

Comments Mixed On Class A

by Alan Carter

Washington DC ... In comments filed with the FCC, some of the largest broadcast group owners came out in opposition to a proposed across-the-board power hike for Class A FMers, while stations that would be affected registered their support promising to take advantage of the increase.

The New Jersey Class A Broadcasters Association, which filed a petition for rule making last September to raise the current 3 kW Class A power limit to 6 kW, pressed the issue once again, in comments due 14 March.

The additional supporting document

"confirms that the time has arrived—indeed is overdue—for the Commission to adjust its Class A FM power rules in light of the dramatic urbanization which has (adversely) impacted Class A broadcasters in the 26 years since the rules were adopted," the New Jersey group stated.

Press Broadcasting, operator of WJLK, Asbury Park, NJ, and whose vice president, Robert McAllan, is a leading proponent of the New Jersey petition, argued in the comments that the proposal is a "technically sound plan to ... address the problems and inequities faced by Class A FM radio station operators."

Press also contended that the New Jer-

sey engineering proposal creates only minimal "additional" interference.

Expecting opposition on this point—which is a main argument noted in opposing comments—Press said, "As the New Jersey petition points out, the current spacing rules have already invaded the 54 dBu (0.5 mV/m) contour of minimum- or short-spaced Class B stations. In addition, the New Jersey engineering proposal does not create more than diminimus (minimal) additional interference."

Other support

Support for the hike also came from the Massachusetts Class A Broadcasters

Association. As with many of the almost 30 who filed support for the power increase, Massachusetts Broadcasters stressed how urbanization has hurt its ability to serve the commuting listeners.

"As a genre we serve the smaller communities which are evolving away from our ability to service them," the Massachusetts document stated. "The times and the towns are changing. The Commission's rules must also change."

Comments in support of the New Jersey proposal noted that Class A broadcasters provide local news and information that the Class B's or C's may not.

For example, WJRZ in Manahawkin, NJ, said it cannot reach 100% of the households in Ocean County operating at 3000 W, yet AM and FM stations operating from New York City and Philadelphia can.

WJRZ argued that Ocean County residents need service it provides for emergency information because the area is subject to hurricanes and storms.

"Ocean County also is the site of a nuclear power station," the comments stated. "In the event of a weather emergency or nuclear emergency, there are three Class A stations and one AM station, none of which can reach 100% of the county residents."

The opposition

Broadcasters against the hike directly attacked some of the arguments supporters used to promote their cause.

Greater Media, licensee of five Class B's and two Class A's, "strenuously" opposed the proposal. The broadcast group, whose vice president for radio engineering, Milford Smith, has addressed this issue before the NAB's Radio Executive Committee, claimed the New Jersey plan is "technically flawed and grossly understates its true impact upon existing Class A as well as Class B FM stations."

"An incursion of over 3,000 square kilometers into the current protection contour of a Class B station cannot be considered diminimus under any circumstances," Greater Media stated.

The group owner continued that the Commission previously rejected "any erosion" of the current protected contour of Class B FM facilities.

Greater Media cut into the argument of many Class A FMers that they are at a competitive disadvantage to serve their community of license because of urban growth. "Any Class A licensee takes its facility with full knowledge of the operational advantages (e.g., reduced operating costs) and disadvantages (e.g., reduced coverage) of such a station."

The owner noted that the Commission based its rules establishing station classes on the desire to accommodate twin goals of establishing higher power

(continued on page 13)

Buyout Heats Up Cart Market

by Judith Gross and Alan Carter

Winchester VA ... In December, it looked like there could be a major shakeup in the broadcast cartridge industry when Capitol Industries announced that the recording giant would shut down its Capitol Magnetics products division here.

The move would have meant the end of the widely-used Audiopak broadcast cartridge, and manufacturing of back-lubricated tape would have been reduced to two producers worldwide, Fidelipac and ITC/3M.



Capitol's Winchester plant will house the new company temporarily.

News Analysis

Within days, potential buyers approached Capitol to purchase what one industry executive says was a profitable part of the company's magnetic products division.

The money-losing end was, by Capitol's own admission, in cassette manufacturing, which was not able to compete with foreign markets.

At one time there were as many as five different groups contemplating purchase, several of them from inside the broadcast industry.

One of them, Fidelipac, also one of the three manufacturers of back-lubricated tape as well as cartridges and cart machines, began negotiating in early December and anticipated relatively quick completion of an agreement.

Fidelipac planned to buy the rights and certain manufacturing assets, and keep producing carts under the Audiopak name at the company's Moores-town, NJ headquarters.

For a little more than two months, Capitol refused to comment on any aspect of the negotiations. Meanwhile, the Winchester facility stayed in production

(continued on page 7)

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REGULATORY NEWS

FCC RF Device Plan Opposed

by Alex Zavistovich

Washington DC ... The NAB has opposed an FCC proposal which would deregulate nonlicensed RF devices, suggesting instead that such devices be restricted from using AM, FM and TV frequency bands.

Claiming the proposed changes would result in increases in interference to the broadcast services, the NAB filed comments with the Commission advocating a "conservative approach to setting emission limits."

... consumers do not ordinarily complain to the FCC about interference.

The association's comments were in response to a Commission notice of proposed rule making issued late last year in which the FCC suggested easing some of the restrictions in nonlicensed RF devices, both intentional and unintentional radiators. The devices are currently regulated under Part 15 of the Commission's rules.

The NAB expressed concern that "the proposed relaxation of permissible Part 15 devices will, if not carefully crafted, result in interference to authorized broadcast services."

Intentional and unintentional radiators

In the category of intentional radiators, the FCC included such devices as wireless microphones and "miniature FM stations," which transmit advertising around places of business. Unintentional

radiators included cable television systems with set-top converters.

The FCC notice proposed field strength limits for operation of such devices which are "the same as those now applied to residential computer products." The Commission noted that those products "have not appeared to be a major source of interference complaints."

However, the NAB contested the validity of a lack of interference complaints as grounds for the proposed field strength limits. An NAB survey released last June indicated that consumers do not ordinarily complain to the FCC about interference, the association said.

"The fact is, that consumers do not notify the FCC when they experience interference," the NAB wrote. "It is an error for the Commission to proceed on the assumption that they do."

That opinion was shared by the Association of Maximum Service Telecasters (MST), a television group concerned with spectrum issues. MST agreed with the NAB that the Commission proposal would result in increased interference to the broadcast services.

The group also noted that basing interference levels on the number of complaints received at the FCC was a "wholly inadequate" system.

Emission limit changes proposed

The FCC also proposed to get rid of restrictions on bandwidth, duty cycle and modulation methods for nonlicensed RF devices, providing the devices comply with general emission limits. The equipment likewise was proposed to operate on, as the NAB described it, "almost any frequency."

Spurious emission limitations for intentional radiators would be relaxed from a field strength of 40 μ V/m at 3 meters to 150 μ V/m at 3 meters.

However, the association suggested

such relaxation of restrictions could cause an increase in the number of Part 15 devices, resulting in even greater interference.

"The likely proliferation of new Part 15 devices resulting from this flexibility will present existing broadcast services with a chaotic interference environment which will be impossible to control," NAB commented.

"Accordingly," the group wrote, "the restriction of Part 15 devices from using broadcast bands appears to be the only certain method to adequately protect the broadcast services from harmful interference."

The FCC docket number is GEN 87-389. For additional information, contact the FCC news media information office at 202-632-5050. Contact the NAB at 202-429-5300.

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FCC Clips

FM allotment downgrade proposed

The FCC in mid-March proposed a change in the way an FM allotment may be downgraded to a lower class. The Commission proposal would allow an applicant to file only an application, instead of first having to file a petition for rule making, which is the current FCC practice.

Under the Commission proposal, once the application is granted the Table of Allotments would be amended to indicate the change. Both vacant channels and existing stations would be included under this proposal.

In the filing of applications for new channels, the FCC plan would "cut off the filing rights" of applications received subsequent to the first acceptable filing. For existing FM stations, the licensee would specify the lower class on its request to modify facilities.

Comments on the proposal, FCC docket MM 88-118, are being requested by the Commission, although at press time no deadline had been set for comments or replies.

For more information, contact Robert Hayne at the Mass Media Bureau: 202-634-6530.

Cable and broadcasting checklists

The Commission has developed two documents to help station managers maintain compliance with FCC standards. The documents—one each for cable and broadcast services—list the most common rule violations for which the FCC imposes fines.

Copies of the checklists, FO-17 for cable and FO-18 for broadcast, are available through the FCC's Public Contact Branch, Consumer Assistance and Small Business Division, and Mass Media Bureau.

For more information, contact the FCC news media information office at 202-632-5050.

New appointment in OLA

The FCC announced the promotion of Stephen Klitzman to the new position of associate director of the Office of Legislative Affairs. Klitzman had served as a legislative affairs attorney for the FCC since 1980.

Prior to joining the Commission, Klitzman was chief counsel and staff director of the Senate Committee on Governmental Affairs, Subcommittee of Oversight of Government Management. He also held the position of counsel for another Senate subcommittee and was attorney-adviser in the office of the chairman of the Administrative Conference of the United States.

For more information, contact the FCC news media information office at 202-632-5050.

Station totals

There are currently 10,267 radio broadcast facilities operating in the US, according to FCC polling this year.

Of these 4908 are AM, 4045 are FM. Educational FM stations total 1314.

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Two NAB AM Studies Proceed

by Alex Zavistovich

Washington DC ... With the deadline for comments two months away, the NAB is at work on two studies relating to the FCC's current review of its technical standards for the AM band.

In November 1987 the NAB allocated \$60,000 for a psychoacoustic listening test for AM, to determine audience tolerance of interference in the band. An additional \$20,000 was earmarked for a study of various technical aspects of the FCC's AM standards.

The studies were requested by the NAB for a notice of inquiry initiated by the FCC on its AM technical regulations. The deadline for the second round of comments on the docket is 17 June.

By mid-March, the greatest progress had taken place in the technical study, which is being undertaken by Harrison Klein, of the San Francisco-based engineering firm of Hammett & Edison. Progress on the listening test has been somewhat slower.

However, the NAB has selected a firm to conduct the listening tests, and the NAB assured the findings will be prepared in advance of the Commission's deadline.

Protection ratios

A status report was expected on the AM technical study during the NAB's Las Vegas convention. The study will focus on three issues, according to Klein, who also authored a paper on over-modulation and occupied bandwidth for the NRSC, which was presented at NAB's Radio '86 convention.

In particular, Klein commented that "the development of more realistic protection ratios is probably the most important technical issue in the AM improvement proceeding." Parameters used in making protection ratio decisions have either changed or will change in the industry, Klein said.

Protection ratios, he said, require taking into account heavy processing, trans-

mitter and receiver bandwidths and pre- and deemphasis in the system. Klein stressed that National Radio Systems Committee (NRSC) standards and wider bandwidth receivers have to be addressed in new protection ratios.

Also of note is the "spectral content of modern programming," which Klein said "differs greatly" from what was standard when the AM rules were first developed. Subjective attitudes of listeners may also have changed, Klein speculated.

Klein stated that objective methods could be used to get to adjacent-channel protection ratios, including a computer-based numerical system which would take into account the parameters.

Noise and usable field strength

Noise and minimum usable field strength also will be addressed in the study. Klein noted that "ambient noise level is a determining factor in minimum usable field strength," which he pointed out is "the basis for determining protected contours."

Man-made noise, Klein commented, is now a "much more serious allocation consideration" than it was when the FCC first instituted its AM regulations—the level of such noise has increased because of the "proliferation of power lines, industrial machinery, and noise-generating appliances."

The study will include suggested "noise factors" which should be assumed to be present in populated regions to make closer estimates of total ambient noise, said Klein.

However, he explained, noise is not constant, and a single report cannot calculate minimum field strengths in all cases. Therefore, Klein expects to develop a computer program which will determine the field strength for "any specified combination of input parameters."

Finally, Klein said the study will address alternatives to the 50% exclusion method for root-sum-square (RSS) cal-

culations. This method, he commented, underestimates interference and can lead to added interference over time.

Among the alternatives proposed to the 50% exclusion method were elimination of exclusion entirely, changing the percentage of exclusion, or requiring inclusion of a certain number of stations when calculating RSS.

Klein also noted that adjacent-channel skywave interference is not considered in nighttime allocation studies. The FCC, he said, is proposing including the adjacent-channel interference in calculating interference at a station's protected contour, or in RSS calculations, after adjusting for the adjacent channel protection ratio.

In investigating these various alternatives, Klein said, the study will show how each one might affect the current allocation system. Revisions to RSS calculation methods and other FCC allocation rules also will be addressed.

Psychoacoustic testing underway

There has also been progress on the association's subjective listening test for interference on the AM band. The NAB has been working with the FCC's Radio Advisory Committee to establish the parameters of the listening study.

A \$60,000 budget was allocated by the NAB for psychoacoustic testing, and in early February the association issued a

request for proposals on the matter.

Out of 56 companies invited to submit proposals, eight study outlines were presented, according to NAB Marketing and Policy Research Director Richard Ducey. The contract was finally awarded in March to the Chicago-based firm of B. Angell and Associates, he said.

Ducey would not identify other firms submitting proposals.

At press time, Ducey said the fee for the study was still under negotiation. A meeting was slated with the contractor in order to design test specifications.

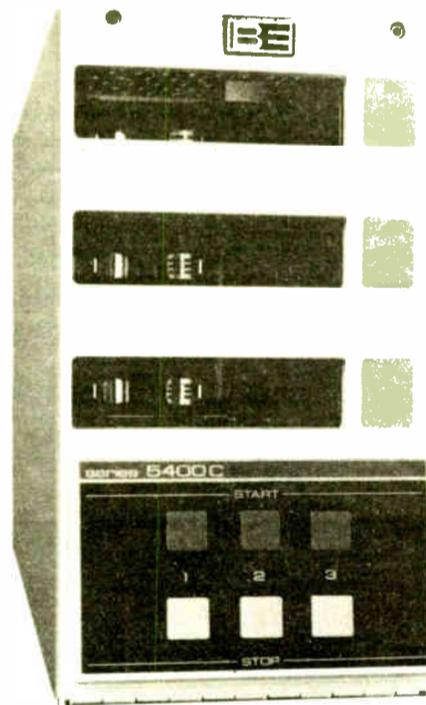
In general, however, Ducey explained the testing would involve a sampling of five markets in the US, to measure the degree to which various types of interference to AM—such as natural or man-made noise—are tolerated by a listening audience.

The testing would be made of a "projectionable sample which could be mapped onto some larger universe," Ducey continued. He explained that the test budget precluded a national survey.

Although by late March the survey had not begun, Ducey was confident that results would be available by mid-May, in time for submission to the FCC within the deadline for comments on the Commission's review of AM technical assignment criteria.

For additional information, contact Harrison Klein at 415-342-5208 or Richard Ducey at 202-429-5382. The FCC docket is MM 87-267; contact the FCC news media information office at 202-632-5050.

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Spring Show Sprung Surprises

by Judith Gross

Falls Church VA ... Big surprise at the NAB exhibits? An R-DAT pro player, from Harris and Allied. The XUD001 carries the Harris name, but is marketed by both companies under their joint marketing agreement.

The price is \$2400 and word leaked out about it just days before most of the industry headed out to Vegas, so it really was a surprise.

Another surprise was the hint that fiber optics might become a force in radio. We know that telephone costs are still soaring, especially now that many local telcos have gotten tariff increases.

Also the satellites are running out of gas and there aren't as many new launches.

The fiber nets are in place domestically and even a transatlantic fiber cable is underway. So how 'bout fiber for radio?

Well that's what US Sprint was asking concerning its first fiber-optic network, and they were asking it in the Comrex booth and in the Broadcast Supply West booth.

Seems some radio producers have been signing up with Sprint's fiber net for sports broadcasts. The company says KMBZ-AM, the NBC station in Kansas City recently broadcast its morning show from the Royals spring training camp,

over fiber.

The station used a Comrex PTLX two-line transmitter in Florida and an RTLX receiver in Kansas City.

The remote team gained access to the fiber-optic network with Foncard, US Sprint's travel card.

Other stations are using fiber for back-hauling games.

Sprint decided to team up with BSW and Comrex at the NAB because the only way to make a believer out of an engineer or GM is with a listening demo.

James Jacob, Sprint's manager/corporate relations, said "We can tell an engineer a 100 times how good our lines are and he will just nod his head, but he becomes a believer after hearing it over the air just once."

This may be the real soundwave of the future.

☆☆☆

Happy Birthday to Circuit Research Labs. On 14 March the Tempe, AZ based processing manufacturer celebrated its 10th anniversary.

That's worthy of respect in a day and age when companies tend to come and go ...

Looks like some overseas cartridge companies have been keeping watch on the Capitol-Audiopak situation, which is not surprising, considering parent EMI is British-based.

Another UK company, John Stevens Recording, called to find out the outcome and the latest on the new company formed by the buyout (see special story, this issue).



The company is looking at the US market, wanted to know if there would be a healthy market for carts here for the next few years.

Well, since the digital outlook is going off in many different directions, and the most promising of the lot, namely hard disk systems, are still too expensive for most stations, the answer is a very safe yes ...

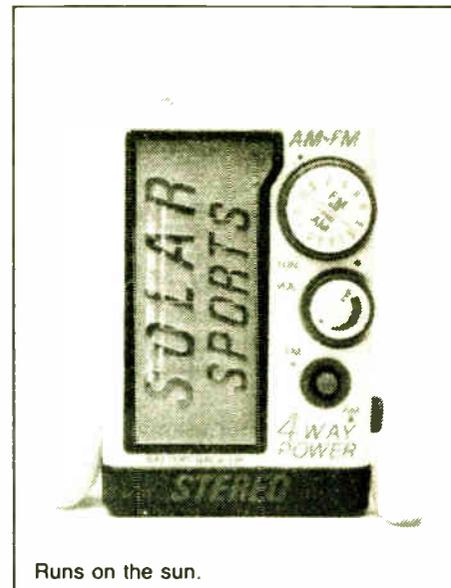
Now that the NRSC has an RF mask proposal, just one little question. They don't really mean that the only way to test compliance is for stations to buy a spectrum analyzer, do they?

Thought that's why they wanted a splatter monitor ...

Now here's one for the NAB. Why, in a mailing promoting its 1987 Radio Financial Report, does the association ask the cryptic question "Wondering whether your engineering costs are unnecessarily high?"

Take a good look out there. Does anybody really believe that most stations spend too much on their engineering budgets? What about those new owners that come in and hold the line on all engineering expenses, sometimes to the detriment of the technical plant?

What about one Maine engineer who recently called me reporting the new management had fired him—after he



Runs on the sun.

had been with the station over 12 years?

Revenge was sweet, though. The contractor they hired couldn't figure out how to get them back on the air one day, and they had to call him in as a consultant at consultant's rates to remedy the problem.

I mean, what is this mailing actually saying? Do you pay your engineer too much? Do you buy too much equipment? Ironically, the mailing went out to NAB's associate members, many of whom are the equipment vendors hoping stations won't neglect to purchase new gear when needed.

☆☆☆

Cheers to Georgia Broadcasters, who are having an "AM-Only Day" in Macon late next month to show everyone that the band is alive and well. Mark Twain said it best "Reports of my demise have been greatly exaggerated."

Now that spring is here, and daylight savings, how 'bout a radio that runs on the sun?

A company called Solar Electric based in California (where else?) has one called Solar Sports, and it gets its power, or recharges its batteries from the sun.

What's next, a radio that runs on yogurt and wheat germ?

Rumors are flying that Emmis, which has to sell one of its New York AMs and one FM with the purchase of NBC's stations in the Big Apple, will switch WFAN (now 1050 kHz) to WNBC's 660 kHz clear channel. WFAN broadcasts New York Mets baseball, so a few of us die-hard fans far from shouting distance are cheering the prospect.

And since baseball isn't the only thing on the brain now that spring has sprung, a book recently crossed my desk titled *Sex and Broadcasting* by Lorenzo Wilson Milam.

It's hard to figure out exactly what it's about. It seems to be sort of a potpourri of unusual looking essays (one is printed upside-down, another slanted across the page).

Anyway, the title is supposed to be irrelevant, and the book is supposed to be about how to set up a non-profit radio station, with the three-letter word thrown in apparently to catch your attention.

Well it got mine.

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OPINION

Readers' Forum

Got something to say about *Radio World*? Any comments on articles? 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).

More contracting horror

Dear RW:

This is in reply to Elden Durand's horror stories in *Readers' Forum* of the 1 March RW. I completely concur with his views.

In thirty years, I have observed hundreds of horror stories similar to his and I would like to present one of my favorites as follows. This one comes all too close to saying it all.

I was out on a typical routine DA tuneup and proof. The owner directly paid my motel bill, one single night at a time! Each afternoon he would pull up to the transmitter building.

Leaving his wife in the car, he would come huffing and puffing into the transmitter building, demanding to know why an hour's worth of work hadn't been done in a minute, why a day's worth of work hadn't been done in an hour, and why a week's worth of work hadn't been done in a day.

The CE and I would fully explain all of the work performed that day. Then he would head back out to his car. He would always call to his wife, "Okay dear, now we'll head for dinner at the club." Off to the club they drove, in their shiny new Cadillac!

I think the time has come to get a compendium of horror stories going. The book begs to be written and I offer the following towards that end.

Send me your horror stories. Make

them short but complete. Sources, authors and stations will be kept strictly confidential unless otherwise noted.

Be sure you indicate how you want your story signed—full name, just initials or name-withheld-by-request.

I have set up a PO box for the purpose: PO Box 703, Glen Echo MD 20812.

Hopefully such a book will materialize in the future as a source of enjoyment and as help for those who might otherwise get caught up in a horror story.

Frank S. Colligan
Bethesda MD

Editor's note: Good idea, Frank. RW will publish excerpts from the book once you get it published.

Take advantage of night power

Dear RW:

I have to tell you that I am surprised at some of the comments in the article, "Not All Daytimers Going Night" that appeared in your 15 February issue. Thanks to Alan Carter for the information.

But it seems that apparently there are
(continued on page 19)

The purchase of Capitol Industries cartridge and cart tape business by its Winchester VA plant manager can be viewed as a good economic indicator.

At a time when other parts of the economy are troubled and when some companies in the broadcast industry are pulling back, an employee buyout is an encouraging alternative to a company going out of business.

It shows that despite the "digital mania" among some broadcasters, the good old reliable endless loop tape cart appears to be alive and well and will be for some time to come.

It was also a healthy sign that a number of parties were interested in buying the Audiopak manufacturing line, including Fidelipac, which has established a good reputation in the cart and cart tape field.

New Look At Carts

Since it was overseas competition that prompted Capitol's initial decision to withdraw from magnetic products, it's good to see a domestic industry—the cartridge and cart tape market—profitable enough to support several players.

The Audiopak purchase keeps the number of cartridge tape makers at three, and competitiveness is sure to be on the increase in the months ahead.

Competition is generally good for the customer—in this case the broadcaster. Competing companies tend to focus on quality and product improvements and spend time and resources on developing new products. They also strive to keep costs down.

The newly formed company, Audiopak, will have to prove it can consistently produce what is apparently a popular product at high quality without the support of a large parent company.

Meanwhile, it's a whole new ballgame. The other players are responding with new policies and other innovations. And they are sure to market their products more aggressively.

With the clear choices available users of carts should take a fresh look at the changing marketplace, re-evaluate, perform their own tests and make enlightened buying decisions.

-RW

FM Stereo Startup Had Snags

by Ken Blake

Stockton CA ... When the FCC abdicated its responsibility and left it to broadcasters to select an AM stereo transmission standard, the big carrot was the promise that the industry would pick a standard.

When that came about, the selected system would fly, every one would say "well done" and AM radio would assume its rightful place in the spectrum.

Now that the AM broadcasters have quite convincingly welcomed one system (C-QUAM), the doom-sayers are playing dog-in-the-manger with their chance to put AM more nearly on a par with FM.

The early days of FM stereo were not the happiest. I was a broadcast field-service engineer with Collins Radio Company when the FM stereo system was selected by an apparently better-organized FCC.

Late 1961 and continuing into 1962 we saw the first of the FM stations implement this two-channel improvement in their facilities.

The make-do rigs in this pioneering effort were the result of the ingenuity of the responsible technicians. As there were no stereo consoles, consumer type amplifiers were yoked together to form a "stereo" system with which to feed the exciter.

It wasn't possible initially to hear the detected stereo signal but, in time, some electronics magazines published articles describing the compilation of transistors and Miller coils to accomplish the purpose when tied to the FM receiver detector.

Eventually, stereo FM radios were available and were pressed into service as stop-gap monitors.

As no FM stereo monitor standards had as yet been forthcoming from the FCC, the Collins engineers designed and built a few high-quality wideband receivers which could make possible the adjustment of stereo transmitters in the field.

These receivers were loaned to customers so they could verify compliance with distortion, noise, cross-talk and separation rules.

Guest Editorial

The minimum required channel separation was (and still is) less than 30 dB but no commercial monitors were available to measure it.

So, to further assist the industry, Collins engineers designed an FM stereo monitor which made possible the measurement of every parameter of the transmitted FM stereo signal.

The units were sold with a guarantee of modifications at no charge if the FCC should come up with different ideas of what an FM stereo monitor should incorporate.

Of course, to interject Murphy's Law, the Commission specified some parameters which were not exactly those of the Collins monitor.

So after much conversation with FCC engineers, and at great expense, Collins retrofitted each customer's monitor to conform to the new rules. Subsequently-

built monitors, of course, incorporated the new specifications.

All of this emphasizes the fact that, even though the FCC announced standards for stereo FM, the pioneers in that improvement of the medium could obtain stereo generators and improved exciters and little else.

Today, in contrast, we have not only an AM stereo (de facto) standard, but we have stereo audio consoles, composite and discrete STL's, and C-QUAM AM stereo generators built by at least four manufacturers who provide stereo monitors.

We also have a proliferation of AM stereo receivers in the field, all of which decode C-QUAM stereo. And 1988 will see more of the same.

It is an occasion for some serious reflection as we look back and consider the hurdles cleared by the early FM stereo broadcasters.

Of course this eventually made possible the unique position FM holds today due, in the main, to the addition of two-channel sound capability.

On the other hand, take a look at the many reticent AM broadcasters with every advantage equipment-wise but who, seemingly, are waiting for some hoped-for millenium which will do for them that which they could be doing for themselves.

Since KJOY has been transmitting C-QUAM stereo since 1983, it really is hard to shake the feeling that some AM broadcasters are nursing a deathwish.

Ken Blake is CE of KJOY-AM/KJAX-FM. He can be reached at 209-948-5569.

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Audiopak Stirs Up Tape Market

(continued from page 1)

and the company filled orders.

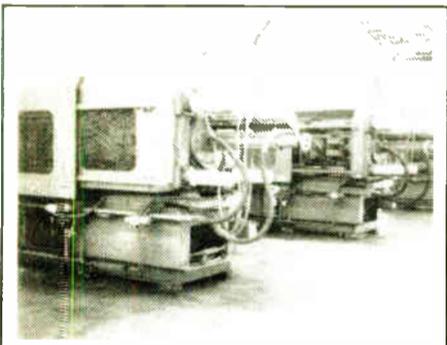
At the same time, distributors expressed concern for future shipments and noted that some broadcasters who used Capitol's Audiopak broadcast cartridge were looking to other manufacturers.

On 23 February, after nearly three months of talks with prospective buyers, Capitol announced that, "An agreement in principle has been reached to sell the Broadcast Cartridge business of Capitol Magnetic Products Division (CMPD) . . ."

The buyers were, according to Capitol, "a group headed by Nick Krassowski, currently the Vice President of Operations for the CMPD plant at Winchester, Virginia."

That transaction was completed at the beginning of March, and a new life for the magnetic division's audio cartridge and cart tape operations had begun.

The group that bought Capitol's broadcast cartridge division is really two peo-



Three of Capitol's plastic injection molding machines were sold to Audiopak.

ple: Krassowski, who worked for the company for 18 years, working his way up through the ranks, and John Good, a certified public accountant with a Winchester-based construction firm.

