Radio World®

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FM Short Spacing Clears FCC

by Charles Taylor

Washington DC Despite opposition from a number of broadcast organizations, the FCC ruled 12 December to allow FM stations to broadcast in short-spaced locations with the use of directional antennas.

In the past, stations were required to apply for a waiver in order to broadcast in short-spaced areas. Authorization normally was granted to facilities of other co-channel or adjacent channel stations, provided these stations were protected from interference.

The order, contained in MM Docket 87-121, will allow existing licensees more options in choosing broadcast sites, according to the Commission.

Opponents, however, claim it will alter the table of FM allotments, provoke interference between FMs and ultimately bring to FM many of the same troubles that AM now endures.

The FCC, in response, pledged that it will continue to maintain strict minimum distance separation in the allotment of FM channels. The amount of short-spacing will be limited by the amount of separation specified for the next smaller station class, it said, though it temporarily will be limited to five miles.

No unanimous decision

While the FCC passed the order, it did not do so unanimously. Commissioner James Quello, in a statement, warned that the liberalization of short spacing posed serious threats to the FM band.

"I doubt it will be very long before short-spacing becomes an allotment tool. This proposal goes far beyond present use of short-spaced facilities in the non-commercial FM band," he said.

Quello added that "rather than opening the floodgates," he preferred adopting a case-by-case approach where applicants seeking to short-space antennas would be required to demonstrate that it had lost antenna sites due to zoning changes, loss of land or other circumstances beyond the broadcasters' control.

"I believe that this approach properly balances the need for flexibility and respect for the table of allocations," he said.

Chairman Dennis Patrick disagreed with Quello's concerns, claiming that the ruling made it "a great day" for broadcasters. During the FCC meeting when the order was passed, he denied charges that FM would be harmed.

Commissioner Patricia Diaz Dennis, also a supporter, noted in a statement

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Felker Wins Gold Medal

MMB Chief Lex Felker (3rd from left) was awarded a Gold Medal for lifetime achievement. For details, see page 3.

From left: Former FCC Chairman Robert Lee; Silver Medalist William Luther; Felker; Silver Medalists Gary Stanford, Martha Contee and Michael Wack; and Commissioner James Quello

Competing License Filings On the Rise

by John Gatski

Washington DC The FCC fears more abuse of the radio licensing process because of a recent increase in competing applications filed during the ongoing renewal cycle.

There has been a long-held concern by the FCC and broadcasters that profiteers abuse the current radio license renewal process by filing competing applications, pressuring the licensee to offer a buyout to assure continuity of its license.

"The number of competing applications appears to be greater than the last time we had renewals seven years ago," FCC Audio Division Chief Larry Eads said, which could be a clue that speculators are getting into the license renewal process.

He said of the approximate 500 renewal applications in North Carolina and South Carolina, for example, there are eight competing applications, an increase from the last renewal process in that region.

Ongoing renewal process

Under the FCC's new licensing cycle, all US radio stations will renew their licenses from 1988 through 1991. The new cycle is the result of the 1981 extension of radio licenses from three to seven years. TV licenses have to be renewed every five years.

According to the FCC, 18 groups of states will undergo the licensing renewal process. Each group has approximately 500 stations. The first group included stations from Maryland, Virginia, West Virginia and Washington, DC. Their renewal period ended 1 October 1988.

"From the Commission's point of view, we are concerned about what we call the abuse of the process," Eads said.

He said the abuse of process can include a purposeful slowdown in the process or a party trying only to gain financially from a competing application.

"On the other hand, it is very hard to pinpoint," Eads said.

Eads said there is no conclusive proof that people behind some competing ap-

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Tower Builder Faces Fines

by Charles Taylor

Colony MO The Occupational Safety and Health Administration said it has charged a McLean, VA, tower contractor with three alleged safety violations regarding the collapse of an antenna here last June that resulted in the deaths of three workers.

Structural Systems Technology (SST) faces possible fines of $16,920 if the charges, issued 28 November, are upheld, OSHA said. The company had 15 working days to respond.

SST President Cabot Goudy said the company contested the charges to the OSHA Review Commission, however, he would not discuss details of the filing.

Denver Holt, OSHA St. Louis area director, confirmed that SST had contested the charges. Normally the process of appeal takes between three and six months he said.

The 1905' tower, from which KRXL-FM and KTVO-TV broadcast, collapsed while the three workers were replacing diagonal rods at the 480' level.

KRXL-FM, Kirksville, MO, was only off the air for a few seconds. An instantaneous alarm alerted on-air personnel, who switched to an auxiliary transmitter at the station's studio. KTVO-TV was

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Tax Change Affects Sales

by John Gatski

Washington DC A change in tax laws may force some radio and television station owners to pay double taxes on broadcast sales if they did not change their corporate tax status by 31 December, according to accountants and media appraisers.

The 1986 Tax Reform Act repealed a provision, known as the General Utilities Doctrine, that allowed corporations to sell assets and liquidate simultaneously without paying a tax on the profit at the corporate level.

By electing before year end to be taxed as partnerships, under Sub Chapter S of the Internal Revenue Code rather than the standard C-status, eligible corporations could avoid taxation at the corporate level and only pay as individuals.

Eligible C-corporations that did not change their status may pay as much as 20% more taxes when selling a radio station, tax experts explained. The double taxing depends on the classification and the amount of the excess of the fair market value of the station's assets over the adjusted tax basis.

Becoming a Sub-S corporation entails several qualifications including $5 million or less in gross revenue, said Dana Kittell, an accountant who handles several radio stations and media brokers from his St. Albans, ME, office.

If a qualified corporation became Sub-S prior to 31 December 1988, the stockholders wait three years from that date before realizing the gains from the assets in order to avoid the extra tax. Declaring Sub-S after 31 December will result in a 10-year wait in order to avoid the double tax.

Because most stations sell their assets to the new buyer, many corporations may convert their stations to single owners or limited partnership status to avoid the corporation double tax, said Frank Higney, a media appraiser for Broadcast Investment Analysts, Reston, VA.

For more information, contact Frank Higney at 703-661-8515, or Dana Kittell at 802-524-9531.

NEWS BRIEFS

AM Listening Down

Westfield NJ Fewer radio listeners are tuning in to AM, according to a report from Statistical Research Inc.

The number of people listening to AM radio dropped from 26% to 24% since the fall of 1987.

More people, however, are listening to FM. That percentage of the share increased from 74% to 76%.

Class A Ruling

Washington DC FCC Mass Media Bureau Chief Alex Felker said a ruling on a proposed 3000 W power hike for Class A FM broadcasters could be forthcoming by March or April.

The controversial proposal, first sought by the New Jersey Class A FM Broadcasters Association, has sparked a flurry of comments at the Commission. Reply comments were due 22 December.

While broadcasters generally agreed Class A's should get a power hike from their current 3000 W, they disagreed over how it should be accomplished.

The New Jersey backers want an across-the-board hike, while others, including the NAB, only want an increase on a case-by-case analysis based on interference concerns.

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NAB Still Planning AM Antenna Project

by Charles Taylor

Washington DC The NAB expects to have one antenna project completed and a second well underway by the association's annual spring convention, according to Science and Technology VP Michael Rau.

An experimental anti-skywave antenna is scheduled to be ready for testing at the end of April, at about the same time results from a study on a low-profile antenna for daytime stations utilizing night authority should be completed.

The anti-skywave antenna, a two-element array designed by Washington consultant Ogden Prestholdt, will be constructed at a site in Beltsville, MD. It currently is awaiting county utility approvals, which are expected by the end of February, according to Rau.

After construction is completed, testing should take between four and six months, Rau said. The NAB has a lease on the property through the summer of 1990.

The facility will operate at 1600 kHz with power up to 5 kW, and will be used to confirm whether the antenna design will be able to achieve separate control over skywave and groundwave signals.

In the second project, an engineering study on the low-profile AM antenna designed to benefit daytimers is expected to be presented at the convention, Rau said.

That antenna's design would allow daytimers to make more effective use of low post-sunset and/or fulltime power authorizations, according to comments filed at the FCC by the NAB last summer.

"We hope to come up with an engineering study with a design for a low profile antenna that is usable by AM stations," Rau said. Discussions were pending with a consultant.

While either of the new designs might mark a positive step for broadcasters, Rau cautioned that the projects' successes are not magical solutions for AM's woes.

"I'm hesistant to raise the industry's expectations that this antenna project is somehow going to be the saviour of AM broadcasting," he said of the anti-skywave project. "I think it's helpful, but there's going to be a cost associated with implementing it, just like any new technology.

"Consider that we have had a pretty hard time getting stations to buy even the $500 NRSC processor. How are we going to encourage stations to plunk down between $10,000 and $50,000 (for the new antenna)?" he continued.

But Rau is still hopeful about the overall benefits of the project. "If we thought that this wasn't worth going forward," he said, "I wouldn't have any hesitation killing it. Even if it benefits just some stations, I think it's going to be worth it." The NAB has invested $60,000 in the project.

Following the testing of the Prestholdt antenna, experimentation of other designs is a possibility, he acknowledged.

But Rau said NAB is "leaving its options open. I guess we'll consider that when the time comes. We're not going to commit to anything now."

Felker Wins Kudos from FCC

Washington DC FCC Mass Media Bureau Chief Alex Felker received the Commission's highest employee award for distinguished service—the Gold Medal—at a special ceremony last month.

Felker was one of five FCC employees honored in the fifth annual presentations in which gold and silver medals are awarded.

A gold medal is awarded to an employee for "sustained extraordinary accomplishments" related to the mission and objectives of the FCC. The Silver Medal is given to an employee for "sustained exceptional accomplishments."

"It's the biggest day in my career," Felker said. He praised the FCC for having an environment and leadership "that encourages and rewards expansive thinking—even controversial thinking."

The FCC cited Felker for superior executive qualities as head of the Mass Media Bureau, a position he has held since September 1987. Under Felker, the bureau has prepared nearly 200 Commission actions and has achieved record levels of performance in processing applications.

Significant accomplishments credited to Felker are his work in improvements in AM, refinement of ownership rules and advanced television.

Felker joined the FCC in 1972 and worked in the Common Carrier Bureau, Field Operations Bureau, Office of Plans and Policy and he served on Chairman Dennis Patrick's personal staff.

The FCC awarded Silver Medals to Martha Contee, consumer assistance specialist in the Office of Public Affairs; William Luther, international advisor to the bureau chief in Field Operations; Gary Stanford, licensing division chief in Private Radio and Michael Wack, attorney advisor in Common Carrier.

To receive an award, employees are nominated to and selected by the Commissioners.

Station Jumping and Film Talk

by Judith Gross

Falls Church VA Stations being "**jumped**"—having their license renewal challenged by a competing application—becomes more of a concern as all stations **come up for renewal** over the next few years.

It will be a good chance for the FCC to try to get a handle on **abuses in the process**, namely those who apply just for a payoff.

The Commission is concerned about such practices, but they're tough to **pin down**. Neither side talks. The problem is, the further along it gets, the **more expensive** it becomes.

All we can do is hope the Commission takes a **good hard look** at any suspicious "jumpings."

It's not often that Hollywood decides to make a **movie about radio** and when it does, the **technical accuracy** is usually laughable.

But all that's changed with the new Cineplex Odeon film *Talk Radio* based in part on controversial Denver talk radio personality **Alan Berg**, assasinated by a neo-Nazi group in 1984.

The flick was a collaboration between **Eric Bogosian**, who penned and acted in a stage play of the same name and screenwriter director **Oliver Stone** (*Platoon*, *Wall Street*).

A tense moment from the latest Oliver Stone picture, *Talk Radio*.

Bogosian plays an argumentative and abusive **talk show host** who becomes sucessful enough to become nationally syndicated. If it were pure fiction, maybe it would be just another movie. But Berg's murder hasn't **dulled the screaming voices** on talk shows, and the film may have something to say worth hearing.

"Hello, you're on the air with KGAB . . ."

Anyway, the technical people went to great pains to **ensure the authenticity** of the radio set. For starters, they hired former NPR producer Bill Abbot as technical advisor.

For equipment they contacted **Pacific Recorders & Engineering** and purchased a BMX III console, Micromax cart machines and PR&E control turrets. The rest of the set was based on concept designs supplied by PR&E.

PR&E president **Jack Williams** saw the movie when it premiered in LA. He said you "walk out of the theater feeling like you've spent two hours in a **smoke-filled talk station's studio**."

Pretty intense. In fact, he said after the first 15 minutes you **forget about the equipment** because it's so authentic and just get caught up in the drama.

Hmmm, if they can make the folks who designed and market the gear **forget about it**, I'd say it has to be a flick **worth checking out**.

★ ★ ★

The filmmakers based the action in **Dallas** and used local Dallas talent. The film's fictional **KGAB** (yeah, it spells "gab") was based on Dallas's **KLIF talk radio**.

Bogosian said he based his character on shock-jock **Howard Stern**, and several incidents in the movie come from the book *Talked To Death* written about Berg.

But is it an **indictment of radio**? Jack says he thinks it reflects one segment, oh maybe 5%, of **this particular format's** audience and that the fringe element of bigotry and depravity is usually grist for its mill. But it's **not all** of radio.

It's a subject for a **future debate**: the fringe element, bigotry, anger, perversity—what happens when, oh say, a struggling AMer finds it boosts listeners and thus revenues? If the people want it . . .

On the other hand, what happens when we reduce **such volatile stuff** to show biz? See the movie and let me know what you think. At least you won't be **laughing in the aisles** at the technical booboos.

Utah station **KSLI** recently yielded to pressure from **Bonneville International** and changed its call letters to **KSGI**. Bonneville, which owns **KSL** in Salt Lake City, was threatening legal action, claiming infringement upon its trademark.

KSLI's owners said they thought call letters **belonged to the FCC**, but they made the change anyway, rather than spend legal fees battling Bonneville.

★ ★ ★

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

Well you may have noticed **RW's** new look over the past two issues. Along with the changes comes some shifting around of our **issue dates**.

You'll still be getting us **twice a month**, but in order to stay **up to date** on the news we're going to depart from our 1st and 15th dates. Look for our **sneak preview box** near the back of this and every issue so you can anticipate the next time we land on your doorstep, or desk or whatever.

READERS FORUM

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

More concern over licensing

Dear **RW:**

I read with some concern your lead article November 1 concerning the drive towards State Licensing of broadcast engineers. First, a concern due to the fact that the association that represents broadcast engineers, the Society of Broadcast Engineers, made no mention of this during the recent national convention at least to my knowledge.

Like many in the business, I was concerned about the quality of performance in the industry with the elimination of the last national standard, the FCC First Class Radiotelephone License.

Fortunately, most station operators have been prudent in their hiring policies and have kept the level of competence up by their job qualification specifications.

Many still require an FCC First (or General) Class License in addition to independent "certifications" by groups like the SBE. Because of this, I have not seen a great degradation in the industry.

In fact, I have worked with a number of Registered Professional Engineers over the years that could not troubleshoot their way out of a paper bag.

Most PEs are great at preparing and filing 301s, performing site studies, and other types of "consultant" work that the practicing broadcast engineer is not called upon to do in a day by day capacity, but to require *all* broadcast engineers to become certified PEs is ridiculous.

First, anyone familiar with the wage scale of the average broadcast operation will know that a person who has spent the time and money to graduate from an accredited four-year engineering school probably will not be too impressed with the average medium or small market radio or television station's offer.

Anyone who has attended these schools will also know that there is virtually *no* training for employment in broadcasting included in the curriculum at 99% of these colleges. As NARTE points out, the PE exam itself contains *no* questions relating to the specialty of broadcasting.

So, what's the point? Will small and medium market operators, already scraping to make ends meet, be forced out of business by having to comply with state laws requiring them to employ marginally qualified "Professional Engineers" instead of competent broadcasters with years of experience?

Will hundreds of competent broadcast engineers lose employment simply to satisfy the egos of the PEs as they attempt to monopolize the word "engineer?" What about those men and women who pilot the engines of the nations railroads? They're "engineers" too; will they have to go back to college and take the same test?

The federal government, through the FCC Rules and Regulations, part 73, has set the conditions by which a person may obtain employment as a broadcast engineer.

Basically, one needs to have a Third Class Operator Permit, or a "grandfathered" First Phone, and be able to do the job safely, legally and within the bounds of good engineering practice. The rules let the marketplace decide, let station owners decide who can do the work that needs to be done. These rules eliminated the old "national standard" for a reason.

Let's make sure that we don't have 50 different local standards come on line when experience has shown that the national standard was not necessary.

I urge *all* SBE members, non-members, station owners and managers . . . all broadcasters to fight these laws with every effort, or risk losing all control over the technical operations of their plants.

No, I don't have an engineering degree from an accredited university. Just a regular degree, 20 years of experience, and enough common sense to recognize a power play when I see one.

Bill Sepmeier, President
Standard Broadcast Service, Inc.
National Supervisory Network™
Avon, CO

PS: I am a proud member of SBE, SMPTE and ABES—the SPE? Never!

Misunderstanding over licensing

Dear **RW:**

State licensing in the broadcast technical area received a lot of attention in **RW** recently. I feel that there is basically a misunderstanding in the various approaches.

For one thing the FCC *never* licensed engineers. The piece of paper was a First Class *Operator's* License—*not* an engineer's license.

Over the years the term "engineer" has become applied to anyone who works with technical equipment. The term "technician" should probably be applied to most such people. There is nothing derogatory in this word: it is actually very descriptive and certainly nothing to be ashamed of.

Ray Thrower, president of NARTE has called me several times on this subject. I have always referred him to Jack McKain, president of SBE. However, I told Ray that I felt "a storm in a teacup was brewing."

State engineering boards have always licensed professional *engineers* who offer themselves for hire to the public. But operators have always been licensed by the appropriate trade boards where necessary.

The best solution would be for the various state boards of licensing to require SBE certification as satisfaction of technician licensing qualifications.

For example, it would be wrong to license and call two-way radio repair technicians by the term "professional engineer." It would be like classing the doctor's receptionist with MD qualification.

