller is modularly designed. A command module is coupled to an editing unit. An automatic program of up to three sequences can be programmed in the central memory of the editing module for each CD player.

For information, contact **Charles Conte at Studer Revox: 615-254-5651**, or circle **Reader Service 87**.



Interface amplifier

Benchmark Media Systems has unveiled its new IFA Interface Amplifier series. Each of the amplifier systems is housed in a small modern style chassis, and three may be rack mounted side by side in a single rack height extrusion.

Up to four modules may be powered from a single power supply, via RJ11 modular plugs.

Among the amplifiers now available are a stereo balanced to unbalanced input and output interface and a dual balance in, single balanced out mix amplifier. Others include a dual unbalanced in to balanced output amp and a stereo balanced in to balanced output amp.

For information, contact **David May at Benchmark: 315-452-0400**, or circle **Reader Service 92**.

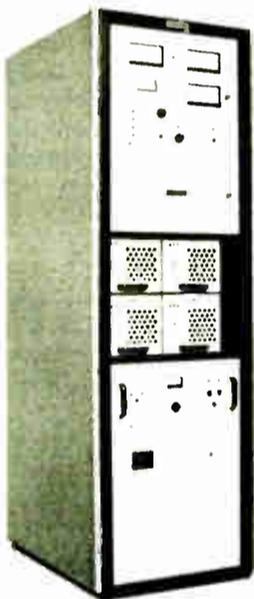
AM transmitter

New from Nautel is the AMPFET ND5, a 5 kW solid state AM broadcast transmitter.

Overall efficiency of the unit is 75% or better at all modulation levels.

Both main and standby exciter sections provide selection for monaural operation or AM stereo operation (using any of the currently available AM stereo exciters).

For information, contact **Jorgen Jensen at Nautel: 902-823-2233**, or circle **Reader Service 98**.



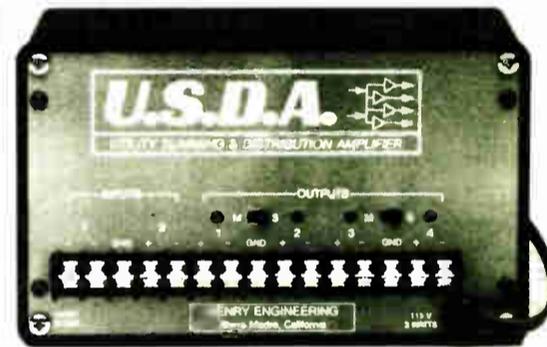
Coaxial cable

Cablewave Systems has introduced a complete line of Radiaflex coaxial cables.

The cables are designed for controlled electrical coupling between the outer and inner transmission line system.

Radiaflex can be used in broadcast applications as well as two-way communications links and monitoring purposes.

For information, contact **Al Criscuolo at Cablewave: 203-239-3311**, or circle **Reader Service 83**.



Summing mini-DA

Henry Engineering's USDA is a stereo mini-distribution amplifier that can combine stereo to mono without degrading the separation of the stereo source.

For information, contact **Hank Landsberg at Henry Engineering: 818-355-3656**, or circle **Reader Service 89**.

Subscription/Reader Service Form

Radio World

April 26, 1989 Issue Use until July 26, 1989

FREE Subscription/Renewal Form

I would like to receive or continue receiving **Radio World** FREE each month. YES NO

Signature _____ Date _____

Please print and include all information:

Name _____ Title _____

Company/Station _____

Address _____

City _____ State _____ ZIP _____

Business Telephone () _____

Please circle only one entry for each category:

- I. Type of Firm**
- D. Combination AM/FM station
 - A. Commercial AM station
 - B. Commercial FM station
 - C. Educational FM station
 - E. Network/group owner
 - F. Recording studio
 - G. TV station/teleprod facility
 - H. Consultant/ind engineer
 - I. Mfg. distributor or dealer
 - J. Other _____

- II. Job Function**
- A. Ownership
 - B. General management
 - C. Engineering
 - D. Programming/production
 - E. News operations
 - F. Other (specify) _____

III. Purchasing Authority

1. Recommend 2. Specify 3. Approve

Reader Service

Please first fill out contact information at left. Then check each advertisement for corresponding number and circle below. NOTE: Circle no more than 15 numbers, otherwise card will not be processed.

001	021	041	061	081
002	022	042	062	082
003	023	043	063	083
004	024	044	064	084
005	025	045	065	085
006	026	046	066	086
007	027	047	067	087
008	028	048	068	088
009	029	049	069	089
010	030	050	070	090
011	031	051	071	091
012	032	052	072	092
013	033	053	073	093
014	034	054	074	094
015	035	055	075	095
016	036	056	076	096
017	037	057	077	097
018	038	058	078	098
019	039	059	079	099
020	040	060	080	100

RON RADIO COMMUNICATIONS, Inc.

P.O. Box 201 Brightwaters, NY 11718

"We Specialize in High Schools & Colleges..."

MAY IS AUDIOPAK AA-4 CART MONTH!

70sec - \$ 4.85, 2.5mins - \$ 5.20, 3.5mins - \$ 5.30, 4.5mins - \$ 5.40, 5.5mins - \$ 6.15 (in Boxes of 24 Only)(Quantities Limited)

SPECIALS OF THE MONTH: (Prices good thru 05/24/89)

ENERGY ONIX: MK - 3.5 (3500watt) FM Transmitter \$ 21,500
MK - 30 (30Kw) FM Transmitter \$ 49,995

BELAR FM Monitor Package (FMM-2 & FMS-2) \$ 2,995
AMM-3 AM Modulation Monitor \$ 1,399

Micro Control Inc.: Composite STL \$5,795

L P B: S-10 6 Channel Stereo Console \$3,795

Inovonics: NRSC AM Add on Processor \$ 485
PMX Digital Stereo Generator \$ 1,695

Hnat Hinds: (NOW SHIPPING!!!)

NEW PRODUCT-CP-2013 FM Composite Peak Processor \$ 895
(Loudness without the distortion or separation destruction of composite clippers)

NEW PRODUCT-MPX-89 Multiplex Telephone Hybrid
(Performance surpasses a digital Hybrid at a fraction of the cost) \$ 795.

WE STOCK 45 RECORD SHUCKS, RAZOR BLADES, EDIT-ALL MARKERS, SPLICING TAPE, LEADER TAPE, ASSORTED CART LABELS AND DANGER HIGH VOLTAGE SIGNS...CALL FOR PRICING

Call RON RADIO COMMUNICATIONS FOR :

AM Directional Tune-up, Adjustment & Repair
Frequency Searches, License & CP Applications
Leasing Thru Dacom Financial Services
All The Major Brands at Competitive Prices...

1 - 800 - 666 - 3525

RadioWorld

BUYERS GUIDE

AM Transmitters & Exciters

KFBK Goes Digital With DX-50

by Dale Harry, Eng Mgr
KFBK-AM

Sacramento CA When the decision was made to install a new 50 kW AM transmitter at KFBK, three main criteria had to be met: the transmitter had to be solid state; it had to utilize the best technology available; it had to be stereo ready.

The features that attracted us to the DX-50 are its digital modulation system, 85% overall efficiency, built-in load matching network, the ability to patch around a defective output module with the transmitter operating and its small size of 78x120x33 inches, including power supply.

We already had two 50 kW transmitters in the plant. With any other product we would have had to remove our old auxiliary transmitter first, but the smaller physical size of the DX-50 permitted us to install and check out the new transmitter while we kept the existing main and auxiliary transmitters in full operation.

At the Harris plant in Quincy, IL, we saw the DX-50 comfortably running at 60 kW carrier and 145% modulation. We duplicated this in our own plant during checkout, but our phasor did not like this test, resulting in a few arcs but no damage.

Taking delivery

Since ours was the first DX-50 manufactured, Harris provided us with two engineers to help our KFBK engineers Mark Stennett and Sal Trapani with its installation and checkout.

And it should be noted that installation of the DX-50 was by far the simplest

foot wide box containing the power supply and virtually all of the transmitter except the output network; and a second, four-foot wide compartment containing the output tuning and matching network.

These two sections and a step-start panel, which mounts on a wall, comprise the entire transmitter.

With all of the active circuitry in one box there were only a couple of lines to interconnect with the RF output compartment and a few control lines to run to the step-start panel, along with 480 V, three phase power.

Installing the transmitter

Several large RF capacitors had to be installed in the output network compart-

ment that had been packed in protective containers to prevent damage during shipment.

output waveform to be generated digitally with a high degree of precision. There are eight MOSFETs on each final module. These are the final RF amplifiers. The modules have green LEDs to indicate when they are turned on and red LEDs to indicate a defective unit.

We found that the DX-50, operating at our nominal common point power of 52.6 kW, could produce positive modulation peaks in excess of 150%. With normal modulation, we have never seen the upper end modules (those needed to produce peaks greater than 125%) turned on and we do not expect to see them unless the modulation limits are changed.

Although a defective module cannot be replaced while the transmitter is in

operation, high positive peak modules could be utilized with the patch system (wherein high-end modules are patched in the place of defective lower level modules). At our power level, the last several modules in the positive peak end of the chain never turn on. So these are built-in spares.

Checking it out

During the initial checkout phase, three of the final amp modules went sour. These were replaced with spares until

the defective ones were repaired or replaced by Harris. Fortunately, all components mount on a single etched board, so repair is easy.

To test the effectiveness of the RF output monitor and protection circuits, we used a shorting wand to ground various points in our phasor system while the transmitter operated at full output.

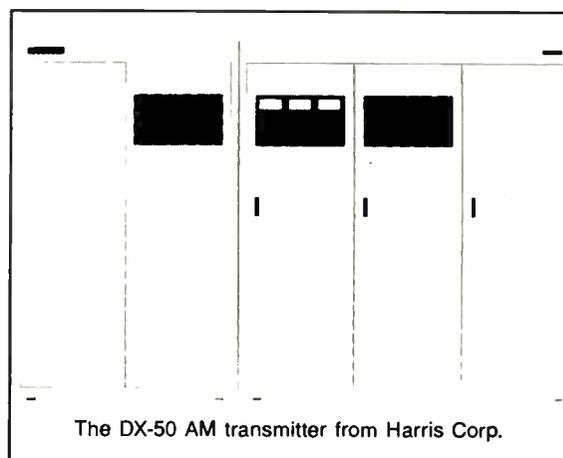
We did find a few spots that caused the DX-50 to exhibit erratic fault indications and cutoffs. But after an additional wide copper ground strap was installed between the DX-50 output cabinet and the

(continued on page 37)

USER REPORT

and quickest of any transmitter that I have installed. We had it operating at full power and ready for checkout two days after it arrived.

For shipping, the transmitter was broken down into two main pieces: one six-



The DX-50 AM transmitter from Harris Corp.

ment that had been packed in protective containers to prevent damage during shipment.

Pre-wired to the step-start panel location were 480 V, three phase primary power and 240 V, single phase AC control power. Preparations were also made for connecting the RF output line and station ground before delivery. Thus, the biggest part of the installation was interconnecting the step-start panel with the main cabinet.

Remote control, status and telemetering connections are straightforward and interfaced directly with our Moseley MRC-2 remote control system.

However, unlike all other transmitters with which I have worked, the DX-50 does not come back on line after an interlock interruption and reclosure, such as a remote control failsafe temporary outage. We found it necessary to build a re-start circuit into our interface to bring the transmitter back up when conditions returned to normal.

The DX-50 utilizes 128 plug-in output modules that are either "on" or "off" as needed to generate the required RF output power.