A mutual friend introduced the two men when Krassowski was putting together his offer to buy the division.

Krassowski named the newly-formed company Audiopak, after the successful

product line.

Now, as one of three manufacturers of back-lubricated tape for broadcast cartridges, as well as a manufacturer of the carts themselves, Krassowski and the company face the challenge of re-firing production and reassuring the industry that Audiopak is alive and well.

The new team

Krassowski is president, managing the day-to-day operations, and Good is secretary-treasurer, a role that will not keep him at the company fulltime.

News Analysis

The team Krassowski has assembled to run Audiopak includes Gordon Stafford, a Capitol Magnetics alumnus who will be vice president of sales. Working in marketing and administration will be John Apsitis who worked in the same capacity for Capitol.

Also working as a consultant to Audiopak on technical sales will be Joe Kemper, who was technical service director for Capitol Magnetics. A consultant, who Krassowski declined to name, will work on engineering developments and design.

In addition, Krassowski is in the process of hiring back some 50 to 60 employees of the more than 500 who lost their jobs in December. "We should be able to staff with close to 100 percent ex-Capitol employees," he noted.

Krassowski said that there will be few changes with Audiopak. "For the present time our theme is everything is going to be the same. We want the industry to know that nothing's really changed."

The company has a year's lease on 17,000 square feet in the old Capitol facility, which was bought by a Winchester furniture maker, but Krassowski hoped to be in a new plant shortly.

At press time he was "98% sure" that

he had found another Winchester site. Krassowski had not yet signed a lease but was going over the paperwork with lawyers and he said, "I've got a key to the (new location's) plant."

Back inventory

Krassowski said in March that there were enough finished goods to last until production could get going full time. He said there was an inventory of two to three months of the cartridge casings and spools, and a six month supply of coated tape.

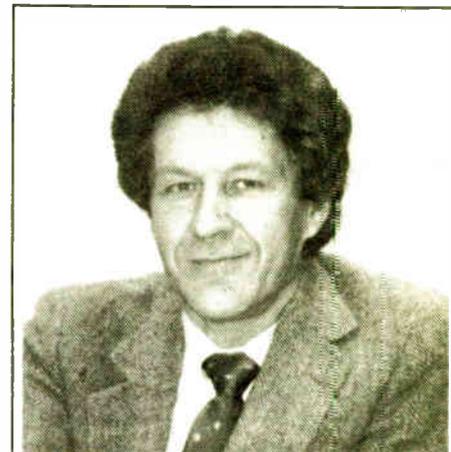
Included in the purchase, he said, were three injection molding machines, coating equipment, a tape slitter and the cartridge assembly line, plus support gear. He also bought the rights to a new Capitol cassette mold and chemical tape formulas.

"Basically, I bought everything I need to run," Krassowski said.

His goal was to start assembly by the first of April. "We've got the tape; we've got the carts." The next step in the operation will be to re-start production of the plastic casings and spools.

By the end of June, Krassowski plans to have Audiopak in production making tape. He projected it would take six to eight weeks to have the new facility in operation, with new pollution control equipment and the necessary approval by Virginia air pollution control officials to operate the tape coating machine.

A senior field representative for the State Air Pollution Control Board in Virginia said the board has 90 days to approve or reject an application once a company has supplied all the necessary



Audiopak's president Nick Krassowski

documents.

By mid-March, Audiopak had made arrangements to take over Capitol Magnetic's booth at the NAB convention in Las Vegas. Krassowski didn't expect to have Audiopak's new cartridge at that show, but he said he could have samples by the September SBE convention. He projected three to five months of field testing, with "probable" introduction during the first quarter of 1989.

Krassowski pointed out that Audiopak is not the new guy in the market. "We've been here," he said.

Tough competition

When Fidelipac decided to start making its own back-lubricated tape in 1983, it did so because of the state of the tape marketplace at the time.

Fidelipac was the company that invented and patented the endless tape loop cartridge and originated the first ones used in auto stereo systems—the 4-track—a precursor to the stereo 8-track.

The concept was ruggedized for broadcast use in the late '50s with the advent

(continued on page 8)

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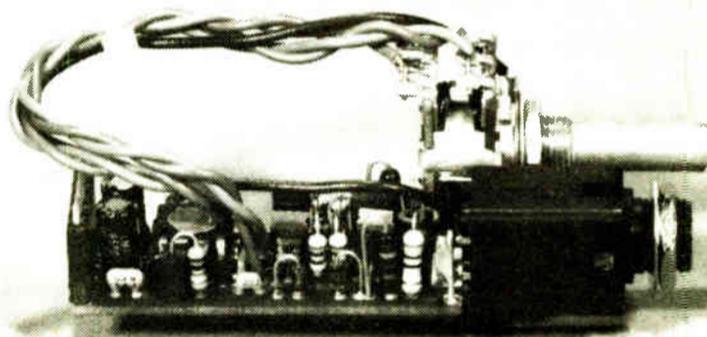
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Cart Makers Compete

(continued from page 7)

of the cart machine, which ran at 7½ ips and used cue tones.

Marketing VP Art Constantine explained that Fidelipac, which had been loading cartridges with tape from other manufacturers (including 3M, Ampex and Columbia Magnetics), decided to make its own when the back-lubricated tape market changed.

"The quality of back-lubricated tape was becoming unreliable due to the demise of the 8-track stereo," Constantine explained. The demand for the tape from the broadcast industry was much smaller than consumer demand had

been, plus consumers would settle for poorer quality than radio stations would.

Constantine recalled that starting up a tape-manufacturing operation was "rough going" at the start. "Learning to operate tape manufacturing equipment even with the most competent advice is extremely difficult; the performance of the equipment is very unpredictable when first turned on."

Nobody at Fidelipac is saying that the going will be as rough for the new Audiopak, but the difficulties of gearing up tape production are in the forefront of both Constantine's and Fidelipac President Roger Thanhauser's thoughts.

Constantine said that Fidelipac sought to take over production of the Audiopak line to "broaden our base" in the business. The line was profitable, with "a respectable share of the market."

He added that with Fidelipac's own broad base of tape and cartridges as well as cart machines, "We felt we were the most likely candidate to continue manufacturing the cartridges on an immediate basis because we already have the tape manufacturing, plastic molding and assembly lines in place."

Of the outcome of the sale, Thanhauser said Fidelipac was "naturally disappointed." But he added, "Perhaps it's for the best since broadcasters prefer to be offered a maximum number of choices among products and different vendors."

He felt it would be inappropriate to comment on what he called the "obvious manufacturing, organizational and financial problems" which confront Krassowski's plans to start up production.

But Thanhauser did caution "prudent station management" to evaluate their alternatives "in advance of a possible crisis."

And both he and Constantine said there will be more aggressive marketing of Fidelipac's tape products, especially the company's most recent product, Dynamax cobalt tape, which was designed to meet station's needs for better dynamic range as they continue to cart up selections from CD.

The company regularly ships sample products to "hundreds of stations," according to Thanhauser, and will continue to do so. He added "We are very gratified to see Fidelipac's cartridge busi-

"We wanted the best sound in town—I think we were successful."
Martin Brandl, Chief Engineer
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(Soft Rock)

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Don Hobson, Engineering Manager
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John Bortowski, Chief Engineer
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Duffy Egan, Chief Engineer
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(Contemporary Hit Radio)

"Clean and loud."
Barry Mishkind, Chief Engineer
KFXX, Tucson, AZ
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"Clean and natural without being strident. It gives you lots of adjustment capabilities, and will fit almost any format. The manuals are very good as usual."
David Ficker, Chief Engineer
KHOO, Waco, TX
(Adult Contemporary)

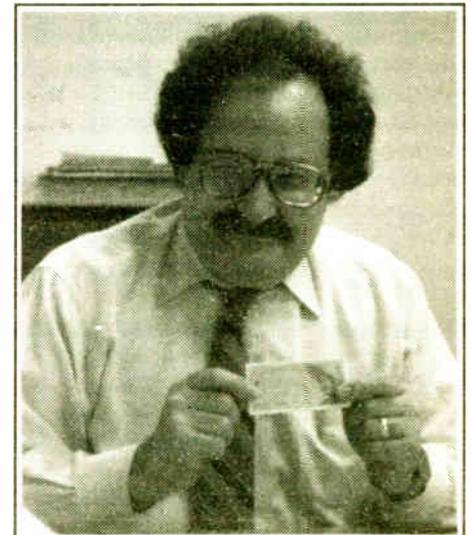
"Voices sound clean and open, and the music sounds great."
John Buckham, Chief Engineer
KITS, San Francisco, CA
(Modern Rock)

"Super! The most cost-effective change we've ever made."
Randy Wells, Chief Engineer
KREO, Santa Rosa, CA
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"It's the biggest bang for the buck—lets us customize our sound for our listeners."
Matt Conner, Chief Engineer
WASH, Washington, D.C.
(Adult Contemporary)

"Lethal."
Terry Carpenter, Chief Engineer
KJYY, Houston, TX
(Vocal Soft Rock)

"Gave us more punch and clarity without any increase in distortion."
Michael Fast, Chief Engineer
WPOC, Baltimore, MD
(Modern Country)



Fidelipac's VP marketing, Art Constantine

ness up dramatically over the past two to three months," but did not attribute that rise directly to the uncertainty which surrounded the Capitol situation.

ITC/3M

"We're not trying to take advantage of the customers or the situation," said ITC Product Supervisor Bill Parfitt. "We're interested in long-term gains. The merits of the products will speak for themselves."

International Tapetronics Corp., owned by 3M, is the other player in the cart and tape market battlefield. But at ITC/3M there appears to be no special move afoot to take advantage of the change in market players.

"We're always changing strategies," Parfitt said. "I don't think we've done anything particular because (of the Capitol sale)."

But he acknowledged, "Certainly, there is an opportunity there to increase the market share."

In addition to Scotch 219 lubricated tape, ITC manufacturers ScotchCart II broadcast cartridges and three series of cart machines: the 99B, Delta and Omega.

He noted ScotchCart tape sales have been on the upswing for about three years, and the company recorded "an associated jump" in sales when the fate of Capitol was uncertain.

Distributors

Concerns first expressed when so many unknowns surrounded the Audiopak cart seemed to have subsided among distributors.

Of the six major dealers contacted nationwide, many made a business-as-usual prediction among the three tape

(continued on next page)

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Circle Reader Service 21 on Page 34

World Radio History

New Arena for Tape

(continued from previous page) manufacturers. Some noted that the new Audiopak will have to prove itself, and they too await the reactions—if any—from Fidelipac and ITC/3M.

"It's a little too early to tell (how the market will develop)," said Broadcast Supply West Marketing VP Tim Schwiager. He said that Audiopak hasn't had time to prove itself since the Audiopak cartridge isn't yet on the market. The company is still distributing its backlog of Capitol product.

Initially, Schwiager admitted that distributors panicked when Capitol announced it would shutdown. "We freaked. I know we made too much of it."

But he said fears of product shortage were calmed as Capitol kept in production and filled orders. "There was nowhere near the panic with the customers as with the distributors," Schwiager said.

During the initial days of uncertainty, Schwiager acknowledged that BSW saw a "brief movement" to other manufacturers' cartridges by radio stations considering a new library. However, he said that as the panic subsided, the movement stopped.

What is happening, though, is customers are shopping the broadcast cartridge market, rather than buying what they traditionally purchased, Schwiager said. "Customers are starting to look a little more carefully."

Marketing

Broadcasters who are looking for cartridges more carefully than before may find a different sales approach, according to one distributor.

"I think you're going to see some aggressive marketing and pricing," said Allied Broadcast Equipment National Marketing Director Dave Burns. He predicted that the manufacturers will make "price concessions" as they compete for the edge.

Broadcasters General Store VP Chris Shute said there was the potential for disaster—if Capitol's cart division had not reopened, or if the company had not handled the transition so smoothly. "I think the concern ended when the destiny of the company was settled," he noted.

Shute finds business as usual in the company's cartridge sales.

At Northeast Broadcast Lab, Sales Manager Cris Onan predicted a more competitive market for cart sales. He said the broadcasters have "three pretty good options" from which to choose.

According to Broadcast Cartridge Serv-

ice owner Bryant Ellis, people overreacted to the issues surrounding Capitol. "People aren't as alarmed now that employees have bought the company," he added.

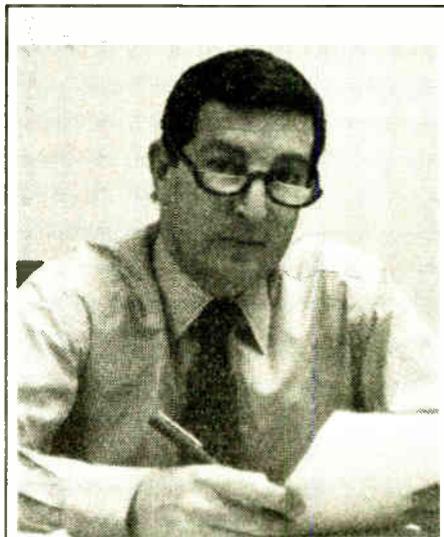
Other industry reaction

Executives of other companies who manufacture cart equipment are pleased to still have three tape manufacturers. What they expect, with new management at one of them, is more competition.

Pacific Recorders & Engineering President Jack Williams, whose company makes Tomcat and Micromax cart machines, expects a healthier industry.

"My guess is the market would not have been well served with only two players," Williams said. "I think the competition is maintained."

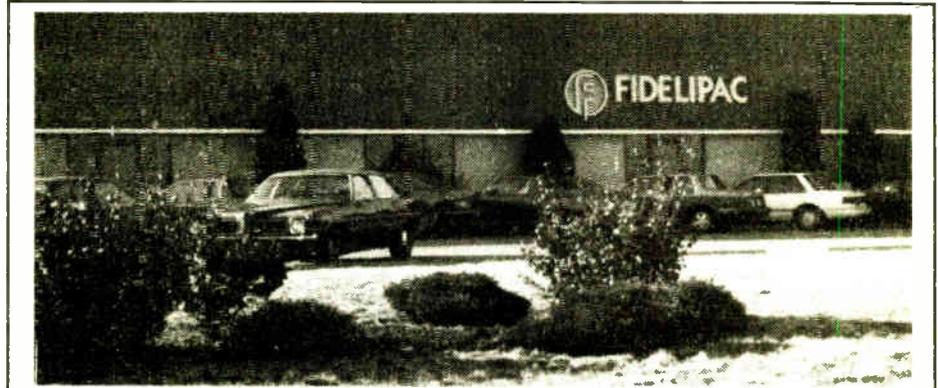
Larry Cervon, president of Broadcast



Roger Thanhauser, Fidelipac's president

Electronics, which manufactures several cartridge machines including the Phase-Trak 90, also praised the effort to keep three players in the cart market.

"They say two's company; three's a crowd," Cervon said. "But business is one place where three makes sense." He added, "When you have two manufacturers of anything, the user is at the



A Moorestown NJ building houses Fidelipac's cart, tape and cart machine business.

mercy of greed."

Fidelipac, however, doesn't agree that the reduction in the tape market from three to only two players would have necessarily been a bad thing.

Constantine pointed out that making tape is a volume business, and that the added volume taking over the Audiopak line would have meant for Fidelipac could have increased the company's efficiency and also meant more uniform quality tape at a lower cost.

"Although it might seem better to have more suppliers of back-lube tape, in fact the volume for the broadcast market is so small relatively speaking that now more manufacturers are splitting a tiny market," he said. Fidelipac also makes back-lube tape for the non-broadcast market.

Otari Marketing Manager John Carey, whose company is a more recent entrant in the cart machine market, was another who thinks the industry will see new marketing strategies.

"I see Fidelipac getting more aggressive because they perceive a way to make more headway," Carey explained.

Constantine, in fact confirmed that the company intends to "escalate its promotional efforts."

And while Fidelipac is not resting on its laurels in either promotion or the development of future products, the company is not shying away from the competition that is heating up in the tape market and promises to continue for the foreseeable future.

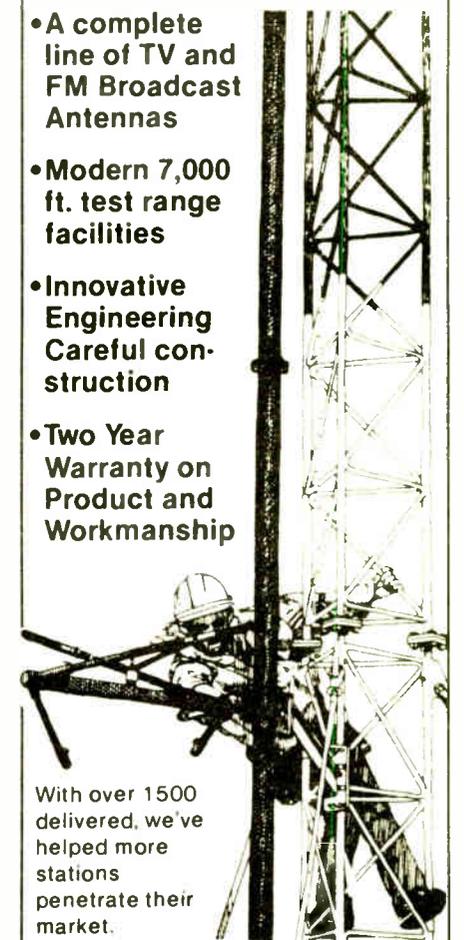
"We believe that the real acid test for the new Audiopak will not come during

the next 90 days, because they're coasting on inventory produced by Capitol," said Constantine. "The real shakeout will occur during the following year, when Audiopak will be totally responsible for its own tape manufacturing and administrative responsibilities."



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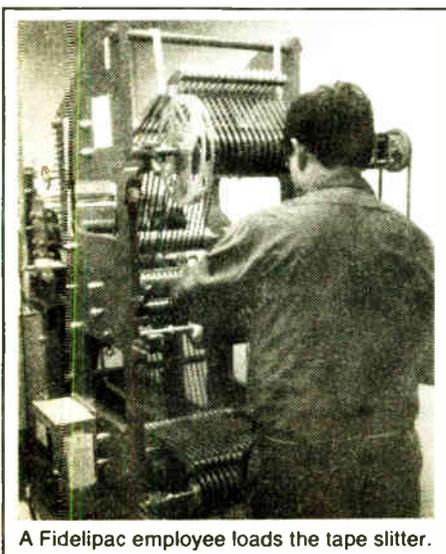


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A Fidelipac employee loads the tape splitter.

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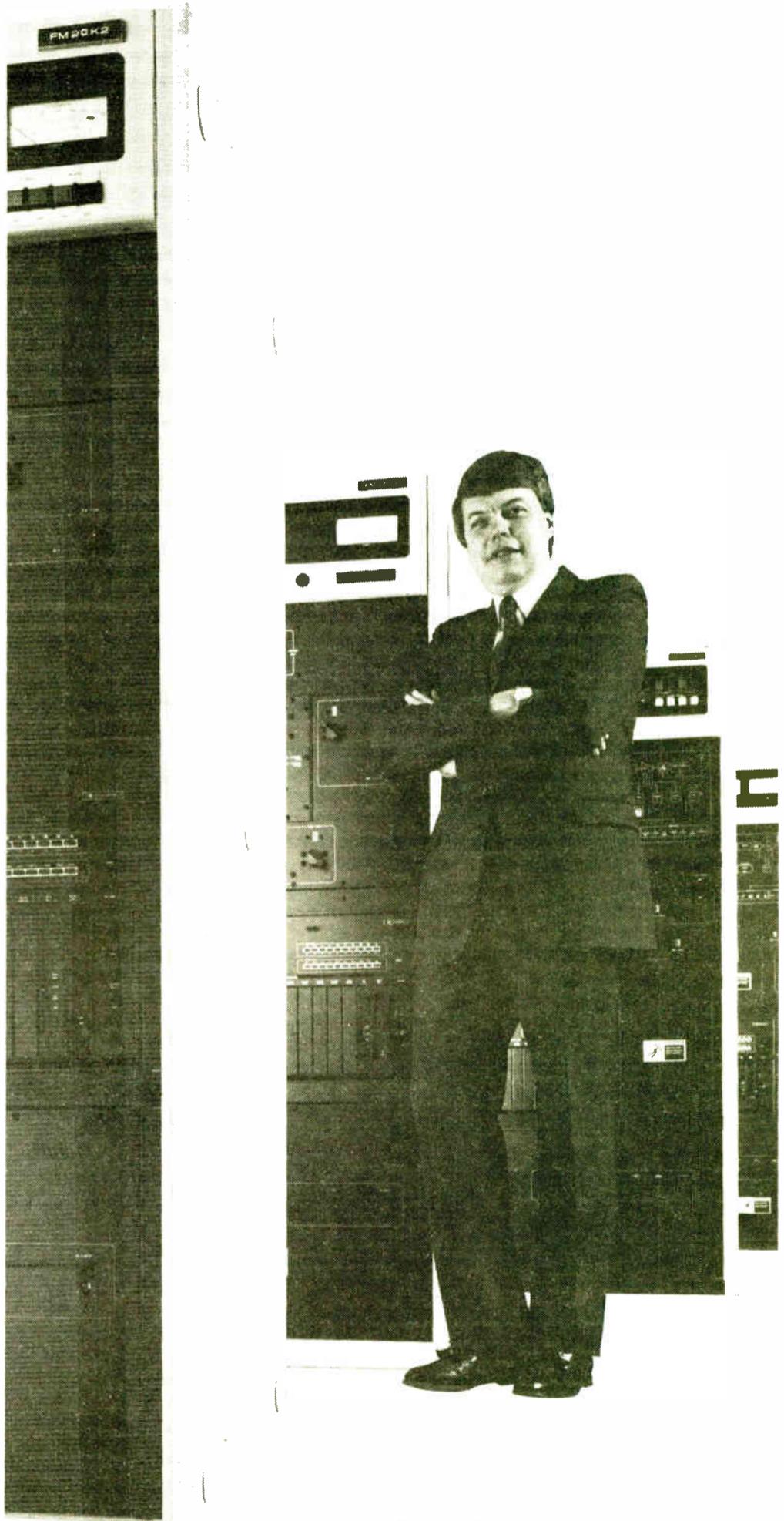
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Antenna Project Nears Launch

by Alex Zavistovich

Washington DC . . . The first leg of the NAB's anti-skywave antenna project is nearing a launch, with some close to the project estimating that a lease for the test site may be signed within the next few months.

The NAB's project will test antenna designs which are intended to limit skywave while increasing groundwave propagation of AM transmissions.

Two designs are involved in the test—a two-element array designed by Ogden Prestholdt, a consultant for the Washington DC-based engineering firm of A.D. Ring & Associates, and a monopole-ring radiator design by Richard Biby, of Communications Engineering Services in Arlington, VA.

NAB Science and Technology VP Michael Rau acknowledged that a lease has been drafted between the NAB and property owner Howard University for the Beltsville, MD site of the antenna project.

Remaining before the lease can be signed is a survey layout attachment to the contract, which will be drafted by Kidde Consultants, a civil engineering firm from Laurel, MD that conducted the site survey for the project several months earlier.

The Beltsville location is to be time-shared between the two antennas involved in the AM project.

Proceeding smoothly

In general, work on the project appears to be "proceeding smoothly," ac-

ording to Prestholdt.

Prestholdt said in late March that a contract was "essentially complete" with Howard University, and he anticipated that a lease would be signed and site preparation would begin "within a month."

However, Rau cautioned that although the NAB was "moving as fast as (it) can," there are several matters beyond the association's control which could affect the project's actual starting date.

Besides the survey layout, the NAB has been working with its attorneys in preparing a building permit application for Prince George's County, in which the Beltsville site is located. Rau said that processing time of the application by county officials could be a factor in the project's launch.

He also suggested that the starting date could be affected by how long it takes Howard University to review and sign the lease once it has been received by the institution.

Howard University had originally held some reservations about the project because of concerns that tower lights might interfere with astronomy classes the school holds at a nearby observatory.

The matter was resolved, however, by moving the intended location of the antenna to another place on the site.

Real testing

Real testing of the Prestholdt design would probably begin "two or three months" after signing of the lease, according to the antenna's inventor.

In the interim, Prestholdt said he would be preparing a budget for the experiment and would work with hardware suppliers for the longer-lead items.

Perhaps the longest lead item, Prestholdt commented, is the tower itself.

At 295', the structure will be "a more or less standard AM tower, only with slightly greater windload."

The tower would require either an 18" or 24" base, he added.

Under the terms of the arrangement being negotiated with Howard University, the site would be leased for two years.

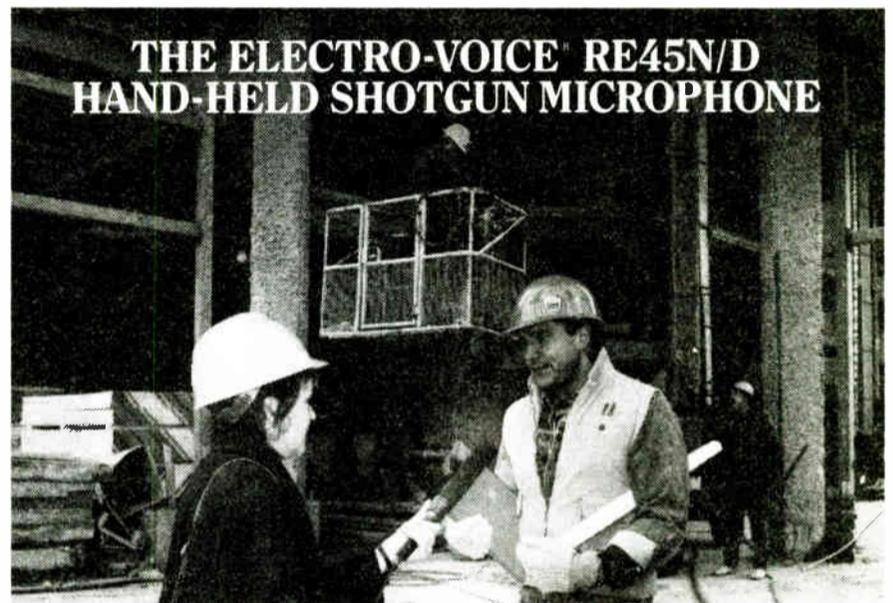
Prestholdt, however, commented he could "only fill up six months to a year" for the research.

"None of us can afford that kind of time," said Prestholdt of devoting two years to the NAB's AM antenna project.

After the testing of Prestholdt's antenna is completed, the site will be used for analysis of the anti-skywave design proposed by Richard Biby.

Originally to be tested in Loudoun County, VA, the NAB decided to time-share the Beltsville site with Biby because of delays in obtaining approval for the Loudoun location.

For additional information, contact the NAB at 202-429-5346.



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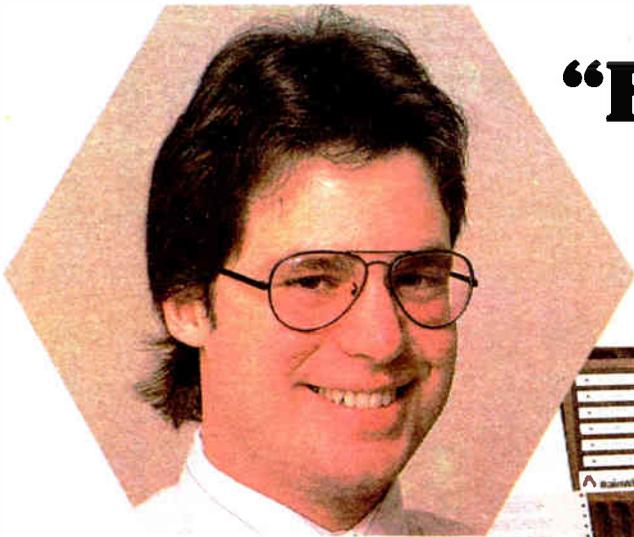
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Class A Hike Comments Filed

(continued from page 1)

facilities to cover large urban and rural areas and other facilities to provide service to as many communities as possible.