But a perfectly good qualification that can be borne with pride is "SBE Certified." Basically engineers design and plan things. Technicians and operators operate them. There is no slur or slight in giving the men who do the work the title of SBE certified technician.

If the FCC were to accept engineering applications only from professional engineers (the same as only lawyers can appear on behalf of a client before the FCC) the problem would diminish.

I do not believe it is in the best interest of the technical broadcast fraternity to insist on state professional board engineering licenses for most workers in the broadcast technical field.

John Battison, PE
John H. Battison & Associates
Columbus OH

Not Good Enough

A disturbing but pervasive trend in our industry is the recent trend toward mediocrity.

It's seen in regulatory changes which presume that increased interference is acceptable as long as stations are allowed to prosper.

It's also seen in manufacturer's statements that the quality of their products is "good enough" for broadcasters. And it's in evidence in the move towards consumer products for professional use.

This is as much a function of the improvement in consumer gear as it is of manufacturers' reluctance to put time and money behind development of a still evolving technology—such as digital audio.

It's being helped along in the radio industry by the large debt service resulting from multi-million dollar station sales.

Management holding the line on equipment upgrades until a quick buyout brings in a hefty profit can force station CEs to demand less expensive gear and consumer models become attractive alternatives to products designed to broadcast specs.

There was a time when broadcast equipment was almost a product of overkill in adhering to stringent specs and when the industry relied on standards to insure quality.

Now even when a standard is possible the regulatory bodies are reluctant to step into what they view as a free-market exercise. And the wide diversity in new technologies makes it nearly impossible to design equipment to a single set of specs.

The consumer equipment industry is too large for the highly specialized broadcast segment to be able to influence.

But broadcasters can help the situation by supporting standards when the opportunity arises and by supporting those companies which do design and market gear to the specialized broadcast market.

R&D is expensive and the price of professional equipment must help pay the freight.

But the opportunity for excellence is there if stations start asking themselves if they are the best they can be and are unwilling to stop at the point where they are merely "good enough."

—RW

One woman's experience

Dear **RW:**

I am addressing this letter in response to WMAQ's Engineering Manager Margaret Bryant's request for information about other women engineers (1 November **RW**).

After a year long sabbatical away from broadcast engineering it was pretty ironic to open **RW** and find this inquiry staring me in the face. I would have liked to read the column that inspired Ms. Bryant's letter, though. Maybe you can send me a copy.

Speaking from experience I could honestly say that I can understand why there aren't many women in the broadcast engineering field.

It is a very taxing and draining field if you are trying to hold up a household at the same time. I speak solely from small market experience, mind you, where we do not have umpteen studios or back up everything.

You are on call 24 hours a day in a market where there is one engineer per three stations. Problems usually occur early morning (3 AM) or late night. Unfortunately these stations cannot afford state-of-the-art equipment, therefore problems always exist.

In answer to Ms. Bryant's question as to any women making it to management in the field, I make a note of my brief engineering history.

I started as a "disc jockey" 11 years ago and found the engineering field to be more to my liking. I made my first assistant CE job two years later while attending college. I made it to Chief a year after that (during my first year of marriage) and proceeded to climb the ladder of experience in all phases of engineering from maintenance to construc-

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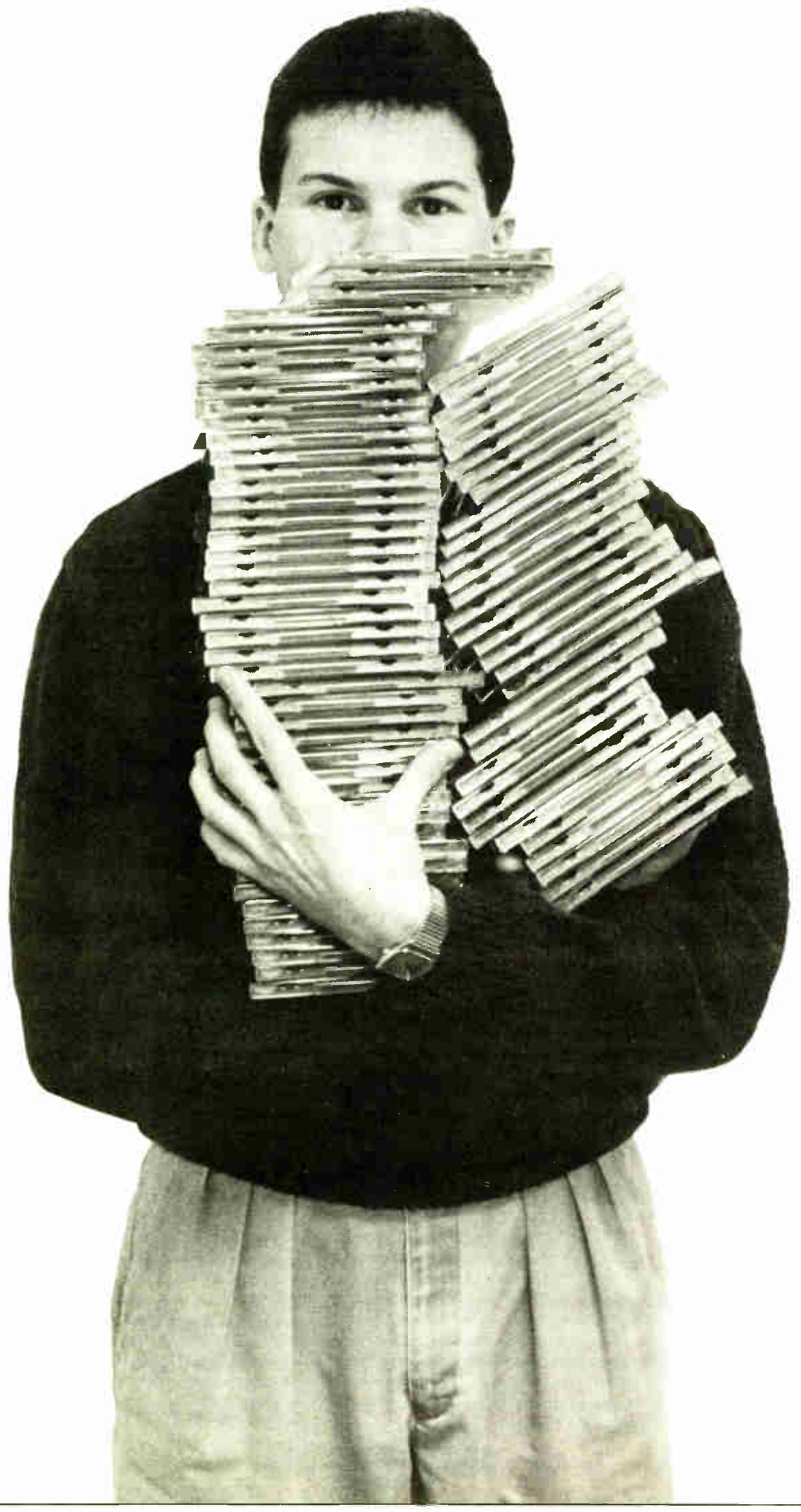

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Ownership Waivers Get FCC OK

by Alan Carter

Washington DC In a second move that reduces ownership restrictions on broadcast facilities, the FCC voted to allow group ownership of radio and television stations in the same market under certain conditions.

The Commission "will look favorably upon" granting waivers where stations are in the top 25 markets and at least 30 separately owned or operated broadcast licensees would remain after the proposed combinations, according to the decision.

The FCC prohibited an owner from holding radio and TV stations in the same television markets in 1970 in hopes of stimulating economic competition and viewpoint diversity.

In order to foster the growth of UHF TV, however, the FCC created a case-by-case exception to the rule for radio-UHF TV station combinations. This ruling eliminates that specific exception and uses the same policy to evaluate all requests for waivers of the one-to-a-market rule.

Follow-up

The change in the one-to-a-market restrictions comes a month after the Commission voted to allow radio station owners to own two AMs or two FMs closer together by reducing the overlap restriction from the 1 mV/m contour to the 5 mV/m for AM and to 3.16 mV/m for FM.

Chairman Dennis Patrick and Commissioner James Quello supported the proposal, but Commissioner Patricia Dennis delayed her vote pending further evalution of the document, which she said underwent last-minute revisions.

Patrick called changes in the one-to-a-market policy modest, but noted it should lead to efficiency benefits and cost savings from joint radio and television ownership. "These efficiency benefits in turn have proven to lead to public benefits such as increased news and information programming, as well as more stations being able to survive on the air in an increasingly competitive environment," he said.

"With this, we don't abolish one-to-a-market," Patrick continued, "we establish waiver criteria."

Quello said that with 30 separate owners, the larger groups will provide efficient programming and public affairs. "Diversity is alive and well," he added.

Looking at effect

Among the broadcast groups that may be affected by the ruling is Capital Cities/ABC, which has a waiver for seven radio stations in four markets. The Commission granted the waiver in 1986 after Capital Cities took over ABC, pending outcome of this proceeding.

An ABC spokesperson said the network could not comment on the ruling until attorneys reviewed the decision.

ABC's affected radio stations are within the top 25 market requirement: WABC-AM, WWPR-FM, New York; KABC-AM, KLOS-FM, Los Angeles; KGO-AM, San Francisco and WLS-AM, WYTZ-FM, Chicago.

Another group affected is Great American Broadcasting, which was granted waivers for stations in Kansas City, MO, and Cincinnati. Those stations are WKRC-TV, WKRC-AM and WKRQ-FM, Cincinnati, and WDAF-TV, WDAF-AM and KYYS-FM, Kansas City.

The Commission "will look favorably upon" granting waivers where stations are in the top 25 markets . . .

Great American, while waiting to review the decision, is optimistic that it falls within the guidelines to keep the stations, according to Anita Wallgren, corporate relations and administration VP. "It is safe to say we will seek and be granted waivers," she said.

In other reaction to the ruling, NAB supported the move and noted its opposition to the original rule restrictions established in 1970.

"The FCC's action is a step in the right direction and given the mood of Congress and its concern over this issue, we believe the Commission went as far as it could," said NAB General Counsel Jeff Bauman.

The FCC, in supporting the change, argued that traditional broadcast services and alternative media delivery have increased significantly since it adopted the local ownership rules. From 1970 to 1988, the number of AMs, FMs and TV stations has increased by 50.2%. There also has been substantial growth in the number and types of media outlets in local markets.

For information from the FCC on the issue, which is under Docket MM 87-7, contact Michele Farquhar at 202-632-5050.

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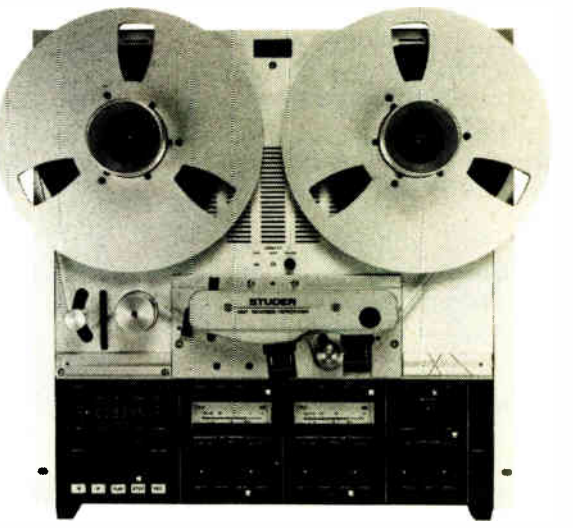

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Circle 19 On Reader Service Card

FMX Builds Market Acceptance

by Charles Taylor

Hartford CT Seventeen months after WDRC-FM in Hartford, CT, became the first American FM to equip itself with the FMX stereo extension system, receivers to utilize the technology are being introduced to consumers.

Seven manufacturers were expected to display FMX—for the first time—at the January Consumer Electronics Show in Las Vegas, including Alpine and JVC, according to Jim Monahan, a spokesman with Broadcast Technology Partners (BTP), which developed the system. The remaining five manufacturers were keeping mum until the convention.

FMX is a noise reduction system designed to allow listeners in the fringes of an FM's coverage area to receive a clean FM stereo signal without the hiss that normally accompanies distant stereo signals.

"We feel that this is very significant because it's the first step in actually getting the product into the marketplace," Monahan said.

BTP also is encouraged by the number of FM stations that have shown interest in FMX, Monahan said. To date, 100 stations have either installed the company's system in the US or are preparing to install FMX equipment, compared with five or six stations at the NAB convention last March.

Stations also have installed the system in Canada, Denmark, Sweden and Thailand, he said.

Proving FMX

"We've been working on actually getting stations on the air for the reasons of stimulating receiver manufacturers and proving FMX viability," Monahan said. "In view of all of the problems with AM stereo within the industry and questions about some of the early difficulties (of FMX) which have since been resolved, the 100 (US) stations have proven that FMX does indeed work."

Buckley Broadcasting in Hartford, which owns WDRC, the station that first installed FMX, seems convinced of the promise of the technology: it has installed or bought equipment for all nine of its FM stations.

"Anything that you're on the leading edge of is exciting. It's the biggest single improvement in FM since stereo," said Wayne Mulligan, VP and director of engineering at Buckley.

No instant gratification

Still, Mulligan cautioned that despite the inroads with the technology, it may take some time before the station's investment pays off.

"I think it's going to be a while," he said. "Just because receiver manufacturers come out with it, it doesn't mean that all of a sudden we're going to have 100% saturation."

All in good time, Monahan maintained.

"Everyone that's tried it so far has ended up buying the generator. We think that this coupled with the fact that the receivers are now coming to fruition is real important progress on our system," he said.

For more information from BTP, call Jim Monahan at 203-622-2631. At Buckley Broadcasting, call Wayne Mulligan at 203-243-1115.

RF Study Still Tabled

by John Gatski

Washington DC The Environmental Protection Agency (EPA) has not changed its mind about suspending work on RF emission standards, according to an agency official who met with the Electromagnetic Energy Policy Alliance (EEPA).

"I'm sympathetic. I understand their concern, but I hope they understand my concern," EPA Radiation Programs Director Rich Guimond said.

The EEPA board met with Guimond on 8 December to discuss EPA's October 1988 decision to stop work on the nearly completed RF standards for human exposure.

High exposure to RF emissions has been linked to adverse health effects in some studies where humans live close to radio and TV transmitters. EEPA believes that the agency made a mistake in stopping the standards project.

Other priorities

Despite years of work and the standards being more than 90% complete, EPA has abandoned the project because limited funding has been diverted to other projects such as radon gas contamination of US homes, according to agency officials.

"We realize that they (EEPA) are encouraging the agency to continue the program," Guimond said. "The dilemma is that the resources have not changed in the interim."

Even though the project is mostly complete, it "can't be whizzed out the door," any time soon, he pointed out.

"It would take a significant commitment of resources this year and next year to complete the work," he said.

Guimond noted that the EPA will use brochures to advise broadcasters and local jurisdictions about acceptable RF emission ranges in populated areas.

EEPA sees dire consequences

According to Barry Umansky, NAB deputy general counsel and EEPA board member, if EPA does not resume the project, local and state jurisdictions will enact standards that are overly stringent and less uniform than a national standard.

Umansky said that stopping the project will not have the US Office of Management and Budget's (OMB) desired deregulation effect because individual states, counties and cities will enact more rules.

He pointed out that the FCC and other concerned groups also are against the EPA's abandonment of the project.

For more information, contact Rich Guimond at the Environmental Protection Agency at 202-382-7400. Contact the NAB's Barry Umansky at 202-429-5430.

Ohm, Volt Values to Change

by John Gatski

Washington DC Attention radio engineers and technicians.

You all know that an ohm, is an ohm ... while a volt is, well ... a volt, right? Only for one more year.

Effective in January 1990, the ohm and volt values will change worldwide—which means very sensitive instruments will need recalibrating.

In the US, the volt will change 9.2 ppm (parts per million) while the ohm will change about 1.7 ppm, according to the US National Bureau of Standards.

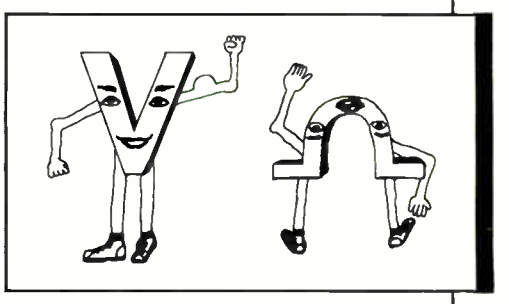
"Any voltage instrument that will read better than 50 ppm (.05% accuracy) might need to be looked at" as far as recalibration, said Dr. Barry Taylor, head of the Fundamental Constants Data Center for the National Bureau of Standards.

Taylor said that ohm measurement instruments probably would need calibrating if their accuracy is within .005%.

Chances are the seven- to eight-digit meters would need recalibrating, but three- to four-digit meters would not, he added.

The 1990 change is the result of four different values being used worldwide and a discovery that the value, last adjusted in 1972 was slightly wrong, Taylor said.

After a few years of discussion, according to Taylor, the change was agreed to in September by the International Committee of Weights and



Measurements, making the unit values consistent worldwide.

All countries will make changes to their values, which eliminates problems in determining the proper constant when comparing voltage sources internationally, Taylor said.

The values for volts and ohms have changed several times since the original value was established in 1885, because of improvements in measurement techniques.

For more information, contact Dr. Barry Taylor at 301-975-4220.

FCC to Study PARAN Docket

Parameter Current Antenna System at Heart of Washington State Controversy

by John Gatski

Mount Vernon WA The FCC wants more information about an unconventional antenna system before it approves either Valley Broadcasters' or Northwest Indian Women's Broadcasters' (NIWB) request to operate a 660 kHz AM station in the Portland, OR, area.

The order is based on a review of a 1986 FCC administrative law judge's ruling, later affirmed by the FCC Review Board, that granted Valley Broadcasting a construction permit to erect its antenna in Mount Vernon, WA. The approval was subject to assurances that the Parameter Current Antenna (PARAN) system would meet FCC efficiency standards once it was built.

A PARAN system is designed to provide the coverage of a taller omnidirectional antenna by configuring four shorter antennas in a square equal to the height of the structures. Because there are few PARAN systems on the mass media frequencies, however, little data is available on the system.