Output modules

Each module has its own torroidal core for coupling power to the RF combining bus. One-hundred-twenty-three of these are big step modules while the remaining five are binary steps, permitting the

A. RF Specialties of Washington, Inc.
11721 15th Ave. N.E.
Seattle, WA 98125
Phone (206) 363-7730
FAX (206) 362-5560
John Schneider

B. RF Specialties of California
3463 State Street, Suite 229
Santa Barbara, CA 93105
Phone (805) 682-9429
FAX (805) 682-4396
Sam Lane

C. RF Specialties of Missouri
R.R. #2, Box 152H
Kearney, MO 64060
Phone (816) 635-5959
FAX (816) 635-4508
Chris Kreger

D. RF Specialties of Texas
P.O. Box 7630
Amarillo, TX 79114
Phone (806) 372-4518
FAX (806) 372-1833
Don Jones & Tim Hawks

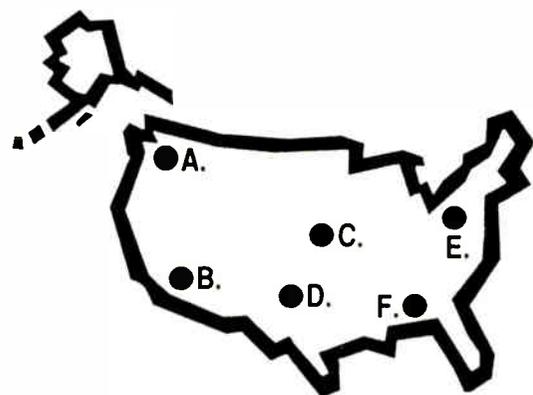
E. RF Specialties of Pennsylvania, Inc.
121 Conneaut Drive
Pittsburg, PA 15239
Phone (412) 733-1994
FAX (412) 327-9336
Tom Monahan

F. RF Specialties of Florida
P.O. Box 397
Niceville, FL 32578
Phone (904) 678-8943
FAX (904) 729-2744
Bill Turney

Each Office is Independently Owned and Operated

RF SPECIALTIES GROUP

LEADERS IN RF SYSTEMS FROM COAST TO COAST



FOR ALL YOUR RF NEEDS, CALL THE SPECIALIST NEAR YOU

SYSTEM DESIGN
COMPETITIVE PRICING

RF Specialties Group

BUYERS GUIDE INDEX

Harris DX-50 Solid State AM Transmitter
by Dale Harry 35

LPB 100 W Low Power Transmitter
by Wilham Lakatas, Jr., HGF Media Group 36

Nautel ND10 Solid State AM Transmitter
by Mel Sather, Octagon Co., Inc. 38

Continental 317C-3 Solid State RF Driver
by Margaret Bryant, WMAQ-AM 40

Motorola 1400 AM Stereo Exciter
by Margaret Bryant, WMAQ-AM 41

Delta ASE/ASM Exciter/Monitor
by John Diamantis, WCPT-AM 45

TTC AM 2500B Transmitter and Orban Optimod-AM
by Larry Kuykendall, WELD-AM 45

Also, a Technology Update from Omnitronic and Insights on AM from Harris, Nautel and Continental.

LPB: "Sleep Insurance" at WLSH

by William Lakatas, Jr., CE
HGF Media Group

Allentown PA "That breadbox on the wall is our new transmitter?" With that comment from a staff member, I threw the switch that turned on our new LPB low power transmitter and instituted 24-hour service on our most recently acquired AM station.

When we purchased WLSH in Lansford, PA, it was a daytime-only operation. It had an overnight authorization of 59 W, but the former owner did not use it. I talked to Dick Crompton of LPB in Fraser, PA and he suggested the LPB 100 W low power transmitter for our application.

I now have a transmitter that can economically provide me with my overnight power and can provide an intermediate power level for Post Sunset Authorization. Also, as Dick calls it, I now have "sleep insurance" in the form of a backup for my main transmitter, an old Collins 21E.

The installation of the LPB transmitter seemed at the outset to be as simple as mounting the unit on the wall, making a few connections and plugging it into the wall outlet.

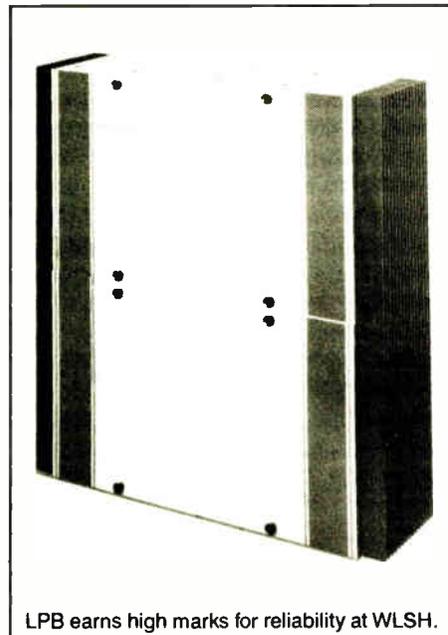
It is that simple—and that is the problem! It took me longer to install the transfer relay in the phasor cabinet, and to plan and install the audio and modulation monitor switch over relays, than it did to install and fire up the new

LPB transmitter.

Incidentally, in my installation, I tapped into one of the 28 V power supplies in the transmitter to automatically operate the audio and modulation monitor relays when the transmitter was turned on.

The transmitter is a very small package, which can be mounted anywhere that you have space on a wall at your transmitter site.

The LPB line of low power transmitters is modular in design. One module is the 30 W transmitter. Two modules



LPB earns high marks for reliability at WLSH.

connected together form the 60 W transmitter and the 100 W transmitter is composed of four modules.

Internal adjustments select a variable output level and adjust audio input. (I added a relay and a trimpot to select two power output levels.)

USER REPORT

The transmitter sounds great on the air and met or exceeded every single spec when I checked it out with our Delta splatter monitor.

As far as quality and reliability are concerned, I have 12 LPB boards among the eight stations in our group. These transmitters are designed and constructed just as well as their boards. If my track record with the LPB boards is any indi-

cation, I expect to see many years of reliable and trouble free service from our LPB transmitters.

Let me also mention that I am installing an LPB transmitter at our Mount Carmel, PA station, which operates with C-QUAM AM stereo. I expect to be just as pleased with this installation as I am with the one at WLSH.

The only changes I would like to see on future designs are external connections for modulation monitors and a door with an interlock rather than pop-on hatches. I am very pleased and impressed with this fine LPB line of transmitters. They were certainly worth our investment.

■ ■ ■

William Lakatas, Jr. is the technical director of the HGF Media Group in addition to being its CE. The group is based in Allentown, PA and owns and operates eight radio stations. Mr. Lakatas may be reached at: 215-434-9511.

For more information on LPB transmitters, contact John Tiedeck at LPB: 215-644-1123, or circle Reader Service 4.

AMs Go Low Power

by Richard Farrell

Falls Church VA November of 1987 saw the FCC begin mailing to daytime stations authorities to broadcast at reduced power levels after sunset and before sunrise.

The move seems to have been well received by those toward whom it was aimed. The most recent FCC figures show that 672 stations were offered an authority, with only 77 declining to take advantage of opportunity.

Confined largely to Class III AMs, it is logical to assume that the move would benefit not only daytimers, but also manufacturers of dedicated low power transmitters.

"I guess it is an effort on the part of the FCC to try to make life easier for the daytime people who have been complaining for years about the fact that it is very hard for them to compete in the marketplace when they are only on during the day. Day being from sunrise to sunset," says LPB's applications engineering manager John Tiedeck.

Tiedeck, whose company makes 30, 60 and 100 W transmitters, is hesitant to call the low power transmitter market a booming one. But he is cautiously optimistic about the future of that market and about radio's reaction to it.

"I think that what we are seeing is a steady market for these transmitters as more and more broadcasters take them seriously," says Tiedeck.

He feels that some broadcasters are initially dubious about their authorities and wonder what 50 W of power will do for them at night when in the daytime they run at 5 kW. "A lot of people's first inclination is: big deal, what is that going to do for me?" he says.

But, according to Tiedeck, "more often than not, a nighttime authority does better than some might think," and that in many cases, a broadcaster can usually find ways to make using his night power worthwhile.

Tiedeck will allow, however, that "there are some cases where no low power transmitter is going to override that Canadian clear channel that comes in every night."

LPB advises broadcasters to first go out

after dark and listen to the band on their car radios. "If it is quiet," Tiedeck says, "then a low power transmitter is worth looking into."

Tiedeck also notes that stations trying to cut their high power transmitters back into the regions of the low power authority that they were offered by the FCC—a fairly common practice—may be taking the wrong approach.

INDUSTRY FOCUS

This is obviously not cost effective, says Tiedeck, because "you can cut these transmitters down to 500 W, but you still need to get down to, for example, 50 W; so what do you do with the other 450 W? You burn it off in a dummy load, or you use some kind of power divider system that will just burn off those 450 W.

"You are paying an electric bill for this, and you are also paying an electric bill to light all of your tubes if you are using an older style transmitter . . . you have to look at it from the electric company's standpoint," says Tiedeck.

Tiedeck feels that one strategy gaining acceptance is for a station to purchase a second, low power transmitter that will run alongside its high power model and is used specifically for nighttime power.

"I think that as people figure out how much it is costing them to run their 5 kW cut back to some lower number, they begin to realize how much of a savings it is going to be on the electric bill to run a small solid state 30 W transmitter alongside the 5 kW," Tiedeck says.

Not to mention the potential problems that might be created by cutting back from such high powers. "In trying to fiddle around with the transmitters to get less power out of them, they get very unhappy, very unstable," warns Tiedeck.

And can low power transmitters improve? Tiedeck says it's too soon to tell. "If there are some new breakthroughs in solid state technology," he says, "then who is to say, five years down the road, what of that technology would apply to a low power transmitter? But I would think that for the moment they are as good as they are going to get."

ALLIED

Broadcast Systems

— A HARRIS COMPANY

PLEASE!!

Before you start your next broadcast project, we'd like you to touch base with us! Let us show you what we can do for you!

Allied Broadcast Systems doesn't just install equipment; we innovate, to better serve the changing needs of today's (and tomorrow's) radio stations.

MODULINK™ has been designed in consultation with, and is built exclusively for Allied by Arrakis Systems, Inc. It's a manufactured studio system that can be custom-tailored to meet your exact specifications, yet its unique design allows your new facilities to be operational in days, not months.

MODULINK studios come fully pre-wired with multi-pin connector "docking modules" which link all units and interconnect all equipment.

Because of its advanced design, MODULINK lets Allied Broadcast Systems give you more studio for lots less money. . . . And that could be the difference between getting exactly the studio package you want, or settling for something less.

3901 MacARTHUR • SUITE 200 •
NEWPORT BEACH, CA 92660 • USA

714-752-0855

Omnitronix Debuts in RF

by David L. Solt, Dir Eng
Omnitronix, Inc.

Fort Washington PA The Omnitronix OMNI-1000 is a new 1000 W solid state AM broadcast transmitter. Its solid state modulators and amplifiers seek to provide low operating costs and allow short payback periods.

Down-time can be minimized by its modular design, which provides ease of servicing,

while modulator and amplifier plug-ins can be replaced "hot" while the transmitter is operational.

An internal NRSC audio processor provides audio quality that is fast becoming the world standard. The transmitter is fully compatible with stereo requiring the usage of two internal NRSC audio processors. Its frequency synthesizer provides frequency agility in nine or 10

kHz steps.

Features of the OMNI-1000 transmitter include a conservative design, remote control interface and rugged modular design.

The OMNI-1000 is designed for broadcast applications in remote areas of the world as well as domestic AM broadcast applications. World-common parts have been used and since the inception of the project a con-

sortium has provided direction on the North American, European and South American markets and requirements.

and the control and monitoring circuits.