Another way

As an alternative, Greater Media recommended that the FCC examine the establishment of additional FM station classes which comply with minimum separation requirements or the use of directional antennas.

Other opposition came from Gannett Co., operator of nine FMs; Tribune Broadcasting, which holds two FMs; Susquehanna Broadcasting, operator of 11 Class Bs and Class Cs; Malrite Radio and Television, which operates seven FMs, and Cox Enterprises, which has six FMs.

The majority of the broadcasters raised questions on interference that the power hike would have on Class B stations.

Susquehanna Broadcasting said it "does not object and, in specific areas would support facility improvements for Class A stations."

However, the broadcaster wrote, "we strongly believe that it is absolutely imperative that such improvements not be made at the cost of creating new interference to any existing FM station regardless of its class."

Susquehanna also claimed the New Jersey proposal contains inconsistencies. The petition notes a 40% increase in 60 dBu coverage without considering interference that would exist in this newly created coverage area, according to Susquehanna.

Consideration also is not given to other Class A stations that cannot take advantage of a similar power increase under the proposal, the company continued.

Directional alternative

Although recognizing the New Jersey group's opposition to their use, Susquehanna stated directional antennas are a legitimate alternative to a blanket power hike for Class A's.

Such a move "would preserve the integrity of the allocation system, and allow all FM stations to take advantage of underserved population areas," the broadcast group owner argued.

Gannett recorded its opposition to the proposal citing a "dramatic increase in predicted interference" for KIIS in Los Angeles.

The company said five authorized or proposed Class A stations are assigned to frequencies within two adjacencies in the Los Angeles area, and that the operations of these stations are close to, at or below the minimum required separations under the Commission's rules for co-channel and for first, second and third adjacent channel stations.

Gannett claimed its study shows these stations cause interference on a predicted basis within KIIS's predicted 1 mV/m (60 dBu) contour, despite the current 3 kW limitation.

"An across-the-board power increase as proposed by the New Jersey broadcasters," Gannett wrote, "would result in a dramatic increase in predicted interference to reception of KIIS-FM's signal in several densely populated areas within the station's primary service area."

The NAB, which tried and failed to reach a compromise with the New Jersey Class As in several talks, filed its

previously announced proposal that the FCC grant power hikes, but only on an individual basis.

NAB called on the FCC to begin a proceeding on whether power hikes should be based upon individual application, and it encouraged the Commission to propose adopting a mileage separation table that permits Class A stations to increase power without degrading the service of existing FM stations.

Create a hardship

The association opposed a blanket power hike because it could create a hardship for some Class A stations that elected not to upgrade. A "one-sided" increase to 6 kW will degrade a co-channel 3 kW Class A station's service area, the NAB argued.

The NAB noted stations might not go with an increase because of financial restrictions or technical facilities.

On its mileage separation table, NAB stated it would favor an increase in power for many Class A radio stations without diminishing existing FM service.

Case-by-case

NewCity Communications, whose vice president of engineering, John Marino, was actively involved in the NAB debate on the petition, opposed the New Jersey proposal claiming it set up the situation of "nibbling away of existing coverage and the creation of new zones of interference for the listening public."

NewCity, however, proposed case-by-case power hikes "to those applicants which comply with the Commission's

current Section 73.207 and which do not create contour overlap."

"... NewCity will support proposals to allow Class A stations to improve their facilities as long as existing mileage separations are maintained and interference is not created by contour overlap."

The broadcast group cautioned the FCC on considering proposals that would create additional interference before tests are performed to assess listeners' response to various signal to interference ratios. These tests are currently being planned by NAB.

NewCity also noted concerns receiver manufacturers have conveyed on the proliferation of FM stations and the likelihood of greater interference potential.

The docket number at the FCC is RM-6237. Reply comments were due 30 March. For information from New Jersey broadcasters, contact Robert McAllan at 201-774-7700.

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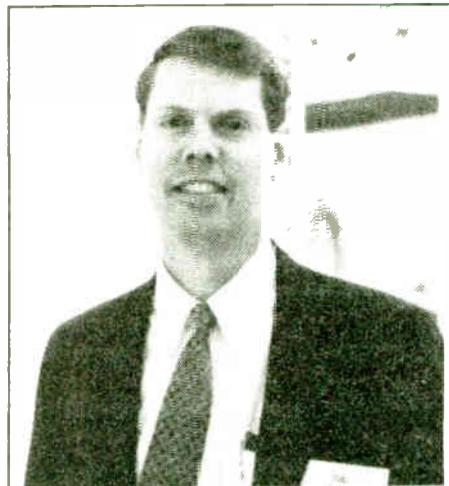


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Tell Addresses RF Compliance



Richard Tell

Editor's note: Richard Tell is a consultant in the field of RF radiation compliance. Prior to opening his private practice, he spent the last five years as chief of the Environmental Protection Agency's electromagnetics branch. The following interview, conducted by RW reporter Alex Zavistovich, focuses on some concerns regarding RF emissions.

RW: Is the issue of excessive RF radiation one which should be of concern?

Tell: I have seen instances in which the Commission has placed a requirement on broadcasters to provide evidence that they are in compliance with the ANSI guidelines before any action is taken on

any of (their) applications. From that standpoint, I think it becomes very important.

From my perspective, the FCC appears to be cracking down much harder on RF violations than it had in the past. I see this picking up, and particularly in the FM field, it may increase even more.

RW: From your past experience, what percentage of towers really represents a problem in terms of excess RF radiation?

Tell: If we were to restrict our definition of a problem to a situation where a station has radiation fields in excess of the ANSI guidelines somewhere in a publicly accessible area, we are probably talking about somewhere between 8% and 10% of FM radio stations, and some-

what less than that for AM.

I'd have to rank the segments of the industry that have the greatest problem with excessive RF radiation as FM, AM and television last.

RW: What about corrective measures? For example, fencing around the broadcast tower, seems to be a mild treatment for the problem. Should more rigid measures be taken?

Tell: The first thing that is important is to take accurate assessments to determine exactly what the field strengths are. I have seen some stations indicate that they thought they had a problem when they really didn't.

If the fields exceed the ANSI standard, which is what the FCC uses to determine RF levels for broadcasters, one has to find out how serious the problem is—are these fields regionalized? In some cases, a fence may be the most cost effective approach—limiting access to the area.

However, it is not always the most cost effective. It may sometimes be more costly to have a fence installed around a given site than it would be to consider something else, such as a change in antenna design.

RW: But should this strictly be a question of cost effectiveness? A fence doesn't really reduce RF radiation, only the chance of exposure.

Tell: Yes, but the objective of the FCC guidelines is to minimize exposure of individuals to fields which exceed the limits, in whatever way possible. How you get it done becomes somewhat immaterial, as long as you get it done.

It is true that if we put a fence around a tower, that has done nothing to the field inside the fence, and obviously station employees may from time to time have to enter the area. A solution like a fence may minimize public exposure, but it will not do anything to minimize occupational risk. Other alternatives, such as shielding, may have to be examined.

RW: There is a controversy among experts as to how RF measuring devices ought to be used. Do you find that there is a problem taking accurate measurements?

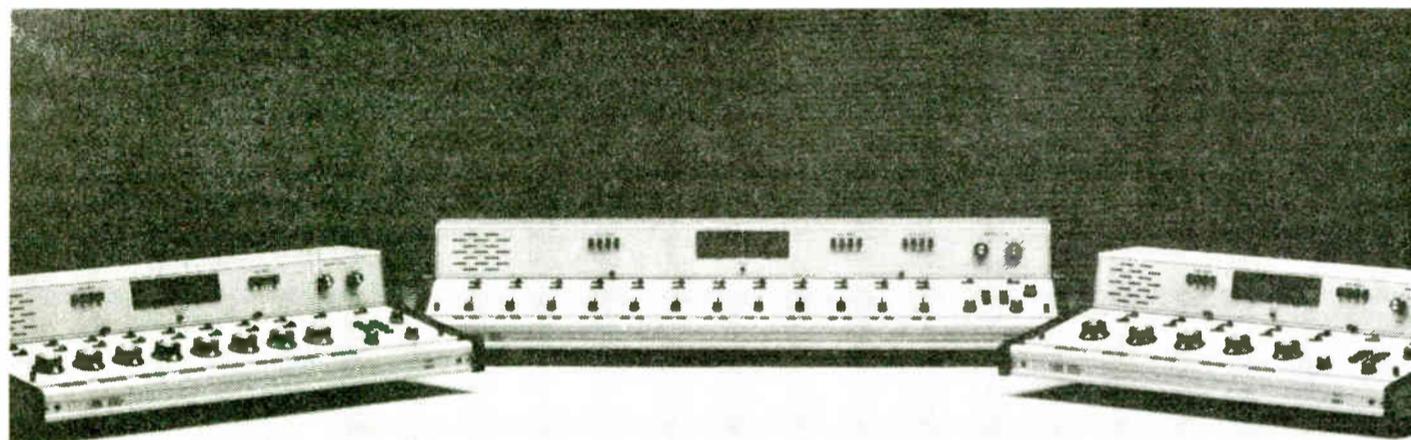
Tell: From time to time, questions may be raised as to whether measurements taken by several individuals show agreement. It boils down to a matter of instrumentation and its application. Some devices may not be the most appropriate for a given circumstance.

In my opinion, you can't characterize any single given instrument as suitable for use under all possible conditions. An array of instruments is required to properly select the one best suited to the condition.

Presently, while a problem does exist, it may be improving as manufacturers improve their own instruments. But it is a problem, because measuring equipment all works differently in various circumstances. That would account for apparently contradictory RF measurements made by different parties in the same area.

RW: You are looking, in many ways, at the RF issue from the other side of the fence now that you are no longer with the EPA and have a private consulting practice. Is your job significantly different now?

Tell: Basically, I find that I am doing work for any organization that is concerned about determining RF levels. While it is true that this has been for the most part on the behalf of potential "exposers" rather than "exposees," in most all cases what is needed is the truth. In that sense, I do not see any difference at all between what I did before and what I do now.



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First High Power FM Booster

by Alan Carter

Racine WI . . . WBZN-FM has installed a high-power booster under "experimental authority" granted by the FCC, after the Commission last summer approved a plan to allow FM stations to increase the power of booster facilities.

The station received authorization for the first such booster in the country, after applying for a temporary permit, while waiting for the FCC to finalize documents for permanent applications, according to Marty Hadfield, director of engineering for the station's group owner, SRO Broadcasting.

"It will work like gangbusters," said Hadfield. The high-power booster has been in operation since early February.

WBZN installed the booster to obtain 2,000 W of effective radiated power, to strengthen its signal in Milwaukee, about 25 miles north of Racine, Hadfield said. WBZN is a 50 kW, jazz format station licensed in Racine.

The process was accomplished with a 950 MHz microwave intercity relay to transmit the signal from the main FM transmitter to the booster site about 18 miles away, he explained. The booster consists of a Broadcast Electronics 250 W

solid state transmitter with a prototype synchronization board that locks the frequency of the booster to the main FM transmitter frequency.

The 250 W transmitter feeds an antenna system, about 300' HAAT, with 2,000 W ERP.

"The idea is to fill in the shadow areas (in Milwaukee) created by the buildings downtown," Hadfield said.

Hadfield noted that WBZN has found the increased power of the booster works too well, and the antenna height may have to be adjusted. He explained that in some areas, the booster causes interference with the station's main transmitter.

"The test has shown, in an area with adequate isolation, a booster is a very

good method to improve coverage in shadow areas," he said. "But in an area with marginal isolation, the booster will need real close tailoring to your coverage area."

Other problems the station encountered is how the microwave system handled the composite signal.

The signal was found to be 180° out of phase from the input to the output of the microwave system. This was solved by installing a Modulation Sciences clipper on the output of the microwave receiver to correct the 180° phase rotation.

Hadfield said SRO plans to apply for a similar permit to operate a second high-power booster at WBZN for a residential area, and has received ex-

perimental authority for another booster at KHIH-FM, Denver.

Under new FCC guidelines, broadcasters can increase booster power to 20% of the maximum permissible ERP for the class of primary station they broadcast. The old guidelines limited stations to a 10 W maximum power limit.

The new rules also allow FMers to use aural broadcast auxiliary channels, on a secondary, noninterference basis to transmit signals to boosters.

In making the ruling, the FCC stressed that the role of boosters has not changed. It maintained that boosters will continue to provide fill-in service, on a secondary basis, to areas within the primary station's contours.

Marty Hadfield can be reached by calling 206-281-5633. The FCC contact on the FM booster issues, Docket MM 87-13, is Marica Glauberman, 202-632-6302.

AM Day is Set in May

Macon GA . . . In an effort to bolster AM pride among its ranks, the Georgia Association of Broadcasters will hold an "AM-Only Day," with seminars addressing various aspects of station operations.

The day-long program is scheduled 26 May, at Macon College, Macon, GA, according to Bill Saunders, GAB president who developed the event concept.

"The entire premise of the day is that reports of problems with AM have been exaggerated," Saunders said. "There seems to be a national minor panic as far as AM radio is concerned."

Saunders has planned a schedule that addresses personnel, programming, news, management and technical issues. The individual sessions will be panel discussions and presentations by well-known Georgia broadcasters.

Former Atlanta WSB-AM programming director Walt Williams, now a private consultant, will discuss programming "for a new era." William Powley, general manager at WMOG-AM, Brunswick, GA, who has written a book on station management, will focus on his special interest.

On the technical side, a session will address the National Radio Systems Committee standard and AM stereo. Saunders said the NAB has supplied him with information to present during this session.

Saunders said he hopes an AM public awareness campaign will grow out of the program. "I am convinced that broadcasters are the greatest promoters for anything except themselves," he added.

The program will be from 9 AM to 4:30 PM. Cost is \$25 for the first person from a station and \$5 for each additional person.

For more information, contact the GAB at 404-993-2200.

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"Marti" Upgrade Aims at Cuba

by David Hughes

Washington DC ... While the Voice of America is improving its Radio Marti AM antenna site to provide a stronger signal to Cuba, there are plans this spring for more talks between Cuba and the US to reduce Cuban AM band interference.

A new four-tower array is under construction at Radio Marti's antenna and transmitter site in the Florida Keys, according to VOA spokesperson Kathy Litwak.

Unlike the VOA's general Spanish language service, which is beamed throughout Latin America, Radio Marti

is geared to providing music and news specifically for Cuba.

The VOA, Litwak indicated, had had a three-tower array at the Marathon, Florida site since 1962, when it began its AM band relay of general service programs to Cuba and the Central America region. The VOA began the Radio Marti service in May 1985.

Improved reception

The \$1.3 million antenna project, which will improve reception of the 50 kW Radio Marti signal on 1180 kHz, is scheduled to be completed in September, Litwak stated.

"The salt water in the atmosphere has

caused a lot of wear to the equipment (at the site)," she said. "Additionally, the original design was not an optimal directional pattern."

The Radio Marti signal is directed southward, away from the US mainland.

"The new four-tower array will provide a better quality signal. It will increase the signal over Cuba, especially in Havana," she said.

Plans also call for installation of a new ground system as well as new RF phasing equipment.

However, Litwak stressed that while the Radio Marti improvements would most likely improve the signal into other areas of Central America, such as cur-

rent hot spots Nicaragua and Panama, the primary reason for the upgrade was improved service to Cuba.

She added that there are also no plans to shift the Cuban emphasis of the Radio Marti programming to a broader focus.

Radio Marti broadcasts to Cuba will continue while the work at the transmitter site is being performed, Litwak added.

Broadcasters, particularly those in South Florida, have been reporting on-going interference from Cuban AM stations. However, there have not been any recent reports of increased interference with the news of improvements to the Radio Marti antenna site.

No objections, yet

Bill Haratunian, a consultant the NAB hired to study the Cuban interference situation, said the broadcasters association has "no objection" to the VOA improving the Radio Marti antenna system.

However, he said if the VOA planned to increase the power of the facility above the currently reported 50 kW level, the NAB would be concerned that Cuba might retaliate with more AM band interference.

Haratunian indicated that he had not heard of any VOA plans to increase the power of the Radio Marti AM transmitter. Radio Marti is also relayed on several shortwave frequencies from other VOA transmitter sites.

If the VOA wanted to increase Marti's AM signal to 100 kW, which has been rumored, it would have to get approval from the FCC and Congress, Haratunian said. It would also have to file with the International Telecommunications Union (ITU) in Europe.

Ever since Radio Marti started, several monitors have said they thought the Marathon transmitter site had operated at times with a power greater than 50 kW, however the VOA has not confirmed this.

Haratunian also reported that a resumption of bilateral talks between the US and Cuba will take place this spring, although at press time no dates had been set.

Talks between the two nations were held in November 1987 to "de-link" broadcasting issues from other topics such as immigration issues.

The announcement of an agreement to send some Cuban refugees, including some criminals originally from Cuban prisons, back to the island nation sparked a wave of riots at the Louisiana and Georgia facilities where they were being held.

One issue that could be raised in future talks is a study Congress has authorized on the feasibility of creating a "TV Marti" service similar in scope and purpose to Radio Marti. It could be relayed either by terrestrial transmitter or via satellite.

In December 1987, Congress approved \$100,000 for a TV Marti study. The government has earmarked \$12.75 million for broadcast operations to Cuba this year. The TV Marti study is scheduled to get underway this spring, and be completed the year's end.

The NAB said it is fearful that Cuba could increase AM band interference in response to plans for TV Marti, which is being sponsored by several Florida legislators.

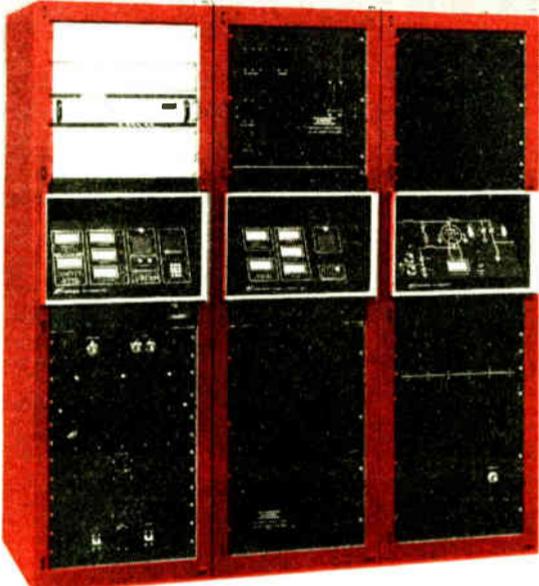
For more information on Radio Marti, contact the VOA's public information office at 202-485-6231. NAB consultant Bill Haratunian can be reached at 301-231-0568.

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Station Depreciation Studied

by Alex Zavistovich

Washington DC . . . The US Treasury Department has initiated a study to determine whether it should change the depreciation of radio and television broadcast assets for tax purposes.

The Office of Depreciation Analysis (ODA) has a mandate under the Tax Reform Act of 1986 to conduct such studies of all tangible depreciable assets, according to Lowell Dworin, acting director of the office.

On 16 March the ODA met with representatives from the broadcasting community—including radio, television, cable and production concerns—to discuss the study and provide input for it.

Class life of assets

The study will evaluate the current "class life" of broadcasting assets compared with their depreciation.

Class life of an asset, according to the Tax Reform Act, "must reflect the anticipated useful life, and the anticipated decline in value over time, of an asset to the industry or other group."

Currently, class lives for broadcasting assets vary depending on the asset. The class life of transmitting towers is 20 years; other broadcasting assets have a class life of six years.

These assets are being reexamined, Dworin explained, because of an "apparent disparity between existing class lives and available evidence." Changes in the tax laws also have required the reexamination, he said.

In particular, the tax law has changed the definition of "useful life," which is central to the class life concept.

According to the Tax Reform Act, useful life of an asset now means "the economic life span of property over all users combined and not, as under prior law, the typical period over which a taxpayer holds the property."

During the 16 March meeting, a num-

ber of issues were raised, including broadcast assets on the resale market, "intangible" asset value, and whether noncommercial broadcasters ought to be included in the study.

“

. . . age of the equipment is not in itself enough of a factor in resale value.

”

ber of issues were raised, including broadcast assets on the resale market, "intangible" asset value, and whether noncommercial broadcasters ought to be included in the study.

NAB Financial and Economic Research Director Mark Fratrick posed the question of determining the value of an asset in the resale market. He pointed out that age of the equipment is not in itself enough of a factor in resale value—there must be some way to account for "intensity of use" of the equipment.

"If you are looking only at 'five year old equipment,' that says nothing about the state of that equipment or the state of five year old equipment in general," Fratrick explained.

Another broadcaster at the meeting claimed that "radio stations don't resell equipment, as a rule." Older equipment

in many cases is used either for backup or spare parts, and any equipment on the resale market would be gear which was completely abandoned in favor of something else.

Dworin also raised the question, based on discussion during the meeting, of "whether one can untangle the value of appreciable assets from all other assets." Although some representatives were

concerned that no mention had been made of "intangible" asset value, others argued that such matters were not relevant to the study, and may be an artifact of tax laws, rather than a true indication of asset value.

Inclusion of noncommercial broad-

casters in the ODA's depreciation analysis also was brought up in the meeting. The NAB's Fratrick suggested that it might be a "mistake" to include these broadcasters in the study.

"The competitive pressures of improv-

ing signal quality and use of equipment

are greater for commercial broadcasters, who turn viewer increases into advertising revenue," explained Fratrick.

Implementing the changes

Dworin estimated that the depreciation study would be completed "in about one year." He noted it could be completed no sooner because of the time required for survey preparation and approval by the Office of Management and Budget.

The implementation of changes could be made through the regulatory process, which Dworin said would "allow for taxpayer input," or by the issuance of a revision proclamation. As to when changes in broadcast asset class life may be implemented, Dworin said he had "no answer," noting that provisions also must be made for public comment on the issue.

For all practical purposes, this first meeting on the study of depreciation of assets used in broadcasting laid the foundation for the ODA's analysis and addressed some preliminary concerns on the part of broadcasters. The next meeting, which will discuss the concerns in greater detail, was slated for May.

For additional information, contact Lowell Dworin at 202-566-8563. Contact Mark Fratrick at the NAB: 202-429-5377.

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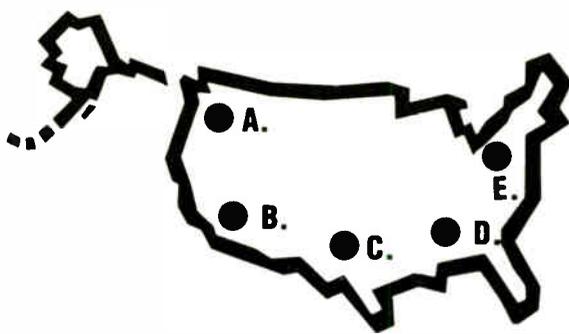
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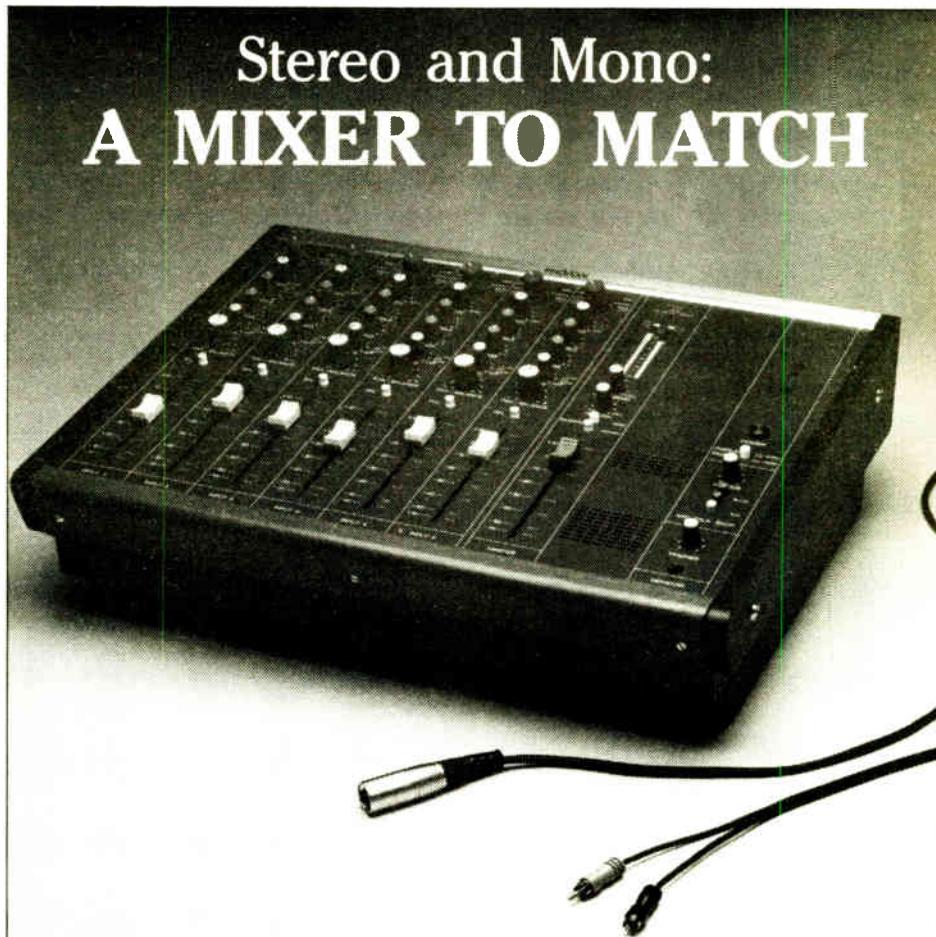


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STUDER REVOX

Plan Would Change IF Separation For FM

by Alan Carter

Washington DC ... The FCC wants comments from receiver manufacturers on a proposal that would adjust the intermediate frequency (IF) distance separation of domestic FM stations and give broadcasters more flexibility in selecting antenna sites.

The proposal, presented on 1 March, is a Further Notice of Proposed Rule Making, docket FCC 88-87.

The Commission said the proposal would provide a uniform level of protection from IF interference. The adjustments would continue to preclude channel allocations and assignments likely to cause interference, according to the FCC.

The proposal would set up "less stringent" IF requirements for all FM classes, except A to A and C to C, said Jay Jackson, of the FCC's Mass Media Bureau. The issue developed when the FCC created intermediate size FM classes.

Center frequency

IF is the center frequency in a small range of frequencies used within an FM receiver for amplification and filtering. IF interference occurs when a susceptible receiver encounters two relatively strong IF-related signals, thus degrading

FM reception.

When it occurs, IF interference can prevent clear reception by the affected receiver of many FM stations in the area.

IF distance separation requirements are the minimum distances by station class that each FM broadcasting transmitting antenna must be spaced from the transmitting antennas of other stations that are IF-related. An example is

Strategies For AM Considered

by Alex Zavistovich

Washington DC ... A study of marketing strategies to improve AM radio's competitiveness in the marketplace is being undertaken for the National Association of Broadcasters' executive board.

The association's executive committee, during its January meeting in Hawaii, had "expressed concern" over the status of AM radio and requested research proposals of the staff examining the issue.

The project is still somewhat "amorphous," said Richard Ducey, the NAB's director of marketing and policy re-

search. The focus, he said, is to improve AM's competitive stance in broadcasting.

However, Ducey noted that the research would probably look into marketing solutions to attract listeners to the band, rather than any additional technical possibilities.

Based on class

The proposed distances have been calculated to prevent overlap of the predicted 36 mV/m (91 dBu) contours of IF-related stations, regardless of the station class.

This level of protection, the FCC said, is equivalent to that provided by the least stringent current FCC requirements. The proposed distances are either the same as, or less than, those under the present rules.

In comments, the FCC would like respondents to address whether the proposed protection level is technically feasible. The Commission would like comments to include data and test results.

The comment deadline will be set pending publication of the proposal in the Federal Register. The contact at the FCC is Jay Jackson in the Mass Media Bureau, 202-632-9660.

search. The focus, he said, is to improve AM's competitive stance in broadcasting.

However, Ducey noted that the research would probably look into marketing solutions to attract listeners to the band, rather than any additional technical possibilities.