Valley's proposed PARAN system would have each tower 100' high and 100' apart, according to the FCC.

Because the Mount Vernon community had a greater need with only two radio stations serving it, according to the FCC, the 1986 judge/Review Board decision approved Valley Broadcasting's request for the PARAN construction permit.

The FCC decision noted NIWB's proposed Portland station would be in a market that already was served by 19 stations.

Decision appealed

NIWB appealed the FCC judge and Review Board's decision, according to the FCC, insisting that the Valley approval was not made in accordance with an FCC rule requiring actual test measurements on an unconventional antenna rather than theoretical calculations.

The Commission agreed and has requested supplemental information on the PARAN system before granting the permit to either party.

The Commission also has reservations about the FCC judge/Review Board decision favoring Valley because a condition was granted to allow the company to change locations and erect a conventional tower antenna if the PARAN system did not perform satisfactorily.

Had the Commission not reviewed NIWB's appeal and requested additional information, the approval would have allowed Valley's Mount Vernon station, KAPS-AM, a 20-year old, 500 W country music station, to switch from 1470 kHz to 660 kHz. The station also would increase in power to 10,000 W.

NWIB had proposed a traditional single antenna 50,000 W station.

PARAN: Does it work?

According to the FCC, only one PARAN system is in service for mass media broadcasting: KIPA, Hilo, HI, owned by Big Island Broadcasting, which was granted program test authority in April 1988.

After Valley's engineer talked with a Big Island engineer, Valley President Jim Keane is convinced the unconventional antenna will work.

"The antenna theoretically is as efficient if not more efficient than a conventional antenna," Keane said.

He said he has been informed that the PARAN system has been used successfully by the US Coast Guard and by some European and Middle East broadcasters.

Alan Roycroft, a consultant to KIPA, said the four antennas at that station are placed in a square at 20° angles and they act as concentric radiators with no standing wave or change in impedance.

"There also is virtually no skywave," he said.

He said KIPA's PARAN antenna system has the same efficiency as a 400' quarter wave omnidirectional antenna. (See **RW** 1 December 1988 for more information on KIPA's antenna.)

FCC confused

So novel is the concept, Roycroft noted, the FCC thought it was a directional antenna after it was constructed, and he had to furnish test results to prove that the configuration radiated in an omnidirectional pattern.

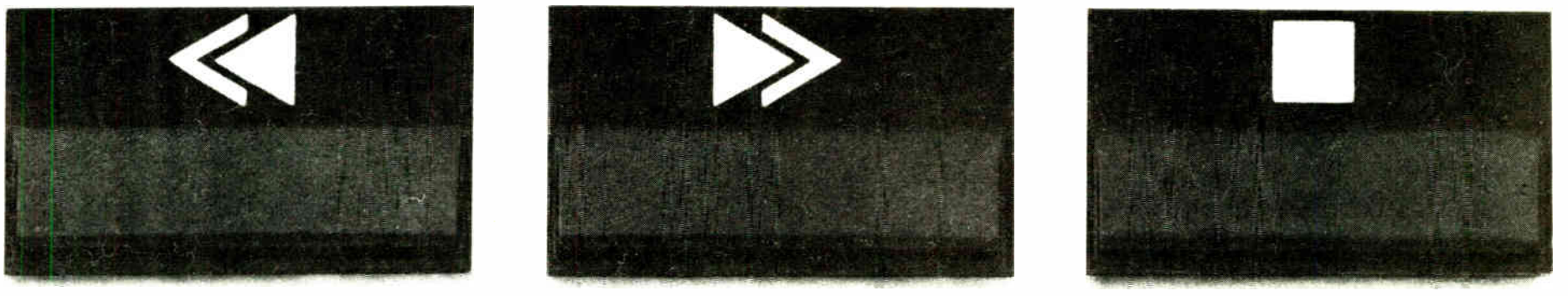
The expense of the PARAN system is comparable to a 400' conventional antenna, depending on the terrain, he added.

The KIPA PARAN system cost more, however, because the footers for the towers had to be hand dug in order to be anchored in a lava base, common in the Hawaiian Islands, according to Roycroft.

NIWB attorney Chester Naumowicz said the PARAN system so far is unproven for efficiency and the construction permit should not be approved for Valley because it has not supplied FCC required broadcast measurements.

For more information about the PARAN system, contact Jim Keane at 206-424-7676, Chester Naumowicz at 202-785-0200 or Alan Roycroft at 808-935-6858.

THE BROADCAST DECK FOR PUSHY PEOPLE.



No tape deck gets pushed around more than a professional broadcast deck.

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Call or write for more information about the 122MKII. Or ask other broadcast professionals. They're the people who really push our buttons.

TASCAM

Circle 20 On Reader Service Card

Synclavier Lets KIIS Go Tapeless

by Frank Beacham

Los Angeles CA Imagine. A radio station with no tape, no records, no compact discs.

A control room with no tape recorders or players, no turntables, no CD or DAT machines. A control room where any music or spot selection can be chosen instantly at the touch of a computer icon.

. . . using the existing Synclavier technology, we could build radio stations that would require no tape cartridges . . .

A production studio where promos can be quickly constructed from an immense library of voices and sound effects—like a word processor for audio.

For Mark Driscoll, production director at KIIS-FM, here, this tapeless radio station is no pie-in-the-sky dream.

It's daily reality as he and engineer Greg Orrante deal with the tedious and difficult task of applying new computer technology to the entrenched "razor blade" customs of the radio station production studio.

Almost one year ago

Last February, KIIS, a Gannett-owned station, became the first radio station in the nation to receive delivery of a fully-configured $350,000 Synclavier Digital Music System with Direct-to-Disk tapeless storage capacity.

Synclavier represents the high end of a new genre of digital audio workstations under the umbrella nomenclature: "Desktop Audio."

Though designed as a sophisticated musical composition instrument, the Synclavier's unique sampling, sequencing and signal processing capabilities are used by KIIS to build radio station promos and spots.

"Our goal was to take this musical instrument and transform it into a tapeless digital broadcast production studio," Driscoll said.

And, in fact, the Synclavier—with its 32 polyphonic sampling voices, 32 voices of FM synthesis and 32 megabytes of RAM—has made the transition. An entire library of jingles, announcer voices and sound effects are stored in the computer's optical and Winchester hard disks for instant recall and manipulation.

No more blades

In a demonstration for **Radio World**, Driscoll assembled a short multitrack promo spot in minutes from an electronic piano keyboard and mixed it through the station's production audio board.

But all is not perfect. After nine months, the reviews on the KIIS system are mixed.

"This big system may be a musician's dream, but it is very much overkill for what we, as broadcasters need to do," Driscoll said. "The equipment is not time efficient yet. It takes too long to navigate through the material in storage. And it's not user-friendly."

KIIS-FM's Mark Driscoll gears up to produce a spot with the help of the station's Synclavier.

But, if that sounds discouraging, an upbeat Driscoll did call the system "the future of radio."

"If we were bankrolled for one year, using the existing Synclavier technology, we could build radio stations that would require no tape cartridges, no CDs, no reel-to-reel tape," he continued.

"The computer system would incorporate traffic, logging and time of play. DJs would have access to all the music, which would already be stored and recalled by the computer. The music director could program from his terminal. We have the technology to do this today."

Adapting to needs

New England Digital, manufacturer of the Synclavier, is responding to the challenge.

The company is developing Driscoll's dream system, according to New England LA account executive Ray Niznik. The system is only a year away, he predicted.

New England is working with Columbine of Golden, CO, developers of administrative radio station computer software, to create a fully integrated computer-based radio station, Niznik said.

As an immediate response to broadcasters, Synclavier has developed the PostPro sytem, a less intimidating audio workstation utilizing Macintosh II computer hardware.

The PostPro is a digital, tapeless replacement for the multitrack tape recorder based on New England Digital's trademarked Direct-to-Disk technology. Price is $83,000 to $122,000, depending on options.

The standard PostPro system, consisting of four 300 megabyte Winchester hard disk drives, offers eight discrete tracks with more than 28 minutes of recording time at 44.1 kHz. It is fully upgradable into more advanced Synclavier digital sampling and music systems, which range in cost from $100,000 to $350,000.

In the field

To date, ten Synclavier and/or PostPro systems have been delivered or are

(continued on page 14)

FCC Gives Nod to Short Spacing

(continued from page 1)
that the ruling will relax the mileage separation rules and thereby give broadcasters more flexibility.

"It will give existing licensees more options in choosing sites and ensure the continuation of excellent FM service with little or no additional interference," she said.

Not reducing protection

Dennis also disagreed with many of the concerns raised by opponents: "We have not reduced the protection granted to Class B and B1 stations. We are not using directional antennas as an allotment tool; we will continue to make new allotments only if they fully comply with our mileage separation rules. We are not allowing unlimited short-spacing."

One of the primary opponents, the NAB, has objected to the liberalization of FM's use of directional antennas since the issue first was raised, and expressed "disappointment" at the ruling.

"As we stated in our comments, 'the FM broadcast service is far from broken; the FCC should refrain from making repairs,' " said president and CEO Eddie Fritts in a statement released by the NAB following the order's passage.

"Authorization of directional antennas will lead to a 'contour' system of allocating FM stations," he continued. "Like the difficult situation faced by AM broadcasting, a change to a contour protection system will increase interference among FM stations."

Fritts also stressed that current technology doesn't make it possible to guarantee the accuracy of a directional antenna. "There is no such device as an FM antenna monitor," he said.

No way to monitor

Wes Whidden, engineering manager of FM stations at Group W Radio and chairman of the National Radio Systems Committee's FM technical subgroup, agreed with the NAB's comments.

"There is no known way right now to monitor the performance of an FM directional antenna," he said. "That in itself is a big part of the problem. Without some kind of known standard, you're not sure what you're doing all the time. There are a lot of variants in FM antenna performance."

Added John Marino, VP of engineering for NewCity Communications, "I think it's going to be very detrimental to FM broadcasting. I can see situations where the signals are going to be spilling over past the theoretical contours and also situations where somebody may not maintain their directional antenna properly."

Also, he said, "The directional elements may get knocked off or fall off or get taken off and all of a sudden, the station is not directional. But then there's no way to prove that it's not directional unless you actually go and look at it."

There are others, however, who believe the move's advantages will far outweigh potential problems.

Periodic checks

"I would like to see them implement periodic (FM directional antenna) checks. It's not like an AM antenna where you check it regularly," said Chris Alexander, director of engineering for Crawford Broadcasting, which supported the change in rules.

But he continued, "I am otherwise in favor of it. I think it's especially important in the Northeast because it's so crowded up there.

"There are a lot of grandfathered stations and a lot of short-spaced stations that are operating at sub-standard power levels because they're short-spaced in one direction. They could let their powers out with a directional antenna, serve more people and do a better job. I'm all for it."

WWUS-FM in Big Pine Key, FL, has a pending application with the Commission to directionalize and, according to station manager Gene Michaels, "We're pleased as punch" by the FCC ruling.

"Our problem is that we're a stretch of islands just a couple miles wide and 150 miles long and most of our signal over the south and north is over water. That's what we're trying to overcome," he said.

For more information on MM Docket 87-121, contact James McNally at the FCC, 202-632-9660.

Readers Forum

(continued from page 5)
tion.

Two years ago I went out on my own as a contractor for several stations in the San Joaquin valley, which resulted in the end of my marriage, unfortunately. So after a year of recovery I am back on my feet as assistant CE for KXXX-FM in San Francisco.

Now I am not a feminist, but I believe you have to be pretty darn tough to be a woman engineer. You never know when you might find a rat in your rectifiers, a snake in your phasing cabinet, a midnight trip to a 3000 foot transmitter site in a thunderstorm, a pleasant slosh through an irrigated field to your towerbases; your STL tower falls over while dinner's in the oven or the air personalities can't seem to figure out the morning power/pattern change for a week straight.

Let's hear it for all the women engineers!

Tammy Veil, Assistant CE
KXXX-FM
San Francisco, CA

Editor's note: A big rah from **RW**. *Now, how about an organization for women broadcast engineers? Are there any more of you out there? Margaret and Tammy, you can be charter members if you'll make me an honorary one.*

KIIS Dabbles in Desktop Audio

(continued from page 12)
scheduled for delivery to radio stations in the US and Canada, Niznik said.

Gannett also has ordered from another desktop audio company, Dyaxis, a two-channel work station for KIIS and has another installed at its Kansas City, MO, station, KCPW.

The Dyaxis units, priced under $15,000 and not designed to compete with the more sophisticated New England Digital systems, also are controlled with a Macintosh computer.

Other digital workstation manufacturers include WaveFrame, AMS/Calrec, Lexicon, Digital Audio Research, Sonic Solutions, FOR-A, AKG, Fairlight, CompuSonics and E-Mu Systems.

A random telephone survey of several manufacturers found that most see their systems as suitable for radio station use, though none had yet made a station sale. A spokesman for Motorola, maker of the digital sound processing chip used by most workstation manufacturers, said 15 to 20 new companies have begun development of digital audio products and predicted an explosion of new technology in 1989.

Stan Gold, director of engineering for Parker Broadcasting, has ordered a NED PostPro system for KYXY-FM in San Diego.

OK . . . but

"Synclavier is the leader presently in digital audio, and I don't think anybody can touch them," Gold said. "They are at a point where they still have by far the better system but they will have to refine it to stay ahead."

Gold also predicted the tapeless radio station is the wave of the future but warned it will initially be expensive and take time to develop.

"Radio is really going though a transitional period right now," Gold said. "It's a tough period to make very important, critical decisions. It's tough to determine which way to go because there is no real difference."

Emmis Broadcasting currently is installing a Synclavier and PostPro system for its New York station, WQHT, and plans a PostPro installation next March at KPWR in Los Angeles. Terry Grieger, engineering VP for the 12-station chain, said he expected the new equipment to give the station a competive edge.

"We're planning to get some musical people on board . . . on a freelance basis . . . to do commercial and promo beds, things like that," said Grieger, himself a former keyboard player.

For information from Mark Driscoll, call 213-466-8381.

SST Faulted in Tower Case

(continued from page 1)
off the air for 32½ hours. The TV station now is broadcasting from a previous antenna site 40 miles away.

OSHA said it cited SST for two "willful" violations, meaning that the employer knew a hazardous condition and a violation existed yet made no effort to correct it.

The agency classified the third charge as "serious," one in which there is a substantial probability that death or serious harm could result and that the employer knew or should have known of the hazard.

One willful charge alleged that the company failed to maintain an adequate quality assurance program to insure that the original structural components met builder specifications, according to OSHA.

The second willful charge stated that SST did not have someone in authority to make frequent and regular inspections at the job site to identify existing or predictable hazards and to change program procedures as conditions indicated, the agency said.

The serious violation charged that SST did not maintain a safety program nor enforce safe work procedures to ensure structural support of the tower while the rods were being replaced, OSHA said.

KRXL has since constructed its own 1000' antenna tower nine miles east of Kirksville, which is about 20 miles closer than the station's transmission from KTVO's tower site, according to Alvina Britz, KRXL owner and GM.

The tower, constructed by Central Tower Co., was to be completed 15 January.

Jerry Heilman, GM of KTVO-TV, said that the station does not plan at this time to pursue any legal action of its own against SST.

The insurance covered replacement of the tower, which was designed and built by SST in September 1987.

For more information from OSHA, contact Patrick Hand at 816-426-5481.

License Competition is Up

(continued from page 1)
plications are only entering the process so that the current licensee will offer to buy them out, but others in the industry said the scenario is very possible.

"It would not be surprising to me," if people tried to make money from the licensing process, Federal Communicatons Bar Association President William Potts said. "I think the conditions for that kind of thing do exist."

Jason Shrinsky, an attorney with the Kay, Scholer, Fierman, Hays and Handler law firm in Washington, DC, which has handled several renewal applications in the Washington region, said he has not heard of any acknowledged buyouts of competing applications, but the rules do encourage it.

"There is always that potential as long as the rules permit it. You're able to be paid off for dismissing your application," he said.

Prior to the 1981 deregulation and license extension to seven years, stations had to document expenses during license renewal periods, but that is no longer the case, Shrinsky noted.

He speculated that a competing application could be bought by a licensee in the early stages of the process for just a few hundred thousand dollars or a party can hold out for more money by advancing through the hearing process.

Potts said competing application filers are taking an expensive chance if they spend $200,000 to $300,000 to advance into the hearing process and have to settle for smaller payoff.

Spotting renewal profiteers

Eads said it is extremely difficult to find out if someone is filing a competing applications only to make money.

The FCC does random background checks of those filing on FM stations and for new licenses, but that cannot always detect profit-only intentions, he said.

A financially sound party may get into the process, hoping for a buyout from the licensee. On the other hand, a party that is suspect because of shaky finances may have honest intentions to run a radio station, he explained.

Eads said the FCC did an audit of Family Stations Inc. Oakland, CA, because it has filed numerous new license applications, but the audit revealed that the corporation is financially sound.

As it turned out, Family Stations already owns and operates several religious stations and has pending construction permits for others, Eads added.

For more information, contact Larry Eads at 202-632-6485, or Larry Shrinsky at 202-783-1200.

Analog Meters in a Digital Age

by Bill Higgs

Louisville KY Every so often I get a flyer in the mail which states in large letters that my analog metering is obsolete, archaic, old-fashioned, went out with the slide rule and so on.

BOTTOMLINE BROADCASTER

Not too surprisingly, most of these flyers advertise some form of digital metering equipment. Digital is the way to go. On-off is where it's at.

All of life, it is suggested, can be reduced to little bits of data to be translated to the ubiquitous seven-segment display.

Maybe. I, too, like the accuracy of digital metering. It's wonderful when you are trying to accurately measure a quantity which is holding still.

However, few things in the broadcasting world are willing to stand still long enough for the digital gadgets to give a meaningful reading. Life, it seems, is dynamic.

Much of the time, we are as interested in relative readings as we are in absolute readings. Take tower light monitors, for instance.

I could tell much more about the operation of these devices with my "old fashioned analog remote control" than I can with my new-fangled digital dial-up whiz bang.