The power amplifier panel contains four 300 W modulators and amplifiers. Each power amp module includes a modulator, modulation filter and RF broadband amplifier.

The antenna interface panel contains the harmonic filter, lightning arrester and output power coupler. The power supply panel includes an isolation transformer, circuit breakers, rectifiers and contactors.

(continued on page 46)

TECHNOLOGY UPDATE

The OMNI-1000 consists of four standard 19" panels in a 48" high rack. The control panel consists of four printed circuit boards, the frequency synthesizer, the pulse width modulator, the NRSC audio processor

DX-50

(continued from page 35)

phasor cabinet, the DX-50 could not be unnerved by load shorts or faults.

The output stops momentarily until the fault condition corrects, or, if the fault persists, the output power reduces until the reflected power reaches a tolerable threshold.

Audio rivals FM

Audio performance measurements gave results approaching what I expect from an FM transmitter. It met or exceeded Harris' specifications.

The front panel of the DX-50 is refreshingly simple and uncluttered. Three analog meters indicate final voltage, current and output power for routine operating parameter observation. The voltage meter also serves as a multimeter to read other parameters and the power meter can also show reflected power at the output port.

Our 125 kW emergency power generator almost seems to coast with 30% lighter load of the DX-50 compared with our former main transmitter.

The biggest surprise came when we got the utility power bill for the first full billing month of DX-50 service—a 29% reduction in kW hours for the entire plant over the same period a year ago. That represents a savings of over \$1,200 per month at our lower winter rates.

Considering that the power bill includes 10 kW of tower lights and building heating, the DX-50 is well over 30% more efficient than our old transmitter.

With an overall efficiency of 85%, there is not much heat generated in the DX-50, so a whole lot of air doesn't have to flow to keep it cool. It appears that the DX-50 will require a minimum of maintenance to keep it clean and functioning.

■ ■ ■

Dale Harry has been the Engineering Manager for KFBK/KAER for the past 14 years. He was previously with NBC Radio and other stations in San Francisco. He may be reached at 916-929-5325.

For more information, contact Ron Frillman at Harris: 217-222-8200, or circle Reader Service 18.

It takes plenty of guts to back our products this solidly.

At QEI, we back our products — and our customers. Our power tubes, for example, carry the best warranty in the industry: 15,000 hours or 2 years. And only QEI includes a FREE comprehensive spare parts kit with every FMQ transmitter, exciter and remote control. Experience shows that you may never use more than 2 or 3 of these "guts". But since we can't be certain *which* 2 or 3, our kits include ICs, transistors, lamps, diodes, fuses — everything you're *unlikely* to need.

24 HOUR SERVICE HOTLINE
Giving you the most complete spare parts kits in the industry is just the first step in a customer support program that lasts as long as your QEI transmitter. If you need expert advice on installing a spare whatever, call us any time at 609-728-2020, day or night. And if you ever need factory parts support, we can deliver — fast. We're just 1/2 hour from Philadelphia International Airport, not out in the middle of nowhere.

MAXIMUM EARNING POWER
You can count on it with every QEI transmitter, because we design them to stay on the air. And as a fully integrated company dedicated to RF and transmission products, we're able to build in quality and reliability — and still maintain our value advantage.

No wonder stations in both large and small markets have been using QEI products as long as we've been making them — since 1971. During that time we've put over 1300 exciters, more than 450 transmitters and over 1000 modulation monitors in service.

GET THE FACTS
When it comes to standing behind our products — and our stations — we're way ahead of the competition. That may make other manufacturers nervous, but it makes QEI customers very satisfied.

Call us at 800-334-9154, toll-free, for all the facts on the transmitters that deliver a solid return on your investment: the QEI "New Reliablies."

QEI

Quality • Engineering • Innovation
QEI Corporation • One Airport Drive, P.O. Box D
Williamstown, New Jersey 08094
Toll-free 800-334-9154 • Fax 609-629-1751

Circle 69 on Reader Service Card

KSKO Fights Alaskan Climate with Nautel

by Mel Sather, Pres
Octagon Company, Inc.

Anchorage AK We received a call from KSKO-AM, asking if we could install their new Nautel ND10, 10 kW solid state transmitter. KSKO is a public radio station located in McGrath, Alaska, on the bank of the Kuskokwim River.

We learned that this would be serial number 002 of this new model, which is usually a cause for some concern, especially for a "bush" radio station. However, Nautel has a good reputation in Alaska and the wheels were in motion, so we readily agreed to do the project.

KSKO-AM, which was then operating at 5 kW with a loaner transmitter as a result of an earlier fire, is in an area that experiences temperature variances of 160° F, more or less. It can reach 80° F in the summer and, in fact, plunged to a record -76° F during the famous Alaska cold spell of this past winter.

USER REPORT

Operation to sixty below is *de rigueur* during a typical winter. At these temperatures, motor oil can turn to concrete and steel can shatter like glass in a Memorex commercial.

Setting up shop

When Octagon arrived on the scene, the new transmitter building was built, the folded unipole antenna was erected and a dual 30 kVA automatic generator plant, complete with a Halon fire suppression system, was in place.

KSKO generates its own electricity, its new site beyond the reach of power distribution for the rest of McGrath. Solid state transmitters are much fussier about proper grounding, shielding and suppression than power-grid tube systems.

The manufacturer has found that sloppy or hasty installation can result in catastrophic damage and ongoing customer dissatisfaction.

Nautel even has an information booklet, "Lightning Protection for Radio Transmitter Stations," which includes maps defining the average number of thunderstorm days in the "United States" and Canada, but excludes Alaska! (Remember, the 49th State?)

Ready to install

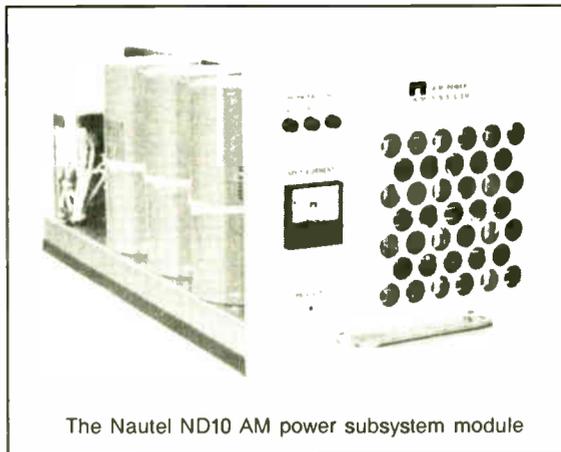
When the transmitter arrived, Will Peterson, the GM, Mike Harrington, Board President of Kuskokwim Public Broadcasting and engineering trainee Gabriel John formed the work party to set the transmitter in place.

Thumbing through the Instruction Manual to Section 2, I was not encouraged to read, under "Theory of Operation," *not available at time of printing*. Great. Well, I thought, maybe things will come together without having to know too much.

Remote control is easy; a hinged door swings open at eye level to reveal a few PC boards for power control, SWR protection, etc. The interface is a barrier strip, plainly labeled.

There are five remotely controlled power levels, remote exciter switching (two exciters come standard in a pull-out drawer), plus raise/lower for any selected power level and all of the metering one could require.

The exciter checkout turned out to be, uh, exciting. There were eight AM power subsystem modules, each designed to run at about 1250 W, with bypass switching for the RF out and the DC in. This allows removal and replacement of a defective module during operation.



The Nautel ND10 AM power subsystem module

The setup instructions called for turning off the 70 VDC switches to the modules and removing a B- fuse, then switching on power with exciter "A" selected. After recording voltages, you

switch to exciter "B." The result was a noticeable change in the generator pitch, with smoke wafting out of the back of the transmitter.

One of the 40 ohm, 30 W current limiting resistors that powered the PA blocks was discolored from trying its best, but was seemingly still OK.

Subsequent discussion with the factory determined that a flaw in the logic intermittently energized the control relay, allowing a path to ground for the B- through the resistor.

The real test

It was time for what I really hoped would not be the "smoke test." I had

(continued on page 40)



Get One Free!

Now, buy any three Radio Systems studio products at our already-low direct prices, and get the fourth free. Mix and match as you like! You write the order.

The savings are tremendous. Consider just one example: Order three TM-2R timers and one stereo DA-16. Our normal low price would be \$820; you pay only \$495.

Call Radio Systems, your factory-direct source. No dealers, no markup, just great products. Call 1-800-523-2133 to order today.

- | | | |
|-------|--|--------|
| TM-2R | Our popular remoteable six-digit up-timer. Crystal reference. | \$165. |
| DA-16 | Stereo 2 x 8 distribution amplifier. Individually adjustable, active balanced outputs. | \$325. |
| DA-8 | Mono 1 x 8 distribution amplifier. | \$255. |
| CL-2 | Digital time-of-day clock, 12 or 24 hours. | \$145. |
| PA-1 | The industry's best phono preamp. | \$225. |

RADIO SYSTEMS INC. 110 High Hill Road ■ P.O. Box 458 ■ Bridgeport, NJ 08014-0458
609/467-8000 ■ 800/523-2133 ■ FAX 609/467-3044

This is Radio Systems.



This studio didn't happen overnight. World-class radio facilities like this one are built for the nation's leading broadcasters by Radio Systems.

Why? Because the radio industry has entered a new age, and the entrepreneur who's looking ahead to the 1990's needs his or her radio station built fast, and built right.

Radio Systems is the only full-service radio equipment company. Custom design and wiring is our specialty. Our twelve-member installation department and 9,000 square foot woodshop allow

us to produce studios and RF plants, custom-suited to a station's needs. We're a manufacturer of control consoles, studio products and DAT machines. And we round out our capabilities by providing thousands of popular radio products.

The nation's leading turnkey system supplier is Radio Systems. Ask us for the names of more broadcast professionals who have found that facilities from Radio Systems were their best investment on the road to success in radio.

Then get ready to own the best broadcast facility available anywhere.

Radio Systems Case Study.

CUSTOMER: WEGX, Malrite Inc.
MARKET: Philadelphia, PA
PROJECT: To design and install custom cabinetry and extensive studio interwiring in four studios, for Malrite's aggressive entry into the nation's fifth-largest radio market.



RADIO SYSTEMS INC.

110 High Hill Road ■ P.O. Box 458 ■ Bridgeport, NJ 08014-0458

609/467-8000 ■ FAX 609/467-3044

800/523-2133

**See Us At The NAB!
 Booth #2037**

Circle 49 On Reader Service Card

WMAQ-AM in RF Driver Seat

by Margaret Bryant, CE
WMAQ-AM

Chicago IL When WMAQ-AM was purchased last year by Group W from NBC, we inherited one of the finest AM transmitter plants around.

The plant had been rebuilt several years before the sale and had been regularly upgraded by their CE Mike Bock and the staff of engineers. Three months before the ownership change the main transmitter, a Continental 317C-2, was upgraded with a solid state RF driver.

USER REPORT

The primary reason for the upgrade was a reduction in Incidental Phase Modulation (IPM). Other reasons included better efficiency, getting rid of the tuning networks, less heat than that generated by the 4-400 tube and more reliability. Following the upgrade, we noticed all of the improvements, just as we had expected.

The kit to replace the tube with the solid state driver comes with very complete instructions. These are necessary because there are several holes that need to be drilled, many new wires to be run and many old parts to be removed from the transmitter.

The description of the work is divided into two parts so one may do the work over a period of time and still run the transmitter when work is not being performed. Continental estimates the installation to take approximately 14 hours. This seems to be about right; Mike Bock says station engineers took two work days to complete the installation and tune up.

The instructions for the installation detail holes to be drilled and parts to be removed. In some instances, wires are to be reused but connected in a different

configuration. Throughout, the instructions offer tips to make each part of the removal of the old and the installation of the new easier.