Considering the NRSC standard, AM stereo, and the Federal Communications Commission's inquiry into AM technical specifications, Ducey questioned whether any other technical studies could contribute anything further.

"There's not a lot of new ground left to break," he noted.

Instead, the NAB's research is expected to examine marketing approaches to improve AM audience share, specifically drawing younger—Ducey suggested "un-

der 40"—listeners to the AM band.

Although he commented that it was still too early to discuss what might be included in the study, he noted that one proposal would incorporate the results of the NAB's research into FCC technical standards and the work of the Radio Futures Committee.

That committee, a joint effort between the NAB and the Radio Advertising Bureau, was formed last year also to investigate the means to make AM more competitive.

In mid-March, there was still "nothing on paper" about the research, Ducey said, although he expected "something will be ready in time for the June board meeting."

For additional information, contact Richard Ducey at 202-429-5382.

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May Named New NAB Lobbyist

by Alan Carter

Washington DC ... The National Association of Broadcasters has named the former lobbyist of a bottling company and industry association as its new executive vice president of government relations.

James May, 42, replaces John Summers, who announced his retirement last July but did not leave until December. May has been working for the Coca-Cola Bottling Co. in New York as vice president of public affairs.

Words of praise

"Jim May brings the experience and talents necessary for conducting and strengthening NAB's government relations program," said NAB President and

CEO Eddie Fritts, in introducing May at a news conference on 11 March.

"In his previous association and corporate lobbying, he has shown he knows how to mobilize the grassroots to achieve legislative goals."

May praised the current NAB's government relations staff and promised to "help Eddie Fritts forge an even stronger and more effective voice for broadcasters on Capitol Hill."

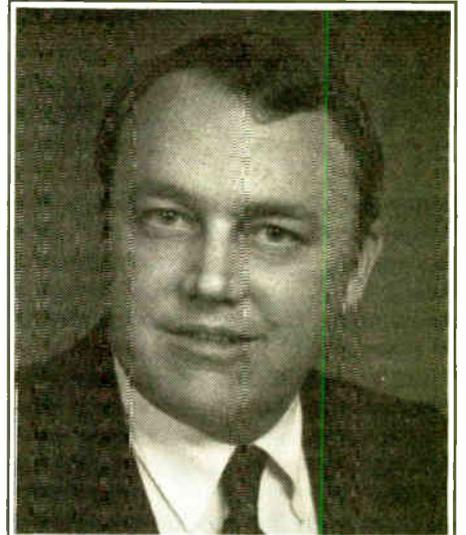
He continued, "The federal legislators are considering a number of issues of vital concern to broadcasters and we must present our views to Congress strongly, clearly and consistently."

May has been with Coca-Cola Bottling since 1984 and established the company's first public affairs department, which included government relations. Previously, he was government relations director for PepsiCo from 1982-1984.

Association work

His association experience dates back to 1977-1982 when he was public affairs VP at the Grocery Manufacturers of America and 1973-1975 when he managed GMA's state public affairs operation.

Contact the NAB public affairs department, 202-429-5350.



New NAB lobbyist James May

Readers Forum

(continued from page 5)

quite a few broadcasters who haven't learned how effective their post sunset authority nighttime power can be. For example the article says, "One station turning down the nighttime offer is WCKW in Warrenton, Virginia, which was granted 42 watts."

It goes on to say "WKLY in Heartwell, Georgia also turned down the offer to stay on the air around the clock. The FCC granted to station 149 watts for night use." General Manager, Joann Moore said, "The nighttime signal probably would get across town. WKRY's tower is about two and a half to three miles outside of Heartwell. That 149 watts is just pitiful." Moore added, "I would settle for 500 watts."

What I would like to tell your readers is that in two separate cases I have personally been involved in, there have been "nay sayers" all over the place. And they have changed their minds.

For example, WAAC in Terre Haute, Indiana was allocated something like 60 watts. The manager of the station pooh-poohed that amount. When he learned how effective his allocation was, he was surprised at how much that amount of power got him.

At one of my stations, WJBM, in Jerseyville, Illinois, our manager said, "What! Only 36 watts?"

But WJBM's community of license of 7,500 people in Jerseyville, Illinois, has excellent night service. WJBM gets all the way up to Carrolton, Illinois, a community of similar size, an amazing 13 miles away.

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I would encourage WKCW and WKLY, and others who are skeptical about what 42 watts and 149 watts, respectively, will give them, to try it.

Boy, wouldn't you kick yourself if when you died and went to heaven, you saw the people who replaced you at those stations turn on their nighttime allocations and get a damn good signal?

Thanks for another great article.

Shelly Davis, President
WKKX-FM
St. Louis, MO

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Thomas J. Koch, *The Audiophile-File*

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Fine Tune Tape Splicing Skills

by Ty Ford

Baltimore MD ... Last month's *Producer's File* took a close look at the art of splicing audio tape. Many consider taking a blade to a piece of tape barbarous and unnecessary.

Their preference is to dub all segments to cart and fire them off in the correct sequence.

This method, although it does spare the tape, requires careful timing in the recording as well as the playback of the carts and puts you one generation down on your master.

It also takes a couple of tries to get the timing exactly right, whereas with splicing you can be right the first time.

Getting to work

If you know you're going to be editing tape, consider which tape speed would be most appropriate. While 7½ ips may be the broadcast standard, you may find it a lot easier to roll at 15 ips.

The faster speed will give you twice as much room to drop your knife. In cases where there's a lot going onto the tape it can mean the difference between impossibility and success.

Because there are generally more spaces in between spoken words than music, voice tracks are usually easier to edit.

The two most important things to listen for when editing spoken words are the length of space between words and the intonation match of the edited segments.

Splice too closely and the words are

jammed together in an unnatural flow. Attempt to complete a sentence when the "pick up" line recorded is from another part of the tape and the inflection may not match.

Keep in mind that close splicing *can* be used as an effect. Try close splicing after each complete thought on the voice track of a spot and it begins to sound like there are twins reading the copy.

Producer's File

The ear and mind recognize that the speech pattern is abnormal. Done right, this is a cheap way to give character to a voice-only spot.

How close you splice makes a big difference. Try experimenting with the effect: first remove all of the breaths, then tighten the spaces.

This is also a great way to cut a few seconds off the read time of the copy. All of those little pieces of tape add up.

The most important part of being a good editor is being a good listener. This is not only vital for finding the right segments to edit, it's vital for finding the right place to drop the knife.

When you put a tape machine in the edit mode and begin rocking the reels to find your edit point, it's similar to using a microscope on one of the hairs on the back of your hand. Without the magnification a hair looks like a hair.

Under magnification that hair looks more like the trunk of a Sequoia redwood tree (mine does anyway).

During edit, human words turn into great masses of low frequency sound which at first sound like noise rather than voice. Words that end in "T" or "S" (like want or cars) seem to die out just before those letters are heard.

Inexperienced editors often make the mistake of cutting these last letters off, not realizing the second sound they hear is part of the word.

Another common error is the inadvertent removal of the beginning of words which begin with a rushing sound like a "W" or "Q"

Clipping the fragile beginnings from words make them sound unnatural, and obviously edited.

It is not always possible to find open spaces between words to make an edit. When this happens consider splicing in the middle of a word. Level and inflection matching becomes critical here, but it can be done.

Try finding a word with a hard consonant that's easily located and do the splice there. With practice you will be able to work some minor miracles.

Music editing

Editing music is not necessarily more difficult than voice. It does require that you understand the rhythm and the instrument voices.

Remember that there are usually sustaining notes in music. If your edit inadvertently chops off a cymbal crash, a guitar or sax or a synth line, the edit will be noticeable.

You also need to be aware of the number of parts in the piece, and how they relate. Things get tricky here unless you develop the ability to hear in your mind what the edit will sound like, and cut tape so that the completed edit still makes musical sense.

You'll know when you do it wrong because the music doesn't flow smoothly. Even though you may have perfectly matched a snare hit, a cymbal crash or some other prominent element of the arrangement, you might be a measure or fraction of a measure too early or too late.

Think of this kind of editing as an arithmetic exercise. Count the number of times a passage is repeated before a new passage is played. Typically, you'll find a lot of two and four patterns.

Once you've learned to edit inside the pattern flow a whole new world of experimental music editing awaits you.

If you're editing dissimilar types of music (for a multiple cut concert spot with vocal upcuts) try recording each segment complete with voiceover.

Choose the pick-up point of the up-

coming piece of music so that its first sound matches or eclipses the piece you're leaving. Drum hits and cymbal crashes are the most obvious of these points.

Try to get your voice-overs over instrumental parts of each piece so that you "talk up" each vocal part of the song. After you have recorded all of the segments, time them.

If the spot is too long, look for phrases in the singing where you can edit to the beginning of the next piece.

Once you've learned these easy functions, you can apply them anywhere. I was at an AOR station when Prince's "Purple Rain" was released. Because we had heavy CHR competition, we had to play the record.

We knew a good portion of our AOR audience would instantly reject Prince. Instead of playing the album cut, I took the 12" EP and edited out the choral vocals so the piece went straight from the verse to the guitar instrumental.

At the end of the guitar instrumental I edited to the last few measures of the song. In addition to editing, I also punched in a parametric equalizer to bring out the guitar lead as I was dubbing the tape to cart.

Creative editing

More and more dance music stations are doing music edits to customize their playlists.

Sometimes these edits are used to shorten the length of a club mix so that it fits within the confines of the station format. Sometimes the edits are more radical, moving entire parts of a song around.

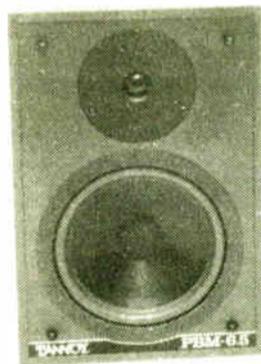
Other uses for your new-found editing abilities include constructing music beds for commercials from records found on the floor of the Music Director's office.

You can also alter jingle donuts for clients and agencies or create special effects tape loops several feet long that run continuously on one of your reel to reel machines.

If you have two machines side by side you can make an even longer loop and string the loop over an empty reel on the left spindle of the left machine's take up reel while you use the right machine's capstan, pinch roller and playback head.

You're on your own now. If you have questions or comments, call me or contact me via MCI mail. I think I'm the only TFORD in Baltimore.

Ty Ford, a radio audio production consultant, helps stations optimize their use of production and airstaff skills. He can be reached at 301-889-6201.



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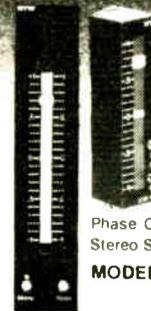
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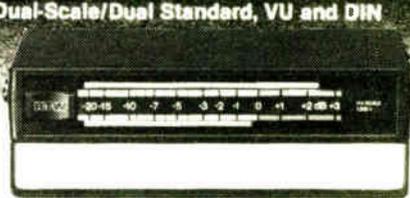
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Stations Look to Systems Firms

Editor's note: In this series, RW takes a look at the recent and predicted growth of systems design in the radio broadcast industry.

This, some say, could be fueled by major changes in the status of the engineering community. In future issues we will examine radio stations' needs for systems design from the outside, how the FCC's deregulation activities have affected the industry, how engineers relate to the changes, and the positioning of the firms providing such systems services.

by David Hughes

Washington DC... An increasing number of radio station owners are looking to the outside, away from their own engineers, when it comes to building a new station or refurbishing an existing one.

More and more, they're turning to firms offering entire turn-key systems.

Instead of relying on their chief engineer to design a new studio or transmitter site and then pick the equipment, station owners are, instead, going to one firm to get the whole job done.

While there have always been firms that have offered turn-key facilities (even as far back as the old RCA operation), there are some important changes causing this new reliance on the systems firms.

Special Report

Some industry observers say one of the main reasons for the latest emphasis on systems work is the gradual decline in the status and in the numbers of radio broadcast engineers.

Many stations, they say, have a beeper-summoned contract engineer who can handle maintenance but not necessarily design work.

Additionally, because of the FCC's apparent success at deregulation, particularly in allowing more non-traditional business investment firms to buy more radio stations, station owners increasingly are looking to outside firms to do the whole job for them.

This, some say, is taking place particularly in major markets, where station groups have reduced their engineering staffs over the years.

But there are two sides to the issue. While some firms see a window of opportunity opening up for firms concentrating on systems, others stress that the window is not yet open, or not open wide enough.

Certain traditional distributors, referred to by some in the industry as "box houses," report strong business and many are not yet willing to make a move to incorporate more systems design work.

Allied's move

One firm that has seen an open window for systems development is Allied Broadcast Equipment, which in mid-1987 formed a new subsidiary to focus on system sales, Allied System Sales.

Known as one of the major "box houses" by some in the industry, Allied said it has identified a rapidly growing need in the radio industry for complete, turn-key systems development.

Chuck Rockhill, Allied's director of

system sales, said radio broadcasting is becoming like other industries such as the computer industry.

"In other industries you have major distributors which offer different equipment from various companies," he said. "They provide complete systems, with value added."

That concept, according to Rockhill, is rapidly being adopted with new verve in the radio station ownership community.

Dinosaurs out

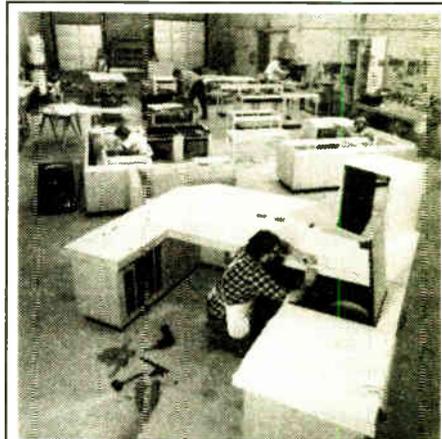
In the past, large manufacturers like RCA or GE produced and distributed a wide line of broadcast related products, everything from cart machines to trans-

mitters, Rockhill said.

Rockhill, who formerly owned his own systems engineering company, and was a former VP/sales and marketing with Moseley, maintained that Allied also got into systems because it "wanted large scale contracts."

He said that Allied, which distributes a line of about 250 products, is "in a position to get what a station wants, design a configuration, prefab it into the furniture, burn-in the gear for 100 hours, proof the system, ship, assemble and train the users."

The firm handles anything from audio studios to new transmitter plants, Rockhill said. **(continued on page 22)**



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Turn-Key Jobs A Growing Trend

(continued from page 21)

hill said, along with RPU systems and RF transmitter set-ups.

Last year Allied signed a marketing agreement with transmitter manufacturer Harris, which would help foster Allied's desire to design and install entire turn-key systems from microphone to transmitter.

But most systems companies concentrate on studio design, leaving the RF portion of the operations to firms specializing in that area.

Shortage of engineers

One reason for the recent new demand for systems work, Rockhill stressed, was that there aren't as many engineers as there once were. "There has been a huge cutback in engineering levels," Rockhill said.

He added that "now engineers are more likely to be operations and maintenance people, not involved in systems design."

"In many cases, a local engineer can't design a new transmitter plant," he said.

Dan Braverman, president of Radio Systems Inc., agreed that there are "no engineers out there." He said that has contributed to the rapid growth of his firm, which handles a wide range of broadcast systems (as well as manufacturing and distributing many products).

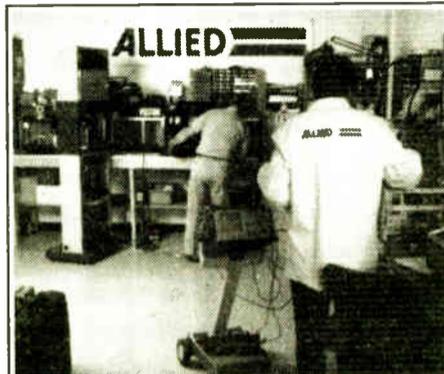
"A broadcast engineer can make more money in other industries," he said. "The average station has a contract engineer with a beeper. The old breed of engineers (who could do anything) is dying out."

According to Al D'Alessio, president of

system developer Northeastern Communications Concepts (NCC): "Many engineers, while they may have a lot of technical talent, may not be up to planning a major capital project."

"It requires a lot of non-technical management and budgetary skills to get a project completed correctly, and on time," he said.

But D'Alessio stressed that engineers are still the main source for technical



Allied Systems engineers test equipment prior to installation.

knowledge about a station and that a systems designer must work closely with the engineer as well as the rest of the staff.

"The engineer knows the most about the station, while we know the most about the (equipment) technology," he said.

Ownership changes

Rockhill also said that changes in FCC regulations have resulted in increased buying and selling of stations, with more non-radio, corporate types taking over.

"They are perfectly happy to contract out work because it's done in other industries," he said.

D'Alessio added that the FCC's deregulatory actions have brought about much of the trend for systems work. "Engineers are no longer allied as closely with stations as they once were," he said.

"Investment firms now own stations, rather than broadcast firms." D'Alessio added that the new owners are applying techniques used for years in other businesses to the broadcast business.

Braverman concurred. "A (non-radio oriented) businessman wants a known price (for a station improvement project). He does not know the difference between a Nakamichi and a 'knock in the head.' If he wanted to put in a new computer system, he would get a consultant. He would not do it himself."

Braverman said the business oriented owner of the radio station would use the same logic in getting a new studio or transmission system for his station.

The future: systems

The future of increased reliance on systems development is coming quickly, many in the industry say.

"There is more of a trend toward systems work and one-stop shopping," said Dick Schumeyer, the project manager for D'Alessio's NCC.

Before joining NCC, Schumeyer worked for 10 years with Capital Cities/ABC, which owns a chain of major market radio stations.

He said the firm liked to operate with a "lean staff" and did not want to burden its engineers with the design of major projects.

By using outside systems companies the firm felt that it could "get more done with less staff," Schumeyer indicated.

NCC, he said, provides entire, integrated systems for its customers including architectural and mechanical engineering work. Work the firm does not handle, such as the actual installation of equipment, is subcontracted. But NCC coordinates the work and remains in final control, he said.

"Many major market stations want this," D'Alessio indicated. "They want a turn-key operation. They want to order a control room, complete with a final price, just as if they were ordering a piece of equipment."

"I can't tell you there's a trend, but there is a market," Rockhill added.

D'Alessio said the trend toward outside systems work is limited primarily to major market stations. In smaller markets he sees no major trend.

While he has yet to see a major trend toward systems from smaller broadcasters, Radio Systems' Braverman said he is directing his firm into the field of "more affordable" \$10,000 to \$30,000 systems.

"We are trying to get our systems into the smaller, more common stations," he said.

Dispute about changes

Despite the predictions of bold growth in systems work in the radio industry, some other in the field are a bit more cautious.

Jack Williams, president of Pacific Recorders, which has done systems work for many of the larger stations such as WNYC in New York, Detroit's WJR and Tribune's WGN in Chicago, said that despite the demise of the RCA and other

firms which could literally build an entire broadcast operation, "the systems business has never gone away."

"You have the consultants on one end and the merchandisers (such as Allied) on the other end," Williams said. Distributors, he said, must sell hardware to survive.

He pointed out that Pacific Recorders is somewhere in the middle. While the firm handles studio design work, as well as on-site assembly and training, the firm encourages stations to use local suppliers rather than have Pacific Recorders obtain the equipment for them.

He also said that definitions are important. There is a grey area in the difference between the "packager" and the "systems designer," Williams stressed.

Local input important

Neil Glassman, sales manager at Bradley Broadcast, said that despite the Allied move into this systems area, he has seen "no trend" with distributors going to overall systems work.

"The management at stations still wants a local person making the decisions," Glassman contended.

"The consultants can tell you what to buy; we can tell you what to buy," but there is still a need for local integration of the project, he said.

"At this time I don't see a demand for mail order control rooms," Glassman maintained. While his firm does system support, it does not provide turn-key operations.

"There are still a lot of people, CEs, doing their own design work," he stressed. "Engineers know what will work."

No market shift

Likewise, while Tim Schwieger, VP/marketing at Broadcast Supply West (BSW), said he has heard lots of talk about distributors getting into the systems business, his firm does not see enough of a market shift to make the move.



Pacific Recorders & Engineering built studios for ABC Talk Radio in Los Angeles.

"We don't do systems, and we deal with thousands of broadcasters," he said.

While BSW does not provide labor or design work, many stations are only interested in the specific gear.

"Many of the stations that we sell to already have competent engineering talent that they are paying for," Schwieger said.

"If we saw a market was there, we would do it too," he said. "There is talk about some distributors, such as Allied, moving toward systems work, but we wonder how much of the talk is just hype."

One distributor's representative, who did not want to be identified, remarked that Allied was doing "the next logical thing. In my opinion, they want to be all things to all people."

In our next installment we will examine the situation from stations' point of view.

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Circle Reader Service 49 on Page 34

World Radio History

Success: It's In the Planning

by John M. Cummuta

Downers Grove IL ... Do you start most days feeling like either a duck or an elephant?

Before you get offended, let me back up a little, to help you answer that question. There's an old joke that goes something like this.

"Why do ducks have flat feet?"

Answer: "From stomping out forest fires."

"Then, why do elephants have flat feet?"

Answer: "From stomping out burning ducks."

Too many engineers, and particularly engineering supervisors and managers live in a constant state of fire-fighting.

Whether they're directly stomping out the fires or the burning ducks, it's a never-ending battle. Each day starts with that sinking feeling, "I wonder what's going to come unglued today?"

I hear you say, "Sure ... but I didn't plan it that way."

Exactly! Those of us who have experienced days, weeks and months with singed shoe-laces and burned pant-legs didn't plan it that way.

Engineering Manager

In fact we didn't plan it at all. And that's the problem. Failing to plan is planning to fail. The only thing that's accidental, when you don't plan your work is success.

What's in a plan

Planning consists of identifying the overall purpose of a project, the activities to be performed, their sequence and the resources required to accomplish them. If any of these four elements is missing, plans will have less chance for success.

It's not really complicated. Most people who don't plan their projects, their career or their life, think that it's a cumbersome process like dissecting a beetle in biology class or assembling a ship in a bottle.

Actually planning can be nearly as simple as breathing and just as natural when looked at as a way of thinking or a way of approaching the goal.

Plans, in their basic form, are nothing more than lists of activities put in priority and chronological order.

Let's see the simplicity by going through our four-part definition above, and breaking planning down into its component parts.

Purpose

The purpose of any plan is the answer to the question, "Why?"

Why is it more efficient to do regular, periodic maintenance on the transmitter, than to wait for it to go down? Why is it better to handle the paperwork as it comes up than to pile it around until deadlines?

Why is it better to put the on-air program in a backup studio or to use down hours to work on the main studio than it is to labor over the announcer's shoulder, while the main studio's on the air?

One of the principal benefits of developing a plan of action towards any goal is that it tends to crystallize people's

focus on the objective, and they much more easily rally to the cause. They can more clearly see what's in it for them.

It's much more difficult to get people committed to a goal when the personal benefits are unclear and the path to attain the goal is fuzzy or even invisible.

Give your people a vision of the completed goal, and make sure that the vision includes how much better it will be for them when the goal is attained.

Defining activities

As stated above, a plan is simply a list of activities put in some kind of order.

If you are developing a plan to accomplish something, there are undoubtedly several activities that will involve one or more people in that accomplishment.

Write each of these activities on a 3x5 index card. List the name of the activity, the measurement or evidence of successful completion of the activity, the tools or other resources necessary for undertaking the task, and the names or numbers of people that will be required.

You'll notice that one of the elements on your cards is the measurable objective of each activity. If you can't measure it, you can't attain it.

Or at least, you can't know if you ever attained it. The measurement is actually a statement of how you will determine successful completion of the activity.

Keep sight of goals

When you put the cards in order you will be able to establish the "when" of successful task completion. Once there is a "what" and a "when" to an activity, it changes to a goal.

Remember a few things about good goals. A sound goal is always achievable. As you identify and define your activities you may see that some are unrealistic. Deal with that.

A sound goal is always compatible with other organizational goals. Run your activity cards past people like the PD and the GM to see if your goals might interfere with any of their goals.

A sound goal is always motivational. Word your activities and their success-measurement in such a way that it makes them sound readily achievable.

This will empower your people to feel confident about successfully working the overall plan.

Put activities in order

To transform your pile of activity cards into a plan, analyze them for the most efficient dove-tailing of efforts and put them in that sequence.

Obviously, you want to start with the most important activity. But consider that there may be another seemingly less-important activity that if accomplished before the more-important task would make the larger goal much more easily attainable.

Your organizing of the activities in your plan should not only result in their priority order, but also in definite times and dates for accomplishment.

While these dates may have to be adjusted later, be as precise as present information allows. There is nothing quite as motivational as a deadline.

Once your activities are in order, you begin to see the flesh covering the bones of your plan. You and your people begin to see the flow of the plan.

They can understand the logic and

reality of the course and destination and they can begin to believe in it.

Determine necessary resources

An essential element of successful planning is the acquisition of physical and fiscal resources: people, space, equipment, supplies, time and money.

I hope you consider people the most important element on this list, because they are.

As you take inventory of your resources include an inventory of skills available among your personnel.

Failing to plan is planning to fail.

Also look for attitudes of openness for acquiring new skills that may be needed.

Other considerations on this "resource" list include answering such questions as, do you have enough space in your facility to accomplish this activity?

Do you have the required equipment, can you rent it, must you buy it? What type of supplies, in what quantities, will be necessary?

How much time will be required for preparation and execution of the activity? And, finally, how much money will it take?

You now have a plan

Your 3x5 cards, in order, with the required resources listed for each activity, now constitute a plan.

However, it's a plan that can be destroyed by a gust of wind. So, you may want to consider transferring your

carded information onto a more-easily-usable format. There are three that I readily recommend. The simplest is the old story board.

If you're at all familiar with the TV side of our business, you've seen story boards, which are nothing more than planning documents that break each scene, in our case each activity, into its component parts. It's a visual outline.

You can make an elaborate document from your index cards, or simply tack them to a bulletin board in the proper order to develop your story board plan.

Another system I like is the computerized version. There are many good software packages available that are designed specifically for project planning.

They range from incredibly cheap public-domain programs to complicated engineering-level systems. You can usually find several advertised in such magazines as *PC*.

Other methods

You could also browse through the many erasable-marker planning boards available at your local office supply store.

These are usually plastic-coated posters that you mount on the wall. They have columns and rows designed for you to label and track whatever you're doing.

However you decide to monitor your plan, the next step is obvious: execution.

There's wisdom in the old adage, "Plan your work and work your plan."

Once you're doing that you can be confident of two things. You won't have to be replacing so many burnt shoe-laces, and you'll finally get relief for those flat feet.

Watch out! Here comes another burning duck.

John Cummuta is president of Marketline, a broadcast management and marketing consulting firm, and a regular RW columnist. He can be reached at 312-960-5999.

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The Lost Art of Tube Testing

by Tom Vernon

Harrisburg PA . . . In many small market stations throughout the country, the older transmitters from the '40s, '50s and '60s live on, still providing reliable service with simple circuitry.

To the younger engineer, bred on 5534s and TTL chips, the tubes used in the lower stages of the transmitter are something of a mystery and transmitter maintenance in this area becomes haphazard.

Station Sketches

Sometimes there are unnecessary outages because the oscillator or audio driver tube has failed completely.

Other stations waste money replacing these tubes every nine months whether they need it or not.

This month's column will present a brief overview of the lost art of tube testing, different types of tube testers and how to interpret the results of these tests.

There are two basic types of tube testers, the simplest being emission testers.

You used to see these testers in a well known electronics parts franchise. Such a device is detailed in Figure 1.

All it does is apply filament and plate voltage and meter the plate current.

The reading obtained is compared to a standard for that type of tube. Sounds simple enough, but there's a potential for disaster here.

The amount of current required by the metering circuit is usually small compared to the current demands of a typical circuit.

A cathode with marginal emission can squeak by a simple emission test but not have the current capacity to operate properly in the transmitter.

There are some other serious limitations to the validity of emission testing, as we shall see in a moment.

The second type of tester checks the transconductance (G_m) or gain of the tube, as measured in microhms. It does this by simulating the tube's operating conditions.