A check of the tower light telemetry channel on the former unit would reveal the reassuring needle swing every three seconds or so, happily indicating that all was well.

My new control would simply tell me on or off, or a current reading, based on a sample at any given time. Nice, but not what I want.

I need something that would give me a reading if the current rose above a certain figure for a certain period of time and thus tell me if my beacon was working properly.

Lo and behold . . .

As it turns out, such a device does exist. Comparators are a special class of operational amplifiers that are designed to output a voltage equal to either supply rail, depending on the relative input voltages.

Thought of another way, it is an operational amplifier with infinite gain.

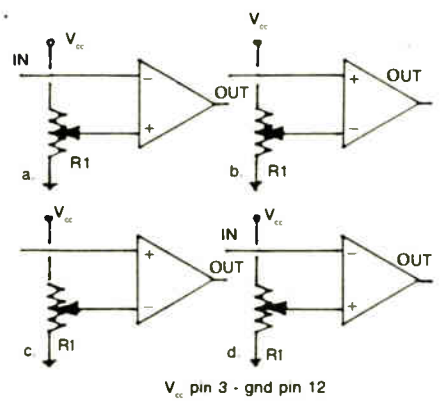
Although my initial application was for tower light monitoring, there are a number of uses around the station for these chips.

Often we would like to monitor a voltage or current for "go:no-go" conditions. Want a circuit that will drop carrier if the plate current rises above a certain value for a certain length of time? An audio peak detector? A circuit to monitor a certain voltage window?

All of these circuits can be made with a simple LM339 IC plus a handful of other parts.

The 339 is a quad unit, having four separate comparators in a single package. Figure 1 shows the basic comparator circuit, with variations.

Figure 1.



V_{cc} pin 3 - gnd pin 12

a. Output goes low when input goes above wiper of R1.
b. Output goes high when input goes above wiper of R1.
c. Output goes low when input falls below wiper of R1.
d. Output goes high when input falls below wiper of R1.

Figure 2.

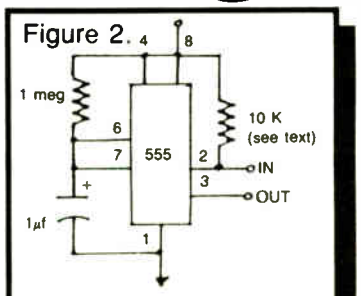
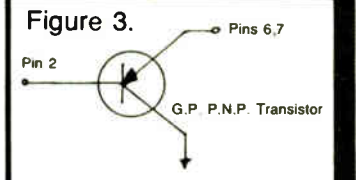


Figure 3.



The chip will operate quite nicely on from 5 to 30 volts, so it can be used to connect to either TTL or CMOS logic with only the addition of a pullup resistor at the output. Note the odd locations of the ground and power pins; not where you would expect them.

Making adjustments

In all four variations, R1 sets the voltage reference level. I

(continued on page 31)

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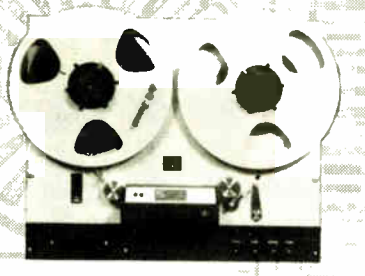

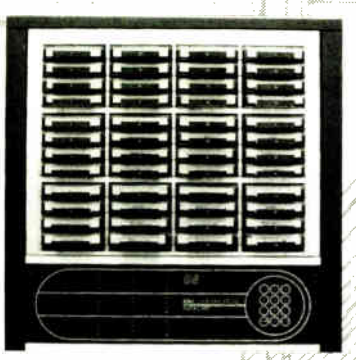

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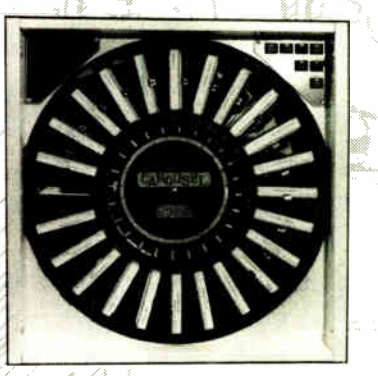

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Great Idea for a Voltage Switch

Editor's note: The first winner of **RW's** *Great Idea Contest is Alan Brooks of WZLI, Toccoa, GA for a cost effective high voltage switch. Alan is invited to have dinner on us with an American Express "Be Our Guest Certificate" worth $50 at any restaurant which accepts American Express.*

He also becomes eligible for our grand prize at year's end.

by Alan Brooks

Toccoa GA This high voltage switch can be made with a minimum amount of specialized tools and costs about $70 to construct.

GREAT IDEA

Radio stations with limited budgets and remote transmitter sites will find this switch extremely attractive. There are several uses for it when installed in a Harris FM-20H or FM-20K transmitter. I'm sure it can be used in other models as well.

It was designed for my transmitter primarily to reduce power in the event of antenna icing. Accessibility to my FM site is particularly bad.

We didn't buy antenna de-icing because of its relatively short life and its expense. We had to have some way to reduce power other than the power trim feature found in the FM-20 series.

Aside from the ability to cut the power for antenna de-icing, we realized that there were other nice things about having this switch in the transmitter.

It helps out alot when you have to do a "from the ground up" tune up of the transmitter since this involves tapping the plate voltage in half.

Instead of having to open up the high voltage supply cabinet and physically moving a knife-type switch, all you have to do to avoid danger and wasted time is push a button on the remote control.

When you go off the air

Another nice thing about having this switch is that in the FM-20H and FM 20K it removes three diodes from the power supply circuit.

What's nice about that? If your transmitter has sustained a lightning strike that shorts one of the diodes, you have a fifty-fifty chance that the diode is in the circuit eliminated by the switch.

You can come back on the air remotely by switching to half-voltage.

Along with the obvious advantages, the associated interlock circuitry provides a plate on status contract . . . something our Potomac Instruments remote control needed for automatic restart that was not provided on the Harris FM-20K.

The way it works is very simple. The two solenoids closest to the armature pivot point provide the energy needed to move the armature to the other side and hold it there.

The two solenoids furthest from the pivot point do nothing more than pull the armature from its snug fit in the contacts. Everything is designed so there shouldn't be any high voltage arcing through the air.

Since its installation two years ago we've had no trouble with it.

A few more details

A couple of notes. The side view of the switch doesn't show the solenoids. This was done to keep the drawing from being confusing.

The holding voltage is reduced when the plates are turned on in the transmitter. This is to increase the solenoid life.

Since the interlock circuitry uses a latching relay there is a power up mode—either half voltage or full voltage.

In my application the power up mode is half voltage since the switch is used for icing conditions and you wouldn't want the transmitter to come up at full power after an intermittent power failure.

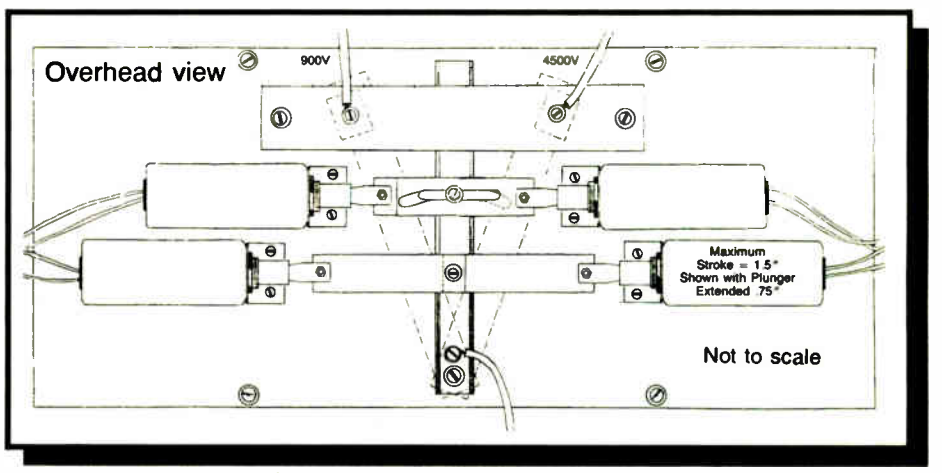
If the primary use for the switch is to cut power for tune up, the full voltage power up mode would probably be an improvement

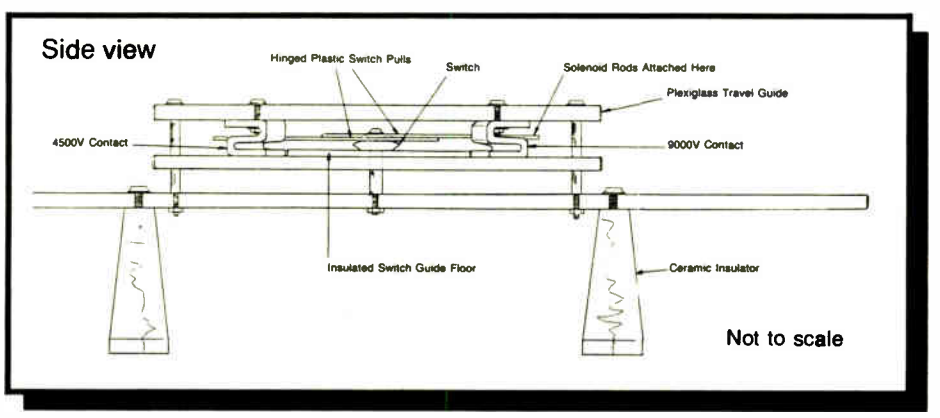
Customize for power supply

The interlock circuit was designed for a 32 V power supply since I use one elsewhere in my equipment rack; the circuit could be modified for a 24 V supply easily.

The armature is made of a piece of half-inch copper tubing pressed flat. The base and travel guides are cut from ¼" plexiglass.

The spacers that separate the travel guides are nothing more than Papermate pen shells. The hinged plastic switch pulls are thin plastic strips I had in my junk box.



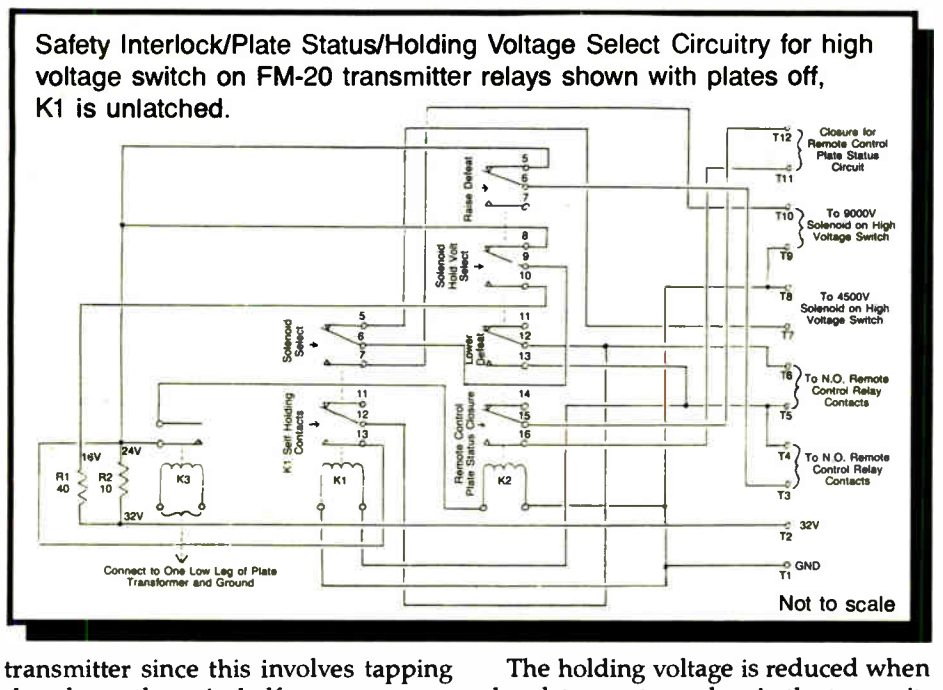


An ideal material to use for the pulls are the plastic engravers used to make "No Smoking" signs. A good solenoid to use is something like a Guardian LT8×16 for continuous duty.

The exact place to mount the solenoids and cut the armature pulls is something best discovered during assembly since the stroke lengths are different for each solenoid.

■ ■ ■

Alan Brooks can be contacted at WZLI, PO Box 106, Toccoa GA 30577 or at 404-886-0106.



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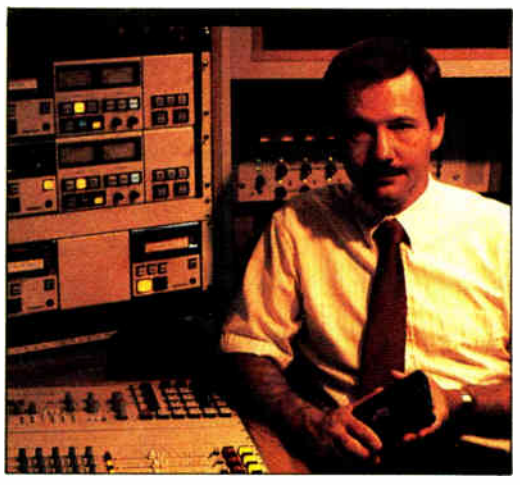

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Circle 31 On Reader Service Card

Rebounding from the Pink Slip

by John Cummuta

Downers Grove IL What do you do when the pink slip comes?

Don't kid yourself that it never will. As the old saying goes, "There are only two kinds of people in the world: those who have been fired and those who will be."

Actually, to be perfectly honest, there is a certain remnant of employees who can go through their working lives and never get the axe—but they have to keep a pretty low profile.

Because both those who stand out by being lousy workers and those who stand out by being superperformers are candidates to get canned—for different reasons.

But, the question is not why you get fired, but what you do after you get the boot.

Don't explode

The most natural reaction is also the worst. You want to finally tell that so-and-so what you really think of him—and the horse he rode in on. But that would be a mistake.

A few weeks later, after you've had a chance to cool down you'll be sorry you burned that bridge so completely.

Even if they blow up at you, keep your cool. It's part of a strategy that may work in your favor.

Don't panic

The next natural reaction is to say, "Ahhhhhhh! What do I do now? How do I eat? How do I pay the rent? Does anyone know if I should kill myself?"

There's no need to panic. Things usually end up working out, so just take comfort in that knowledge.

Read the papers and see if you find any stories about people jumping off tall buildings because they got axed. You probably won't, even though thousands of people get fired every day.

It's an American pastime of sorts and it's as much a part of business as ulcers and bankruptcy.

After you've had time to take inventory of your situation you'll begin to see options and paths that lead to other possibilities.

So just know in your heart that you'll make it to that point and don't let your emotions get away from you. Don't get depressed.

This is also a good point for me to pass along a little information that every financial planner tells every client they ever talk to.

If at all possible put at least a half-year's budget in the bank, or in other easily liquidated investments.

It will make your job-hunting time a lot easier if you have money to pay the bills.

By the way, the best time to do this is before you get fired.

At the moment you're getting fired, the person firing you usually feels uncomfortable and guilty. Use that to your advantage.

Don't ask for their car or their daughter but do ask for access to equipment to make airchecks or whatever else might be beneficial in your seeking future employment.

Also ask for severance.

If they say no, you say "No? You mean you're going to toss me (and my family) out on the street with nothing?"

ENGINEERING MANAGER

Say it with hurt in your voice. It should be worth a few hundred dollars anyway.

Also get a letter of recommendation and get a commitment from them that you can have prospective employers call them for a reference.

If you casually mention that you'll probably have to go on unemployment—and stay on it—if you don't find a job right away, they'll be giving glowing recommendations to anyone who calls.

They'll even lie and say, "Sure . . . I'd hire him again," to save unemployment money.

A fresh start

My experiences, the times I got fired, were that I always ended up with a better situation.

My life materially improved, after tense but brief periods of fierce activity.

The point I'd like you to see is that getting fired isn't just an ending, it can be an exciting new beginning.

Look at the bright new world you face, and reach out for whatever your heart desires.

You might think that the circumstances that caused your availability destine you for some obscure position, but experience doesn't support that.

Many people go from getting booted out to being welcomed in, somewhere where they end up loving it.

Once you've gotten as good a deal as you can in leaving your ex-employer, you now must turn your attention to locating your soon-to-be employer.

The whole idea of getting a job is simply a marketing problem and since you're coming from an advertising business, you should have some idea of what's involved.

Marketing is simply finding the best potential customers for whatever you're selling and showing them all the benefits of your offer or *what's in it for them.*

That's all a potential buyer is interested in: what's in it for them. Ask some of the salespeople at your station.

They'll tell you that they can talk all day about the features of the station when making presentations to prospective advertisers but it's not until they begin showing these prospects how the advertising will *benefit* them, that sales start happening.

You must sell yourself to prospective employers; and you do that by showing them all the ways it will benefit them to have you on their team.

Locating opportunities

The best way to start is your own personal network of contacts. Most jobs are usually filled through someone who knows someone who knows the guy on the job.

Check around with the people you've worked with or gone to school with. Even if their stations don't have any openings, they may know about something in their market.

The next place to try is the trades, but you've got to work this aggressively. You can't just sit back and mail resumes, hoping that something will happen.

Follow up those mailings with calls, working for appointments, where you can sell yourself face-to-face.

And don't believe anyone who tells you you can't get a job through classified ads. I've gotten several good ones that way.

The resume seems to be one of the accepted vehicles for advertising yourself, so pay attention to how you put it together.

Consider it a sales document, not just a fact sheet. Sell your experiences and your skills. Use it to showcase all the solutions to common problems that you represent.

Start right out with your capabilities, then your experiences that back up those capability claims, then lastly list such uninteresting things as education and personal data.

You know, in all my years of station management, I never once found myself wishing that I could hire a five-foot, ten-inch man, with three children and a

(continued on page 22)

Odds and Ends in Engineering

by Thomas Vernon

Harrisburg PA A happy 1989 to you all! This month's Station Sketches is made up of short items that have been collecting dust in my "in" basket for the last 12 months.

One of my first resolutions for the new year is to clean up my desk, so writing this column will help me to get organized.