The WMAQ installation was done by the staff engineers and supervised by Continental personnel. According to Mike Bock, the installation was straightforward and went well.

The factory data sheet notes that originally the transmitter had an IPM of 0.099 peak radians. Following the installation the IPM was measured at 0.03 radians.

This reduction in IPM was a nice improvement to the transmitter, and became more important when C-QUAM AM stereo was installed by Group W three months after the solid state RF driver. We have been very pleased with the transmitter's performance when running it with C-QUAM AM stereo.

In the year and a half since the installation, one modification has been done to the driver assembly per the instructions of Continental. The modification provided additional decoupling to the 70 V power supply. This provided additional protection to the RF driver when the Magnaphase circuit operated.

One potential nuisance with the solid state driver is the location of the 70 V power supply fuse. I do not know whether this situation is peculiar to our particular installation, or is the situation for all retrofitted driver assemblies.

It seems the 20 amp fuse for the 70 V power supply is after the sample point for the front panel voltmeter. So, if the fuse is blown, there would be no Vcc applied to the RF driver and yet the front panel voltmeter will indicate the presence of the 70 V supply voltage.

In addition, the fuse is hidden under the driver assembly. So if you are unaware of these details, you could spend a lot of time looking in the wrong place for the problem.

In the year since I came on board as CE, we have found the solid state RF driver to perform flawlessly. The unit has been extremely reliable, and the reduced IPM gives us better sounding C-QUAM AM stereo.

■ ■ ■
Margaret Bryant is Engineering Manager at WMZQ-AM Radio. Mike Bock is currently Manager of Engineering for WMAQ-TV in Chicago. Bryant may be reached at: 312-670-6767.

For more information on the Continental 317C-3 upgrade, contact Walt Rice at Continental: 214-381-7161, or circle Reader Service 7.

Anchorage AM Adds Nautel ND10

(continued from page 38)

would not be the "smoke test." I had previously turned the power control all the way down and hit the "plates." The "plate voltage" indicated a bit over 70 V, with minimal current. Slowly turning up the power pot, the eight modules began to come alive, individual current metering on each module creeping up.

The transmitter had a power out meter, calibrated in kW, as well as a smaller reflected power meter. Having previously bridged the antenna and ATU, VSWR should have been very low, but I noted a bit more than a nominal amount as the power edged past 2 kW, then up to 5 kW.

Everything seemed stable and proper, except for the slightly excessive reflected power. As I began turning power up toward 10 kW, the transmitter whined disconcertingly and the power cut back. The SWR warning LED snapped on angrily. But it settled down at 2 kW and seemed perfectly happy at this power level.

Not having a dummy load meant checking the system with the bridge and generator, which was quickly accomplished. Everything looked good. Gingerly bringing back power and creeping up to 5 kW, while carefully watching meters, I noted the VSWR meter was hovering at just under 100 W.

I left the transmitter at this power level for quite a while, and then plugged in some audio. The transmitter made agonizing noises in the vicinity of the power modules and slipped back to around 2 kW.

At about this time I flashed back to the manual and the notation *not available at this printing*. Discussion with the Nova Scotia factory was fruitful, after some initial false starts. It turned out that a coax cable from the RF cabinet to the protection PCB assembly was missing a ferrite bead.

I had a couple of leftover ferrite donuts, which were supplied for the power

and transmission line to aid in surge suppression, and wrapped the coax around one of them. The transmitter came up to 5 kW, modulated just fine and happily stayed on the air as I cranked it up to full power.

The ND10 has proven itself in this harshest of environments by performing even when the temperature outside dipped to -76° F and the temperature inside the transmitter room hovered at less than $+20^{\circ}$ F. The transmitter puts out only about 750 W of waste heat, so it did not contribute much warmth when a heat exchange failed.

More efficient than tubes

Operating at about 75% efficiency (primary power to RF output) vs. the 55% efficiency of a tube type transmitter, the power consumption increased only slightly over the 5 kW transmitter.

Subsequently, we added some decent processing, replacing our old Audimax/Volumax with CRL AM processing and NRSC filtering, taking advantage of the full potential of this transmitter.

The Nautel has performed flawlessly. Even when there was an intermittent short on the antenna at one point, the transmitter would "soft-fail," cutting back power and maintaining an on-air signal until we could get in and rectify the problem.

Since we have many radio stations in the Alaska bush that operate under similar hardships, we have been scrutinizing the ND10 for reliability and performance.

The Nautel is stable under the often adverse power, weather and maintenance limitations imposed by the unique circumstances we encounter here and its redundancy and forgiving nature have led us to recommend this particular transmitter to other clients in similar situations.

■ ■ ■
Mel Sather has been a broadcast engineer in Alaska since 1959, and formed the Octagon Company in 1974. His company does consulting, engineering and maintenance for broadcast radio and TV, general communications and oil field systems. He may be reached at: 907-349-3753.

For more information on the Nautel ND10, contact Jorgen Jensen at: 902-823-2233, or circle Reader Service 51.

Your Problem Solvers

from **ATI**

- Mike
- Line
- Phono
- Mixing
- Matching
- Metering
- Monitoring
- Processing
- Distribution
- Rack Mounting

AUDIO TECHNOLOGIES, INC.

328 W. Maple Ave., Horsham, PA 19044 • (215) 443-0330 • FAX (215) 443-0394

C-QUAM Hits the Air in Chicago

by Margaret Bryant, CE
WMAQ-AM

Chicago IL When WMAQ-AM was purchased by Group W from NBC, we had one month to change the station from "talk" to "all news." One of the other changes we wanted to do was to make the station C-QUAM AM stereo.

As it happened, Motorola in nearby Schaumburg had a new exciter that the company wanted to get into radio stations. The Motorola Model 1400 exciter

improvements over previous models. The RF amplifier has been changed and improved and RF output is now variable. In addition, the TTL output can now drive a 50 ohm load. Also changed are the audio inputs. They are now actively balanced.

However, serviceability tops the list of changes—the front panel now drops down and the circuit cards slide out from the front. Aiding in the serviceability is the superb operating/maintenance manual.

Manual concise

The operating/maintenance manual starts with a description of how C-QUAM works. It continues describing

is offered in Schaumburg, lasts a day and costs a big \$25. A deal if I ever saw one!

The seminar started out with C-QUAM theory and then went into the circuit theory. The seminar was geared to the Model 1400 as well as the earlier 1300 model. The section on installation was very detailed, starting from the closed loop checkout of the exciter itself and moving on to checking out the transmitter performance.

Generous materials

The seminar then went into detail on how the exciter is set up. The course materials are taken from the exciter manual and are therefore very generous with photographs, drawings and diagrams to aid those in attendance in understanding the operation and maintenance of the exciter.

The seminar then discussed audio processing for stereo. Specific processors were mentioned, and detailed descriptions of the processor setup was discussed. From there, the discussion turned to troubleshooting. The seminar went into detail (as does the manual) on steps to take to discover where the problem lies.

A troubleshooting flow chart is included from the manual and is also discussed. From there, the floor was open to questions and discussion on the material presented. It was time well spent.

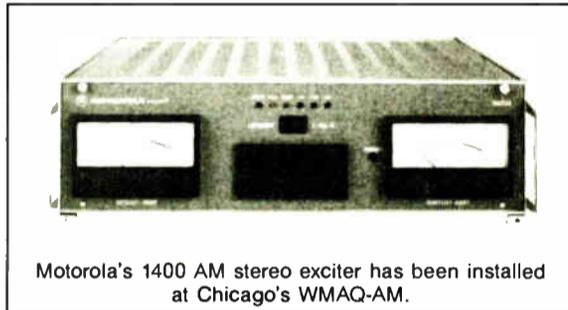
I think, as time goes by and the broadcast engineering environment continues to change, I would not be surprised to see others (besides Motorola and the transmitter manufacturers) offering seminars on their equipment.

The exciter has been installed for a year now, and has been virtually trouble free. The only problem we have had was

the installation in detail, including how to cure IPM problems in various transmitters. The various exciter alignments and adjustments are detailed in a manner seen in few manuals.

We have found on the few times we have checked the exciter that it responded exactly in the manner described in the manual. There is a separate, detailed section in the manual on troubleshooting, but we have never had to use it, so I can only guess that it is as detailed as it needs to be! Motorola does not skimp on the drawings and diagrams in its manual either.

It is a joy to see a manual that makes no assumptions as to previous knowledge. Motorola also offers a seminar on C-QUAM AM stereo. The seminar



Motorola's 1400 AM stereo exciter has been installed at Chicago's WMAQ-AM.

USER REPORT

had been extensively tested by the factory, but we were to be the first radio station to use it on the air.

Being the first to try anything has its risks, but in this case, being the first worked out just fine.

The folks from Motorola came out and installed the exciter. Since the station had been AM stereo, all the exciter wiring was present and the transmitter and antenna were all ready for C-QUAM stereo. This previous preparation greatly simplified the installation.

Tuning up for C-QUAM

The exciter and transmitter tuned up quite nicely. The separation went as low as 28 dB at 10 kHz but was typically 36 to 37 dB across the rest of the band. We had no IPM problems with our transmitter, but, just in case, the Motorola folks were well armed with information on dealing with IPM in almost any transmitter.

Their experience and the fact that our transmitter and antenna were ready for stereo made the installation relatively easy.

The exciter itself has some nice im-

Acquired . . . Troy, MI-based **ADM Technology, Inc.** was purchased on 2 March by an investor group that includes corporate financier Dewey Norton, who becomes President and CEO of the company, and Richard Stiennon, now ADM's marketing VP.

The company has filed for reorganization under Chapter 11, and Robert Bloom, founder of the broadcast au-



dio manufacturer, has been retained as a consultant to aid in ADM's transition.

Those wishing further information on the purchase of ADM Technology may contact Mr. Stiennon at: 313-524-2100.

People . . . Attendees at this year's AES convention in Hamburg, Germany early last month may have heard that **Studer Revox America (SRA)** has named Tore B. Nordahl as its new president, while former president Bruno Hochstrasser has been

elected Chairman of the Board of Directors of SRA.

Nordahl was previously the vice president and general manager of SRA, and has in the past held positions with **Rupert Neve, Inc.** and **Mitsubishi Pro Audio Group.**

Both Nordahl and Hochstrasser began their new duties on 15 March.

Meanwhile, at **Gentner Electronics Corp.**, Walt Lowery has been added to the company's broadcast marketing department. Lowery will be responsible for training dealer salespersons on Gentner products as well as working closely with radio station engineering staffs to provide solutions to Gentner equipment problems.

Fidelipac has just announced that 20-year broadcast equipment veteran Larry Lamoray will become that company's Director of Marketing. Mr. Lamoray spent many years with MCI prior to its acquisition by Sony.

Stocks go NASDAQ . . . Speaking of Gentner, the company also announced that as of 3 March its shares of common stock had begun trading in the NASDAQ market.

Gentner, whose trading symbol is **GTNR**, hopes the move to NASDAQ

will provide brokers and others in the market with instant access to the best bid and asked prices, as well as other pertinent information about the company's shares throughout the day's trading.

Opens new facility . . . Radio Systems, Inc. on 20 March will begin business in its new 33,000 square foot headquarters in Bridgeport, NJ. The company is moving from its quarters in Edgemont, PA, where it had conducted business since 1983.

Customers may now reach Radio Systems at: 800-523-2133 or 609-467-8000. Correspondence should be addressed to: 110 High Hill Road, P.O. Box 458, Bridgeport, NJ 08014-0458. The new fax number is: 609-467-3044.