There are two types of transconductance testing—static and dynamic.

Static testing places the correct DC operating voltages on the tube and measures transconductance on the meter.

The most sophisticated test—dynamic testing—places the correct DC operating voltage to the tube, and then applies a high frequency sawtooth waveform to the grid.

The amplified AC waveform is rectified and metered, indicating the tube's ability to amplify.

Dynamic transconductance testers simulate the tube's operating conditions, and are the most accurate evaluation method.

A simplified schematic of a dynamic tester is shown in Figure 2.

Another variable that can affect a tube's gain and bandwidth at high frequencies is the spacing between elements.

Prolonged thermal cycling can some-

times cause elements to become physically deformed or warped. Such deformities can also be caused if a tube is dropped, so handle with care.

From the above discussion you can see why tubes that pass the emissions test may fail to operate in the transmitter, particularly in the oscillator and RF sections.

In addition to transconductance, other

Figure 1. Simple emission testers metered DC plate current, but revealed little about a tube's ability to amplify HF pulsed waveforms.

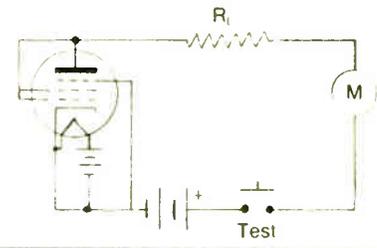
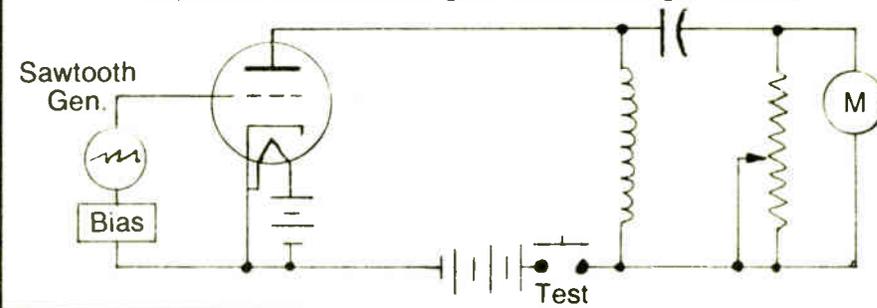


Figure 2. Dynamic transconductance testers evaluate tubes as HF AC amplifiers, and therefore give more meaningful results.



tests are necessary to complete the evaluation of our vacuum device.

"Microphonics" refers to the amplification of mechanical vibration of tube elements as audible noise.

This is usually checked by listening with headphones attached to the tester as the tube is lightly tapped.

To evaluate the lifespan of a tube, reduce the filament voltage by 10% and note G_m . A drastically reduced reading indicates that reserve emission has run out, and the tube is nearing the end of its life.

Shorts between selected tube elements are usually indicated by a neon lamp. Typically this is one of the first tests completed, because it is fast, and there's no use continuing with other tests if shorts exist.

Tubes that have been in service for some time can develop grid leakage. When this happens, the control grid begins to act like the cathode and gives off electrons.

These electrons go to the plate through

the power supply and back through the grid resistor.

This makes for a positive grid voltage, resulting in distortion in the audio driver and clipped sync waveforms. Such leakage usually occurs only after the tube is fully warmed up.

Better testers will measure leakage down to the $1 \mu A$ range so you don't have to wait a half hour before making this test.

Used tube testers can usually be had by checking flea markets, hamfests and surplus catalogs. Prices are cheap nowadays; look for a good dynamic transconductance tester.

By regularly scrutinizing tube performance as part of preventative maintenance, many more years of reliable service can be had from transmitters with 12BY7s and 6146s.

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

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DATA: Reference + 10 db at 1000Hz.
Measurements conducted by Marti Electronics.



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Stalking the Transmitter Pest

by George Riggins

Long Beach CA . . . Ever gotten out of a car and looked under the hood when the vehicle was not working properly? That was a visual inspection.

The first thing we usually do when the car does not operate properly is "eyeball" it. We look to see if there are obvious problems such as burned or loose wires or broken or loose hoses. Obvious problems!

Around a radio or TV station, we use our sense of smell to find burned resistors and transformers, and we use sight to find blown capacitors and broken connections.

Recently two contract engineers (Tom and Dick) were called in the middle of the night because an FM station was off the air.

As the two walked into the transmitter building each took a cabinet for inspection.

Dick opened the door of the cabinet he was inspecting and brushed aside a wiring harness that had fallen so he could get his head inside the cabinet and look around.

After not finding an obvious problem, he stepped back to give some thought to the situation and confer with Tom.

After having been in and out of the cabinet three or four times, Dick discovered the "wiring harness" to be the remains of a snake that had crawled into the transmitter for warmth.

As the snake made its way toward the warmth it got close enough to the HV connection on the tube to make an electrical path to ground. One fried snake, and one shaken engineer! Fortunately, the snake was not poisonous (or even alive, at that point).

After relating this experience to other engineers, I find snakes to be a common problem in many parts of the country.

My problems were not caused by snakes, but by field rats. In either case, unwanted pests can be a problem.

We are hard pressed to completely vermin-proof remote sites, but a few minutes spent repairing holes in vent screens, plugging other holes and sealing around cable entries can eliminate one of the reasons for a trip to the "hill" when the signal goes away.

One engineer in the local area has done his best to close all access holes and cracks in the transmitter and at the same time has changed from an exhaust type of cooling to a positive pressure system.

The change from exhaust to positive pressure meant the elimination of all air leaks.

Side benefits from positive pressure and good filtering include the amount of time needed to clean dirt and "other" contaminants from the transmitter.

The reported saving in cleaning time amounts to about 20 work hours every

six months. Also, there is better air flow around the final, better cooling and longer tube life.

On another note, a new controversy has arisen: charging for telephone consulting time.



I get many calls regarding service on equipment because I am listed as a warranty service center by one of the larger manufacturers.

I am obligated to answer the questions to the best of my ability. Some of the questions are rather elementary, and others are quite to the point.

If the equipment is still in warranty there is no hesitation on my part to spend as much time as necessary to assist the person on the other end of the line to get the machine back into proper operating condition.

If the equipment is out of warranty, where does one draw the line?

Am I obligated to verbally furnish a schematic or hook up directions to the second or third owner? Am I supposed to supply an instruction book or a schematic free of charge?

At a recent SBE convention in St. Louis I talked to Carl Peterson of IGM about the problems of telephone consulting.

I was rather interested in Carl's comments. As Carl explained the conditions to me, I see no reason for anyone to be alarmed by the service charge policy at IGM.

The conditions he stated were: no charge for equipment under warranty and no charge for time when a reasonable parts order is placed.

The main problem that both Carl and I have is where to draw the line in consulting on equipment that is several years old and passed on to the second,

third and sometimes fourth owner.

Often the instruction book did not get passed along with the equipment.

Maybe the person hired by the station owner has not had the benefit of working with a more experienced person, and is almost at the bottom of the learning curve in broadcast technology.

All of us know that what we have between the ears is what makes us valuable. We give of that knowledge of our own free will and accord for value received.

Whether that value is a future sale or a past sale is part of the picture when we derive our earnings from selling or repairing equipment.

Those of you who work at the station level expect to be compensated for your knowledge, so why should others of us be expected to dispense our knowledge at no cost?

We expect to be compensated in some way so we can afford to be available in the future.

How many of us can say that we are not price conscious? Where do we make the compromise between price and service?

We all want to purchase for the lowest price, and we expect to obtain adequate service in the future.

What sort of answer do we get at the local hi-fi discount house when we have a technical question, or do we just get a blank stare?

What does the doctor or lawyer say when we ask a question? The last time I called my lawyer I got a bill. The comment was either pay a retainer fee or expect to get charged when you call!

Comparisons have been made to the computer industry. Better yet, check the software side of the computer industry.

When we paid the software prices two or three years ago we got almost unlimited telephone consulting time.

Prices have dropped, and so has the telephone service. Have you paid the author for all the software you have? Possibly you received a copy of a good pro-

gram from a friend. Did you pay the author for his knowledge in writing the program you were given?

Those who work at the station level like to eat. You get the money to purchase food and housing by trading your knowledge and experience for money.

Carl and I like to eat, stay warm and dry. If we give our knowledge away without something in return, how long are we going to continue to stay fed and housed?

George Riggins has experience in radio and electronics dating back to the 1930s. He is also a licensed ham operator and has had his own broadcast sales and service company, Riggins Electronic Sales, for over 20 years. He can be reached at 213-598-7007.

57 Years Ago in RW

Editor's note: The RW of today and the RW of old fortuitously share the same name. The RW of old was printed for a period of time in the 1920s and 1930's, when radio was first becoming popular.

The current version of RW that you hold in your hands has been around (in various forms and names) for over ten years.

Pointed Opinions

GEORGE LEWIS, Radio Engineer and Vice-President of Arcturus Radio Tube Company: "The radio set of today always will be an integral part of television receiving. The two systems must be operated simultaneously for satisfactory results. One depends on the other in bringing a synchronized television program into the home. Commercial broadcasting is transmitted on frequencies between 550 and 1,500 kilocycles and a radio set is necessary to receive the signals in this wave band. Television is sent on frequencies between 2,000 and 2,200 kilocycles, and requires a special circuit or set designed for that wave band. True, we may have a compact cabinet combining the two sets, but a radio set to-day will be an efficient adjunct to the television receiver of the future."

Reprinted from Radio World, October 1931

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Circle Reader Service 34 on Page 34

Circle Reader Service 48 on Page 34

DIGITAL DOMAIN

How To Choose a Pro CD Player

by Skip Pizzi

Washington DC . . . Last time, we said we'd start talking about digital broadcasting.

But in the meantime I've talked to an awful lot of folks who have a more pressing and immediate digital topic on their minds, namely the use of CDs for broadcast.

Their queries included why, when, whose and how much. So intensive was this dialog that I felt a change of course for this episode was warranted.

The question today at most music-formatted stations without CD players yet should not be whether to get a CD player, but which one(s) to get.

If anyone has been waiting on this decision, the recently initiated practice of many record companies to start servicing radio stations with CDs for airplay should cast away any lingering doubts.

This is a trend that will probably continue, and soon we won't be able to remember when we didn't get promotional CDs.

Pro players are here

There are plenty of contenders for the "professional" CD player in the marketplace currently, and more on the way.

Some stations have taken the short-sighted but fiscally expedient approach of buying consumer CD players, and perhaps adding +4 dBm balanced outputs.

While this did get them on the air with CDs, most have since found that a truly professional CD player differs from the hi-fi models in more than just its output configuration.

Durability, tight cueing/instant-start and user-friendliness are all just as important.

When you think of the technology and utility of a cart machine or reel-to-reel deck, or even a top-notch turntable/tonerarm/phono-cartridge/phono-

preamp system, \$1200 to \$2000 is not too much to pay for what may just become your primary on-air audio source, if it isn't already.

This is the price you should expect to pay for a serious broadcast CD player, and comparing it to all that other studio hardware, it's a bargain at that.

Basic features

In addition to the above-mentioned attributes, you should look at remote-control functions (hard-wired, not infrared!) and how and what information is displayed.

You should also consider ease in reading displays under a variety of lighting conditions, user-friendliness in operation (especially for such functions as programmability), and other "DJ-oriented features" such as the "play-the-last-few-seconds-of-the-cut" button on one recently introduced player.

Surprisingly, audio quality is not something to be extremely worried about here.

Although it *should* be considered, the variation among players in this regard is far less than the variations in the other areas mentioned above.

Pick a player that has a good track record for durability, has *the features you need*, seems easy to operate and sounds good, in that order.

A comparative test is always a good idea, but don't do just a listening test; make it a full evaluation, by both operation and maintenance staff.

By the way, the "99-cut access" that some players feature may at first seem excessive, but remember that sound effects and production music libraries are now available on CD, and these will often use this function to its fullest, at least in the production room.

In fact, you may want a different, more fully featured model in the production room than you do in the on-air room, although uniformity throughout a facility

also has its merits.

Most CD players are smaller than the turntables they replace.

A typical control room update replaces one of the original three turntables with two CD players, leaving you with two of each (perhaps upgrading the phono cartridges and/or preamps while you're at it).

Update, or Phase Two, might involve replacing one of the remaining two turntables with a pair of R-DAT's, etc.

There are three basic design philosophies among pro CD players. The first of these is quite basic, with simple functions and some programmability.

\$1200 to \$2000 is not too much to pay for what may just become your primary on-air audio source.

One of these that looks promising is a new entrant from Shure Brothers.

Another of the basics is from Denon, and takes quite a different approach altogether. It resembles a cart machine in design and function.

For use in these decks, CDs must first be placed in hard plastic protective sleeves, which have windows for the laser to scan through.

To some this is just another gimmick, but depending on your environment (i.e. "Samurai DJs") the added measure of protection for the disc can be worth the added hassle and expense of using these sleeves.

These machines are also quite space-saving. Probably the biggest advantages of this basic class of CD player are the lower cost and simplicity of operation.

The second general category might be referred to as "fully featured." Here a variety of additional bells and whistles are introduced.

Some of these include thumbwheel cueing, such as an offering from Technics, or higher order programming and special functions, like the "play-the-first-few-or-last-few-seconds-of-the-cut" feature from Studer.

The third design style involves the use of several small CD decks without controls on them, connected to a single, fully-featured common controller, designed like a small console.

The decks, usually grouped in sets of three, may be placed at some distance from the controller. Sony and Philips each have had products of this nature on the market.

This is probably the most expensive way to go, but may be well suited to production applications. However, if the controller goes down, it takes three players with it.

Also, these two companies' CD players are not being marketed very aggressively in the industry of late, and that's especially true since the Philips-Studer joint venture.

Now Studer has an updated pro CD player which reflects its collaboration

with Philips, so it will be interesting to see if the original Philips players also survive on their own.

The best choice is your own, of course. None of the above systems is the perfect unit for all applications, and budgets are obviously a consideration.

There is a bit of range in that regard, but as mentioned earlier, sonics don't have a lot of correlation to price necessarily. Features are the driving force here.

Reliability should be your greatest concern though. Ask dealers for references and call them *all*, to learn from other's experience.

If possible, get demos in, or at the very least, just buy one of a particular model and try it until you're satisfied, before outfitting the entire plant with them, and then finding out you've got a dozen turkeys gobbling' digitally in your studios.

Other features to look for on any of the newer, "second generation" pro CD players are "cue to first music," in which the player ignores subcode information and actually finds the beginning of the cut's audio.

There are also varispeed options, and two-, four- or greater oversampling, which is a form of digital filtering to eliminate the need for steep analog filters in the D/A converter.

While oversampling in and of itself doesn't necessarily insure better sound, if the rest of the D/A and analog section sounds good in a player, proper implementation of oversampling should sound a bit better than equivalent analog filtering in that player.

One other feature that almost all CD players have, and which is of particularly great usefulness to the broadcaster is the "time-remaining" counter display function.

This function counts down the amount of time remaining on the cut or on the disc, depending on which function is selected.

Of course, these rely on the accuracy of the timing information entered into the subcoded data on the disc. Just as LP cut timings aren't always accurate, neither are these.

Better times

In my experience, however, the CD timings are a bit more on the money than LP timings overall.

This may often be due to the speed inaccuracy and variations inherent to the analog turntable, a variable which is eliminated by the CD format, where a crystal-locked clock rate determines playback speed.

Now we just have the stopwatches and the ear-hand coordination of the stopwatch operator to blame.

Next time, we really will start to look way down the road at possibilities for broadcasting to the listener in a digital format.

Hardware is really the least of the problems, as we'll see.

Regulation, politics (both domestic and international) and money are the big issues here, in a debate which has just started to emerge from the overshadowing of the HDTV hullabaloo. Stay tuned.

Skip Pizzi is the training coordinator for National Public Radio's Program Engineering Department. He can be reached at 202-822-2483.

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Thrifty Troubleshooting Tips

by Bill Higgs

Louisville KY . . . I am often amused by equipment manuals. Not simply because they are poorly written (many are), but because they seem to make things too complicated.

According to the manual, some devices require a labful of test equipment, just to make them work.

Admittedly some devices are quite complex (audio processors for instance). But some seem to be too complicated for their own good. What ever happened to simplicity?

Fortunate indeed is the engineer who has at his disposal all of the latest whiz-bang test equipment. Most of us are forced to make do with much less.

This month, we will look at a few ideas on how to adjust and repair studio gear with simple and inexpensive equipment.

We'll also look at a few other inexpensive techniques. It is surprising how much can be done with only a few items.

Troubleshooting of stereo equipment is made much simpler by the technique of using one channel to test the other.

Since the circuitry is identical, it is necessary only to clip identical points together and work backward until you find the trouble.

BottomLine— Broadcaster

The only equipment required here is a clip lead and perhaps a capacitor for DC blocking. Use a nonpolarized cap of about 25 μ F. Cost: 50¢ plus the clip lead!

Another trick for audio tracing on a console is to use the cue channel.

Connect a test lead through a series resistor to the cue bus (use the same value used in the console from the fader switches), and you have a built-in signal tracer complete with a speaker. Cost: 5¢ plus the test prod!

Level setting and phasing are always bugaboos in a stereo system. Consoles with non-mechanical displays may look pretty but they are bears to set up properly!

VU meters are not always reliable indicators either, since in most modern consoles they are driven from independently adjustable opamps.

Conventional wisdom uses an audio voltmeter to set both channels to equal levels. Since relative levels between channels is usually more important than absolute levels, I generally use a *nulling* technique.

Begin by connecting a mono tone source of correct input level to both channels. Set one channel to the desired output level with the fader at the normal position.

Then connect a pair of high-impedance headphones to the R+ and L+ outputs of the console (ground the R- and L- outputs of transformer coupled outputs only).

Adjust the output of the *other* channel for a null in the headphones. Finally, turn the VU meter adjustment to the proper setting (usually zero).

The same trick can also be used for setting levels and phase on cart decks, turntables, etc. It also works fine for unbalanced outputs.

Remember the \$5 telephones of a couple of years ago? Cut the plug off the end, attach a couple of alligator clips,

and you have a poor man's test set. It's no good for checking loops, but works fine for testing dial-up circuits.

Tired of holding the microswitch with a pencil when cleaning pinch rollers on cart decks? Cut the back out of an old cart and remove the guts. Then you can reach them with a swab through the hole.

Speaking of carts, another trick is to cut the top out and reload it with clear leader tape (don't run it—it will bind without lubrication).

It works well for setting head height, since you can see the gap through the tape. For this one, make sure the cart casing is not warped or damaged. The leader tape trick also works fine with reel-to-reel machines.

This may be basic for many of you, but put a dab of nail polish or laquer on trim pots after setting them. Not only does this keep them from vibrating loose, but it discourages tampering.

Many items using trimmers accessible through a panel hole can be "jock-proofed" by sticking a small adhesive color dot over the opening.

If you are like me, you put in a lot of nylon cable ties, only to have to cut them out later to add extra cables.

Several companies sell twist ties by the roll (similar to bread ties), which is handy for temporary ties. After all wiring is complete, then you can install permanent (hopefully) ties.

Screw-in coat hooks are handy for wir-

ing looms. So are large storage hooks sold as bicycle hangars. Plastic gutter ferules work well for looms if installed with long nails and roofing washers.

A large low-voltage power transformer makes a good emergency bulk eraser. Put it in a non-ferrous box (wood, aluminum, or even cardboard).

Leave the secondary disconnected and put a pushbutton switch in series with the primary. Put wirenuts over the secondary leads to prevent shorting.

These are just a few of the ideas I've picked up over the last several years—I'd love to share a few of yours!

Bill Higgs has been CE for WXLN/WFIA for six years and has also done station consulting work. He has a Ph.D. in Theology which helps explain his patience with small market radio. He can be reached at 502-583-4811.

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Basic Tee Networks

by Tom Osenkowsky

Brookfield CT ... Altering the symmetry of sideband load impedances is most often accomplished by a Tee network.

Transmission lines can be modeled as Tee networks and can be used as "line stretchers" providing that the required length is fairly short for economical and physical reasons.

In general transmission lines are fixed and not adjustable. The basic Tee network design equations are given in Figure 1.

Load reactance must be accounted for in determining the correct value of X2, the output leg.

Tower bases and power divider input impedances are generally complex—that is, not purely resistive.

A Tee network may be configured as leading or lagging (phase advance or retard), determined by the sign of the shunt leg reactance.

It is quite customary to place a coil in series with the capacitor of the shunt leg in a lagging network, thus allowing fine tuning of the X3 reactance.

While vacuum variable capacitors are preferred, they are expensive. Two series components may have another advantage which we will examine later.

Another customary practice is to place a capacitor in series with the output leg regardless of the load reactance.

I have found numerous output leg capacitors in ATU's feeding capacitively reactive loads, or inductive loads where additional inductive reactance is required to fulfill the value of X2.

This practice adds additional cost and does not stop lightning from entering the ATU, the transmission line, etc.

Tee, unlike L networks afford impedance transformation as well as independent variation of phase shift. In a DA, proper phasing is essential to the radiation pattern.

The ATU network must provide the proper phase shift and at the same time match the characteristic impedance of the transmission line.

Our main goal in network design will be to provide a uniform match and phase shift at carrier as well as at sideband frequencies.

Minimal change in any network can be achieved by using low L-C ratios whenever possible. Consider the examples in Figure 2. Both a low and high L-C ratio were used in the X2 and X3 branch.

While Figure 2a might have a greater adjustability range, the phase shift variation is greater, as are the sideband VSWRs.

This is a good example to demonstrate why it may be dangerous to model a Tee network as a transmission line.

There are two positive applications of high L-C ratios. A series combination of coil-capacitor may be used to cancel equal/opposite sideband reactances at the common point or ATU terminals.

Certain criteria must be met, however.

Another benefit of a specific L-C series combination is in the X3 shunt leg where it is desirable to reject a specific harmonic or adjacent frequency.

For lagging networks we can resonate a higher frequency and for leading networks we can resonate a lower frequency.

Location of symmetry is of utmost importance for audio quality and loudness.

In a plate modulated transmitter, symmetrical sideband impedances are required at the plate of the final amplifier tube(s).

In a solid-state transmitter, it is desirable to have a symmetrical load at the combining point of the PA modules.

While it is fairly simple to measure the load impedances in a solid-state transmitter, high impedance tube plate circuits present a problem to the usual GR or OIB.

In such cases, a Wayne-Kerr bridge is of value.

A fairly good approximation of plate load can be made using a transmission line model.

These output networks often contain harmonic rejection, passband and/or third harmonic shaping components which cannot be accurately portrayed by the line model. But one can come reasonably close.

For a symmetrical load to appear at the plate or combining point, the impedances as seen at the transmitter output terminals might very well be horseshoe sideways as viewed on a Smith chart!

Taking last month's 760 kHz common point impedance sweep, we see a symmetrical load at the tube plate as shown in Figure 3.

Bear in mind that phase rotation occurs in the ATU, transmission line and output network. Depending on where we look, symmetry may not exist at all.

The most important point of symmetry is right at the generator model terminals. The customary -225° output network phase shift is determined so that the loading and tuning controls have a minimum of interaction.

For almost all transmitters, both solid-state and tube, a load having negative sideband reactances and lower resistance at the lower sideband and higher resistance at the upper sideband will produce the correct load at the generation point.

The Nautel 1 kW transmitter should see a symmetrical load at the transmitter output terminals while all others must be evaluated according to the chart.

Two areas of symmetry exist on the Smith chart.

The horseshoe up provides higher sideband resistances and a general deemphasis while the preferred horseshoe down has lower sideband resistances and an amount of preemphasis.

Through exact network measurements, there may indeed be a difference in sideband VSWR (which means the network is not a pure transmission line model).

Since the Smith chart VSWR circle encompasses an infinite number of impedance combinations, equal sideband VSWR's may not be the best load to achieve.

Figure 1.

$$X_1 = (\sqrt{Z \cdot R} + 1 - \sqrt{Z/R} + \cos(\theta)) / -1$$

$$X_2 = (\sqrt{Z \cdot R} + 1 - \sqrt{R/Z} + \cos(\theta)) / -1$$

$$X_3 = \frac{\sqrt{Z \cdot R}}{\sin(\theta)}$$

Z = characteristic impedance of transmission line
R = Load Resistance
 θ = Phase shift of network

Figure 3.

F(kHz)	Z _c	Z _s	P _s
750	502 + j96	42.5 - j4	28.8
760	600 + j0	50 + j0	100.0
770	518 - j47	54.8 - j11	28.7

Figure 2A.

F(kHz)	R	X	θ	VSWR	P	F.I.	Z
910	46.9	+10	-86.2	1.24	25.5	5.05	55 - j10
920	50.0	+0	-90.0	1.00	100.0	10.00	50 + j0
930	44.5	-12	-93.8	1.32	26.2	5.12	45 + j10

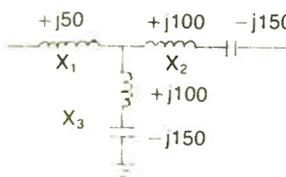
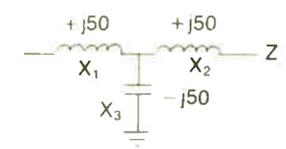


Figure 2B.

F(kHz)	R	X	θ	VSWR	P	F.I.	Z
910	44.6	+7.9	-88.7	1.22	27.1	5.21	55 - j10
920	50.0	+0	-90.0	1.00	100.00	10.00	50 + j0
930	51.3	-11.5	-91.1	1.26	23.2	4.82	45 + j10



One must look further. I prefer to examine the sideband powers generated at the plate or combining point. This is a direct reflection of the signal in the far field (neglecting pattern bandwidth problems for the moment).

We performed the 10 kHz test last month. If you did not find a good correlation between the upper and lower sideband field intensities, it's time to "rotate" your plate or combine point impedances.

The optimum field at each sideband would be one-half the field of the carrier. If your carrier F.I. was 10 mV/m, each sideband would ideally be 5 mV/m.

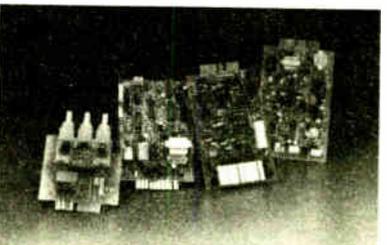
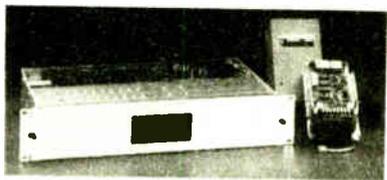
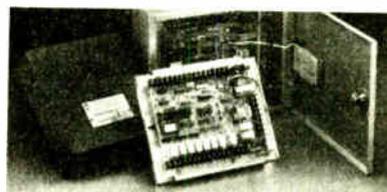
You can perform rotation using an OIB only by experimentation.

Move the shunt arm one turn in one direction and adjust for 50 ohms resistance using X2, and clean out the reactance using X1.

Do this at the common point or ATU of a non-D. Now re-measure your F.I. as before.

If it got worse, go two turns in the opposite direction on the shunt arm, etc. A mathematical model is far more precise and less time consuming.

Tom Osenkowsky is a radio engineering consultant and president of MASTER Software, and a regular RW columnist. He can be reached at 203-775-3060.



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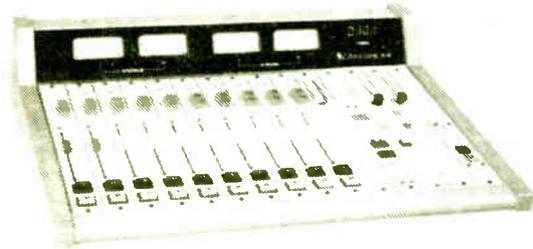
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On-air console

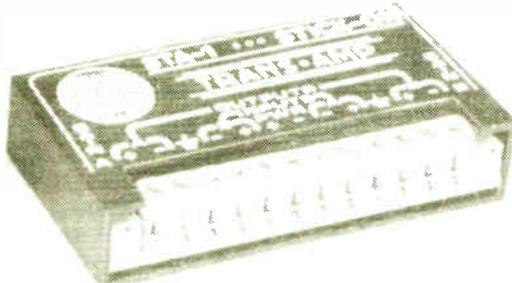
Wheatstone Corporation's A-20 on-air radio console has been designed for smaller radio stations and news/production. It is available in a 10-input console featuring modular construction.