STATION SKETCHES

The most accurate way to measure licensed power is by the direct method. This means either the use of a calibrated transmission line meter or inline wattmeter.

When a transmission line meter or other such device is unavailable or is inoperative power must be determined by the indirect method. These measurements are not as accurate as direct power calculations, but fulfill FCC requirements.

To make the calculations, the input power to the final stage is multiplied by the efficiency factor for the transmitter. This information is found in the instruction manual, and is filed with the FCC. Thus, the formula $P=E_p \times I_p \neq F$.

Most stations have a chart of voltage vs. current for the FCC 90-105% power requirements. Even if the station normally logs power output using the direct method, it's good to have such a chart drawn up for emergencies and available at the remote control point.

There are several areas where error can creep into indirect power calculations. With a little time and effort, most of these can be rectified.

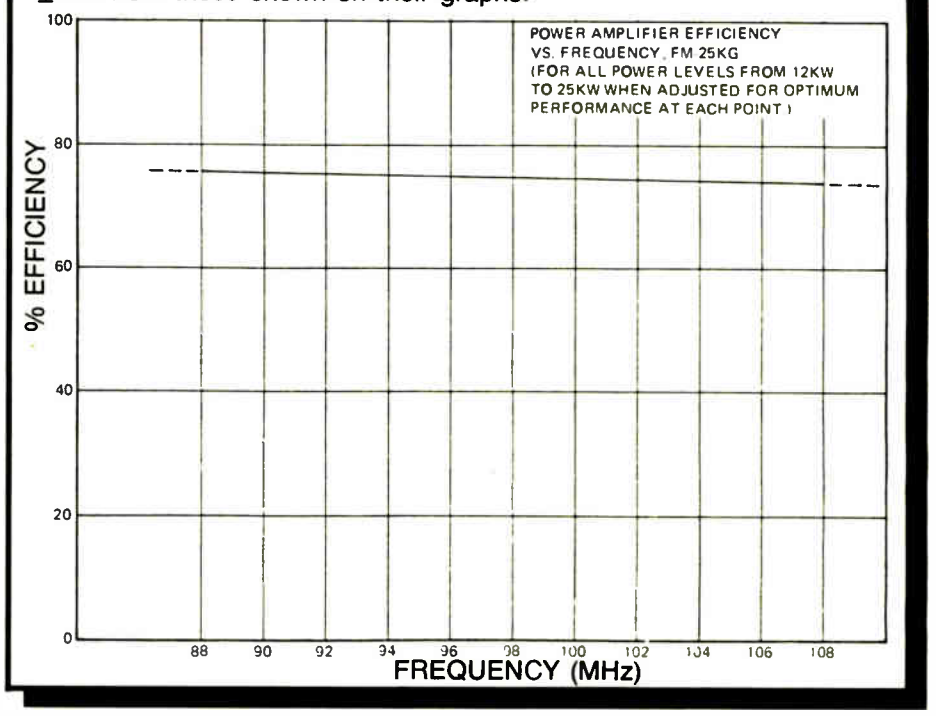
As components in the meter multiplier and shunt resistors age the accuracy of these instruments may be degraded. Meter precision is easily verified with a good DVM.

The biggest source of error is usually the efficiency chart used to make the calculations. The transmitter manufacturer gets this data by averaging the performance of several identical transmitters at different powers and frequencies.

Some charts show efficiency vs. power output, while others show efficiency vs. frequency. A variation of 3% above or below the charted value is not uncommon.

As components in the meter multiplier and shunt resistors age the accuracy of these instruments may be degraded. Meter precision is easily verified with a good DVM.

Figure 1a. PA efficiency charts may graph efficiency vs frequency or efficiency vs power output. Individual transmitter efficiency figures may vary ±3% from those shown on their graphs.



Figures 1a and 1b illustrate typical efficiency curves supplied with transmitters.

You can eliminate this source of error by calculating the efficiency for your transmitter and using this value in place of that in the chart.

To do this, first verify plate voltage and current accuracy, as described above, then adjust the transmitter for licensed power (100%) as observed on a calorimeter or wattmeter.

Efficiency of the PA is calculated from the formula $E=P_{out}/P_{in} \times 100$. P_{out} is read off the calorimeter and P_{in} is the product of plate voltage and current.

If you have access to the proper equipment and calibrate the transmission line meter every six months it can be used for direct power measurements. There are two types of dummy loads that can be used for power calculations: resistive and calorimeter.

The resistive type uses a large 50 ohm resistor, usually immersed in oil and cooled with a fan. An RF ammeter is inserted in the line, and power is calculated with Ohm's law.

With a calorimeter

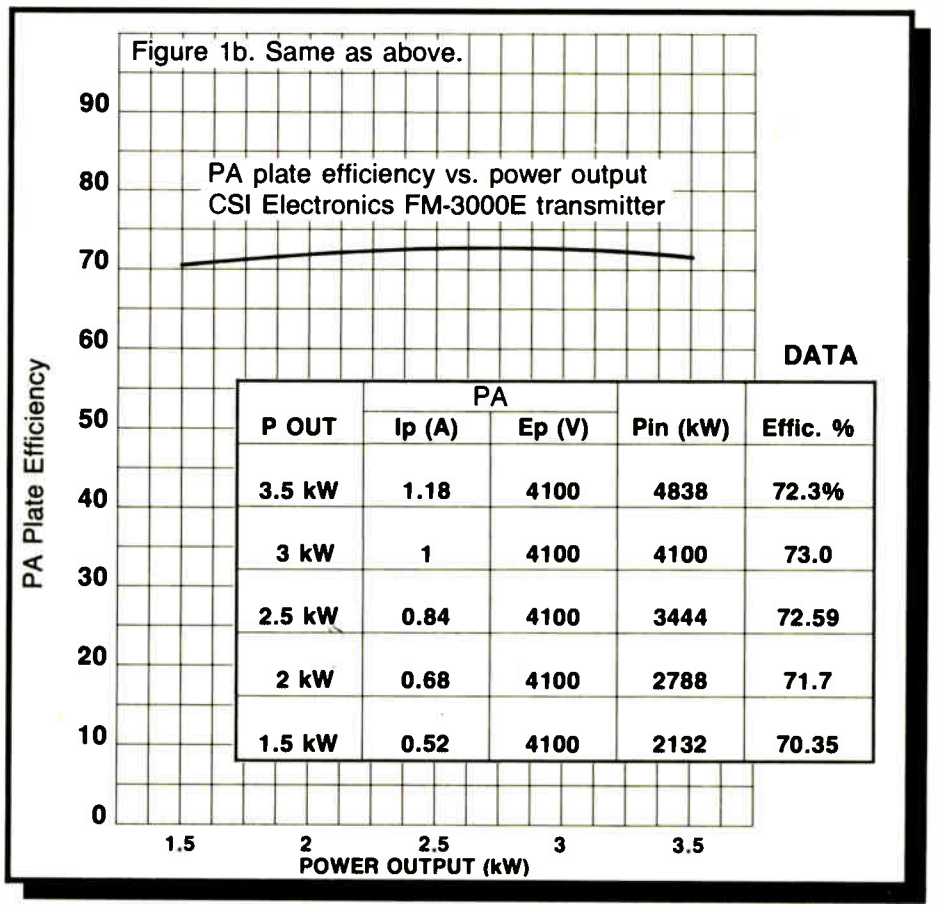
In a calorimeter, power output is determined by measuring the heat power dissipated in the load resistor. Water is usually the medium that is heated. Power is determined by the formula $P=.0264 \times \text{gallons/minute} \times (T_{out}-T_{in})$.

Of these two types of dummy loads, the calorimeter is more accurate. This is because the water temperature and flow velocity can be accurately controlled and measured. Accuracy may be within ±3%.

When you're done recalibrating, power measurements by direct and indirect means should agree within 1%.

(continued on page 26)

Figure 1b. Same as above.



DATA

P OUT	PA Ip (A)	PA Ep (V)	Pin (kW)	Effic. %
3.5 kW	1.18	4100	4838	72.3%
3 kW	1	4100	4100	73.0
2.5 kW	0.84	4100	3444	72.59
2 kW	0.68	4100	2788	71.7
1.5 kW	0.52	4100	2132	70.35

Networking Two New Studios

by Dee McVicker

Cedar Rapids IA The "On Air" light above the new studio doors at KIIK-FM and WOC AM are pretty typical of most stations—hardly enough candlepower to spark that illuminary difference between old facility and new.

Yet it was those particular "On Air" lights that GM Jim O'Hara must have longed to see while he waited for the delivery of a new facility.

James "Jim" Loupas, the contract engineer hired to package that delivery, was about as anxious to see those oblique lights beaming out from under regular programming. He had been routing cable for months, laying down a network of signals that might or might not decide to work on "On Air" day.

How and where these signals interconnected had been foremost on Loupas' mind for some time.

His objective was to make the operation accessible from every production room in Signal Hill Communications' new building. That meant networking consoles as well as being able to send AM and FM airfeeds from all control rooms.

Loupas had started the project almost a year before with less than a handful of studio equipment. Even a new building was on the list of items needed.

The 20-year-old building that once housed WOC-AM and KIIK-FM, also housed WOC-TV. In taking over the licensing of the AM/FM, Signal Hill needed to divorce its purchase from that of WOC-TV, which was still under license to Palmer Communications.

The blueprints and mortar began on what would eventually become a sprawling radio enterprise with two news booths, a news room, a main production control room, an FM control room, an AM control room and a secondary backup control room.

The secondary control room for KIIK/WOC combines the needs of each station.

Getting signals to cross

Since WOC-AM is a news/talk format that gets its feed from any number of 30 satellite sources coming off of its four dishes, it became apparent to Loupas early on that sophisticated distribution was in order. What type—and where—is what he tackled first.

A good many of these satellite sources were for short term usage only—five to 10 minutes out of the day at the most. A crosspoint switcher was quickly ruled out. Low usage of these sources did not justify the cost.

Instead, for these short duration feeds Loupas installed Gentner 20×1 mono program switchers at relevant studios. Since these program switchers easily accepted telephone-type connectors, he was able to distribute these satellite feeds via inexpensive 25 pair telephone cable.

This method of distributing secondary information saved two-thirds the cost of traditional shielded cables and boards and met technical requirements for this low profile use.

"They're all controlled levels," says Loupas, "so there are no crosstalk problems." And should any occur in this parallel configuration he has engineered switches into a split feed so that problems could be easily isolated and solved.

To make secondary satellite sources even more accessible, Loupas then installed Auditronics DA-6/LCs. These 1×6 DAs were also used for the main network feed and stereo remote sources. And, he found them equally useful in networking all the consoles and the AM and FM airfeeds.

With the Auditronics DA-6/LCs, Loupas was able to make all consoles and their airfeeds, as well as all relevant sources, 100% accessible from any console in the building. In all, the studios ended up with some 50 DAs.

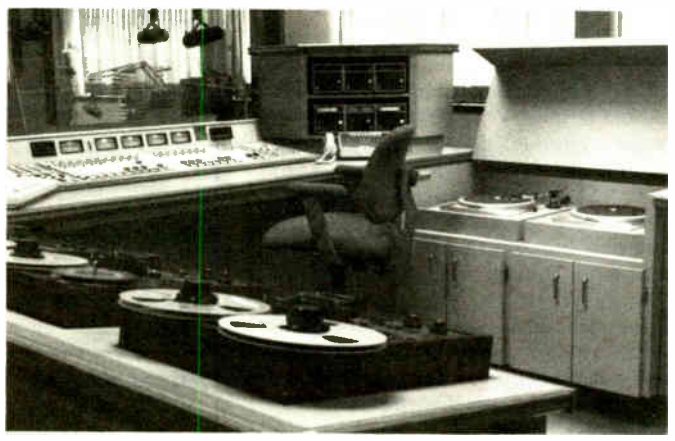
FACILITIES SHOWCASE

To connect this massive transit system together, Loupas used Gentner prewired patch panels. Some were the Versapatch panels that accepted stranded wire cable terminated on Gentner's Flexiblock punch block system.

Others were specified, as he puts it, to "Loupas specs" so that exact configuration and type of interface could be met.

"All of the consoles have extensive patching capabilities." he says. "We used above counter patching in the production room and below-counter patching in the air control rooms."

Although patch panels are found virtually everywhere in the facility to ensure feed flexibility, it is seldom that an operator requires a patch. "Nothing we ever did required a patch on the part of the operator," adds Loupas.



The control room at WOC-AM manages 30 satellite feeds.

KIIK-FM's control room has plenty of bells and whistles for on-air personality.

The Tech Center, the central junction for this large network, is where all the audio and video lines interchange. To switch lines into airfeeds, Loupas again chose Gentner. Both WOC and KIIK have Gentner 10×2 program switchers that can each select stereo inputs from any studio in the building.

What and where to buy

While Loupas was interconnecting this network on paper, he was also drawing up equipment requirements. For this, he relied on his past experience and the criteria outlined by station management.

Experience told him that large, unexpected costs came from unexpected changes. Loupas asserts that "If it costs a jillion every time you make a major change, you've failed." The idea was to make WOC and KIIK function in the short term, as well as the long term.

For consoles he chose the Auditronics 200 series for most of the control rooms. The only exception was the main production room, which was equipped with an Auditronics mainframe 310 for heavy production use.

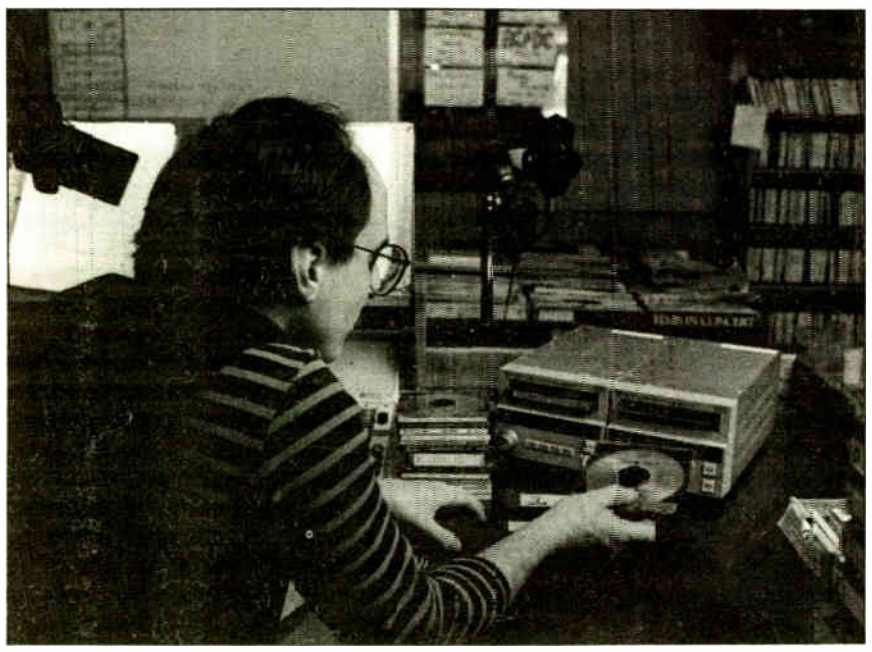
The reason he chose Auditronics, Loupas says, is because they "have VCAs on the channels, they have good add-on capability for peripheral and comprehensible remote control. And they're reliable and fairly economical."

"Reliable and fairly economical" was the measuring stick that Loupas used to gauge most of his equipment buys. He wanted equipment that was solid, had a good reputation and was backed by warranty.

The furniture, for instance, was custom made by Dave Thompson & Associates in Owasso, OK. Leaving nothing to chance, Loupas had them come in with bench saws and carpentry tools to make sure that all rooms were outfitted to

(continued on page 25)

CD Á LA CART (ADVERTISEMENT)



If you think the Compact Disc has changed the way music is played at home, imagine what it has meant to radio. With more and more recordings released on CD, most stations now play the little discs more than 75% of the time. And they sound great on the air: no clicks, no pops, no hiss- no surface noise, other than what was on the master.

Then again, when something goes wrong, there is hell to pay. With CD, there's no such thing as pushing the needle ahead. The only solution is to get a record up, fast! When such glitches occur, they usually do so because of the less-than-lab conditions at a typical radio station, which includes not only ambient dust but whatever the DJ has managed to get on his fingers- grease, ink, coffee, soda, tobacco, etc. In short, all the enemies of the CD.

Last year, a new sort of Compact Disc player burst into the studio of WMMR in Philadelphia, where I spin rock'n'roll on weeknights, and it forever changed the way this station plays CDs.

It is a Denon DN-950 "CD Cart Player," so called because it plays CDs only after they have been put into plastic cartridge housings. Instead of putting the bare disc into the machine, you insert a cartridge, which resembles a very skinny 8-track, into a slot. A spring-action door on the bottom of the housing slides open as the disc begins to spin, so the laser can scan the disc.

The DN-950 has several controls and features specifically for studio use. You can select one track while another's playing, and have the machine either play that track next or cue the new track up and await manual starting. You can also audition a disc through the studio's cue channel while another signal goes over the air.

The display reads to 1/75 S, so you can cue with amazing precision, if you take the time. The player's precise cueing capability allows, for the first time, the CD equivalent of a slip cue. While a CD is sitting cued, the display shows the full time of the selection. During play, it counts down the time remaining. This is a marvelous feature, since it tells the DJ exactly how much time he has to prepare the next cut. And the DN-950 can also flash a light and trigger an external signal, a studio automation system to start the next selection when the track is finished.

The Denon DN-950 thus is simple and easy to use. It's child's play to take out a disc cartridge, insert another "cart," and cue the desired selection. I've done it lots of times while talking on the air, without missing a beat.

The Denon has proved much more suitable for on-the-air use than any of the fine home-use decks that previously paraded through WMMR's studio. Those units were just not designed for 24-hour, 365-day use, and they simply wore out. Reports Phil Harris, chief engineer and director of engineering at our station, "The only bugaboo that surfaced in our six original Denon machines, as it had in every other CD machine on the market, was skipping. And Denon has recently replaced our old machines with new decks that don't have this problem. Even with skips, the failure rate for our original six players (two of which were in continuous use) was very small, especially on CDs that had been cleaned well before being put into the cartridge."