Correction . . . In the 22 February **RW** Buyers Guide User Report on Carl Watkins' Auto-Jock system, the contact telephone number listed the area code as 308 when it should have read 208. Therefore, the correct contact number is 208-785-5940. **RW** regrets the error, and apologizes for any inconvenience it may have caused those who have tried recently to reach Mr. Watkins.

the "Pilot" indicating LED. The resistor value had been miscalculated—the LED shorted and the resistor smoked.

All of our problems should be so minor! We have been very pleased with the overall performance of the exciter. It runs and runs and sounds just great. Not bad at all for being the first unit on the air at a radio station.

■ ■ ■

Margaret Bryant writes: "Readers may remember me as the 'Broad' in broadcasting (a previous RW article). I have been at WMAQ for one year, prior to that I worked for Group W's station in San Antonio, KQXT. When I am not working, I like to fly aerobatic airplanes upside down."

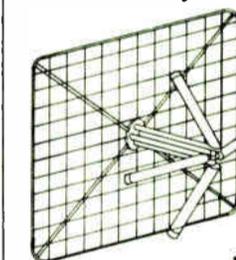
Ms. Bryant may be reached at: 312-245-6143.

For more information on the Motorola 1400 AM stereo exciter, contact Steve Kravitz at: 312-576-2879, or circle Reader Service 5.



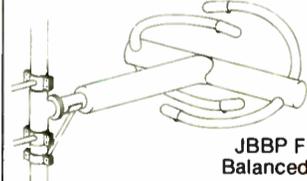
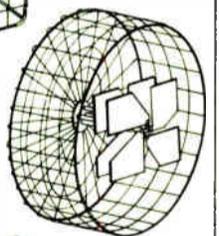
Puts your signal in it's place!

If you need a quality antenna, you need: **JAMPRO ANTENNAS, INC.** The really experienced one for over 30 years.



JAHD CP Arrowhead Screen Dipole

JSDP CP Spiral Broadband Antenna



JBBP FM Antenna Balanced Excitation

JAMPRO is the world leader in custom-designed, directional, CP antennas.

- With over 1600 of our penetrators delivered, more stations have penetrated their market.
 - Our custom-made directional antennas are operating world wide.
 - Full-scale antenna measurements on **JAMPRO's** all-year, all-weather test range.
 - We custom-make tower structures to duplicate your's, for optimum results.
 - Ask about **JAMPRO's** low-power educational packages.
- Give us your requirements and see how fast we produce.

JAMPRO Antennas, Inc.

6939 Power Inn Road
Sacramento, CA 95828
(916) 383-1177 • Telex: 377321
FAX (916) 383-1182

AM Radio in an Era of Change

by Ronald C. Frillman and Robert R. Weirather

Quincy IL Probably the most important change in the radio industry during the 1980s has been the growth of the consumer electronics industry.

Today more than ever, radio stations are competing not only against each other—though by the sheer number of stations on the air—but against a vast number of easily accessible and highly affordable consumer electronics products.

US consumers spent billions on sound equipment in 1988. Much of this equipment is used in automobiles—a trend fully recognized by car manufacturers, who are offering CD players in high-end models. One car manufacturer is even considering offering DAT playback models.

Keeping up with audiophiles

All this adds up to a new kind of listener: the audiophile, who no longer will tolerate the once-inevitable speck of dust on the LP. It also adds up to even greater demands on radio stations, who must either offer competitive sound to listeners or risk losing them to other stations or to alternate sound sources.

Certainly, competitive sound is only part of the equation, and in no way do we underestimate the importance of the right programming and formats in capturing and retaining listeners.

Within the context of greater competition both in and out of broadcasting, certain trends have crystallized in recent years, and broadcast equipment

manufacturers are responding.

There had been little question that from the mid 1970s, AMers had faced continuing audience erosion as many listeners shifted to FM. For more than a decade, no one in the industry really knew where the erosion would end.

While most major market AM stations managed to hold their own with a proven formula of format, personalities and coverage, medium to small AM stations were heavily impacted. AMers have demonstrated a great deal of creativity in bringing the erosion to a standstill.

INSIGHT ON AM

In general, we saw many differentiating changes occurring on the programming side. AM began to target the 35-plus market more and more. Sports coverage became increasingly important for three out of four AM stations and syndicated as well as local talk formats also proved successful.

We also saw AM sharpen its focus on local and regional news coverage. In some rural communities, low power stations actually began to compete against weekly newspapers, capturing audience by offering immediacy in coverage of events of local interest.

Programming was only part of the answer for AM. The industry also recognized the importance of technical improvements to make AMs sound more competitive with FM.

At Harris, during an extensive research and development program, we found that digital modulation, which could produce audio virtually free from tilt, ringing and distortion, enabled AM transmitters to sound as good as FM.

Expense management

The very struggles faced by the AM broadcaster extended to the entire radio industry in another, less obvious way.

Audience erosion in AM translated directly into financial problems for many operations. In the process, AMers in particular and radio broadcasters in general became highly expert and sophisticated at managing the expense side of the ledger.

As an equipment manufacturer, Harris found that customers no longer were interested solely in outright purchase price when making capital equipment investments. Other value-related questions were being asked more frequently and the answers were being carefully scrutinized along with price in the purchasing process.

As utility costs edged up, a big question emerged with respect to the overall efficiency of equipment: what impact on electricity bills would new products have over the long haul? What changes could equipment manufacturers make to increase efficiency?

In some cases, revolutionary technology was needed to substantially improve

efficiency. The digital modulator in the Harris DX-10 offered real cost savings with an overall efficiency of 86%.

Other questions relating to long-term value had to do with on-air operation and serviceability: What features does the product offer to ensure on-air operation? And what technical expertise is required for maintenance and servicing?

Dwindling engineer ranks

The last question about technical expertise has become extremely important as the number of engineers with an RF background dwindles.

While major market stations still are likely to have fulltime transmitter supervisors on staff, the vast majority of radio stations contract with consulting engineers for routine maintenance on an as-needed basis.

Transmitter manufacturers no longer can assume that an on-site staff is available to provide on-going tweaking and maintenance for top product performance.

In product development, reliability, performance consistency and user-friendliness are essential. Automatic features such as proportional VSWR fold-back and automatic power control; "soft-failure" features; high stability designs; easy diagnostics and good accessibility for servicing and remote control all help to ensure continued on-air operation with minimal technical requirements.

Certainly many of the technical improvements that offer great potential for US radio broadcasters must be ad-

(continued on next page)

Barriers to Quality

by David Grace

Nova Scotia CANADA One of the challenges facing today's transmitter manufacturer is the attempt by many radio stations to cut their budgets and improve their operating efficiency.

Solid state transmitters, with their reduced power consumption and greater reliability—without the need for periodic tube replacement—have helped in this area.

In many stations, however, cost cutting includes cutting technical staff and these cuts tend to lower the high priority usually placed on maintenance. It is thus becoming more and more important to keep a transmitter's design simple and straightforward.

Reduced station technical support also means that a transmitter manufacturer must offer an increased level of customer service. Nautel maintains factory modules on the shelf in both the U.S. and Canada for all of our AM transmitter customers.

These modules can be shipped with less than 24 hour's notice. This, together with round-the-clock technical help available to users by telephone, enables us to respond to demands for service.

In keeping with this type of effort is the drive to maintain equipment reliability not just by redundancy but by retaining hermetically sealed TO-3 MOSFETs and ICs for harsher environments, rather than using less expensive plastic devices.

Higher quality sound today is impeded more by receivers and broadcasters than by transmitters. Audio distortion in our transmitters is much less than 1.0%, while most envelope detec-

tors introduce more than this. We do not use negative feedback and do provide dynamic reproduction.

Lack of negative feedback insures that transient distortion is less than 1.0%. The performance of these critical parameters is an order of magnitude better than that achieved by tube transmitters and no periodic adjustments are required to maintain the results achieved in the production test facility.

INSIGHT ON AM

Much of the improvement in AM transmitters has been encouraged by the advent of AM stereo, which, unfortunately, lost momentum during the "which system?" argument.

We believe that AM stereo will not fully benefit from these technological advances until the majority of receiver manufacturers respond with improved receiver performance and the majority of stations ease up on their preoccupation with loudness and overprocessing.

Until these events occur the listening public will be mentally and aurally programmed to an inferior AM sound.

Digital modulation, for its part, as opposed to processing, will not have a direct effect on AM broadcasting. After all, what comes out on the air is amplitude modulation, the same as before.

Digital modulation does, however, change the basic nature of the transmitter. Using PDM, which is digital until the PDM filter applies the signal to the power amplifier stage, each PA/modulator is a stand alone transmitter.

(continued on next page)

CCA ELECTRONICS, INC.

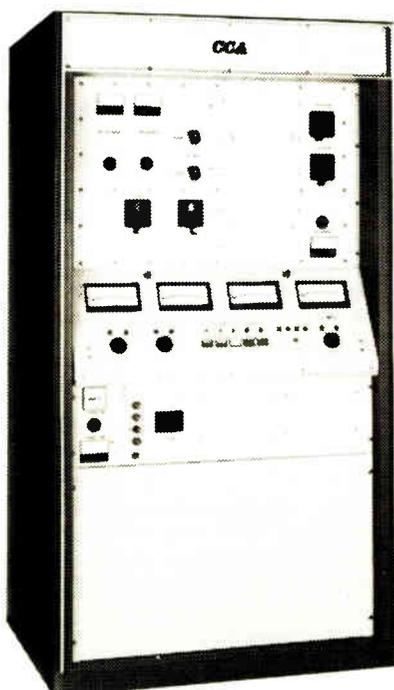
25 Years of Reliable Broadcast Transmitters

For over 25 years, CCA Electronics, Inc. has provided reliability through simplicity. Specializing in simple circuitry and rugged construction, CCA manufactures dependable, longlife AM, FM, Shortwave and Longwave Transmitters.

CCA transmitters deliver durability and reliability to satisfied customers throughout the world. The high quality standards and design simplicity produces the best value of broadcast transmitters in the world.

FEATURES:

- Time Proven Long Life Design
- Rugged Construction with High Quality Components
- Zero bias Triode in DC Grounded Grid Circuit
- Conventional Plate Modulation
- Longest Documented Tube Life
- Designed for FCC, DOC and CCIR Requirements



WE MAKE IT SIMPLE

CCA 360 Bohannon Road/P.O. Box 426, Fairburn, Georgia 30213
Phone: (404) 964-3530 Fax: (404) 964-2222

Barriers

(continued from previous page)

Each PA/modulator, then, experiences an equal stress and supplies equal power—all contributing evenly to the whole. This means that there is uniform redundancy throughout the transmitter.

In the "digital modulation" technique, each power amplifier is, in effect, a single digit in the word characterizing the amplitude of the RF output at a given instant in time. The number of PAs or digits required will be turned on for a given amplitude.

It is apparent that some PAs will be on far more often than others, with the result that utilization and distribution of the PAs is non-uniform throughout the system.

Looking to the future, several developments should help the AM market.

Antennas that suppress skywave could allow more stations to address market segmentation. Also, the demand for quality sound is increasing, and recent moves by the NAB to standardize both emission standards and audio preemphasis are leading the way to the possibility for real improvements in the quality of sound available to AM listeners.

Superior AM transmitters are now available and assurances by broadcasters that they will provide an opportunity for improved performance—by maintaining these new standards of emission—will hopefully provide the incentive needed for higher quality receivers to appear on the market

■ ■ ■

David Grace is President of Nautel. He may be reached at: 902-823-2233.

AM Change

(continued from previous page)

dressed industry-wide and strategically. Historically and philosophically, the United States has favored more deregulation, not less.

On a "let the market decide" basis rather than on a regulatory one, necessary changes have come about slowly.