Available modules include mono/mic, stereo line, control room, studio and full function machine modules.

Other features included as standard are program and audition meters, digital timer, remote starts and external input controls.

The console meets the same standards as Wheatstone's larger model, the A-500a.

For more information contact **Patty Bagshaw** at 315-455-7740, or circle Reader Service 73.



Electronic transformer

Radio Design Labs' "Transamp" electronic transformer provides a compact method of converting the output of a CD player (or other unbalanced audio source) from unbalanced to balanced, or vice versa.

Two identical electronic transformers are housed in a case 5/8" x 1 1/2" x 3". A large adhesive strip allows the unit to stick onto the rear of the CD or other machine. Connections are made through a terminal strip.

For more information, contact **Jerry Clements** at 805-684-5415, or circle Reader Service 77.



Audio editing

Compusonics Corporation recently announced a new audio editing software version for the DSP 1500 digital cartridge disk recorder.

The upgrade provides cut-and-paste audio editing and program sequencing for broadcast production and on-air playback.

The new editing functions may be accessed with a serial data terminal, or with the optional "MacSonics"™ software package running on an Apple Macintosh personal computer.

Editing commands are available via the RS-232 computer port on the 1500.

For more information, contact **John Stautner** at 415-494-1184, or circle Reader Service 74.



Announcement system

Allied Broadcast Equipment is marketing Interitalia's Interactive Plus, a solid state audio announcement system that provides user access via touch tone, dial pulse or voice activation.

It can simultaneously answer six telephone lines and provide 14 separate information messages with up to 17 minutes of digital voice storage.

Other system features include digital call count register, remote access and system operating battery back up.

Any of the 14 individual messages can be changed independently.

For more information, contact your local Allied Broadcast Equipment representative.



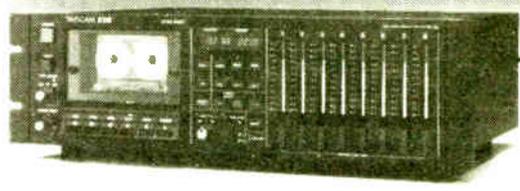
Modular console

Soundcraft Electronics announced its new SAC200 modular broadcast console designed for on-air use.

The mono and stereo inputs are based on the Soundcraft Series 200 standard and stereo input modules with a control logic/VCA printed circuit board fitted next to the fader control.

A Telco module is available to provide a mix-minus output and reverse talkback facilities.

For more information, call **Mark Gander** at 818-893-4351, or circle Reader Service 78.



Multitrack cassette

Tascam has introduced an 8-track multitrack cassette recorder using standard audio cassettes.

The rack-mount Tascam 238 Syncaset™ supplies twice the amount of tracks previously available in a standard cassette multitrack recorder.

Features include 3 3/4 ips tape speed, full function remote control, auto punch in/out, auto rehearse, dbx II noise reduction and MIDI compatibility.

It is SMPTE-friendly, which enables it to lock up with other decks and synchronize with video. It also features a serial connector for computer control.

For more information, contact **Dave Oren** at 213-726-0303, or circle Reader Service 71.

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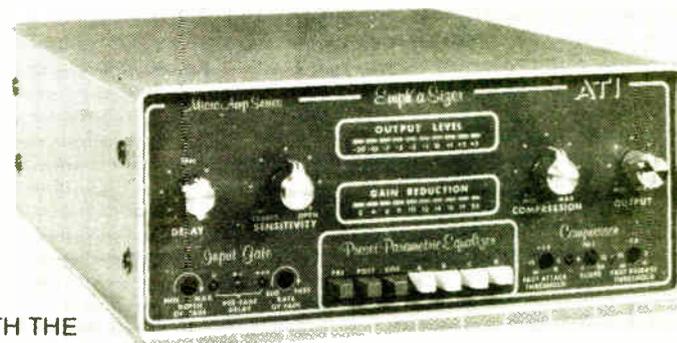
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BUYERS GUIDE

AM Transmitters & Exciters

KIOA First On Air with DX-10

by Steve Konopka, Corp DE
Midwest Communications, Inc. and
John Kosobucki, CE
KIOA-AM

Des Moines IA ... Committing your station as the first on-air site for a technologically innovative piece of equipment is a risky endeavor—especially when that piece of equipment is the transmitter!

In our case, however, the risk paid off. On 10 September 1987, KIOA became the world's first digitally modulated AM station with the Harris DX-10.

We'll admit we had mixed feelings before the installation. While we were happy that KIOA was getting a new transmitter, we knew that our real-life broadcast situation was far removed from the ideal conditions in a research and development laboratory.

KIOA signed on in April 1948 and is one of eight stations owned and operated by Midwest Communications, Inc., headquartered in Green Bay, WI.

User Report

During the daytime, KIOA broadcasts at 10 kW with a two-tower directional pattern that reaches 90 of Iowa's 99 counties. At night KIOA goes to 5 kW with a complicated six-tower array which forms a sharp V-shaped pattern to the west-northwest.

We knew our Harris DX-10 would be the first in the field and were convinced

KIOA became the first digitally modulated AM station with the Harris DX-10, shown here by the station's chief engineer, John Kosobucki.



that if something *could* go wrong, it *would* go wrong.

Also, while we're not unfamiliar with solid state equipment, its application in the DX-10 made us somewhat apprehensive.

In short, there was a fear of the unknown.

However, these misgivings have turned out to be unfounded. In fact, the DX-10 is the *only* transmitter we've been around that doesn't try to do anything weird.

It doesn't try to overload. It doesn't try to shut down. It doesn't burp. It just works!

The DX-10 is based on a patented digital amplitude modulation system, and offers superior audio performance, system reliability and operating efficiency.

The Harris DX-10 produces FM-quality sound with excellent signal transparency. In fact, you can modulate the daylight out of it—125% peak capacity at 11 kW, 140% at 10 kW.

We know of no other transmitter capable of such high average modulation. Plus, with extremely low THD and IMD, the DX-10 is transparent to whatever you feed it. THD is typically 0.4% at 95% modulation from 30 Hz to 10 kHz. SMPTE 4:1 IMD is typically 0.7% at 10 kW, 95% modulation.

The DX-10 has virtually no audio overshoot, tilt or ringing. If you put a square wave in, you get a square wave out. We're picking up high end that we didn't even hear before, and it's a difference you can hear even on an average receiver.

With typical overall efficiency of 86% at 10 kW, we've noticed a substantial power usage reduction. Our old transmitter was pulling an average of 27 kW; the DX-10 averages 12 to 15 kW.

Harris' patented digital AM modulator, which consists of 48 identical RF power amplifiers, is at the heart of the DX-10. Each amplifier is individually controlled by low level DC voltages for typical PA efficiency of 90%.

Harris' digital modulator applies audio to an ultra-fast analog-to-digital (A/D) converter. Digitized audio and a carrier level control signal are applied to the modulation encoder which controls each power amplifier.

Power amplifiers are turned on and off with modulation, and their output is totalled in a master RF combiner.

Designed for serviceability and reliability, all 48 RF power amplifiers feature a plug-in design and are identical and interchangeable.

The DX-10 uses Harris' FlexPatch™, an inherent soft failure feature that en-

sures continued, safe on-air operation should one or more of the high-power RF amplifiers fail.

The DX-10's ColorStat™ front panel single-flow diagram enables easy monitoring of the transmitter, using 28 separate LEDs to represent key operating stages.

The transmitter also offers an easily accessible remote control interface panel, and standard and convenient output tuning.

Installation of the Harris DX-10 was straightforward and virtually problem-free. The transmitter arrived at KIOA on 8 September 1987, and was on the air two days later.

The results were impressive right from fire-up. While we had a few bugs when we switched to night pattern, a Harris engineer easily solved the problem by making some minor adjustments.

There are several features of the DX-10 which we especially like.

The most obvious is that there are no power tubes to worry about. The DX-10 has eliminated an annual \$1,500 tube replacement expense.

Power consumption figures are impressive. With the old transmitter, our power bill was between \$1,200 and \$1,500 per month. With the DX-10, it is less than \$1,000 per month.

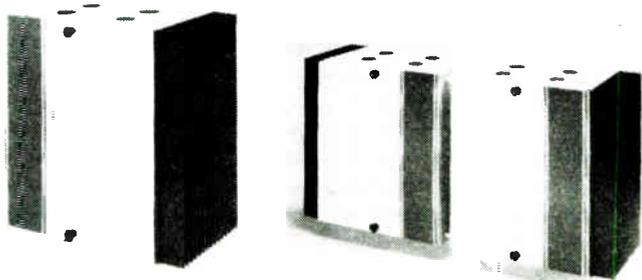
Also, the DX-10 withstands severe weather conditions. We were a little nervous when the first thunderstorm hit, but the DX-10 performed exactly as it should have.

The tower took a couple of lightning hits. After a momentary power reduction accompanied by an audible click, it was immediately back on the air at full power. This is a true test of a solid state transmitter.

The DX-10 runs silent to average, and it is a cool transmitter. It is housed in a 20' x 100' building. We were in the room

(continued on page 46)

Cost-Effective Transmitters for Low Power AM Authorizations



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Also articles from Nautel on the AMPFET ND10 and Radio Design Labs on its ACM-1, as well as an article from Dave Hebert on AM stereo installation.

BUYERS GUIDE

Manufacturers Commit to AM

by Marlene Petska Lane

Falls Church VA ... A chief engineer from Louisiana recently told me that he'd received a CP from the FCC allowing him to build an AM station. He also told me he'd decided to "forget it."

"AM is on the decline," he said. "What's the point?"

Although this attitude may be a little extreme, AMers in many parts of the country are becoming increasingly distraught over the state of AM.

"The trend seems to be among broad-

cast ownerships that the bottom line is being emphasized," says Gordon Allison, manager for radio sales and product for Wilkinson.

What the focus on the bottom line usually means is the lack of new equipment and, more importantly, the lack of a full time engineer to keep the old equipment in top shape.

"The station that can't afford a full time engineer is also probably using an antiquated or at least not state of the art transmitter," says Walt Rice, director of domestic sales for Continental. "And

those stations are the ones that need the engineer the worst," he adds.

But rather than pull back from an AM market that appears unprofitable, transmitter manufacturers are rallying to bring the quality—and listenership—back into AM.

Their commitment is most obvious in their introduction of new AM products that are simpler, more reliable and more efficient. And their efforts are aided by the recent focus on AM technical improvements.

Harris' Broadcast Division broke new

ground with its DX-10, the first digital solid state 10 kW AM transmitter.

"We are really committing a lot of resources here toward the development of new technologies for AM," says Ron Frillman, manager of domestic radio sales for Harris.

The DX-10 uses a patented digital amplitude modulation system, which is capable of 125% peak capacity at 11 kW. The modulator consists of 48 identical, individually controlled RF power amplifiers.

Harris was scheduled to show a 25 kW version of the transmitter at the NAB show in Las Vegas.

Nautel's latest 10 kW solid state transmitter uses a patented enhanced pulse duration modulator to increase its stability, along with other patent-pending upgrades. AC line variation has been totally eliminated, says Jorgen Jensen, AM broadcast sales manager for Nautel.

The Nautel transmitter's modular redundancy allows a module to be shut down and removed while the transmitter is in operation. It also has a built-in spare exciter, making standbys, says Jensen, a thing of the past.

Industry Roundup

Nautel is planning to expand into other RF products, as well.

"Broadcasting has been very good to us and we'd like to look at increasing our involvement," says Jensen. "We're going to be looking at add-on products and will be going in a couple of other directions with broadcast-related products," he adds.

Continental also planned to show a new solid state transmitter at NAB, and is offering modification kits for its present line.

The new direct RF PWM 1 kW transmitter samples audio twice per RF cycle. The RF output filter functions as a PWM filter, which keeps incidental phase modulation extremely low.

Wilkinson's Allison says that the company will be spending about \$1 million on the development of a family of solid state transmitters.

"Solid state is where the action is—and that's where we intend to go," says Allison, who added that Wilkinson will continue to maintain its tube transmitters until its customers are ready for solid state.

Transmitter manufacturers say that because of the changing status of engineers at many stations, they will continue to offer full service and support for their products, as well.

Nautel has customer service people available around the clock, although Jensen says that the simplicity of the transmitter design has contributed to low support costs.

"Our transmitters were built on the philosophy that we were designing aeronautical radio beacons that had to operate in remote, inaccessible locations where people could only get in during the summer," explains Jensen.

Continental provides a 24-month warranty for transmitter parts, and also provides technical seminars in various parts of the country free of charge to engineers.

Wilkinson's one year warranty can be **(continued on page 47)**

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BUYERS GUIDE

WTGC Switches to Nighttime with LPB

by Gary Magill, CE
WTGC-AM

Hollidaysburg PA ... On 30 August 1985, WTGC in Lewisburg, PA was issued a show/cause order for night operations. The power issued was 13.6 W.

At first, we used our old RCA BTA250M, a 250 W AM transmitter with a dummy load and tapped coil to get 0.5 A on the base current. The transmitter was already set up for post sunset at different powers.

We found the commercial power required to achieve 13.6 W was far more than efficiency prescribed. The audio quality of the old RCA at this low power was not very good, either.

What we needed was a low power transmitter.

I called Dick Crompton at LPB in Frazer, PA to see what he had in the way of equipment because I knew that LPB had a great deal of experience in lower power transmitters.

Dick suggested his LPB AM-30P solid state, 30 W AM transmitter.

We estimated that the savings from electric power costs would pay for the transmitter in one year.

Delivery time was quick/about two weeks. The instructions were very easy to follow, and we were able to install our new night transmitter in August of 1986.

User Report

The operating people at WTGC were amazed at the size of the new low power transmitter. It is approximately 12" high, 6" wide and 5" deep.

The unit has adjustable power control and audio input control. The output connector is an S0239 connector. The power input is a standard 120 V plug.

We made a modulation monitor sample connection with the circuit supplied in the book. We used a ceramic switch to switch between the RCA and the LPB units.

Our audio is driven with a Dorrrough Model 310. The LPB AM-30P modulates positive peaks very well. The adjustable power control makes an easy transition from the power of post sunset into nighttime power.

The frequency stability is very good at about +10 Hz. The audio quality on the LPB is comparable to that of the main transmitter operating on daytime power.

The LPB operates low level modulation with linear amplifier push/pull. To supply power to the unit, there is a toggle switch inside the front door with an LED indicator on it.

One thing I would like to see is the main power and RF power adjustment

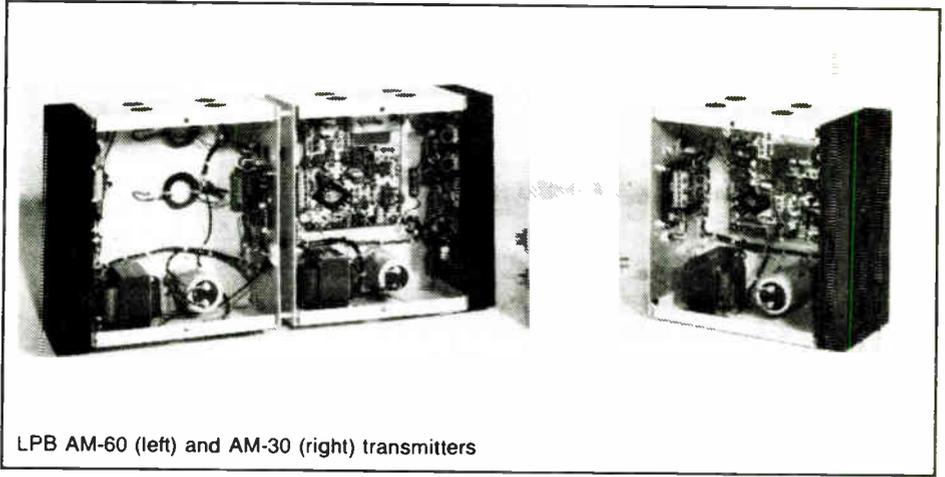
Editor's note: Gary Magill is CE of Cove Broadcasting stations WHPA and WKMC. He is also an engineering consultant for WTGC.

For more information on LPB solid state transmitters, contact John Tiedeck at 215-644-1123. The author may be reached at 814-695-4441.

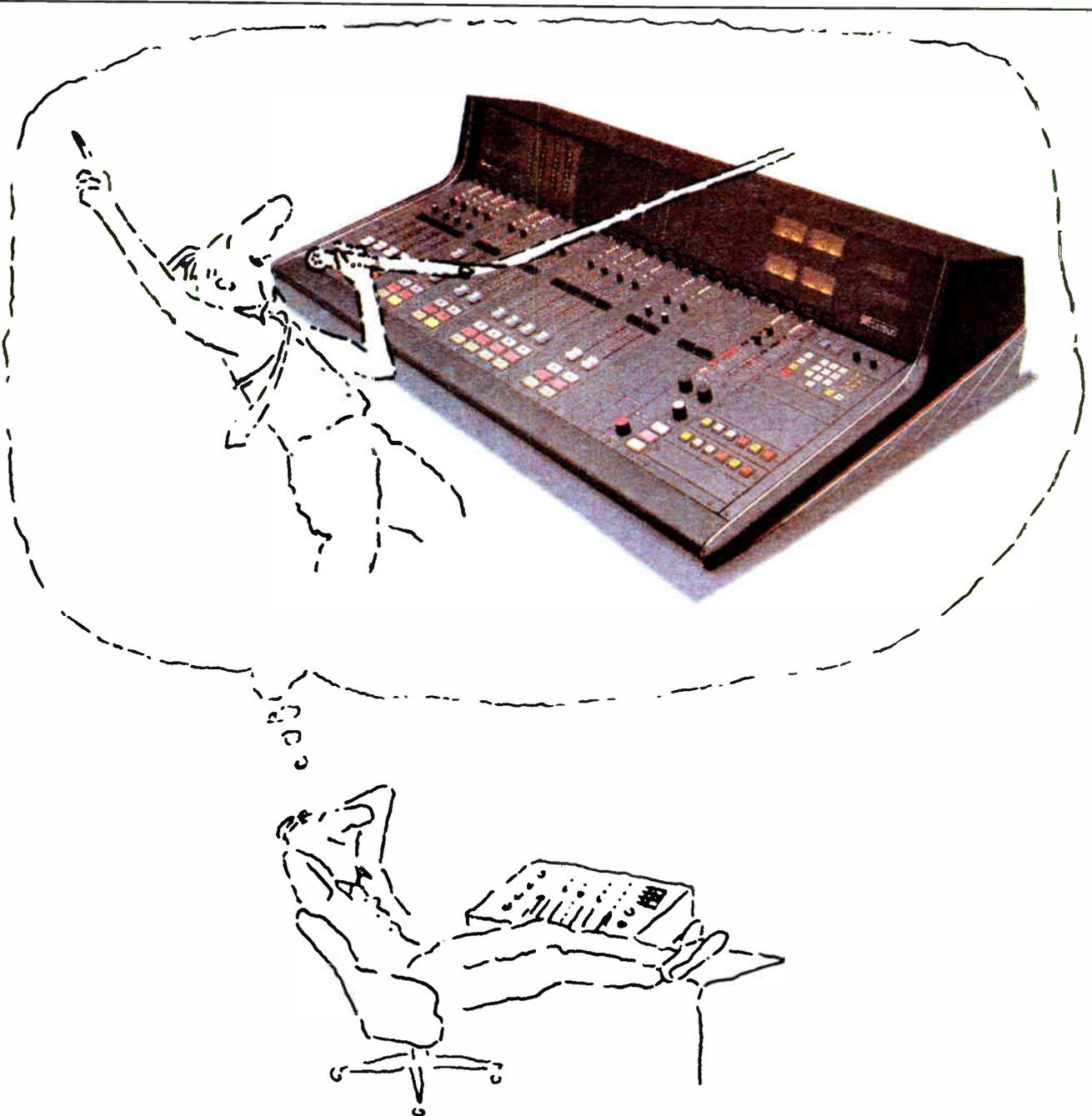
mounted on the outside so the unit can be operated with the power on.

Also, the means of sample for the modulation monitor should be mounted inside of the unit with the jack on the side.

Overall, however, I highly recommend the LPB AM-30P to stations looking for economical night transmitters.



LPB AM-60 (left) and AM-30 (right) transmitters



IMAGINE

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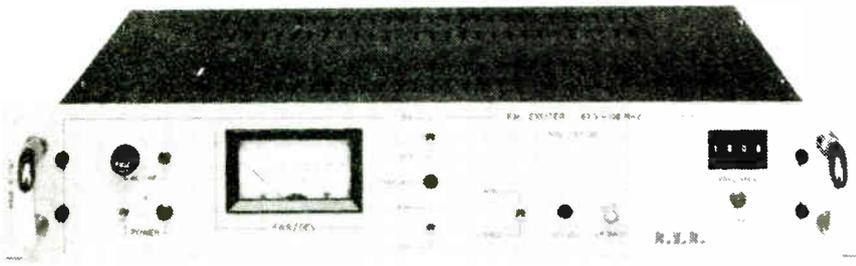
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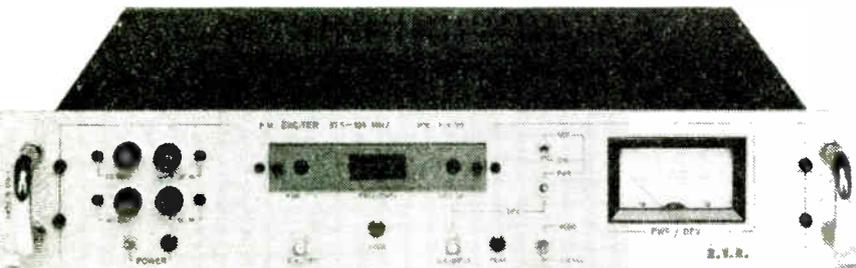
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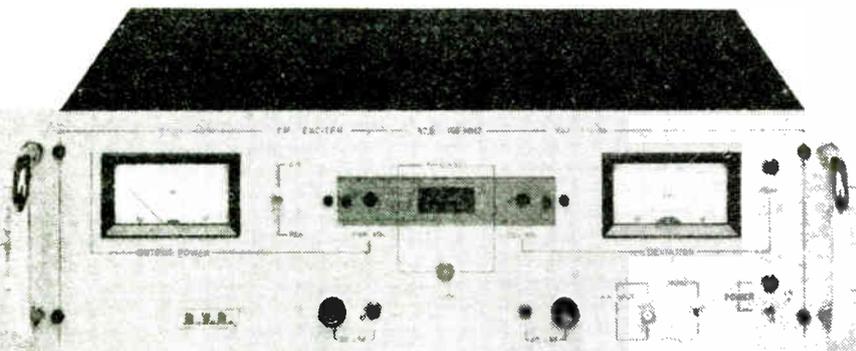
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Nautel Intros ND10

by Jorgen Jensen, AM Bdcst Sales Mgr
Nautel

Tantallon Nova Scotia ... Nautel has been building all solid state high power radio transmitters for nearly 20 years. Our first AM broadcast transmitter was the 10 kW AMPFET 10 introduced in 1982.

Technology Update

Since that time solid state AMPFET series transmitters in powers up to 50,000 W have been delivered throughout the world.

Just before NAB, Kawartha Broadcasting at CKBB, Barrie, Ontario took delivery of the first production unit of the new Nautel AMPFET ND10.

The AMPFET ND10, 10 kW AM transmitter is based on the field-proven technology of the AMPFET 50, 50 kW, and avoids unnecessary complexity and experimental design risks.

Overall efficiency is guaranteed to be 75% or better at all modulation levels. This includes total AC power required to operate the transmitter including ventilation fans and low level drive circuits.

The AMPFET ND10 can provide savings in tubes and power which in a few years exceed the purchase price of the new transmitter.

Nautel's techniques of Class D power amplification and pulse duration modulation are inherently linear.

Performance parameters are optimized without the need for overall negative feedback. The AMPFET ND10 with fully DC coupled audio input has a frequency response which is flat from DC to 10 kHz.

Audio distortion and IMD are less than 1%; low frequency phase shift is zero. AM stereo operation is enhanced by a typical IQM of 50 dB at 1 kHz (40 dB, 30 Hz to 10 kHz).

Nautel's patented Pulse Duration Modulator (PDM) incorporates a unique line voltage compensation circuit which stabilizes transmitter power against variations of line voltage and virtually eliminates hum and distortion products due to line voltage sag.

The technique in effect subjects the PDM control signal to dynamic division by the supply voltage and results in minimal carrier shift when modulating the transmitter heavily.

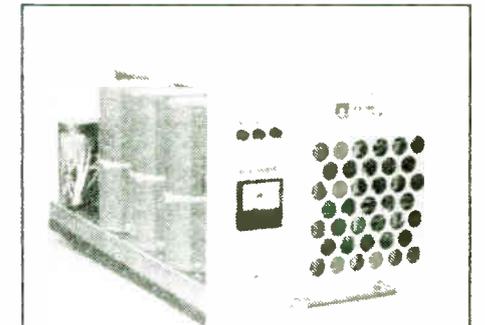
This means that hundreds of watts more actual power are delivered than transmitters exhibiting 2% or 3% negative carrier shift.

The transmitter is housed in a rugged 6' high cabinet requiring only 7.5 sq. ft. of floor space, or approximately half that of other 10 kW transmitters.

Main and standby exciter sections are mounted in a single drawer. Each contains its own crystal oscillator and the control circuitry to provide RF drive and modulator drive signals to the power amplifier/modulator sections.

Eight identical 1.25 kW AM power subsystems each contain three PA modules and associated PDM modulator. These subsystems are combined to provide 11 kW output capability.

The modulation system provides true



An ND10 1.25 kW power subsystem module.

soft failure without the need for patch-cards to maintain acceptable performance. More importantly, there is no risk of sudden out-of-band splatter.

The benefits of modular redundancy are optimized by the provision of isolation switches for each 1.25 kW AM power subsystem. A subsystem may be safely removed for servicing while the rest of the transmitter remains on air.

The single most important design constraint for semiconductors with their low thermal time constants is avoidance of thermal cycling.

A feature of Nautel's PDM design is even distribution of power in the modulator and power amplifier devices at any carrier or modulation level.

Nautel's solid state design has evolved over our years of experience with thousands of high power solid state radio transmitters. Very conservative component derating and avoidance of unnecessary design complexity assure long-term reliability.

Editor's note: For more information, contact the author at 902-823-2233, or the Bangor, ME plant at 207-947-8200.

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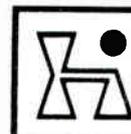
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BUYERS GUIDE

KPBC Tests Continental 314F

by W.C. Alexander, DE
Crawford Broadcasting Company

Dallas TX ... Continental Electronics of Dallas, TX has developed an all new design RF Pulse-Width Modulation solid state 1 kW AM transmitter, the 314F, which uses new technology to solve problems that have long plagued PWM designs.

Crawford Broadcasting Company's KPBC, Dallas, was used as a test bed for the prototype. This installation proved very useful for Continental, as KPBC receives a much greater number of lightning strikes on the tower than the average.

PWM history

Pulse-Width Modulation solid state transmitters are nothing new. Designs several years old by other manufacturers incorporated high-level pulse width modulators and the necessary PWM filters to remove the chopping frequency.

As AM stereo came on the scene, receiver bandwidths began to improve and several problems with the 70 kHz sampling rate used in these transmitters became apparent.

User Report

Since the PWM switching frequency is quite close to the audio range, lower sideband products of the PWM switching frequency and higher modulation frequencies appeared in the audio range.

This was not apparent in older narrowband receiver designs. But in newer wideband receivers these side effects became noticeable, especially in program material containing synthesizer music and other material with a high harmonic content.

Another side effect in the wideband receivers was distortion as a result of the (relatively) low sampling rate. Using a 70 kHz sampling rate, at a modulating frequency of 10 kHz, only seven samples are taken, whereas 70 are taken at 1 kHz and 700 are taken at 100 Hz.