According to Harris, the DN-950's ability to interface with the studio's console is another huge plus. "The deck will connect easily with any broadcast automation system because the necessary jacks are on the back panel. The Denon can be remote startable from a button somewhere else, like on a console. Many home or consumer machines didn't have that capability, so engineers like me had to go inside and tear apart the machine to make it work properly with broadcast equipment. The Denon also has balanced-line outputs; that won't be of interest to most consumers, but for us it means there's no interface amplifier necessary between the machine and the console."

At present, the plastic cartridges cost about $4.00 each. For home use, this could quickly get into serious money. However, as Harris says, "To a broadcast station, it is a very small price to pay for increasing reliability and keeping dirt off the disc."

Thanks to machines like Denon's CD Cart Player, the era of industrial-strength Compact Disc players is finally upon us.

Michael Tearson
Photo by Neil Benson

Phase, Matching and Other System Tuning

by Tom Osenkowsky

Brookfield CT Adjustment of phasing, matching and power dividing networks in a DA system is more complicated than for the single tower case.

In a DA system, all towers have a degree of mutual coupling between them. This means that an adjustment at one tower will have an effect on the other towers.

Some adjustments will have more interaction than others.

RF READER

If, for example, a transmission line at one tower is mismatched and you attempt to adjust the ATU for 50+j0 you could be running in circles adjusting one coil at a time unless you consider the whole coupled system.

Each time you make an adjustment, the parameters change, hence the drive point impedances change and thus the ATU load impedances change.

Let's look at a working example. Table 1 shows the parameters for a new two-tower array in Connecticut. The turn-on parameters are shown in Table 2.

When actual parameters vary from the predicted, the most important course of action is to take impedance and current readings at each pertinent point in the system.

In this case, the cause of the mismatch and phase discrepancy lies in the self-impedance prediction. An additional +j25 is present at each base and to a lesser degree, a 2.5 ohm greater load resistance.

The additional reactance can be attributed to the lighting retard coil and also the shunt effect of the static drain choke to ground.

In order to make things right, the output arm of each ATU is reduced by j25 ohms and a slight change is made to the

(continued on page 30)

Table 1

TWR	F RATIO	PHASE	SPACING	Zbase	Zop
1	1.000	0.0	0.0	42+j20	56+j56
2	1.250	+114.0	90.0	42+j20	22+j11

Table 2

TWR	L RATIO	PHASE	ATU Zin	Zbase	Zop
1	1.000	0.0	33−j2	44.5+j45.5	85+j45
2	0.739	−52.0	34.5−j18	44.5+j45.5	39+j21

Equation 1

$$\text{Phase Shift} = \cos^{-1}\left(\frac{I^2_{in} + I^2_{out} - I^2_{shunt}}{2 \times I_{in} \times I_{out}}\right)$$

Where: I_{in} = Input Current
I_{out} = Output Load Current
I_{shunt} = Shunt Leg Current
$\cos^{-1}$ is the Arc Cosine

What To Do When The "Axeman" Cometh

(continued from page 19)

wife, who weighed 195 and was in good health.

Yet, I'd get reams of resumes that would start out with such mundane information.

The beginning of your resume may be all that's read, before it goes in the can, if you don't start right out with what station managers and chief engineers are looking for: skills, skills and more skills..

Do it right this time

One of the real benefits of getting fired is that it gives you an opportunity to do a little self-examination.

You can rest assured that at least some of the bad things you were told about yourself are true. Now's the time to change them.

You can also take solace in knowing that some of the bad things you feel about your former employer are true also.

When you're interviewing for new positions, look for indications that these people have the same failings.

Try to avoid getting yourself into another situation like the one you just left.

When you finally find the job you want, be positive and energetic in your interviews. Nothing sells like enthusiasm.

Don't lie about your former position, but neither should you voluntarily vomit out all the bad things you know about your past performance.

Try to get away with something like, "I guess what I was hoping to accomplish there and what they needed, just didn't match up."

Then ... when you get the job, be everything you promised them you would be, and maybe you can avoid having to reread this article in the future.

■ ■ ■

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.*

Setting Standards for Quality

by Barry Mishkind

Tucson AZ Recently we have been discussing both instruction manuals and the attitudes that lie behind the entire manufacturing process. A number of you have been sufficiently interested to call or write with your opinions.

What standards can be applied to "good" or "bad" are, of course, quite subjective. Hence, simply asking the question "Is it good enough?" leads us directly to "by whose standards?"

It's interesting to sample the great divergence of thought in the industry. Engineers often tend to be an opinionated lot.

While there are a number of really rottenly constructed and documented products, there are an equal number of manufacturers trying for technical excellence. Also, there are many engineers who grouse about something yet are not motivated to do anything positive to make things better in the industry.

. . . simply asking the question "Is it good enough?" leads us directly to "by whose standards?"

One reason it is important to give consideration to all of this is the critical juncture at which the radio industry has arrived.

We're not talking just about AM listener erosion, nor the huge debt service many stations carry, leading to lowest common denominator programming. They *are* important.

The case for standards

But, the area we can have an impact in is more technical. Is there a danger of industry "standards" slipping under deregulation? Or, has the term "broadcast equipment" as a standard of quality become endangered?

For instance, as we move into the digital age, we are finding a good deal of consumer grade equipment in stations. This includes not only the "IHF" hi-fi type gear, but also equipment that was not designed for the inevitable abuse it would face in the control rooms of America.

Sometimes this is due to cost constraints. Other times it comes from the feeling that "It's good enough" for broadcast specifications. Or it fits within the budget.

Sure, some of you old timers remember the days of the "rumble masters." Bullet proof turntables that, in order to get quick starts, had low end rumble at about −40 dB. Of course, many AM transmitters were hard pressed to make FCC specs of −45 dB, so the rumble wouldn't be heard on the air.

So, for many stations, the turntables were "good enough." Similarly, phone lines that were equalized to 5 kHz were "good enough."

DJs that could run the commercials were "good enough." As FM started to be a market force, and engineers worked to reach new standards, equipment that just barely met the Equipment Performance Measurement requirements was often kept on line or installed because it was "good enough."

Then, listeners started to become more discerning as better radios were available. While the system may have passed its EPM under "test" conditions, audio chains spewing bad audio became more obvious. It was no longer acceptable to offer hissy, pumpy, muddy audio.

ECLECTIC ENGINEER

Thus it was that a good many stations started to drive for signals that exceeded the FCC minimums. Often, consumer grade equipment was brought in to the studio. It didn't stand up as well as the old reliable gear, but it sounded better and was usually cheaper.

The key point was that in many markets, sharp-eared listeners began to notice marked differences in audio quality among the stations. It was pressure from the listeners that made the stations upgrade. It was pressure from stations that motivated manufacturers to offer the needed equipment.

All through the Seventies and eighties, advances in technology and applications brought a solid, clean signal within reach of most stations. Then the "blessing" of deregulation came and the modulation wars began to result in a uniform "buzz" on carriers in many places.

Into the Nineties

So here we are, at the threshold of the Nineties. Delegates to the NAB and SBE conventions are subjected to a near case of sensory overload as they walk the aisles and check out the displayed wares. And debates rage constantly over the future of the medium.

There is little question that deregulation has freed the engineering community from a lot of onerous paperwork and meaningless rules.

On the other hand, a whole new can of worms has entered our lives. The decision to eliminate technical licenses and testing for such licenses has contributed to an engineering crisis in many places

(continued on page 25)

Auditronics "because they work well and they're so easy to use"

"That's what I tell colleagues from other stations when they ask why I prefer Auditronics consoles," says Jon Book, Engineering Manager, Studio Systems for WOC-KIIK in Davenport, Iowa.

"We have about 15 people working the boards between our AM and FM operations so ease of use is very important to us. Our five Auditronics consoles in on-air and production let our people air a highly professional product on both our programming and the commercials we produce."

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SPECIFICATIONS

TRANSMITTER

Frequency Range . . . . . 400–470 MHz, in 1 MHz bands, 2 frequencies within 6 MHz of each other.

RF Channels . . . . . Two pre-programmed operating frequencies are front panel selectable.
Two carrier frequencies can be located up to 6 MHz apart and each carrier is programmable within its 1 MHz band in 2.5 kHz steps by internal DIP switches.

Power Output . . . . . High level 25 watts; mid-range 6–18 watts; low range 0–8 watts; normal reduction with 13.8V external battery. (50 ohms, type N female connector)

Maximum Frequency Deviation . . ± 5 kHz, ± 10 kHz, and ± 25kHz

Signal-to-Noise Ratio . . . . . 65 dB with microphone input at ± 25 kHz deviation
70 dB or better with line input at ± 25 kHz deviation

Frequency Stability . . . . . 0.00025% (0°–50°C)

VSWR . . . . . Withstands infinite VSWR

Spurious Output . . . . . 60 dB below carrier

Harmonic & Intermodulation Distortion . . . . . 60 dB below carrier

Audio Inputs . . . . . Three microphone inputs at – 70 dBm to – 40 dBm, 150–500 ohms balanced, XLR-3 connector and transformer coupled input, level control provided.
Switchable to high level line inputs. – 20 dBm to + 10 dBm, 600 ohms balanced.

Audio Frequency Response (1 dB rolloff) . . . . . 50 Hz to 16 kHz, for ± 25 kHz deviation.
50 Hz to 10 kHz, for ± 10 kHz deviation.
50 Hz to 6 kHz, for ± 5 kHz deviation.

External Audio Processor Patching . . . . . Rear panel connectors for external unity gain companding or processing; input level 10K, 2V RMS; output level 1V RMS, 600 balanced, XLR connectors.

Peak Modulation Limiter . . . . . Built-in peak modulation limiter to prevent over-deviation.

Front Panel Diagnostic Meter . . . Monitors power supply, VCO voltages, forward and reverse power.

Front Panel Bargraph . . . . . Monitors modulation level

Power Requirements . . . . . 115 Vdc, 60 Hz, 100 watts, 1 amp or 13.8V external battery, 100 watts, 7 amps; switchable. 230 Vac, 50 Hz optional.

Size . . . . . 1/2 rack mount: 5¼" (13.3 cm) H × 8½" (21.6 cm) W × 14½" (36.8 cm) D

Weight . . . . . 14.5 lbs net (6.7 kg); shipping wt: 18 lbs (8.3 kg)

FCC ID BI09CJ8888RPU

RECEIVER

Frequency Range . . . . . 400-470 MHz, in 1 MHz bands, 2 frequencies within 6 MHz of each other.

RF Channels . . . . . Two pre-programmed operating frequencies are front panel selectable.
Two carrier frequencies can be located up to 6 MHz apart and each carrier is programmable within its 1 MHz band in 2.5 kHz steps by internal DIP switches.

RF Input . . . . . 1.0 uV for 20 dB quieting ± 5 kHz deviation (25 kHz channel spacing) de-emphasized audio. 50 uV for 50 dB. (Type N female connector, 50 ohms.)

IF and Image Rejection . . . . . 80 dB

Frequency Stability . . . . . 0.00025% (0°–50°C)

Spurious Rejection . . . . . 70 dB

Audio Response (400Hz reference) . . . . . Narrow Band: + 0.5, – 1 dB, 50Hz to 6 kHz; – 3 dB point is 7 kHz
Mid Band: + 0.5, – 1 dB, 50Hz to 7 kHz; – 3 dB point is 10 kHz
Wide Band: + 0.5, – 1 dB, 50Hz to 9 kHz; – 3 dB point is 15 kHz

Program Audio Output . . . . . + 10 dBm, 600 ohm balanced, with squelch, barrier strip

Front Panel Meter . . . . . Monitors received signal strength, program audio level, power supply, VCO voltages.

DTMF Decoder . . . . . Allows remote control of receiver bandwidth, channel frequency selection, and repeater transmitter enable.

External DTMF . . . . . Overrides input DTMF signal from air link. Phone jack connector.

Received Signal Strength DC Output . . . . . 1 Vdc to 5 Vdc for 1 uV to 200 uV of RF

Transmitter enable . . . . . Relay contact closure enables external repeater transmitter

Security Code . . . . . User programmable 4-digit security code, set by internal DIP switches.

AC Power . . . . . 115/230 Vac, 60/50 Hz, 30 watts, 0.25 amps

Optional Battery Power . . . . . 12 to 13.8 Vdc, 30 "watts," approx 2 amps

Operating Temperature . . . . . 0°–50°C

Size . . . . . 3½" (8.9 cm) H x 19" (48.3 cm) W x 11" (27.9 cm) D.

Weight . . . . . 10½ lbs (4.8 kg); shipping wt: 13 lbs (6.0 kg)

Contents subject to change without notice

Receiver Bandwidth, SNR, THD, and Adjacent Channel Rejection

CHANNEL SPACING (FCC Description)	F	IF BW	THD (400 Hz)	S/N (De-emp)	Adj. Ch Rej
25 kHz (25KOF3)	± 5 kHz	Narrow	<2%	>55 dB	50 dB
25 kHz (25KOF3)	± 5 kHz	Mid	<1%	>55 dB	6 dB
25 kHz (25KOF3)	± 5 kHz	Wide	<0.5%	>55 dB	0 dB
50 kHz (50KOF3)	± 10 kHz	Mid	<2%	>60 dB	55 dB
50 kHz (50KOF3)	± 10 kHz	Wide	<1%	>70 dB	6 dB
100 kHz (100KOF3)	± 25 kHz	Wide	<1%	>68 dB	26 dB 60 dB* *for 150 kHz spacing

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The RPU transmitter and receiver are frequency-synthesized for maximum versatility in the N1, N2 and S frequency bands. Two operating frequencies are programmed by internal DIP switches and are front panel selectable.

SELECTABLE FREQUENCY DEVIATION AND RECEIVER BANDWIDTH

The Model 8888 system allows you to select ± 5kHz, ± 10kHz or ± 25kHz frequency deviation depending on frequency band or occasion.

In addition, selection of receiver bandwidths is possible via a front panel switch or DTMF signal. The 8888 also gives you full audio frequency response.

DTMF CONTROL

Versatile DTMF control is provided for receiver activation, bandwidth and deviation selection, and security. All these plus more via a touchtone telephone handset.

RF POWER OUTPUT VERSATILITY

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WOC/KIIK New Studios On Air

(continued from page 21)
specification.

The equipment bids sent out were controlled, for the most part, by who the group had bought equipment from in the past and who could supply the bulk of what was needed.

After months of planning, wiring, and finally putting large masses of studio gear into place, Loupas took a tour through the building.

In the AM control room, the Auditronics 224 console orchestrates the main satellite feeds, remote broadcast hookups, talk and news booths and an automation system.

Next to it are three Otari MX 5050 recorder/players so that incoming satellite and telephone information can be taped for later on-air scheduling.

For incoming phone line communications, Loupas installed the Eventide BD-980 to police and match stereo delay. The talk booth, which is hosted by a computer system linked to the AM control room, seats four at individual microphone stations.

Adjacent to the AM control room is the newsroom, by far the largest production room in the building. News is gathered from four work stations, two of which have cart machines, Otari MX 5050 recorder/players and Arrakis mixing consoles.

For anchoring newscasts, two news booths have Auditronics 212 consoles, Otari MX 5050 reel-to-reel and cart recorder/players. The newsroom and the news booths, like AM control, have access to network feeds.

The FM control room has much the same ease of programming that the AM does, except radio personality instead of information is what is readily available at the operator's fingertips.

The console, an Auditronics 218, manages six ITC cart machines as well as a pair of MX 5050 recorder/players.

The main production room is almost a combination of the AM and FM control rooms.

The mainframe Auditronics is an 8-track with 24 inputs. It also features an Otari MX-70 recording deck; making it feasible to upgrade to a 16-track on one-inch tape at any time.

For mastering decks, Loupas chose the Otari MTR-10 recorder/players. He also made sure to install all the bells and whistles, such as a drum computer, an effects processor, an Eventide harmonizer, a Urei 535 equalizer and an Orban 424A compressor/limiter.

The secondary control room, which not only serves as on-air backup for the AM and FM control rooms but is also where the majority of production work is done, has the same extensive network feeds as the AM.

This control room is where Loupas installed the Technics SP-15 turntables and Technics CD player, as well as an effects processor, cassette recorder/player and two Otari MX 5050 tape machines.

■ ■ ■

Dee McVicker is a free-lance writer with a long record in radio equipment sales. Comments on this article, as well as inquiries on your writing service, can be taken at 602-899-8916.

On Quality

(continued from page 23)
where there is a qualified engineer available or willing to work at the wage levels offered.

The SBE has stepped in and tried to offer a testing program and support for many of the concerns of working engineers. However, without strong support from the NAB, it has been slow going in making any progress to help those working in smaller markets.

Also, there have been literally dozens and dozens of articles and letters dealing with the AM stereo issue. About all that can be agreed upon is that deregulation essentially robbed us of a standard. The marketplace approach has arguably left AM Stereo in the critical ward.

As we look at the point to which we have come, it is getting harder and harder in many places to convince management obsessed with debt service that consumer grade equipment is not "good enough."

By the way, there is still time for you to share strange or great examples of instruction manual writing with everyone. Just drop me a line, or photocopy, at 2033 S. Augusta Pl., Tucson, AZ 85710.

■ ■ ■

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

Bits and Pieces in Engineering

(continued from page 20)
Remember however, that any appreciable reflected power will introduce error into readings from the transmission line meter.

Occasionally one finds a transmitter with the power meter readjusted to correspond with the efficiency curve or with 100% at a reduced power output.

While this gives nicer looking numbers for the operators, it limits the line meter's usefulness for tests and measurements.

Readings from an unaltered power meter are valid for FCC logging as long as these same readings were used on the license application. You can also prepare a chart for operators, relating these arbitrary numbers to 90-105% licensed power level.

Finding VTVM probes

Although DVMs have become the standard for most types of measurements, there are still some areas where analog VTVMs are the instrument of choice.

Such applications include: aligning tape heads, adjusting tuned circuits for peaks and nulls, or measuring quantities that change quickly over time.