Perhaps the most dramatic recent example of the slowness of change has been in the establishment of an AM stereo standard. While 1988 witnessed a move in the US toward C-QUAM as the AM stereo standard—long recognized as one technical improvement that could make AM more competitive with FM—the process of arriving at a standard was long and drawn-out.

What we learned from the stereo question is that perhaps a total free-market approach is not the best.

In today's radio industry where material and substantial changes can easily cost millions or tens of millions of dollars, greater cooperative efforts among broadcasters and manufacturers are needed.

Broadcasting is change, and those who act upon that notion will prosper and survive. Those who fail to do so will be quickly overridden by the competition.

■ ■ ■

Ronald C. Frillman is manager of domestic radio sales, and Robert R. Weirather is director of strategic marketing for Harris Corporation, Broadcast Division. To contact the authors, call Harris at: 217-222-8200.

Stay Current

by Steven A. Claterbaugh

Dallas TX The AM broadcaster has been faced with numerous changes in this media, one of which is the advent of AM stereo. While the survival of AM may not be dependent on AM stereo, it has made the AM broadcaster take another look at the sound quality of radio and the stations technology.

With the growth of FM broadcasting, radio listeners have developed a more sophisticated taste in audio quality. Because of this, AM broadcasters have had to change formats or find other creative ways of maintaining their audience.

All this means that transmitter manufacturers have had to make changes

in the designs of products for AM broadcasters, who are demanding higher performance and trouble-free maintenance as much as they are asking for the most cost effective solutions.

INSIGHT ON AM

In response to their demands, acceptable distortion levels have been reduced, stereo compatibility is a must and frequency response must be excellent.

Meeting these requirements has meant that manufacturers must design new equipment that will more faithfully transmit processed audio signals from compact disc players and other sophisticated audio sources.

During these design changes, other sig-

nificant research surfaced, such as the introduction of totally solid state transmitters that boast higher overall efficiency.

AM broadcasters must rally together to improve industry standards, as well as to get the full support of the FCC and the NAB. This support is vital to their status today and in the future.

The survival of this legendary media depends on the research and development of new products and a larger promotional effort aimed at the AM frequencies. Broadcasters must find their niche in a highly competitive market, whether it be news, talk or music.

And then they must inform the listening audience that they are on the air.

■ ■ ■

Steve Claterbaugh is Continental's Director of Advertising and Sales Promotion. He may be reached at: 214-381-7161.

Comtech's 3.8 Meter has the Extra Performance Margin Needed for Crystal-Clear Audio Reception. Why Settle for Less?

Major network affiliates all over the country are specifying Comtech's 3.8 Meter Antenna. The reason is simple: No other antenna in its size category can deliver a gain of 42.9 db at 4 GHz.

This increased performance margin means outstanding audio reception on SCPC sub-carrier signals, and digital even in low EIRP areas.

Comtech's leadership in satellite antenna design is no accident. They pioneered the exclusive 3-piece "splice-strap" parabolic reflector with a superior sur-

face tolerance unequalled by mesh or other home-type antennas. The result is higher efficiency, optimum side-lobe performance and increased gain. This is the extra margin of performance that only a Comtech Antenna can provide. That's why literally hundreds of Comtech 3.8 Meter Antennas are operating today at radio stations throughout the U.S.

So why settle for marginal performance when you can have a performance margin today and in tomorrow's 2° spacing environment.

Allied Broadcast Equipment distributes Comtech Antenna systems to the radio industry nationwide. Call today for more information.

317-962-8596

ALLIED
Broadcast Equipment

3712 National Road West
P.O. Box 1487
Richmond, IN 47375

Comtech Antenna Corp.—Taking the lead in Satellite Antenna Systems



Radio Station KAIR/JOY, Inc.
Tucson, Arizona
3.8 Meter Antenna Installation

Get the message?

C-QUAM® is setting the AM Stereo standard.

We said so last year . . . and the year before . . . and the year before. And it's still true! C-QUAM is setting the AM Stereo standard the hard way — in the marketplace.

We can prove it. Just count the number of C-QUAM stations, receivers, IC's, plus equipment manufacturers and countries committed to C-QUAM. The numbers tell the story.

Visit Motorola Booths #1068-1270 at NAB '89 in Las Vegas!

With the whole world turning to Stereo . . .



You can stop worrying about who's setting the AM Stereo standard.

We Are. With C-QUAM® AM Stereo!

Some people will think we're pretty bold making that claim. You bet we are! Because we're confident. And here's why, when you modernize with C-QUAM AM Stereo, you can be confident too.

- **MORE STATIONS** . . . Nearly 9 times more C-QUAM stations worldwide than any other AM Stereo system — over 600. And still growing.
- **MORE RECEIVERS** . . . C-QUAM is already in over 30 countries.

C-QUAM® AM Stereo . . . setting the whole standard and nothing but the standard.

WI
broad
Go C-QUAM system w

Face it. We live in a family of world C-QUAM AM Stereo.
• Over 500 C-QUAM stations worldwide
• Nearly 10 million C-QUAM receivers shipped to date
• 3 countries named the official standard in so honored
• C-QUAM broadcast gear available from 5 sources, the only AM Stereo system with more than one source
• Over 70 major models of C-QUAM receivers available — none for any other single AM Stereo system



You be the judge. Here's proof that C-QUAM AM Stereo is "Setting the Industry Standard" with more:

- **MORE STATIONS** . . . Over 700 C-QUAM stations worldwide! More than 20 times any other AM Stereo system — and growing!
- **MORE RECEIVERS** . . . Over 17 Million C-QUAM IC's shipped to date! And C-QUAM is already in more than 50 countries marked by over 30 manufacturers.
- **MORE IC's and NEW FEATURES** . . . Automatic band width control, notch filtering, low or medium voltage operation. Plus a whole C-QUAM family of IC's to offer enhanced AM Stereo performance!
- **MORE COUNTRIES** . . . 3 Nations already have named C-QUAM their official AM Stereo standard; many more are currently testing.
- **MOTOROLA COMMITMENT** . . . From studio to listener, we're totally committed to AM Stereo. IC technology, broadcast equipment, receiver design, international seminars, technical/marketing support.

Your verdict? Right — even blindfolded. C-QUAM is Setting the AM Stereo Standard. So put the Standard to work at your station. Call Steve Kravitz (collect) on the Motorola C-QUAM Hotline 312/576-0554.

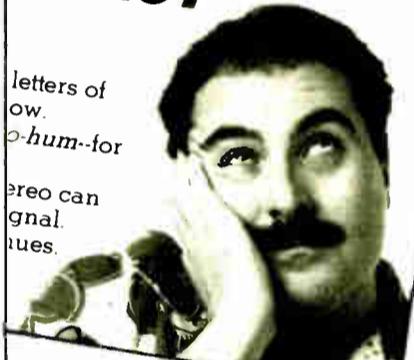


Model 1400 Exciter
Model 1410 Monitor

MOTOROLA
C-QUAM® SETTING THE INDUSTRY STANDARD

Music really Mono?

letters of
ow.
o-hum-for
ereo can
gnal.
ues.



- More C-QUAM stations on the air worldwide than any other AM Stereo system — and growing!
- Over 12 Million C-QUAM decoder IC's shipped to receiver manufacturers to date
- 4 manufacturers committed to providing C-QUAM decoder IC's — none committed to any other single AM Stereo system
- C-QUAM named the official standard in 4 countries — the only AM Stereo system so honored
- C-QUAM broadcast gear available from 5 sources, the only AM Stereo system with more than one source
- Over 70 major models of C-QUAM receivers available — none for any other single AM Stereo system

For details on the Motorola C-QUAM AM Stereo system, call Steve Kravitz collect at 312/576-0554.

MOTOROLA

C-QUAM
Setting the Industry Standard

For more information, call Steve Kravitz (collect) at 312-576-0554. FAX 312-576-5479.



MOTOROLA
C-QUAM® SETTING THE INDUSTRY STANDARD

C-QUAM® IS A REGISTERED TRADEMARK OF MOTOROLA, INC.

Delta Exciter a Solid Product

by John Diamantis, Dir Eng
WCPT-AM/WCXR-FM

Washington DC WCPT is located just down the road from Delta Electronics. Such close proximity to this manufacturer has given us the opportunity to see its AM stereo product's (C-QUAM) evolution.

From the early "carbon copy" of the Motorola boxes, each refinement provides more features for the engineer. Delta's latest offering, to be displayed at the NAB, is no exception.

USER REPORT

Delta's new ASE/ASM exciter/monitor combination has the same solid construction that is associated with the company's other products.

Although the front panels look like the early Motorola systems, that is where the similarity ends. Inside are high quality "mil-spec" pots and switches that make this exciter an investment.

Modular construction

The internal construction uses a top-accessed card cage and exciter and monitor functions are modularized on several different boards that fit into zero insertion force (ZIF) sockets.

This modular approach has been carried through from Delta's earliest systems and has several advantages. First, the boards can be easily accessed for testing or maintenance; an extender board with test hooks is provided.

This modular approach permits easy upgrades as state-of-the-art changes occur. The ability to plug in a new circuit board and improve system performance is definitely a quality worth considering. Few AMs would have the budget to purchase a brand new exciter every few years, just to take advantage of new circuitry.

A third feature is the mounting of critical delay and EQ adjustments—they are accessible from the top. By not being available from the front, tampering with these settings is reduced.

Easy access to exciter

Setup and maintenance are no problem, as the exciter can be supplied with rack slides. You simply slide the exciter out for adjustment and slide it back into the rack afterwards—out of the way of those Junior Engineers' fingers!

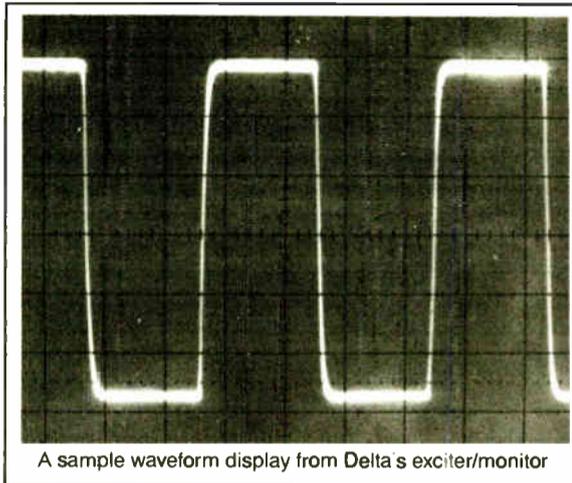
A number of convenience features are found on this exciter/monitor. They include a rear-accessed carrier frequency trimmer, full dual transmitter/dual pattern interfacing circuitry and an updated tech manual that includes an expanded troubleshooting and service section.

This troubleshooting section was prepared after reviewing service information and field installation data from two hundred exciters presently in service.

Delta has added the little finishing touches that make the system easy to set up and maintain. An example is the top panel control silk-screened legends, which permit quick identification of a pot or switch.

A high angle flasher signals excessive

phase modulation, caused by too much single channel information. In addition to warning the engineer of a system malfunction, the flasher can be used when



A sample waveform display from Delta's exciter/monitor

setting up the matrix audio processing. It is set to trip at the point just before overload of your listener's C-QUAM stereo decoder ICs.

The companion monitor offers a selectable NRSC deemphasis on the balanced

line outputs. Since it is selectable, stations not presently running NRSC will not be concerned with separate deemphasis networks when they make the conversion. They must simply move the jumper.

Improved performance

Perhaps the greatest improvements made in the new Delta exciter are those dealing with performance. Both exciter and monitor have improved frequency response, THD, separation and noise specifications. Delta has also incorporated true SMPTE Intermodulation tests as a part of the final system checkout.