Phase distortion that occurs in the PWM filter is another problem that has been difficult for AM stereo broadcasters to overcome.

The obvious solution to all these problems is a higher sampling frequency.

Direct RF PWM is the method that Continental chose in its new design. The audio is sampled twice per RF cycle, which is the greatest amount possible.

“ The transmitter occupies the space of one equipment rack and weighs less than the average empty refrigerator. ”

This scheme eliminates the PWM filter, as the RF output filter also functions as a PWM filter, and incidental phase modulation is kept to an extremely low value across the audio spectrum.

Features

Other than the modulation scheme, the most attractive feature of this new transmitter is the solid state design. Power MOSFETs are used in the power amplifier, and they are rugged enough to drive an antenna located in an otherwise hostile environment with a high degree of reliability.

Each of the five power amplifier modules incorporates sophisticated fault protection circuits that increase the reliability to a point over that of conventional tube-type PA circuits.

These fault protection circuits include overcurrent protection, overtemperature protection, overvoltage protection and SWR fault protection.

The current fault circuits operate within one RF cycle to quickly clamp the output and thereby safely control lightning and static transients.

The modular design and fault protection scheme work together to keep the transmitter on the air even after a multiple failure has occurred.

The RF switching drive is clamped so that the module can series pass RF cur-

rent without actually being in an operating condition.

This design scheme also fosters a wide dynamic power range, from 50 W to 1.1 kW, where only the number of output modules required to produce the desired output power are used at any given power level.

The 314F maintains the same pulse width and clamps off modules, thereby

maintaining excellent audio response at very low PSA or PSSA power levels.

Stereo performance is excellent, and internal/external drive and crystal on/off switches are provided for stereo operation and testing.

The modular design of the transmitter permits any part of it to be removed easily and quickly for bench repair. The PA modules slide out from the front, and the MOSFET amplifiers are removed from their sockets and replaced in minutes.

Installation

Control and audio circuits are all on removable plug-in PC modules that are accessed from the front. All ICs are socketed for easy replacement.

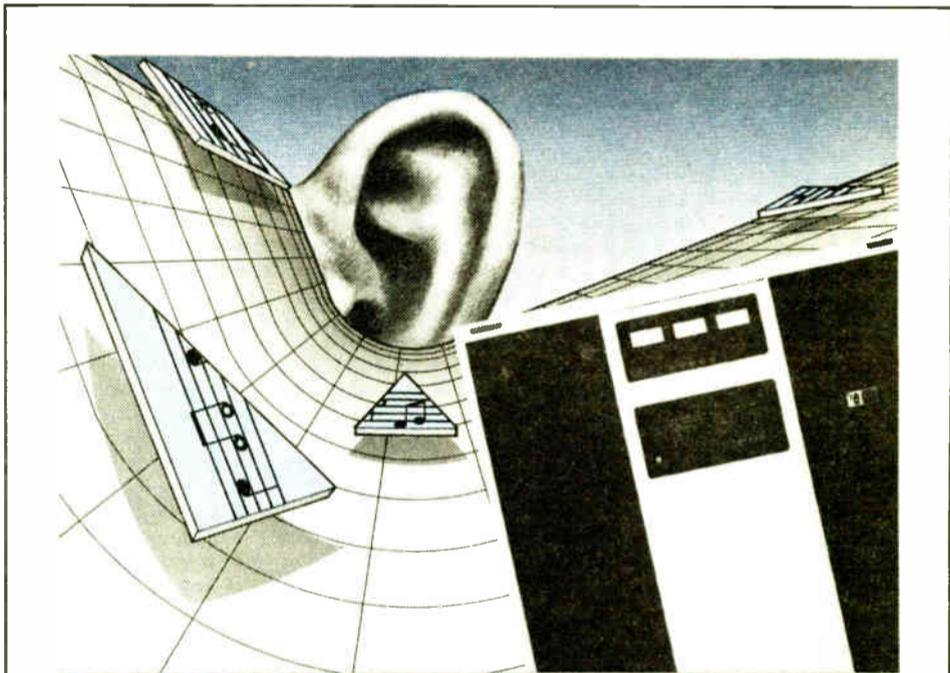
Most components within can be accessed without removing the supply from the transmitter, but if necessary, the entire assembly comes out in a matter of minutes.

Installation is an easy afternoon's project. The transmitter occupies the space of one equipment rack and weighs less than the average empty refrigerator. It is easily maneuvered into position with a light-duty hand truck.

Power connection is made at the bottom of the cabinet through access holes in either the top or bottom of the cabinet.

Remote control/metering/status connections are made on barrier strips on the back of the card cage. Complete "readback" information is available to drive the most sophisticated status/

(continued on page 44)



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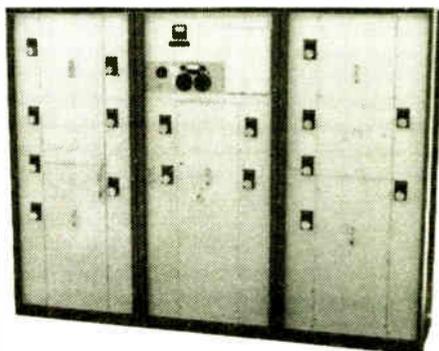
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BUYERS GUIDE

Pointers for Installing AM Stereo

by David Hebert
Dave Hebert & Associates

Pasco WA . . . Installation of AM stereo equipment is a complicated procedure that can easily result in frustration, poor performance and inflexibility in dealing with equipment problems.

Those stations contemplating the installation of new stereo AM equipment should begin planning the installation even before the equipment is ordered.

This advance legwork can make the actual installation easier and stereo per-

formance credible.

Most experts agree that a patch panel is necessary to allow for easy access to the audio signal as it travels through various consoles, compressors and limiters to the stereo generator.

Each piece of equipment should be terminated into a patch panel so one can easily "break into" the audio path as necessary to check for signal quality.

A "normalizing" path should be provided to allow the audio signal to travel to the next piece of equipment without the need for patch cables.

The stereo exciter is mounted in a rack cabinet external to the transmitter. This location should be planned in advance to allow easy access to the internal adjustments of the exciter whenever necessary.

One stereo exciter, the Broadcast Electronics AX-10, is equipped with rails to allow additional accessibility to internal adjustments and ease of maintenance.

Careful attention should be given to properly grounding the stereo exciter. Lack of attention in this area can create excess noise, distortion, RFI and other

performance deficiencies.

Once the stereo equipment is ordered, and during the period before the equipment is delivered, attention should be given to interfacing the stereo generator to the transmitter.

This does not need to be a particularly difficult problem, as the vendors of stereo equipment have developed sufficient information on transmitter interfacing to remove much of the mystery.

Generally speaking, AM transmitters require two signal inputs to develop stereo. The first path is a L+R, or monophonic, signal which is applied to the regular audio input.

This input should be routed through some patching system, as mentioned before, so the audio path can be maintained by patching around the stereo exciter during times of maintenance or malfunction.

The second path involves the RF, or carrier signal which is the L-R, or stereo subchannel. This signal can be installed through a switch so the transmitter's regular oscillator can be switched on during times when the regular exciter is inoperative.

Whenever the transmitter is in the stereo mode, the regular oscillator should be disabled so the two oscillators don't interfere with each other.

One must be careful to ensure that the RF signal level from the exciter is adequate to ensure the low level buffer/IPA stages of the transmitter are functioning properly.

There are times when it may appear the signal levels are appropriate for the transmitter, but they are not.

A clue to this condition could be the loss of the stereo pilot intermittently during modulation (usually with low frequency audio signals), or excessive L-R noise.

Transmitters that use TTL signal levels in their early oscillator circuits seem to be especially sensitive to improper signal levels. The best advice is, "when in doubt, check the levels with an oscilloscope."

IPM, or incidental phase modulation, is a nemesis of quality stereo broadcasting. Each of the stereo systems currently marketed involves a phase modulation of the carrier to develop the stereo signal.

The transmitter's power amplifier will tend to develop its own phase modulation through deficiencies of poor bandwidth of the interstage coupling circuits, power supply characteristics, poor neutralization or problems in the final output tank or load.

Some transmitters require modifications to reduce any IPM that may be developing in the system. Many monophonic transmitters have developed so many problems with IPM that it is not uncommon for them to turn an AM stereo radio into the stereo mode, even during non-stereo operation.

The transmitter manufacturers and vendors of stereo exciters can provide a wealth of information in this area.

Ironically, some of the older AM transmitters seem to lend themselves naturally to low IPM characteristics and excellent stereo performance.

Proper audio processing is important for successful AM stereo performance. It is critical that negative overmodulation be prevented because it turns off the stereophonic pilot and, subsequently,

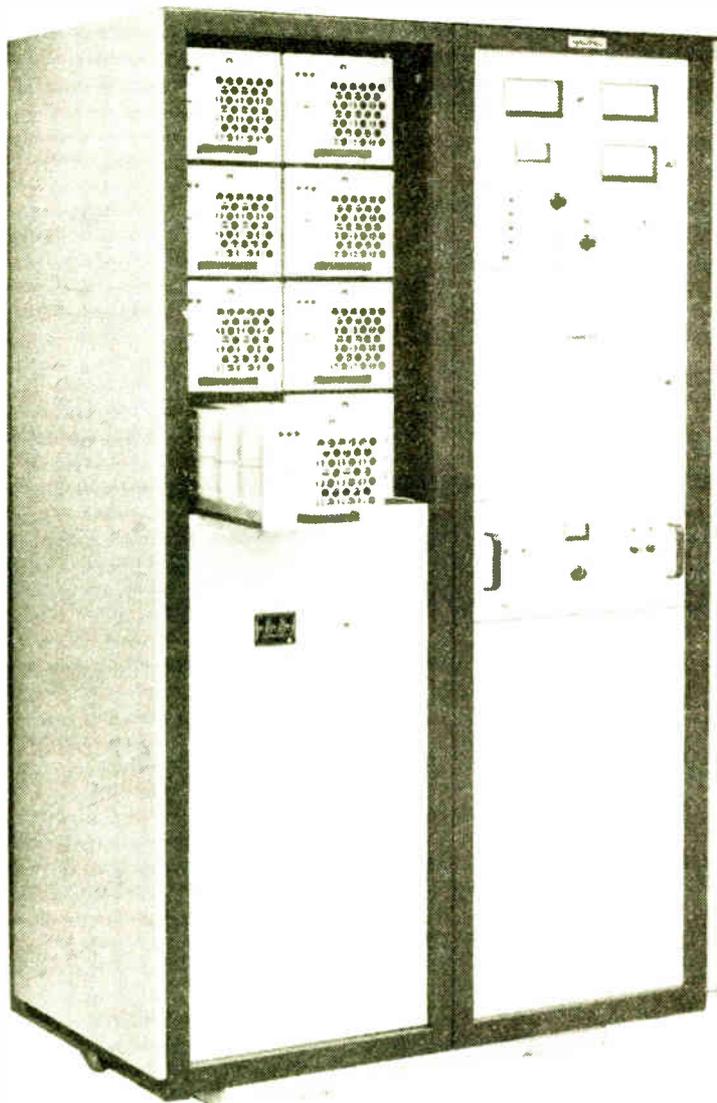
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BUYERS GUIDE

Wilkinson 1000B AM Rugged

by James Stanley
Stanley Broadcast Engineering

Tempe AZ ... The Wilkinson AM 1000B broadcast transmitter offers the broadcaster reliability and simplicity at an affordable price. It is extremely rugged and utilizes conventional circuitry to achieve 1 kW of output power with A3E (amplitude) modulation.

User Report

The power amplifier stage of the AM 1000B is a class "C" design which offers a high efficiency factor (70%) and is simple to adjust.

A minimum number of parts are used in the power amplifier section. Additionally, the PA stage utilizes 4-400C tetrode power grid tubes, which are considered a standard in the industry.

The output network is a conventional PI-L circuit which offers excellent suppression of unwanted second and third order products. The output stage utilizes heavy duty inductors and vacuum capacitors in order to assure cool and reliable operation.

The modulator stage employs high level plate modulation by using a modu-

lation transformer and reactor to couple the modulator output to the last radio stage.

Simplicity of design

All Wilkinson AM transmitters use this time-proven technique because it offers simplicity and reliability of operation.

Maximum efficiency is also achieved. The only losses introduced occur in the modulation transformer and reactor. The modulator stage also uses the 4-400C tetrode tubes.

All low and high voltage power supplies utilize the Wilkinson "self testing" silicon rectifiers. Visual inspection during normal operation determines proper operation.

To achieve this self testing technique each diode is shunted by an indicator light, which is illuminated by the reverse voltage present across the diode.

Should the diode "short circuit," the reverse voltage is no longer present and the light is extinguished.

The control circuits in the AM 1000B are quite simple and offer all of the necessary logic to assure minimal down time. Recycling is an integral part of the system and electronic timing circuits control the application of voltages to the various stages of the transmitter in a

specific sequence.

In the event of a momentary overload the high voltage is removed and then reapplied automatically. If the fault condition has cleared, the transmitter will return to operation automatically.

However, if the overload persists, the control circuit will inhibit continued operation. Air flow switches are incorporated so that should the blower fail both filament and plate voltages are removed immediately.

AM stereo operation is made easy with

the Wilkinson AM 1000B transmitter. The manufacturer offers a stereo conversion kit which renders the transmitter "stereo ready."

Also, new transmitters can be shipped from the factory with the stereo kit already installed.

AM stereo compatible

We recently tested the AM 1000B in stereo using a C-QUAM exciter and monitor. The proof of performance measurements revealed that the performance specifications were somewhat better than the manufacturer's published specifications in the instruction book.

(continued on page 44)

Stereo Installation Tips

(continued from previous page) any stereo receivers are switched into the mono mode.

A listener can become quite annoyed if his radio is constantly switching between stereo and mono. However, these processors must still maintain a proper balance between L+R and L-R to preserve separation between the left and right channels.

Awareness of studio maintenance will take on an increased importance with stereo operation. Turntables must be repaired to reduce rumble.

Close attention should be given to stereo tape machines to be sure of optimum

head alignment for maximum separation.

Distortion, noises, "clicks" and other sources of audio degradation must be reduced to an absolute minimum to ensure a proper stereo audio signal.

With care and planning, conversion to AM stereo can involve a minimum of effort. To achieve a stereo signal that is unique does require advance planning. But once the installation is complete, the results will justify the effort.

Editor's note: Dave Hebert is a frequent contributor to RW. He may be reached at 509-547-1618.

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The Tascam 42B makes other 2-track recorders seem downright slow.

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For more information, call or write about the Tascam 42B today. It's a new and vastly improved way to keep meeting your deadlines.

And your budgets. **TASCAM**

BUYERS GUIDE

WNYR Gets Optimod NRSC Kit

by Randy Orbaker, CE
WNYR-AM

Rochester NY ... WNYR has been using an Orban Optimod 9100A/2 audio processor since 1985. We're very pleased with its performance, but I have observed some degree of second adjacent channel "splatter" when using Orban's recommended 17 dB of HF boost.

User Report

Reducing this boost from 17 dB to 8 dB helped somewhat, but did not eliminate it to my satisfaction. When I heard of the new NRSC preemphasis/10 kHz LP filter standard in early 1987, I felt that it would both solve our problem and make us compatible with the proposed new AM receivers.

I called Orban and ordered one of its RET-042 NRSC conversion kits for our Optimod AM.

Since the kit was not then in production, there was some delay between placing the order and receiving it (four months in our case).

When it came, I found everything I needed—no missing parts, no wrong parts, everything correct.

Orban's manual is, like every one of its manuals, very detailed and well written.

Among the items included in the kit are: a new circuit board (#1S10) which

plugs into the #1 card slot inside the Optimod and provides the 5/10/12 kHz LP filtering.

The NRSC uses 10 kHz, but the other curves are strappable to the Optimod's "DAY-NIGHT" mode switching to operate differently between day and night, if necessary.

New HF EQ modules are supplied, which replace the standard green, red or yellow modules supplied with the Optimod. They provide the modified 75 μ s preemphasis curve required.

If your Optimod has a serial number below 700000, you must install sockets for the EQ modules before converting to the RET-042.

These sockets are available as Orban's RET-033 kits, and should be ordered if needed before attempting to put in the NRSC kit.

In our case, even though our unit's serial number was 680410, we had the sockets already on the #4 and #5 cards, so we avoided some extra work.

Check your unit first, install the sockets if you need them, then simply replace the existing modules with the new blue modules to provide the new HF curve.

Jumper wire installation

To provide ± 4.1 VDC for the clipper on the 1S10 card, I had to install two supplied jumper wires onto the back of the Optimod's motherboard. This requires removal of the Optimod's rear

panel, following the instructions in the manual.

It's not difficult but must be done carefully to avoid breaking any of the ceramic feedthrough capacitors on the motherboard.

This particular step took the greatest amount of time, about 40 minutes. Once done, I reassembled the Optimod and reinstalled it.

Before plugging in the 1S10 card, compare the jumper settings with the diagrams in the manual.

... I listened and found that the second adjacent channel splatter ... was now gone.

This card has features used with Motorola C-QUAM AM stereo systems: a single channel limiter, a 200 Hz HP filter (for the L-R channel, when using low frequency SCA or telemetry), and a stereo enhance control, to improve subjective stereo separation.

WNYR is not operating in stereo at all, so I simply defeated these with the card's jumpers. Our LP filtering is hard-jumpered for 10 kHz both day and night.

After installing the card and powering up the Optimod, I made a manual frequency response sweep of the Optimod with our Potomac Instruments AG-51 oscillator. (First, though, I set the HF EQ control fully CW, to the "22 dB" position. This provides the correct HF curve.)

Overall response was flat to about 9.6 kHz, down better than 15 dB at 10 kHz, rolling off sharply above that. Orban's specs call for a 60 dB per octave rolloff—that's sharp!

After restoring normal programming, I listened and found that the second adjacent channel splatter we'd had before was now gone. This was confirmed on different radios at a distance from the transmitter site.

Audible HF response was down

slightly, due to changes in the shape of the HF curve, but it wasn't what I would call "bad." It is a compromise we will live with until the new wideband, 75 μ s de-emphasized radios are produced. (They will be produced, won't they?)

After more than six months of operation with the NRSC conversion kit, there have been no detectable failures or unusual operation.

Installing this kit required minimal effort, and a maximum of 1½ hours work time. The intention was that converting processors to the NRSC standard should be easy to accomplish, and that was the case here.

My opinion is that the NRSC retrofit for our Optimod 9100A/2 was well worth the \$500 investment. We are now set to a standard that will eventually provide almost complete high fidelity sound from any AM station.

I say "almost" because it does not permit response out to 15 kHz, but in view of the drastic reduction in second adjacent channel interference, 15 kHz response must take a back seat.

Not an audio cure-all

Also, if your audio quality going into the transmitter is not the best it can be, you will sound bad even with the NRSC conversion. It isn't a cure-all for audio problems.

However, with a good audio chain, good source material, and a clean transmitter, the NRSC conversion will be of benefit.

Electrical interference will probably never go away on AM, but sometimes the "monkey chatter" from second adjacent channel signals is much more of a problem, and the NRSC kit will eliminate that.

Please consider converting your Optimod 9100A/2 if you haven't done so already. In fact, please consider it no matter what processing you have. It can only improve AM.

Editor's note: Randy Orbaker entered broadcasting in 1975 as a board operator and became assistant CE for WNYR in 1977. He was promoted to CE in 1981.

For more information on the RET-042 NRSC conversion kit, contact Howard Mullinack at Orban: 415-957-1067. The author may be reached at 716-325-7260.



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Circle Reader Service 36 on Page 34

BUYERS GUIDE

CRL SPF-300 Sets the Standard

by Thomas R. McGinley, DE
Cook Inlet Radio Partners LP

Morningside MD ... Circuit Research Labs, a full line processor manufacturer based in Tempe, AZ, was probably the first company to offer a wraparound NRSC adaptor for AM stations.

User Report

The SPF-300 is the same size as other CRL processors and contains two separately accessible NRSC compliant circuits: the modified 75 μ s NRSC preemphasis section and the NRSC 10 kHz low-pass filter section.

This approach allows the unit to be used effectively with any combination of AGC and peak limiter units already employed. The SPF-300 preemphasis section is inserted between an AGC compressor unit and the peak limiter unit.

The low-pass filter section is then the final section between the peak limiter and the transmitter's input.

The performance of each section easily complies with the NRSC limits and specifications. Unless you have a spectrum analyzer, it is not easy to verify compliance with the NRSC curves.

Testing with steady state tones or even white or pink noise does not yield realistic performance results.

For this reason the NRSC has specified the use of the new USASI test signal, a pulsed noise signal containing similar audio spectral distribution and energy levels as normal programming.

The preemphasis section can provide either the modified NRSC curve or can take a standard FM 75 μ s preemphasized signal and modify the shelving to enable full NRSC compliance, merely by lifting one resistor in the circuit.

This would be appropriate for AM/FM full simulcast stations which use an already 75 μ s preemphasized and processed signal from a composite STL receiver output or FM stereo generator output to feed the AM peak limiter.

For the integrity of the NRSC modified 75 μ s curve is to be maintained, keep the summed outputs of any multiband AGC/compressor ahead of the SPF-300 set to flat response, at least above 1 kHz.

Any increase in treble boost in addition to the NRSC preemphasis will only cause stridency and harshness on receivers. The 10 kHz filter performance is really the bottom line of the improvement the NRSC standard provides.

Keeping the response nearly flat to about 9.5 kHz and then achieving 40 dB

of attenuation at 10.5 kHz without noticeable ringing or overshoot by-products is by no means an easy task. But the SPF-300 delivers with flying colors.

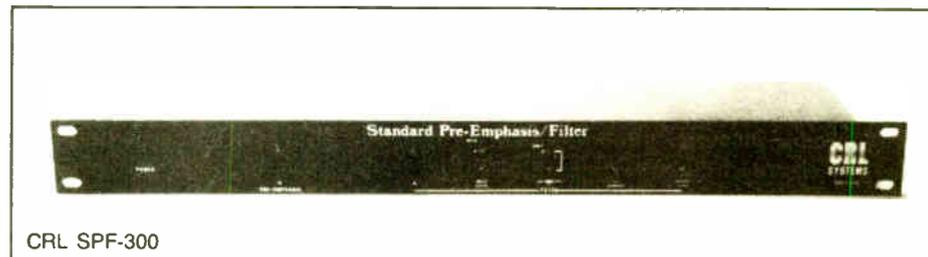
It is important to recognize that the effectiveness of this filter can be easily compromised by a "dirty" transmitter.

Older plate-modulated rigs with soft or unbalanced modulator sections or PA

when you make A/B comparisons with the NRSC filter in and out at the transmitter, remember that you are probably listening to a wideband modulation monitor.

Ninety-nine percent of all AM listeners are using narrowband receivers. Do your A/B tests using the standard NRSC deemphasis filter. Or better yet, use a standard car radio, a boom box or even an AM/FM component system tuner.

You won't notice any loss of high end on those devices, and you may hear cleaner response on all radios with the



CRL SPF-300

finals can produce lots of harmonic and intermodulation distortion, as well as incidental phase modulation, which will degrade the 40 dB suppression at the skirts of the NRSC passband to only 30 or even 20 dB.

The result is wider than normal occupied bandwidth, not to mention the distorted audio. If you expect NRSC to deliver improvement, be sure to optimize your transmitter performance first.

There is one other important point to remember about any NRSC processor:

NRSC filter in, since many transmitters exhibit degraded harmonic and IM distortion performance when subjected to all that high frequency punishment contained in open-ended preemphasized audio.

Editor's note: Tom McGinley is a member of the NRSC Committee and is engaged in NRSC field testing.

For more information on the SPF-300, contact Dee McVicker at CRL: 602-438-0888. The author may be reached at 301-441-3500.

Put the Tascam CD-501 next to any other broadcast compact disc player, and you'll find there's no comparison.

Nothing can compare to the purity, clarity, and accuracy of its sound, thanks to breakthroughs like Tascam's proprietary ZD Digital Circuit and double oversampling.

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Circle Reader Service 16 on Page 34

BUYERS GUIDE

KPBC Tests Continental 1 kW

(continued from page 39)
interlock system.

Control circuits are opto-isolated for immunity from externally induced damage.

An LC connector is provided on the top of the cabinet at the rear for the antenna connection. BNC jacks provide connection points for both stereo drive and monitor output.

At KPBC, the transmitter came off Continental's truck and was dollied up the stairs on a light-duty hand truck in a matter of minutes.

Two hours later (after an educational session installing the LC male connector on the coax), all connections were complete and the transmitter was ready for operation.

Installation time could be even shorter if an existing transmitter were being replaced and coax connectors and remote control/power wires were already in place.

Performance

The 314F has so far been an outstanding performer. Audio quality is exceptional at all modulating frequencies and levels, and stereo performance is exceptional.

There is a noticeable improvement when punching between the next-best sounding stereo station and KPBC on a good quality AM stereo receiver.

L-R distortion caused by IPM and other factors in other transmitters is non-existent. The sound is clean up to the legal modulation limit at all power levels.

With NRSC preemphasis/passband in place, the station stands out on even the most narrowband AM receiver.

While lightning posed some problems soon after installation, Continental engineers were on hand at the KPBC site to study the damage and conditions under which the damage occurred.

Protection circuits were improved to

the point that absolutely no lightning damage was sustained during the subsequent severe weather season, and we experienced no down time.

The protection circuits are designed in such a manner that we have few nuisance trips due to static discharge.

The down side

The only real complaint that I have about this transmitter comes in the area of heat produced. Operation of this transmitter has resulted in considerable

discomfort on the part of the engineering staff during winter months.

When the transmitter with the tube-type PA was in operation, the transmitter building was kept toasty-warm. This is not the case with the new 314F.

So little heat is produced by the transmitter that the inside temperature of the transmitter building rises to only a few degrees above outside ambient temperature during cold weather. I suppose I shouldn't complain. I just have to keep my coat on.

Since the 314F has been in operation, the utility bills for the transmitter plant have dropped to half of their former value. I have much larger electric bills at home nowadays.

The Continental 314F solid state 1 kW transmitter provides perhaps the best of all worlds to its users. It offers the user efficiency, reliability and high fidelity that is imperative in today's competitive radio market.

Editor's note: W.C. Alexander is a regular contributor to RW.

For more information on the 314F, contact Walt Rice at Continental: 214-381-7161. The author may be reached at 214-445-1700.

Texar Provides NRSC Compliance

by Harry Simons, CE
WAEB-AM/FM

Allentown PA ... The NRSC audio standard is one of the most important advances for AM broadcasters in the history of the service.

A combined cooperative effort in the creation of this standard has made it relatively easy for processing manufacturers to include the NRSC audio preemphasis and filter specifications into current audio processing technology.

In doing some comparison testing of available NRSC processors under various conditions I concluded there were no real sonic differences among them.

Although processing manufacturers have chosen different methods in their implementation of technology in filter designs, the end result is basically the same to the ear and to the spectrum analyzer.

During on-air testing done at WOR in New York City in March of 1988, Paul Stewart, operating manager and CE concurred. "When all the units are set up properly I can't tell the difference on the air," he said.

Stewart said that installing the NRSC standard at WOR "definitely makes me louder" and that "although I can't prove it yet I feel as if there has been a substantial reduction of distortion on a null

User Report

radial that I have always had problems with, leading me to believe that this distortion was above 10 kHz."

A standout

In my opinion, the Texar Phoenix stands out in the crowd when you look at additional features and price. The four-band gating and front panel test points are unique to the industry.

At a cost of \$2745 you can't beat it. The fact that the Audio Prism has proven its ability to produce excellent audio results combined with its ease of operation should both be considerations when choosing your NRSC processor.

Another Texar option is to field-modify your existing AM Audio Prism to comply with the NRSC standard. To do this, simply request in writing to Texar the

purchase of a field kit that includes one AMC-2 replacement card and one PS-2 power supply.