The problem is that many otherwise serviceable VTVMs and FET-VOMs from the early-mid '70s fall into disuse because the probes wear out or get lost and replacements are no longer available from the manufacturer.

These are the special ones with the switch built into the probe, to insert a 1 MΩ resistor in series for DC voltage measurements and switch it out for all other functions.

After an exhaustive search for such a probe, starting with the original manufacturer and continuing through numerous surplus outlets, the solution to this problem finally jumped out of a Pomona Electronics catalog.

Pomona to the rescue

To the rescue comes the Model 4871-0 "Do-it-Yourself Component Mounting Test Probe." The rear half of this probe unscrews to reveal turret terminals for component mounting and a spade lug terminal for attaching the cable.

With a little bit of mechanical ingenuity and a hot Exacto knife, you can mount a miniature slide switch in the probe handle, wired to a 1 MΩ resistor on the terminals.

The 4971-0 should be available from any electronics distributor stocking Pomona and lists for $4.75. Incidentally, many of the standard probes listed in their catalog are much more affordable than the equivalent product purchased directly from the meter manufacturers.

Although DVMs have become the standard for most types of measurements, there are still some areas where analog VTVMs are the instrument of choice.

Ballast Lamps

While I'm on the subject of things that are getting difficult to find, the small 3 W 120 V ballast lamps used in signal generators are getting scarce, and your oscillator won't work without one.

The problem is compounded by the fact that when these signal generators were being built, the ballast bulbs were selected by trial and error for minimum distortion and good linearity.

One bulb might give terrible performance, while the next would be nearly flawless.

For you opamp junkies, I should explain that older tube and transistor oscillators used ballast bulbs in the positive feedback path to control amplitude variations.

As output voltages increased more current was drawn through the lamp filament, which in turn increased the temperature, and thus the resistance.

Increased resistance reduced positive feedback and thereby, amplitude. When output voltages were reduced resistance was reduced, giving higher feedback voltages.

One source for these bulbs (the only one I have found so far) is Tapecaster, which is now a part of Auditronics.

They were used in the bias oscillator of TCM cart machines. Price is around $2 each. If you can find a bulb that gives reasonable performance, it can be fine-tuned by paralleling resistors or capacitors across it as needed.

■ ■ ■

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

Production Rat Discovers MIDI

by Ty Ford

Baltimore MD The Production Rat was restless. Somewhere deep inside there was an itch that would not go away. His spots and promos lacked something.

Those music beds he had created from rejects from the Music Director's office sounded tired. Store-bought production music libraries helped, but there were times when finding just the right music was impossible.

The dissatisfaction had begun months earlier when PR (Production Rat) had been exposed to some local musicians with MIDI (Musical Instrument Digital Interface) keyboards.

They certainly seemed to be enjoying themselves . . . making and modifying different sounds, playing with them on a keyboard, looping them with a sequencer or editor.

The sounds were great. At the touch of a finger you could have the simplest droning tone, an entire orchestra, even sound effects and short speech segments.

In fact, there were people who did little else but think up new sounds every day. These samples, sounds or patches as they are sometimes called were traded like baseball cards between synthesizer owners.

With digital sampling things got even better. Instead of approximating the waveform of a sound or instrument as most of the synthesizers did, the new samples were digital recordings of the real thing. String sections sounded like string sections, because they were!

Love at first touch

With the help of a friend, PR was amazed to find that with MIDI he could record multiple channels of music data, hit the playback button and have a first generation multitrack arrangement play back right in his face.

This meant no more tape hiss from multitrack tape or bounced tracks. Of course it also meant PR had to learn to play a keyboard as well as be fluent in MIDI.

In his dreams he imagined himself in command of a bank of gear, working feverishly to create new sounds with which to stun his audience.

The dream was short-lived because of three obstacles: money, his lack of knowledge about which boxes he needed and the fact that he had opted for Little League instead of piano lessons as a child.

Recalling how difficult it had been to convince the station manager to spring for the digital reverb unit for the production studio gave him little hope of making a convincing argument for buying equipment he didn't know how to use and wasn't sure he could play.

While lesser men and women would have shrugged, sighed and given up the idea, PR continued to pursue his dream.

PR enters MIDI purgatory

In the meantime, he found that dropping in to his local music store on a Saturday afternoon was the wrong thing to do. The showroom was overflowing with people who looked like they had just fallen off of an album cover.

The noise generated by all the instruments being played at the same time was terrible. In addition, the sales people were much too busy to answer PR's questions.

PRODUCER'S FILE

He decided to come back on a weekday. This second visit was more rewarding. He asked questions about MIDI. Yet most of the answers were confusing and brought about more questions. Books he read on the subject didn't offer much help. They were great at explaining MIDI theory but lacked practical application.

There were just enough differences in the operating systems of each piece of gear to keep PR confused and frustrated.

The feelings were exactly the same as those he had felt while trying to master word processing, spreadsheet, database and other computer softwares. Press the right button at the wrong time and you had to start all over again.

PR soon began to realize there was a lot more to MIDI than he had realized. There was no easy way with MIDI. Each piece of gear had its own idiosyncrasies.

After explaining to the person at the music store that he wanted to create beds and sounds for radio production and that he didn't have much money, he was led to keyboards in the $500 to $700 range.

At first the going was easy. PR could push a few buttons and make a variety of neat sounds. These were not unlike sounds he had been imagining he could make.

Sampling was out of the question at this price range, but there were 128 different sounds, all of which he could modify and store for future use. PR could now create rich sounding sustainers and sweeps for his promos.

There were at least a dozen ways to modify each sound, some subtle, some very obvious. The salesperson explained that sound could be created and modified in either the digital or analog domains, or a combination of the two.

Tailoring the sound

You customized the sounds by applying filters or modulators to the primary sounds generated by the synthesizer's main oscillators. The more oscillators and filters, the more complex and precise the sound.

After an hour or two he felt a lot more comfortable with keyboards. Sure his performance wasn't that great but PR knew it would only get better with practice.

The salesperson suggested that he also consider a sequencer. Although they came in many configurations, all sequencers did basically the same thing.

They recorded, stored and played back MIDI data. It was this performance data that "played" the music. It was like having an updated version of an old-fashioned music box, the kind with the big rotating cylinder with the little spikes that plinked just the right note each time they came around.

Only with MIDI you could change the sound or timbre of the music box, the tempo, the key and even the order of the notes.

The salesperson showed PR a good mid-priced drum machine sequencer. In it were stored the sounds of 26 drums and assorted percussion instruments.

To make life easier, the manufacturer had programmed in 50 different percussion patterns ranging from sustaining straight beats, fills, accents, shuffles, two-steps, latin beats, rock beats and dance beats.

You could use the programmed patterns as is, modify them or make up your own from scratch.

MIDI to MIDI

The patterns could be linked together by part number to make song-length drum tracks. They could be sped up, slowed down, added to or subtracted from.

The salesperson explained that the drum machine and synthesizer could be connected via their MIDI ports so that they could "talk to" each other in MIDI.

In one configuration, the MIDI output of the sequencer/drum machine was plugged in to the synthesizer. This allowed the sequencer to play the synthesizer. By assigning the touch pads on the drum machine to specific notes on the synthesizer, specific melodies or patterns could be recorded and played.

These melodies or patterns could be built up one note at a time on the sequencer. If PR hit a note he didn't like he could erase it and put in another one.

At the end he had built a very intricate pattern which would have been impossible for him to play.

After listening to it loop around and around he thought it needed to be played just a little faster. With the tempo slide adjustment on the drum machine he could slow the finished pattern down to a crawl or speed it up to a dizzying pace.

All but one of his questions had been answered. He knew what boxes he needed, how much they cost (together about $800) and that he could get them to make the kinds of sounds that would improve his production.

(continued on page 28)

Synthesized Promos

(continued from page 27)

The only question he didn't know was whether or not the station manager would agree to sign the purchase order. He decided to use the "multiple option" approach—suggesting that the equipment could be bought outright or traded out.

Selling the GM

He attempted to strengthen his position by convincing the people at the music store to let him hook up a tape recorder to the system and record some beds that he could use back at the station.

One of the salespeople who specialized in keyboards (seeing the opportunity to make a sale and maybe get some of his own compositions on the air) was more than happy to help PR.

The GM was skeptical at first. He thought it chancy to spend money on equipment that only one person knew how to operate. Weren't radio station racks full of equipment that sat idle because the person who requested them was no longer there?

PR mentioned that people felt the same way about digital delays and reverbs when they first came out. He argued that this gear could help the station obtain a truly unique production sound that would help it be recognized amid the clutter on the dial.

He played the tape of his work, including some of the pieces created by his friend at the music store. The GM had to admit it *did* sound different. He recognized some of the sampled effects as similar to those he had heard on national spots. Surely this stuff must cost a fortune!

Sensing an opening, PR explained that systems could start simply and be expanded on. He had done enough homework to know how much each of the pieces cost.

He knew that to do some of the fancier stuff you needed more expensive boxes. He asked which sounds and effects the GM liked most and then briefly explained the capability of each piece and its cost. For around $2500 you could do some very impressive stuff.

Although the GM was surprised that the cost was below what he had expected, he was still hesitant to approve the purchase. PR knew he was close to closing the deal.

The clincher

In an effort to show his commitment he offered to pay out of his own pocket for the MIDI seminars that were held at local music stores. He also agreed to show other people at the station how to use the new gear.

The GM closed his eyes briefly and thought about the first quarter revenues. The logs were light in the first quarter. If he traded for the gear there would be no problem running the spots.

In fact, establishing a good relationship with the music store might also give the station a source for a few CD players to put on the air and maybe even give away as prizes. There would be no better time than now to do the deal!

PR was ecstatic! After recovering from the rush of joy he quickly complimented the GM for having such great business sense.

The GM took PR out for a "working" lunch and they made plans to approach the local music stores with spec spots that PR would write and produce.

PR did follow through on his promise. The seminars he took helped him to appreciate the power of MIDI. As he continued to learn, his production continued to improve. He found, as many do, that time becomes uncountable when you're working on something that interests you.

Other people at the station became curious about what he was doing and why he seemed to be having so much fun doing it. PR helped them get involved. Some went further than others.

The bottom line was, the excitement that hadn't been in the production studio in years was back. People actually waited around to get into the studio.

It proved the soundness of the one of the more basic management principles: Give the right people the right tools to get the job done and stand back!

If PR's parable has peaked your interest and you'd like more information give me a call or check in with your local music store.

■ ■ ■

Ty Ford, audio production consultant and voice talent can be reached at 301-889-6201 or by MCI mail #347-6635.

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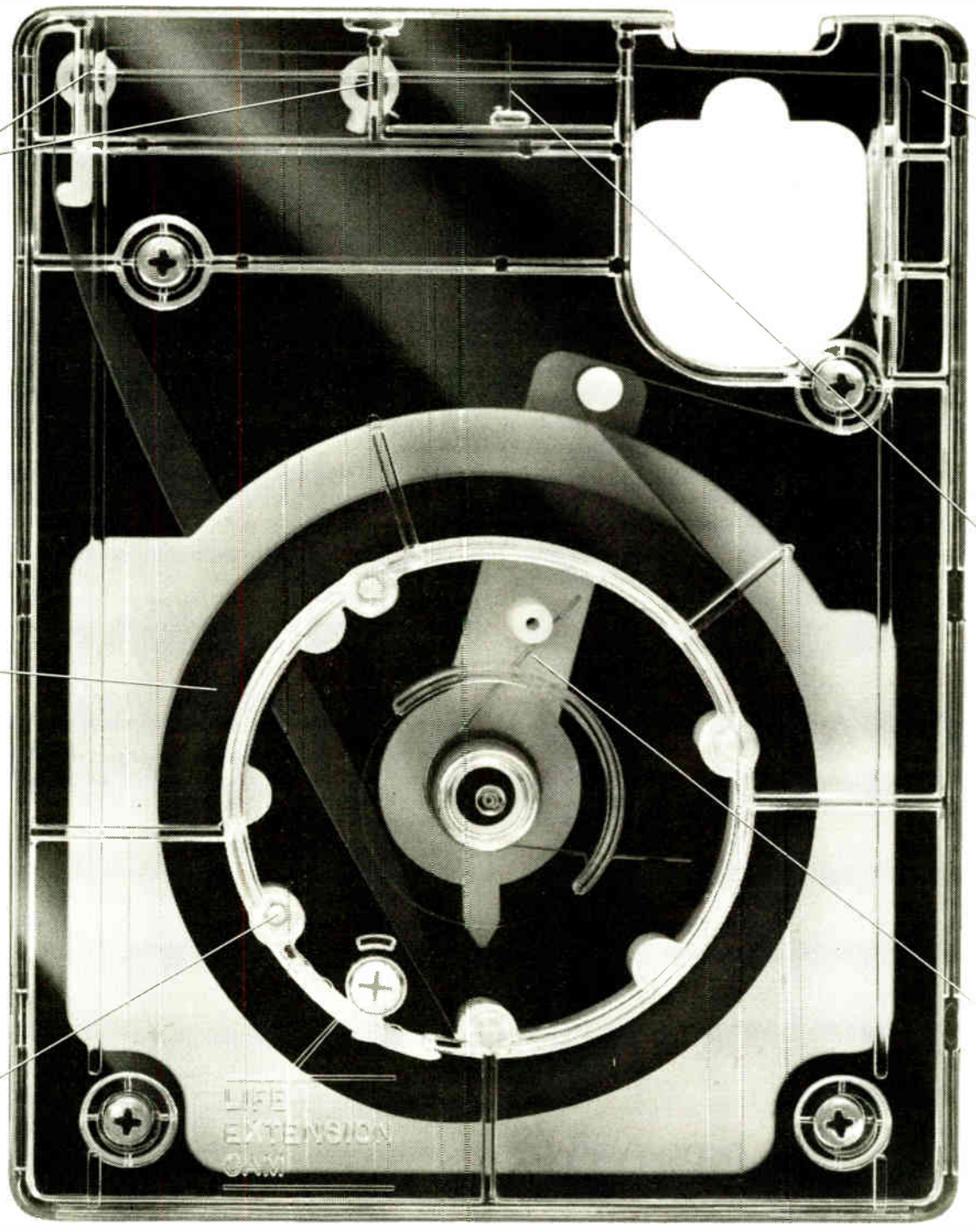

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Circle 52 On Reader Service Card

Treating a Cranky Transmitter

by David P. Hebert

Pasco WA It was a cold, clear night. The full moon hung on the horizon, shining like a huge spotlight in the southern sky. A dog howled and the engineer was contently sleeping in his warm bed dreaming of oscilloscopes and grid-leaks.

CONTRACT ENGINEER

Suddenly, a telephone rang out! The tranquility of dreamland must surrender to those horrible words, "We're off the air!" The reality of this situation has now reared its ugly head.

This story can bring terror into the heart of the most callous among us. Going "hand-to-hand" with a snarling transmitter can produce some rather interesting feelings.

One of the feelings that comes to me at this time relates to questions of whether I have the equipment necessary to deal with the task at hand. What to take? I am weighing my effectiveness in dealing with the situation at hand against the resources I have available to me.

Sometimes, we must improvise the equipment we have to suit needs other than what this equipment is intended to meet. This improvisation is important for several reasons, not the least of which is that we need to troubleshoot with an open mind.

Cranky transmitters just love to baffle us with confusing symptoms, and our best defense is an arsenal of ideas and resources to keep us from being defeated early in the game.

Making do in a pinch

A good universal piece of test equipment can be a frequency counter.

I remember a transmitter that I was trying to resurrect recently that seemed to have a mind of its own. I was able to get this monster to produce power.

Cranky transmitters just love to baffle us with confusing symptoms, and our best defense is an arsenal of ideas and resources to keep us from being defeated early in the game.

All the meter readings were normal, according to my notes, and all seemed well. The only problem is that the signal couldn't be heard in the city.

On top of this a station in the same market complained of interference to their signal. What to do?

I decided that first we should check to see if it was tuned to a harmonic. Secondly, it may not be on frequency. Or, even worse, it might be creating some spurs of its own.

I decided to take the good old counter with me to check these possibilities. After the counter was turned on and warmed up, we turned on the transmitter. All that we got from the counter was random frequencies.

I decided that the counter was locking on spurious frequencies generated by the transmitter and was as confused as I was. As the tuning of the transmitter was adjusted, the counter began to lock on the station frequency.

Thereafter, tuning the transmitter for maximum power consistent with a stable frequency reading gave the most positive results.

We were rewarded with a strong signal in town, happy neighbors and a stable transmitter. Needless to say, the frequency counter was the real hero of the day.

There are times when any amount of test equipment will let you down and you are faced with a solo effort.

Use your brain

There is no denying the fact that the mind is the best test equipment there is and one should take advantage of this resource.

Early in my career, I went against a grounded-grid FM transmitter that had developed a self-oscillation. (We all know this is impossible, don't we?)

The transmitter produced full output when the exciter was turned off and the output frequency could be changed with the tuning of the driver plate circuit.

All components checked as normal and all the help that I could summon seemed unable to produce any ideas as to what should be done.

As a matter of desperation, I decided to replace all the doorknob capacitors in the transmitter. My efforts were greeted with a normally functioning transmitter and a happy GM.

Some other makeshift ideas

Many of the newer transmitters do not measure tube filament voltages in the conventional manner—namely, with a true RMS AC voltmeter.

Manufacturing economies being what they are, it is not uncommon to sample the filament voltages with a rectifier circuit and feed the sample voltage to a DC meter through a calibrating pot. The DC meter is calibrated to a standard in the factory.

This circuit can sometimes help locate a tuning combination in the transmitter that is leading to instability.

For example, I've found that once an RF amplifier begins to generate spurious signals because of poor tuning procedures, the RF bypassing on the sample lines to the rectifier becomes insufficient, and the meter shoots to the end of the scale.

(continued on next page)

DA System Adjustment

(continued from page 22)

shunt and input arms to take care of the 2.5 ohm resistance.

Absolutely no changes are made at the phasor cabinet. Exact computer modeling of the array and phasor verifies this approach.