Tilt as well as overshoot are greatly improved, while the exciter still employs the benefits of AC coupling. The AC coupled input prevents cumulative DC offsets from affecting the relative clipping level in aggressively processed stations.

Of these improvements, the most impressive is viewing the ASE audio out-

put while feeding a 1 kHz square wave, low-pass filtered at 100 kHz. You will see no overshoot.

System performance specifications are also improved. A new Decoder II Assembly in the monitor has improved third order Bessel function response for better separation figures as well as overshoot. Again, the modular construction is carried through to the monitor, permitting field installation into existing systems.

Now to the bottom line—what do all these improvements cost? The system list price has not changed. It is still \$12,500, which includes complete installation and a proof. Field mod kits to upgrade older systems are also available.

If you get to NAB, take a look at this product. You will not find a lot of flashiness and glitter—that is not Delta's style. What you will see is a solid product. And if past performance is any indication, the product will serve you well.

■ ■ ■

John Diamantis has been CE at WCXR/WCPT for the past two years. He may be reached at: 703-683-3000.

For more information on Delta's ASE/ASM exciter/monitor, contact John Bisset at: 703-354-3350, or circle Reader Service 8.

WELD Upgrades to TTC, Orban

by Larry D. Kuykendall, Co-CE
WELD FM-AM

Moorefield WV In the summer of 1987, WELD's management decided to increase its AM power. We also decided to improve the sound quality and to plan for the NRSC audio standard.

Because we had been plagued with modulation peak trip-out and distortion in the audio quality of our solid state main transmitter, we began looking for a new 2 kW unit and associated audio processing equipment.

The AM transmitter would have to meet the 2 kW power requirement, be capable of critical hours power reduction to 500 W and be rugged enough to withstand frequent direct lightning strikes to the 300' tower to which it is connected.

Transmitter criteria

Although we wanted to get away from highly processed asymmetrical modulation, we needed a transmitter that had the capability of high positive peak excursions. A second criteria for transmitter selection was that it be able to tolerate a load that does not exhibit symmetrical sidebands.

Our tower is 70.5° at 690 kHz, series fed, 25.7 -j53.8 ohms, and matched to 50 ohms at the ATU input. But, as with many non-resonant series fed towers, the sideband symmetry is capacitive reactive, with opposite slopes to each side of the center frequency.

The TTC AM 2500B seemed to fill all of the above requirements, and a 3 0, high-low power version with extended local control was ordered.

With the transmitter selection taken care of, we got down to business of selecting an appropriate audio processor to drive the 2500B. The highest priority was to produce an unprocessed sound that had presence and impact.

Since one of the objectives was NRSC-1 audio capability, the Orban Optimod-AM appeared to be our first choice for an ideal compliment to the transmitter.

The 2500B transmitter and Optimod-AM were installed during January of 1988. Several nights of work were involved because the antenna tuning unit and transmission line had to be replaced to accommodate the higher power.

Setup and adjustment of the transmitter and Optimod were straightforward. However, it took 12-plus hours of "fine tuning" to get the desired "FM-like" sound.

USER REPORT

Orban recognizes the complexity of NRSC audio and answers virtually every preconceived question, if one takes the time to read the manual thoroughly. And control settings are listed for every major sound signature a station would want to create.

With HF preemphasis, increased demands are placed on the antenna systems. Irregularities that went unnoticed in the "good old days" of AM become major obstacles for wideband broadcasting.

Antenna problems

The high frequency sideband components are coupled with lower efficiency to the antenna and may be reflected to the transmitter or dissipated in the tuning unit. This antenna bandwidth problem consumed a major portion of the 12-plus hours we spent on setup and adjustments.

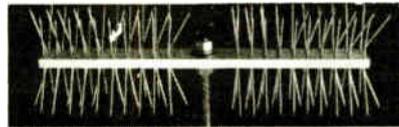
In early February of 1988, the system was placed into primary service. Located in the Eastern Panhandle of WV, WELD-AM is heard throughout the Potomac Highlands and a portion of several neighboring states.

One year of service and two lightning (continued on page 46)

Affordable Lightning Protection



Charge dissipation with 1/8", type 304, stainless steel rods ground to needle sharpness. They won't bend from ice and severe weather. They provide a continuous low-resistance discharge path for the static electric charge on tall structures.

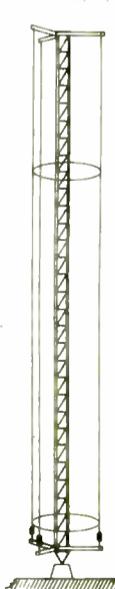


Let us design your system at no cost or obligation! ①
Stati-Cat • Stati-Kitty • Crow's Nest

The Folded Unipole: The Ultimate Antenna for AM Broadcast!

- Broad bandwidth
- Grounded antenna
- Eliminates isocouplers
- Practical for AM-FM site consolidation
- Effective as detuning skirt
- Fully FCC acceptable
- Custom kit; easy assembly

Designed by nott ltd; ②
manufactured by Cortana



Write for free brochures.
Also available from Cortana:
Ground Radial Wire Detectors
Mastercard/Visa



P.O. Box 2548
Farmington, NM 87499
(505) 325-5336
FAX 505-326-2337

Omnitronix Builds RF

(continued from page 45)

strikes later, the following can be stated: there have been no equipment failures in the transmitter or audio processor; one burned-out tower base RF amp meter has occurred due to lightning—even though it was switched out of the circuit at the time and no apparent drifts in operating parameters have occurred.

During the one year of operation, we have made several observations. Although not as efficient as our solid state transmitter, the 2500B projects a sound quality improvement that can be heard and appreciated.

The heat generated from the four 4-1000A tubes is used to heat the transmitter room in the winter. The overall reliability seems to be high, since the 2500B appears to employ redesigns of time-proven technology. The RF frequency stability has remained good, since it is IC-generated at two or four times final output (depending upon output frequency requirements).

One of the features I like about the AM 1500B is its HV power supply, which is of the diode string variety, rated for many times the actual applied voltage. Each diode is protected and is "self-testing." The neon lamp extinguishes if the diode shorts.

Modulation bias adjustments are easily accessible from the front and a slide-out drawer enhances the accessibility of the control circuits. A vacuum variable is used for PA plate load capacitor.

Since station operating power is below rated transmitter output, the modulator idling current was reduced by 30 mA to reduce tube dissipation. No change in distortion characteristics were noted.

Adapting to change

After the transmitter was ordered, the local utility had a change of heart on service voltage. We were able to change the HV plate transformer taps to accommodate the 208 service, and maintain range centering for the

2 kW operation.

But a 500 W resistor was added in series with the PA screen supply. The resistor is automatically shorted out when operating at high power. Independent centering is now possible for each power level.

The low frequency square wave tilt correction proved to be time consuming. Previous experience with preemphasized AM audio is a great attribute.

We set out to increase power, improve

our sound and prepare for preemphasized audio. With the purchase of a TTC AM-2500B, an Optimod-AM 9100B and many hours of work, I believe WELD did just that.

■ ■ ■

Larry Kuykendall is a consultant working in broadcasting and cable TV. He may be reached at: 304-538-6062 or 304-538-6033.

For more information on the 2500B AM transmitter, contact Gordon Allison at TTC: 303-665-8000, or circle Reader Service 6.

WELD-AM Moves Up

(continued from page 37)

transformer, circuit breakers, rectifiers and contactors.

The OMNI-1000 requires three connections for installment: 190-250 VAC, 50/60 Hz single phase primary power; the 50 ohm antenna; and the 600 ohm audio input. The unit is lightweight—290 lbs.—and therefore easily transportable.

Protection circuits are included for switching the transmitter to standby in the case of over-voltage, over-temperature, excessive current draw, under-voltage, loss of voltage or high VSWR. Once such a fault condition has passed, the transmitter will automatically return to normal operation.

Input transient protection is insured with an isolation transformer and surge protectors. Antenna transient protection is provided by detection of high VSWR conditions and the use of a hermetically sealed spark gap at the anten-

na output port.

Power-up is simply accomplished by switching the main circuit breaker that powers up the logic voltages. A push-button switch then activates the high voltage to the power amplifier modules.

The power supply will monitor conditions on the high voltage line, and, in the case of excessive current draw, will recycle the high voltage contactor. Operation is streamlined by easily readable indicators and meters.

On the OMNI-1000's front panel, indicators constantly monitor all voltages, percent modulation and output power. A built-in multi-meter is capable of measuring all currents and voltages. If a fault occurs, LED indicators display the nature of the fault.

Production quantities for the OMNI-1000 are scheduled for July 1, 1989.

■ ■ ■

For more information, contact the author at Omnitronix: 215-540-0654, or circle Reader Service 3.

CONSULTANTS

R.L. HOOVER

Consulting Telecommunications Engineer

11704 Seven Locks Road
Potomac MD 20854
301-983-0054

Member AFCEE

R.J. GRANDMAISON, P.E.

CONSULTING ENGINEER

Applications and Rulemakings

11213 Split Rail Lane

Fairfax Station, VA 22039

(703) 764-0513

Member AFCEE

THIS SPACE AVAILABLE

Call
1-800-336-3045

SPENCER BROADCAST

The Radio Station Specialists

Chuck Spencer
Phoenix, AZ
602-242-2211

RF and Audio Coast to Coast

STEVE VANNI ASSOCIATES, INC.

BROADCAST TECHNICAL CONSULTANTS

Project Management Facility Planning
Equipment Installations

P.O. Box 422
Auburn, NH 03032

(603) 483-5365

FM Study Program

FM Searches Within The Budget of Anyone Who Owns An IBM-PC
L.R.C.
602-293-2374

FCC's Engineering

FM and TV Data Bases for your PC
Call today to request a free sample.

Communications Data, Inc.

6105 E Arlington Blvd

Falls Church VA 22044

(703) 534-0034

EVANS ASSOCIATES

Consulting Communications Engineers

FCC Applications, Design & Field Engineering

Broadcast Engineering Software

216 N. Green Bay Rd.

Thiensville, WI 53092

(414) 242-6000

Member AFCEE

W. LEE SIMMONS & ASSOC., INC.

BROADCAST TELECOMMUNICATIONS CONSULTANTS

5 Gracefield Road
Hilton Head Is., SC 29928
(803) 785-4445

Moffet, Larson & Johnson, Inc.

Consulting Telecommunications Engineers

Two Skyline Place

5203 Leesburg Pike #800

Falls Church VA 22041

703-824-5660

800-523-3117

Member AFCEE

MIRKWOOD ENGINEERING

Rural & Remote Site Field Engineering

50 Park Ave.
Claremont, NH 03743

603/542-6784

Consulting Communications Engineers

- FCC Data Bases
- FCC Applications and Field Engineering
- Frequency Searches and Coordination
- AM-FM-CATV-ITFS-LPTV

OWL ENGINEERING, INC.