Easy installation

The NRSC conversion kit takes about one hour to install and comes complete with ample and simple-to-follow instructions. According to Texar the NRSC field modifications have no effect on your warranty coverage.

Texar has chosen not to provide a so-called NRSC wraparound box, saying that this type of device is inconsistent with its technical criteria and standards. Yet I have tried such a unit myself and have found it to work and sound fine.

The NRSC audio standard goes a long way toward a quality improvement in AM. Any AM station not converted as of yet may wish to reconsider its technical priorities.

Editor's note: Harry Simons is an NRSC Committee member.

For more information on the Texar NRSC conversion kit, contact Glen Clark at Texar: 412-856-4276. The author may be reached at 215-434-4424.

This new QuantAural™ QA-100 Audio Program Analyzer gives you the advantage in competitive broadcasting

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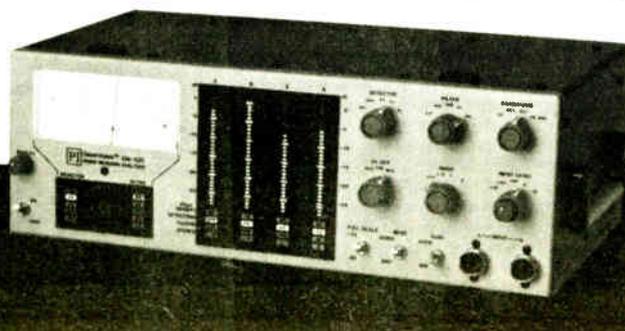
Real time analysis of any audio signal. From a receiver, tape recorder, or processing equipment. You see the measurements as you hear the sound. Changes in processing or variations in system performance are immediately shown on the QA-100 panel meter or bargraph display—using program material as the signal source.

The QA-100 hears like a program director and talks like an engineer. With it you can monitor maximum peak level (relative peak modulation), overall

processing effectiveness (average level), tightness of sound and processing control (peak density), tonal balance, consistency and preemphasis (four band real time analyzer), stereo image width (L + R to L - R ratio) and "punch" (special "aural intensity" measurement).

Interested? To learn more about how the QA-100 will help your station compete, call Potomac Instruments today.

QuantAural is a registered trademark.



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Circle Reader Service 30 on Page 34

World Radio History

AM 1000B Suits Stereo

(continued from page 41)

The AM 1000B transmitter is of vertical panel construction for maximum component accessibility. It is housed in a steel cabinet and is finished in a durable gray Rantex finish with aluminum trim.

The transmitter is available in a frequency range from 535 kHz to 1620 kHz and will operate into a load ranging from 30 ohms to 250 ohms. It requires 208 to 240 V single phase power and the nominal shipping weight is 1200 pounds.

The Wilkinson AM 1000B represents a good value for the price-conscious broadcaster or for those who desire simplicity in design through the use of classic "time proven" circuitry.

Editor's note: Jim Stanley is a broadcast engineering consultant and president of Stanley Broadcast.

For more information on the AM 1000B, contact Gordon Allison at Television Technology, Wilkinson Radio Division: 303-465-4141. The author may be reached at 602-264-8752.

BUYERS GUIDE

ACM-1 Provides AM Noise Alert

by Joel Bump, Eng Dir
Radio Design Labs

Carpinteria Beach CA ... You're probably asking yourself why we are talking about FM in an AM Buyers Guide! But how better to focus attention on an industry problem—and a new solution.

AM transmitters are supposed to produce amplitude modulation. FM transmitters are not; but they all do! The majority of the FM transmitters, from my experience, produce a lot more AM than some station engineers would believe likely.

Radio Design Labs' ACM-1 Amplitude Component Monitor is the first instrument designed to let FM be FM (and AM be AM).

Technology Update

The ACM-1 is a 24-hour monitor which measures AM noise in FM transmitters. Tight control over modulation related AM noise is necessary for clean signals throughout an FM station's coverage area, and for proper operation of all subcarriers.

AM noise measurement circuitry is selected on the front panel for wideband response (synchronous AM noise meas-

urement under modulation) or 75 μ s deemphasized response (asynchronous AM noise measurement without modulation).

Signal quality improved

The ACM-1 is intended to be used to improve FM transmitted signal quality and to improve the consistency of the station's signal.

The ACM-1 is centered around three principal functions. One is that the front panel high intensity LED string display provides a clear visual indication of peak AM noise for precise tuning of the transmitter.

Sample and hold circuitry permits the unit to be connected to any remote control and to deliver AM noise readings to the studio.

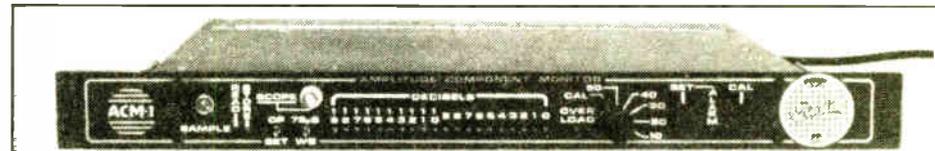
Lastly, alarm circuitry permits the engineer to "program" the ACM-1 to alert the operator (or DJ) when the AM noise reaches the threshold where signal degradation will soon become noticeable.

This threshold may vary from station to station, depending on multipath and subcarriers used, and can be set to the value needed by the station.

Main channel noise and subcarrier crosstalk are well known to result from fairly low levels of AM noise. These effects are caused by amplitude and phase

disparities between FM sidebands.

Under modulation the FM carrier amplitude reductions which make up AM noise can be very fast. The ACM-1 is designed to address this need to "capture" and display these instantaneous AM excursions, which may go undetected using other methods.



Radio Design Labs ACM-1 Noise Monitor

The fast LED string displays a 20 dB range of AM noise in 1 dB increments. The display range is selected in 10 dB steps on a front panel switch.

To read the noise, this range switch is first set to CAL and the carrier level is adjusted to full scale. This refers all future AM noise readings to 100% amplitude modulation.

A range is then selected to observe the AM noise on the display. The ACM-1 covers a total range of 70 dB.

Since the unit is primarily intended to read synchronous AM noise which occurs during modulation, knowing the average of the AM noise peaks can be a convenient reference.

The internal sample and hold circuits,

which are needed to provide stable reading voltages to the remote control, may also be activated and displayed on the front panel.

The Sample sequence first stores values for the AM noise peaks during a one second interval, and then displays this average value on the LED string for seven seconds. This same sequence is followed when initiated by remote control.

The remote control reading is based on

the 20 dB relationship of remote indications between 10 and 100. The output DC level into the remote control is adjustable up to 10 V. Easily read remote control decibel conversion charts, for various remote control scales, are provided.

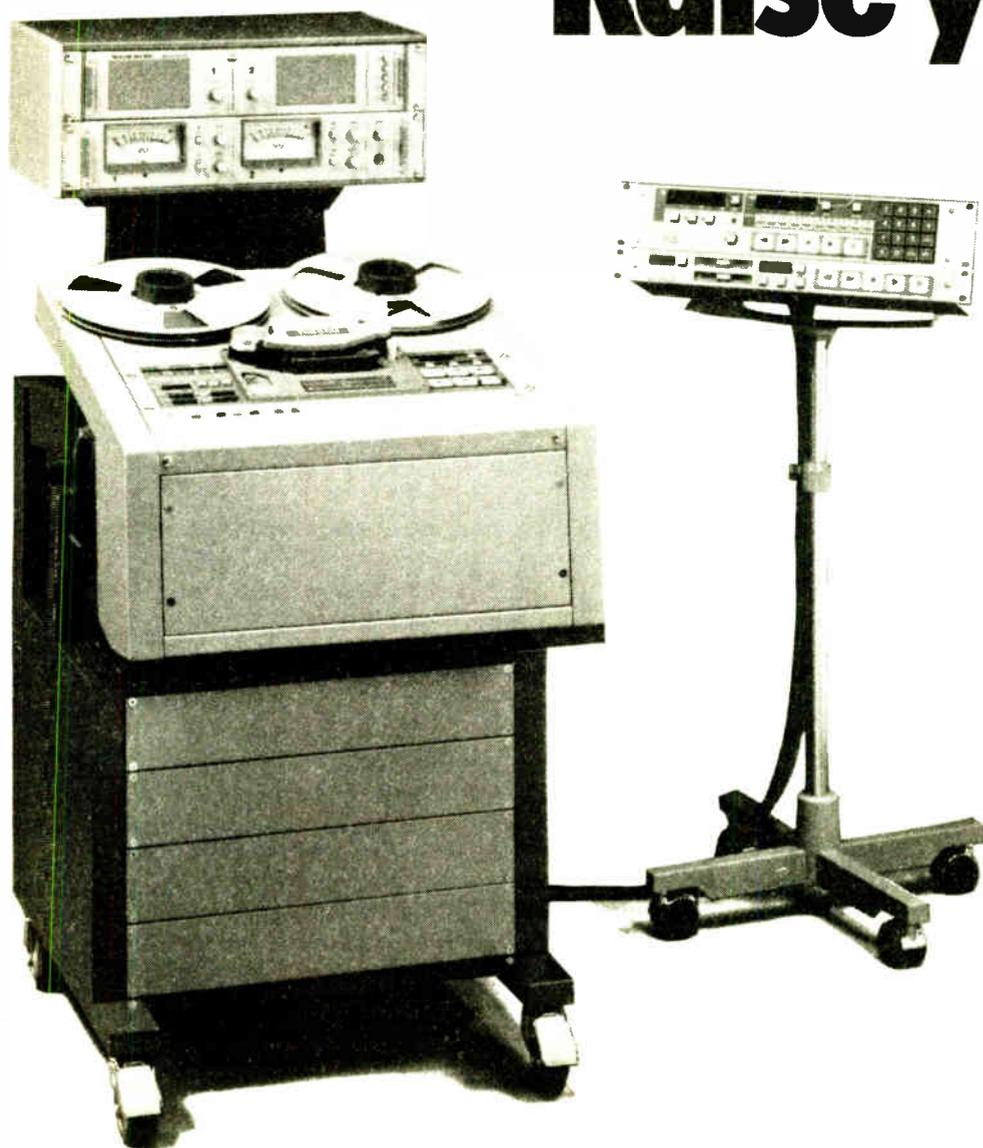
Activating alarms

The ACM-1 alarm closure can be used to activate a remote control status return, alerting the engineer that the transmitter requires attention.

Setting the ACM-1 alarm threshold to -39 could alert the engineer to retune the transmitter for lower AM right then. Thus the consistency of the station's sig-

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Raise your standards.



To understand the superiority of the Tascam ATR-60/2N, begin with the heads: no other 2-track production recorder has heads that can provide sync response fully equal to repro response—an advantage that allows you to save time by making critical audio decisions without rewinding.

Next, look at its direct-drive reel motors, its PLL servo capstan, and its 3-motor servo controlled tape handling system—all factors that lead to the ultimate in fast, accurate, and stress-free tape handling.

Finally, consider that the ATR-60/2N gives you all this and more, hour after hour, year after year.

Then call or write today about the Tascam ATR-60/2N. And take your broadcasting to a higher level.

TASCAM

BUYERS BRIEFS

Motorola's newly announced, FCC type-accepted Model 1400 AM stereo exciter offers several new features.

The front loaded cards allow for adjustment of all equalization and delay, from the front, via a provided extended card or by removing the top.

The front panel, which swings down to allow front access, now also contains a printed circuit board containing all the parts previously hand wired and the relay allowing for remote mono-stereo switching.

The motherboard contains connectors for power supply, input module, envelope output and RF amp DC power, as well as a switchable envelope delay which will ease installation in some transmitters, according to Motorola.

The rear panel features the same input and output as the previous units with dual envelopes provided for independent driving of two transmitters.

Power supply status indicators for the main power supplies are on the new unit. The headphone output allows for analysis of the sound being fed into the exciter from the source.

For remotely switching to mono, the AC power is fed through a combination line filter and fuse with a card-selectable line voltage (105, 120, 220 or 240) at 50 or 60 Hz.

The power transformer is toroidal to keep hum fields to a minimum.

A night card comes standard with the exciter. Either two transmitters or two antenna patterns can be driven by the 1400.

Other modifications include a new cabinet with a polycarbonate front escutcheon and handles.

The exciter has provisions for future development of both synchronous operation and data transmission.

For more information contact Don Wilson, Ray Schulenberg or Steven Kravitz at Motorola: 312-576-2879, or circle Reader Service 52.

Delta Electronics recently made improvements in the audio circuits of its C-QUAM AM stereo exciter to reduce overshoot and tilt. These changes can be made to exciters already in use and at a modest cost, according to the company.

The changes apply to the Delta-manufactured version and have not been endorsed as approved changes by Motorola for early versions of its exciter at this time.

Overshoot improvement is necessary for heavily processed stations to maintain high levels of modulation. If excessive tilt is present and a clipped or square wave-type signal is applied, the tilt will cause the waveform to rotate in

Figure 1. 20 Hz Squarewave 100% L + Modulation.

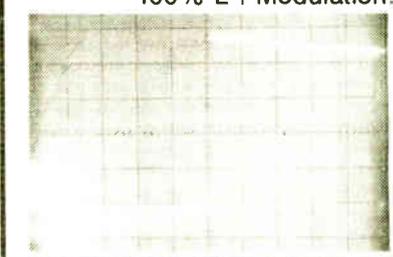
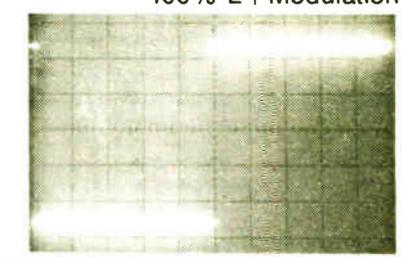


Figure 2. 20 Hz Square wave 100% L + Modulation



the direction of the tilt. The result is increased overshoot.

To compensate for these overshoot peaks, the average modulation level must then be reduced to prevent over-modulation. Reduction of overshoot permits the station to increase its average modulation level.

Figure 1 shows a 20 Hz squarewave at 100% L+R modulation. This photo shows the tilt present at the audio output of the exciter. Figure 2 shows the same 20 Hz squarewave at 100% L+R modulation af-

ter the modifications are made.

The Delta modifications involve minor component changes on three printed circuit assemblies inside the exciter. Two resistors, eight capacitors and one operational amplifier are replaced.

Detailed modification instructions are available upon request and are provided at no charge. A field modification kit is also available.

For more information contact John Bisset or Chris Wilk at Delta: 703-354-3350, or circle Reader Service 55.

KIOA First to Air DX-10

(continued from page 35)

when the transmitter was turned on, and the increase in the room temperature was only about 1°

It is easy to service and maintain. So far the most maintenance required for the DX-10 has been cleaning the air filter. We've never had it off the air for service or routine maintenance.

It is capable of 125% modulation, and it still sounds good. The Harris DX-10 performs with extremely low distortion which allows us to increase modulation. Using a good modulation monitor, the sound is as good as FM.

This high quality sound has been very consistent. In general, we're very pleased with the Harris DX-10. Harris engineering has paid off, and the quality is superb.

My feelings about Harris have turned around 180%. As a rule, vendor engineers are so stuck in the textbooks that they can't relate to real-world broadcasting.

It's nice to see that there's a company with engineers who know what's going on in the field and are actually willing to come out and work with customers.

Feedback from KIOA listeners and engineers from other stations has been excellent. Even before we announced that KIOA had gone digital, we started getting calls!

An engineer from a competing station

phoned to ask what we'd done, because, as he put it, "The station is standing on end!"

One of our announcers said the station now sounds like FM—and asked when we were going stereo. Also, the DX-10's quality sound revealed a couple of faults in our own audio chain.

We quickly recognized that our main fault was in our existing STL system, and made a quick call to George Marti of Marti Electronics in Cleburne, TX.

He showed an extreme interest in providing STL equipment on very short notice to use with the world's first digital transmitter. The DX-10 is making us all more quality conscious.

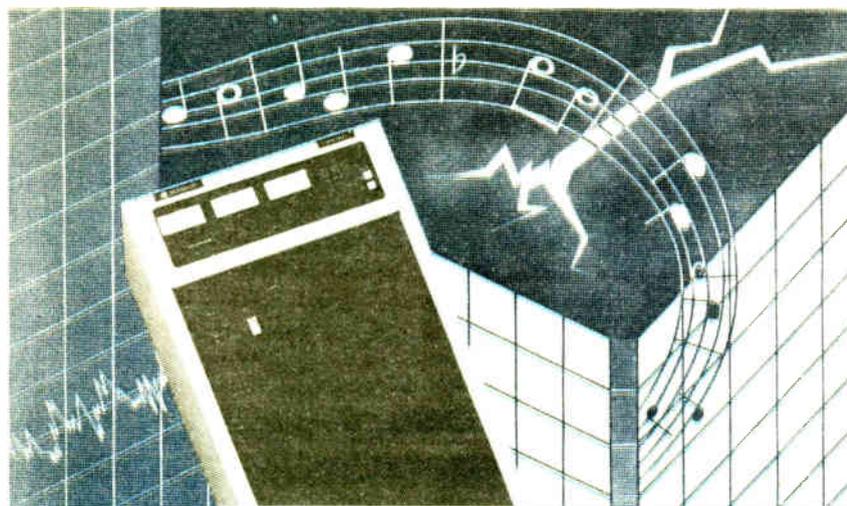
Steve Mathews, the station's program director, observed that the DX-10 will make radio manufacturers stand up and take notice that AM radio is *not* dead.

And, another interesting note, 25 engineers within a 100 mile radius of Des Moines chose to meet at the DX-10 site here to organize a new SBE chapter instead of going to lunch at a restaurant.

Editor's note: Steve Konopka has been in broadcasting for 19 years.

John Kosobucki has been CE for KIOA-AM/FM for four years.

For more information about the DX-10, contact Ron Frillman at Harris: 217-222-8200. The authors may be reached at 515-288-9493.



"Keeps Playing"

"I can't let another day go by . . ."

"...without telling you about my Harris SX-5A AM Transmitter," writes R. Dale Gehman, partner and chief engineer of WASG AM Stereo 55 in Atmore, Alabama.

"We got prompt action on our order. Your shipping people followed it through. I was very pleased with the manual, the construction (Built Tough!), the hook-up procedures and the initial turn-on performance. The final numbers were beyond my wildest dreams! Imagine 0.3% distortion, 0.2% intermod, 3% IPM ... I never dreamed I'd see any AM transmitter turn out numbers like these!

"But let me tell you what surprised me most: WASG is located in a lightning belt—more strikes than anywhere in

America. Our 511-foot tower has been popping with static many times, but your solid-state SX-5A just sits there and keeps on playing! We haven't been off the air once. THANKS!"

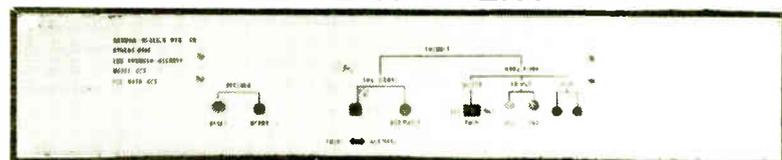
Harris' SX-5A is your best bet for a rugged, reliable and efficient 5 kilowatt AM transmitter, and it's available for single or triple phase hook-up. There also are 1 and 2.5 kW SX models. SunWatch™ automatic PSAPSSA and C-QUAM® AM Stereo are options. Standard-setting Harris training and service top off the features.

Call today for your SX brochure, 1-800-4-HARRIS, Ext. 3006. Or write: Harris Radio Sales, P.O. Box 4290, Quincy, IL 62305-4290.



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EBS EQUIPMENT



Model	Price
Model CEB Encoder-Decoder	\$475
Model CE Encoder Only	\$330
Model CE with Stereo Option	\$360
Model CD Decoder Only (REQUIRED FOR LPTV)	\$280
Receiver can be supplied to drive Decoder	\$100

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- Exceeds FCC Specifications •

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BUYERS GUIDE

AM RF Gear Thrives

(continued from page 36)

extended an additional year if its line surge protectors are purchased with its transmitters. And with all new orders, a factory-trained engineer is sent to the station to turn on the transmitter.

"We send down an engineer whether (stations) want one or not," says Allison. "Most of our problems in the past have been at the turn-on stage." Wilkinson hopes to eliminate the initial turn-on difficulties with its new policy, according to Allison.

Harris, too, has put an emphasis on service after the sale, offering a 24-hour technical assistance phone service and a repair/exchange program. This year it also began offering AM transmission workshops open to anyone interested in the subject.

Transmitter companies are clearly doing their best for AM, and say they will continue to support it.

"We are not abandoning the AM broadcaster," says Rice. "We see him as one with a lot invested and we want to help him make that return."

Industry Tidbits

New Directions ... Northeast Broadcast Lab has been appointed the mid-Atlantic representative for the **Broadcast Electronics** line of FM transmitters. For

information, contact **Harry Larkin** at the mid-Atlantic office: 215-322-2227.



New Locations ... Those interested in contacting **Innovative Automation** about its Di-trol automation system should know that the company has a **new address and phone number**: 3316 19th Avenue SE, Rio Rancho NM 87124, 505-891-0501.

The audio equipment division of

Vaughn Communications Group, **AVC Systems**, moved to new facilities located at 7901 Computer Avenue South, Minneapolis MN 55435, 612-831-3435.



People ... **Harris Corporation** has named **Edward Pryor, Jr.** of Arlington, TX as its new **radio district sales manager** for Texas and New Mexico ... **Electro-Voice** announced several new appointments, including **Ivan Schwartz** as broadcast/production marketing specialist, **Doug MacCallum** as general manager of E-V Canada and **Garry Templin** as national sales manager of E-V Canada.

Also, **RAM Broadcast Systems** appointed **Fred Ekins** to the newly created position of manager of research and development.

If you are involved with **TEF™** measurement equipment, you may be interested in contacting **MCG Audio Consulting**, recently formed by **Mary Gruszka**, formerly senior project engineer with CBS and a columnist for **RW's** sister publication, **TV Technology**. The company address is 88 Myrtle Avenue, Edgewater NJ 07020, 201-224-4937.

If you have industry/equipment news to report, send it to **RW Buyers Guide**, PO Box 1214, Falls Church VA 22041.

ACM-1 Addresses AM Noise Problem

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nal would not be compromised.

The efficiency of engineering time is also improved, since transmitter trips can be scheduled when transmitter tuning is most needed.

Modulation related AM noise is generally a result of transmitter bandpass deficiencies. Unless the bandpass is perfectly centered, AM noise excursions are much greater on one sideband or the other.

The front panel oscilloscope output permits visual observation of these excursions as the carrier swings to either side of center frequency.

The 10 V p-p scope output also permits display of asynchronous waveforms

which are very helpful in isolating the nature of power supply hum or vibrations.

Additional features include a rear panel DC output (representing relative AM noise level) intended for chart recorder operation or tracking AM noise variations.

Audio output and DCF

A rear panel audio output permits the engineer to connect a speaker and amplifier to hear the AM noise during tuning.

Signal input to the ACM-1 is made through an input cable which is supplied with the unit. The other end of this

cable is connected to the DCF (direct conversion filter).

The DCF connects to an appropriate sample port following the harmonic filter. The DCF converts the RF sample to a modulated DC, thereby eliminating impedance mismatches between the sample and the monitor.

Reducing AM noise offers an opportunity to help raise the overall quality of FM broadcasting.

Let's let FMs be FMs and AMs be AMs!

Editor's note: For more information contact your local dealer or Jerry Clements at Radio Design Labs: 805-684-5415.

10 years from now, it'll still be the standard.

The undisputed standard for broadcast cassette decks has always been the Tascam 122B. But that standard has just been surpassed.

Presenting the 3-head Tascam 122MKII. Its leadership is founded upon features such as Tascam's Cobalt Amorphous tape head technology. Plus a choice of built-in Dolby systems: not just B and C, but also HX-Pro, for virtually perfect high-end frequency response.

More than any comparable deck, it maintains constant tape speed and tension, thanks to a tape handling system that includes Tascam's Hysteresis Tension Servo Control.

And when it comes to handling, the 122MKII is the complete professional tool, with cue and review functions (manual cue), balanced XLR +4dBm inputs and outputs, and rack-mountability.

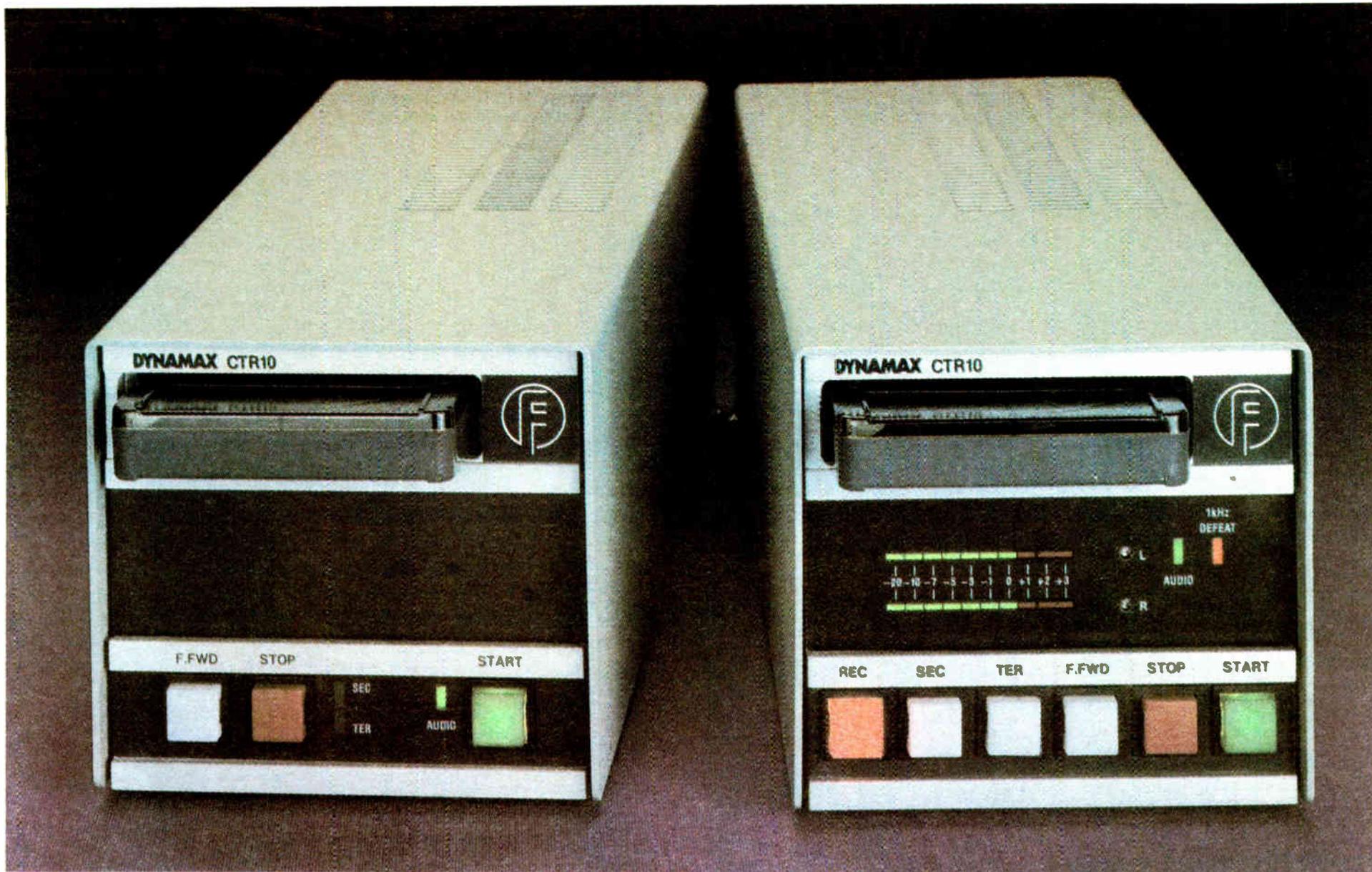
Call or write for more information about the 122MKII. Get it now, and use it for decades.

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TASCAM



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DYNAMAX CTR12 and CTR14 shown

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