1306 W. County Road, F.
St. Paul, MN 55112
(612)631-1338 "Member AFCEE"

SOFTWARE

FM CHANNEL SEARCH

FM Database pool

MSDOS

EGA Graphics-Color

Broadcast Technical Consulting

Doug Vernier

Broadcast Consultant

1600 Picturesque Drive

Cedar Falls, IA 50613

319-266-7435

R.L. Kennedy & Associates

Telecommunications Engineering Consultant

Radio-TV-ITFS-Microwave

P.O. Box 141

Waynesville, NC 28786

(704) 648-3283

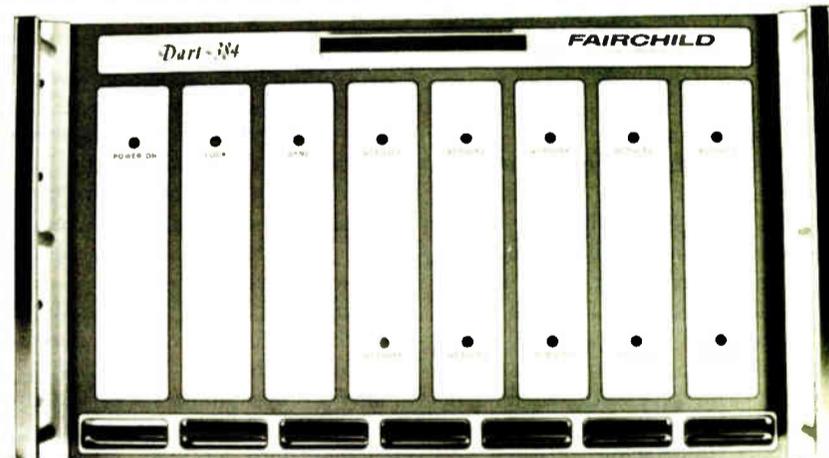


HARRIS ALLIED

You Saw It Again at NAB...

Digital Satellite Audio:

THE FAIRCHILD DART 384.



We knew the Fairchild Dart was the best value 6 years ago. It remains the best value today!

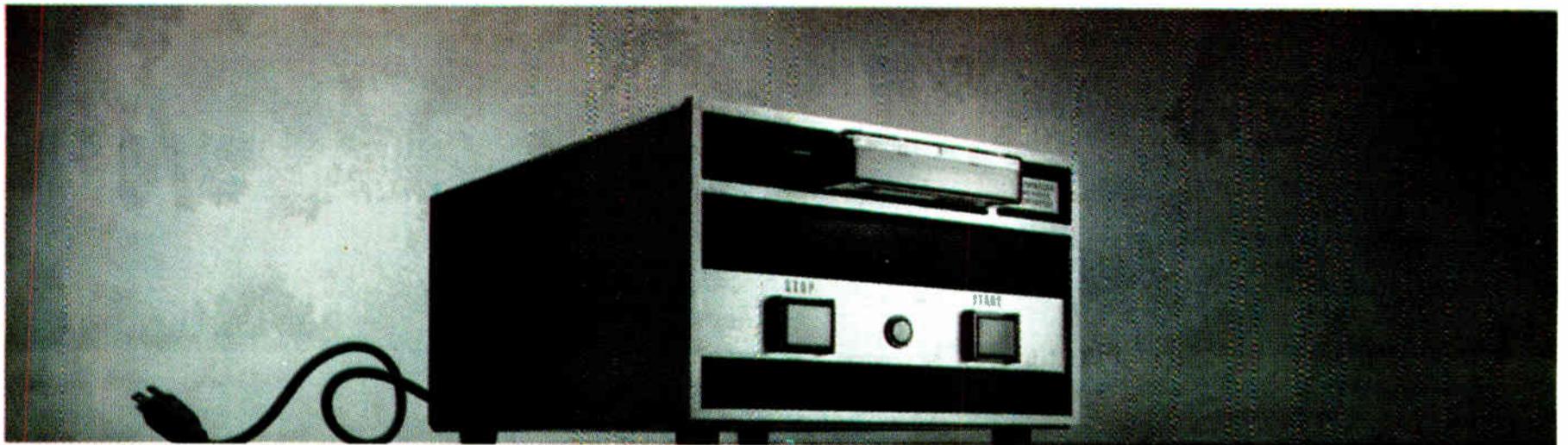
- ✓ More Features
- ✓ Lower Price
- ✓ Only from Allied

Call the Satellite Experts

3712 NATIONAL RD. WEST • P.O. BOX 1487
RICHMOND, IN 47375

317-962-8596

It's withstood nineteen years of raps, bops, swings and hits.



Reliability. It's what ITC audio cartridge machines are all about. Even after years of playing and pounding. In fact, you'll find many of our original models still in use today. Like this one from KOMA-AM in Oklahoma City.

ITC cart machines have always been engineered to withstand heavy-duty use. That includes our latest models. It's reliability that's made ITC the undisputed world leader in cart machines.

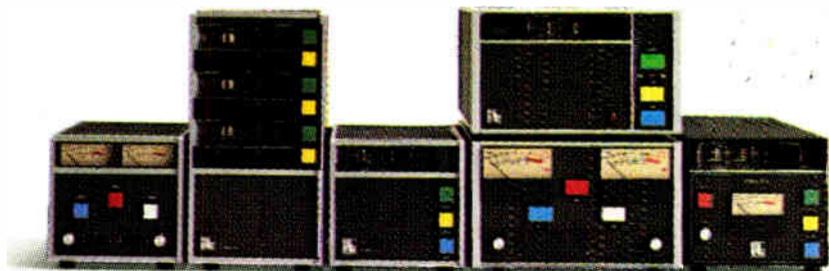
But our reputation doesn't end there. Engineers say ITC offers the best support in the business. With toll-free technical advice. Fast turn-around on repairs and parts. And a two-year warranty on factory labor and all parts including motors, heads and solenoids.

No wonder stations buy ITC machines more often than any other brand. And keep coming back for more.

There's an ITC cart machine for every need. The 99B Master Recorder with the patented ELSA cartridge preparation system. The DELTA series, the most popular cart machine for the last five years. And the economical OMEGA series, offering affordable performance.

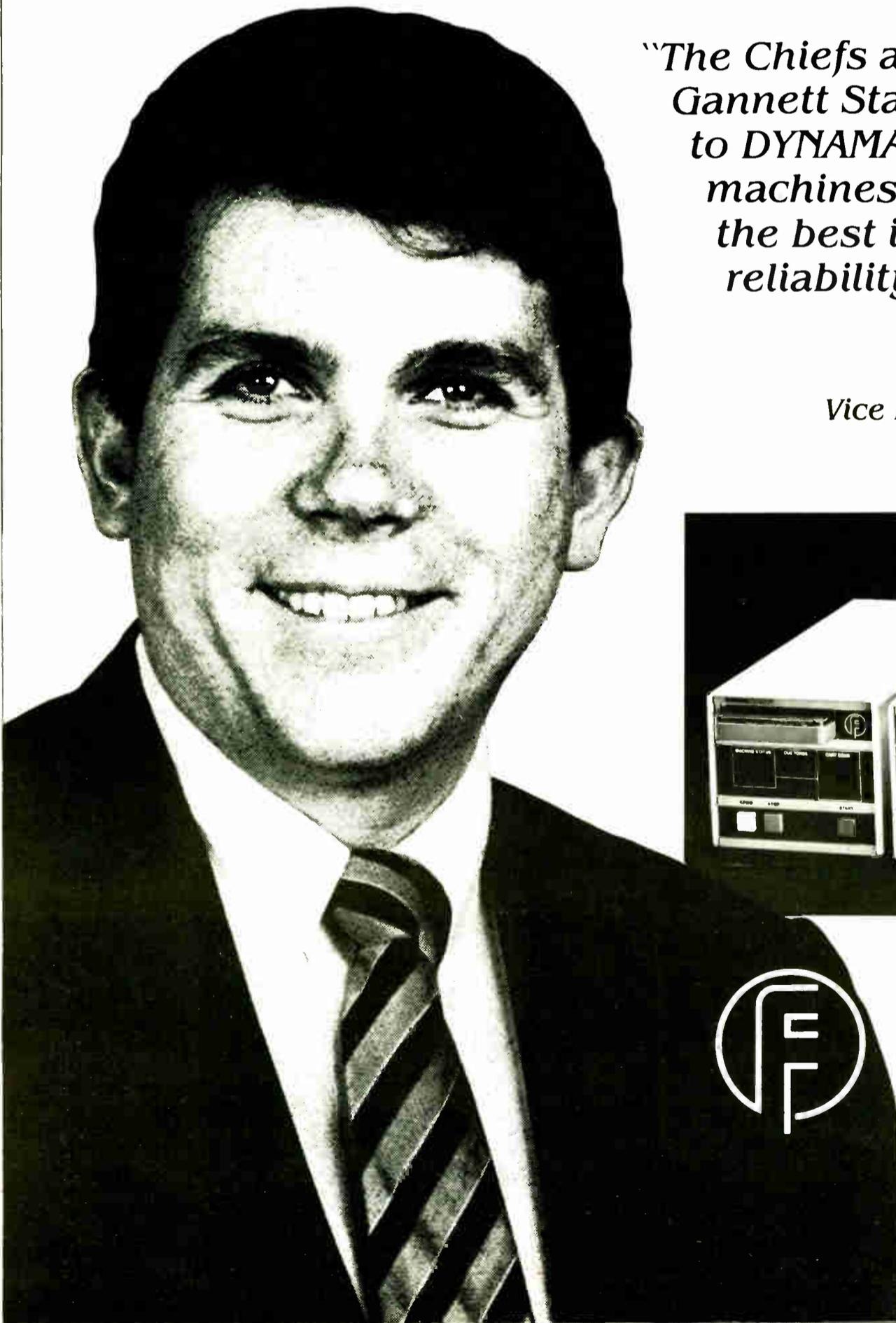
To find out more, call International Tapetronics, 3M Broadcast and Related Products Department at 1-800-447-0414. (In Illinois and Alaska, call collect: 309-828-1381.) Or see one for yourself at these dealers: Allied Broadcast Equipment; Broadcast Services Co.; Broadcast Supply West.

Tell them you heard about it from a reliable source.



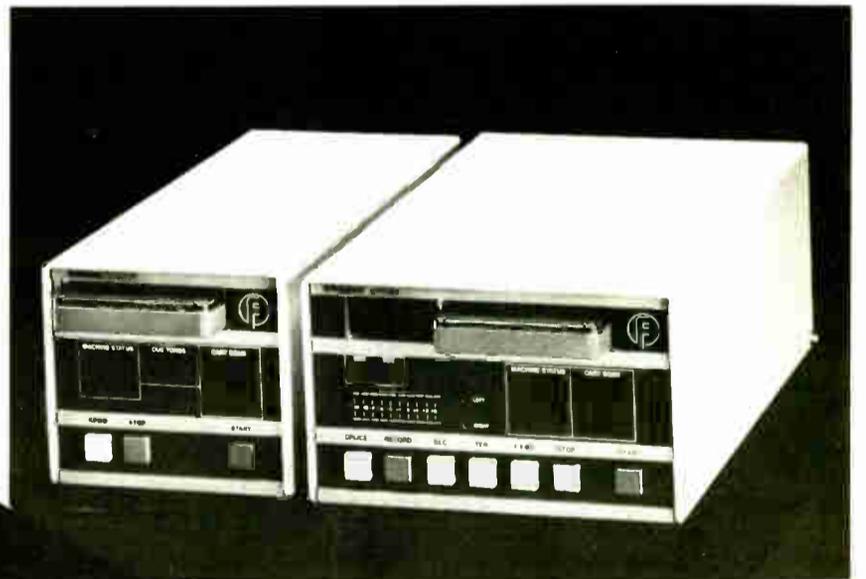
GO WITH THE WINNERS.

DYNAMAX CTR100 SERIES



*"The Chiefs at 14 of 16
Gannett Stations switched
to DYNAMAX cartridge
machines. Each Chief wants
the best in performance
reliability, and versatility."*

*Paul Donahue
Vice President of Engineering
Gannett Radio*



DYNAMAX™
BROADCAST PRODUCTS BY FIDELIPAC®

Fidelipac Corporation
□ P.O. Box 808
□ Moorestown, NJ 08057
□ U.S.A.
□ 609-235-3900
□ TELEX: 710-897-0254
□ FAX: 609-235-7779