I have previously pointed out that phase distribution in a DA system is important to pattern and impedance bandwidth as well as for component ratings.

Among the measurements to make at each ATU is the network input voltage to output current phase shift. A vector voltmeter is a handy tool but not always available.

You could use your antenna monitor and a toroid sampler (at very low power) or Equation 1.

This is a variation of the law of cosines and all you need is an RF ammeter. With the network phase shift, load (drive point) impedance and input impedance, usually 50 ohms, you are now well prepared to recalculate the needed values for each network.

Once all the proper values are calculated, each network can be readjusted. Do not turn on the transmitter until every adjustment is made.

Remember, you are dealing with a coupled system and intermediate results may appear discouraging. Programs MMA and WCAP, available from Westberg Consulting were used in the analysis.

■ ■ ■

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.*

Comparators in the Digital Era

(continued from page 15)

recommend you use a 10-turn resistor of about 20 kΩ, as the input imepedance of the chip is rather high.

Should you need finer adjustment, use a smaller 10-turn resistor with enough series resistance to equal about 20 kΩ.

The input to the circuit is derived from a divider or other voltage source providing a voltage approximately half of the chip Vcc.

Putting it to use

Now that we have a voltage swinging either to ground or to Vcc when an event happens, we need to do something with it.

Many modern remote control units have status inputs which can be triggered by a TTL (5 V) input. Simple. Just use the circuit with a 5 V supply and a pullup resistor of about 10 kΩ.

The circuit can easily trigger an LED for an indication. Choose a configuration which offers a low output on detection.

Connect the LED from Vcc to the output with a series resistor of from 470 ohms (5 V supply) to 1800 ohms (15 V supply). As the entire chip draws only a few milliamperes, power can be "swiped" from any handy source.

Often, it is desired to "capture" a fleeting event and "stretch" it to a couple of seconds or so. This is easily done with the simple circuit in Figure 2.

Here, an NE555 timer is used as a one-shot, giving an output pulse of approximately one second in length.

The output is from Vcc to ground and can be used to light an LED or trigger logic as in the direct circuit. Drive this with one of the Vcc to ground configurations.

. . . few things in the broadcasting world are willing to stand still long enough for the digital gadgets to give a meaningful reading. Life, it seems, is dynamic.

With the addition of one transistor the same 555 timer can be used to detect recurring events, such as our tower beacon. Use the circuit in Figure 3, driven by one of the ground to Vcc configurations.

Remove the 10 K resistor at the 555 input. The 555 output goes low when it goes three seconds or more without retriggering. Again, it can be used to drive an LED, digital latch or other logic circuit.

This circuit is so inexpensive, and heck, you get four to a chip, I'm sure other applications will suggest themselves.

The IC is made by many manufacturers, and is often available for under a dollar. The only restrictions are to stay within the ratings, and all four comparators must, by design, work within the same Vcc.

On the subject of digital metering and dial-up remote controls, ours gives a large selection of synthesized words including "fire," and "fire (excited)."

If my remote control tells me something about fire, it had better be excited!

■ ■ ■

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

Transmitter Tweaking

(continued from previous page)

Now this meter is telling you of a great social injustice and you must use this resource to help tune the transmitter.

Our sleepy-head friend can be well-served with a variety of helpful tools among those he already owns, if he chooses to use them.

Perhaps the most important goal at such a time is to get back to bed. With this result in mind, we must take advantage of whatever help we can get.

■ ■ ■

Dave Hebert is president of Dave Hebert & Associates. He is an occasional contributor to **RW** *and can be reached at 509-545-9672.*

New IC Cuts AM Noise

One of AM's biggest problems has been noise—from manmade and natural sources. A new receiver IC presented in a paper at last year's NAB Engineering Conference promises to remedy the problem. These two reports each take a look at the potential and the workings of the new chip.

The Secret of Noise Blanking

by Jon Grosjean

Woodstock CT As most of us know, one of the main problems with AM radio today is the extremely high levels of man-made noise present in all but the most rural of locations.

This includes ignition noise in vehicles, lamp dimmers in homes, power line corona leakage, thermostats in stoves and electric heaters and static discharge from moving vehicles.

In shortwave receivers, this would also include over-the-horizon radars of which Russian Woodpecker is the most famous.

Now, a new IC can be added to almost any AM radio and will almost completely eliminate these kinds of noise. (Unfortunately, lightning noise is not included, because the duration of the discharge is too long.)

In fact, the listener will probably not be aware that the noise is present unless the noise blanker is switched off.

How it works

Any time an impulse is applied to a tuned circuit, it excites it and causes it to oscillate. The length of time the oscillation will last depends on the bandwidth of the circuit.

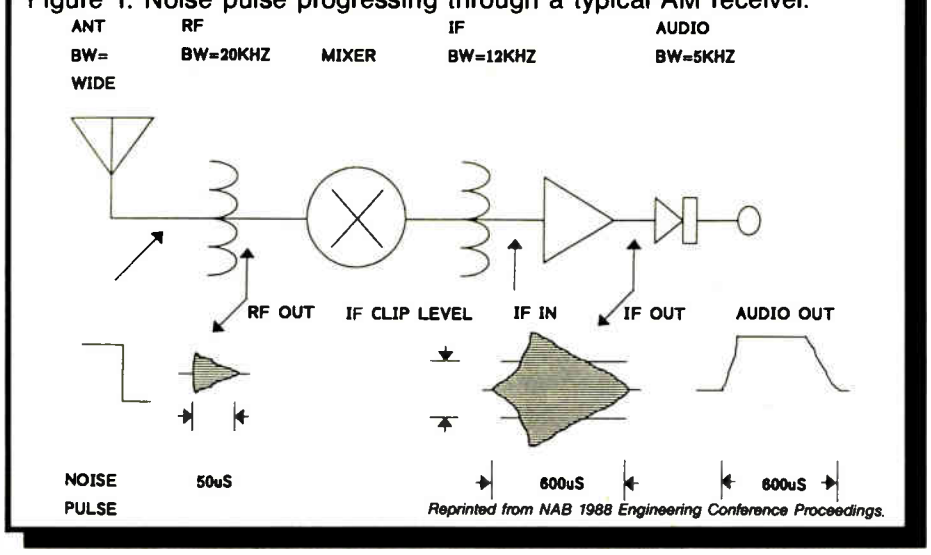
Narrow bandwidth circuits will produce long oscillation times and the converse is also true.

Usually the impulse is so much longer than the AM radio signal which is being received that the oscillation produced by the impulse is much larger than the desired signal.

As this noise passes through the RF section it grows somewhat in length and since the IF portion of most AM radios has a much narrower bandwidth than the RF section, the noise-produced oscillation is much longer at the output of the IF filter.

(continued on next page)

Figure 1. Noise pulse progressing through a typical AM receiver.



Sprague Chip Targets Autos

by Neil Lewbel

Stratford CT Sprague Electric has developed a low cost, high performance noise blanker designed to significantly reduce impulse noise, which is caused by sparks, SCRs and some types of meteorological static discharges.

Previous methods of suppressing impulse noise have included clipping, gating and some forms of blanking.

Clipping of impulses that are larger than the existing modulation is common and easy to implement. However, clipping only reduces the noise level rather than eliminating it.

Another approach is gating the signal off at the antenna. One earlier blanking method sensed the signal in the IF amplifier and blanked the audio output, resulting in long blanking times and poor performance at higher audio frequencies.

The concept of noise blanking is not new. In fact parts of this chip's circuit are based on the Lamb blanking technique, which was first described in an article by James J. Lamb titled "A Noise Silencing IF for Superhet Receivers" which appeared in the February 1936 issue of *QST*.

This new chip detects impulse noise in the receiver's RF input section. It then shuts down the output of the mixer for a brief time, thereby preventing the unwanted noise from moving through the radio and being processed, amplified and heard by the listener.

However, this blanking leaves a space (or hole) in the signal (or carrier) as it moves through the receiver circuitry and this will degrade the audio.

Fixing a hole

To eliminate the problem, the chip uses delay, blanking and audio gates to fill in the space in the audio signal.

This blanker chip has enough selectivity to not be influenced by signals outside the band of interest, such as nearby AM transmitters.

Two versions of this chip will be offered. The first version, for AM tuners, is designated ULN-3846A. A version for AM stereo is designated ULN3845A.

The theoretical basis and functioning of the new chip was described in a brief paper by Oliver Richards of Sprague Electric Company. The paper, titled "A Low-Cost, High Performance AM Noise Blanker" was given at the 1988 NAB convention.

To demonstrate the effectiveness of this chip, Richards made a tape of a stereo AM station near his home, both with and without the blanker chip. For an interference source he used a light dimmer in his house. This exercise demonstrated the need for an effective way to decrease RFI.

Targeting autos

Richards pointed out that the chip is aimed primarily at the automotive radio market for several reasons.

First, auto radios are usually more expensive than home receivers and this may reduce the pressure to cut costs in manufacturing.

Also many field complaints about auto radios are related to noise and interference.

Other possible applications for this chip include shortwave radios, citizens band and mobile communications equipment.

Asked about developing a product for the AM market, when most firms are concentrating on FM, Richards pointed out that despite a decline in AM listening, most radios—especially in cars—still include AM.

"This means there is still a responsibility to get the product to the listeners," said Richards. He added that the project to develop a noise blanking circuit was started as a result of a customer request.

■ ■ ■

For more information about the noise blanker chips contact Oliver Richards, Analog Applications Manager, Sprague Electric Company, Box 2036, Worcester, MA 01613-2036, or phone at 617-853 5000.

Neil Lewbel often writes about radio and has worked in the broadcast and data communications fields. He may be reached at 203-377-8517.

Blanking

(continued from previous page)

This long duration IF signal is then detected by the detector and comes out of the audio amplifier as a long pulse and is perceived to be loud.

Therefore, if the audio signal is blanked by a noise blanker, it must be blanked for a long time, and a lot of the desired audio signal is lost.

At frequencies over about 400 Hz, so much is lost that the blanked signal is almost as bad as no blanking at all.

Blanking before IF

If, instead, the noise pulse is blanked before it reaches the IF filter it is still short and the resulting audio noise is much less objectionable.

The ULN3845 and ULN3846 AM noise blankers operate by blanking RF noise impulses at the output of the mixer before the IF filter of the AM receiver.

They also contain additional sample-and-hold audio gates to remove remaining residual audio noise caused by removing the received carrier during the blanking time. The ULN3845 has two audio gates for AM stereo applications and the ULN3846 has one.

Otherwise, they are identical. They can operate independently of the rest of the radio, because they contain a high gain RF amplifier which is flat up to 10 MHz with its own AGC system.

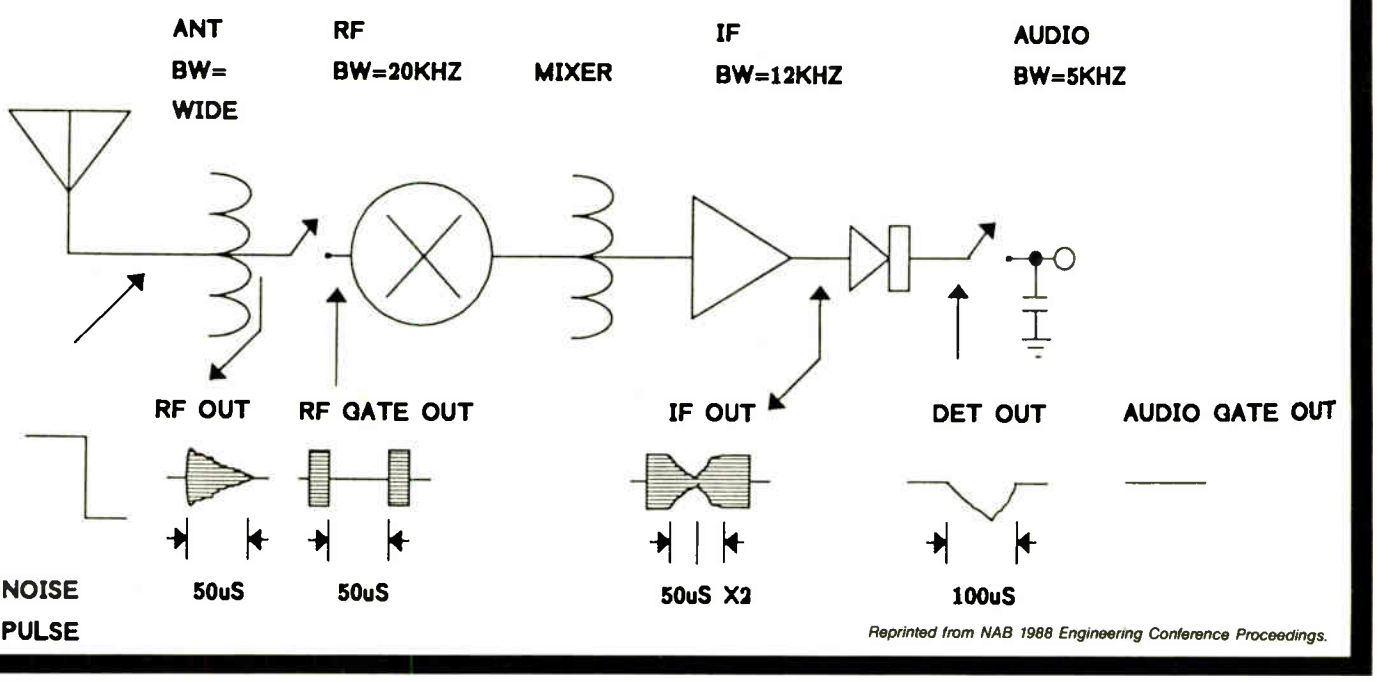
The input impedance of the RF amplifier is relatively high, so it can usually be connected to the output of the receiver RF amplifier or input of the mixer without changing any of the components in the receiver.

They also contain a full-wave detector, noise separator, shunt JFET RF gate, timing multivibrators for the RF and audio gates, and CMOS sample-and-hold audio gates.

More features

The input impedance of the audio gates is 100 kilohm and the output impedance is 1 kilohm, so they can also be connected in the receiver without changing any other components.

Figure 2. Lamb blanker with improvements.



Reprinted from NAB 1988 Engineering Conference Proceedings.

The ULN3845 IC for AM stereo requires only 13 external components. Some of these such as the audio coupling capacitors may not be needed if the DC output of the receiver IC is close to that of the audio gates.

If you ever get a chance to listen to these ICs in operation, don't miss it.

It is possible to set up the noise coming into the radio with the blanker turned off so that it is not possible to understand the audio signal.

When the blanker is turned on, the audio sounds almost normal. The blanker is not restricted to noise with low repetition rates either.

It works with 60 or 120 Hz noise and will even blank a 1 V, 1 kHz square wave applied to the antenna input.

■ ■ ■

Jon Grosjean is a consulting engineer and can be reached at 203-974-2035.

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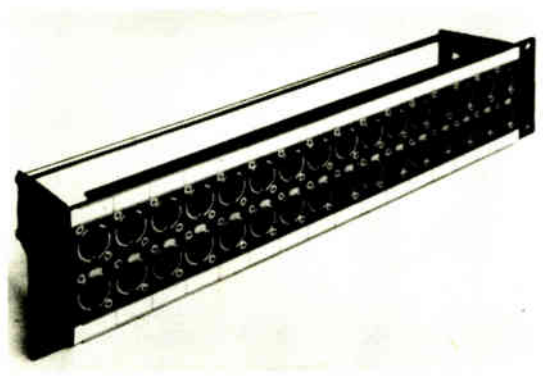
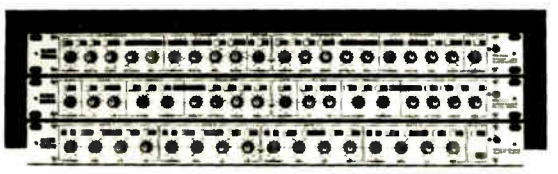


Patch bay system

Connectronics Corp. recently introduced the "J" Bay and "X" Bay systems of patch bays, providing for flexibility of connectors. The "KV" (kit version) format allows for a wide variety of hardware and connectors including MIDI, RCA and XLR.

For information, contact **Richard Chilvers at Connectronics: 203-324-2537**, or circle **Reader Service 47.**

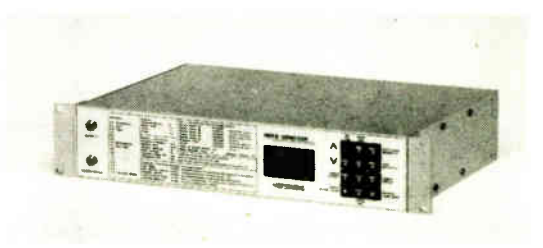


Signal processors

Klark-Teknik has introduced new dynamic signal processing gear. The new line includes the DN500 Dual Compressor/Expander/Limiter; the DN510 Advanced Dual Noisegate; and the DN514 Quad Auto Gate.

The compressor specs show distortion less than .05 percent, 20 Hz to 20 kHz. The noise gate has noise figures of −104 dBm, 20 Hz to 20 kHz maximum attenuation. The quad auto gate includes a sync fucntion which synchronizes parts by interlocking all four gate release times.

For information, contact **Jack Kelly at Klark-Teknik: 516-249-3660**, or circle **Reader Service 53.**

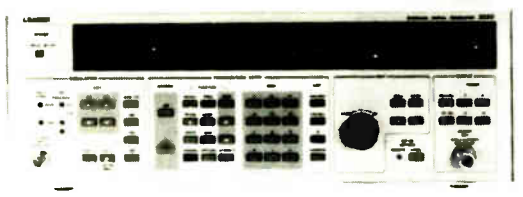


Routing switcher

"News Director," a microprocessor controlled 16×2 program audio and monitor routing switcher has been introduced by Sine Systems. The unit was designed to be the central control device for a radio news workstation.

The Sine Systems switcher contains analog CMOS switches for its audio routing duties. Built into the device are speaker and headphone amplifiers, a clock, a manual event timer and various audible alarm timers, among other features.

For information on the "News Director," contact **Bill Shute at Broadcasters General Store: 904-622-9058**, or circle **Reader Service 61.**

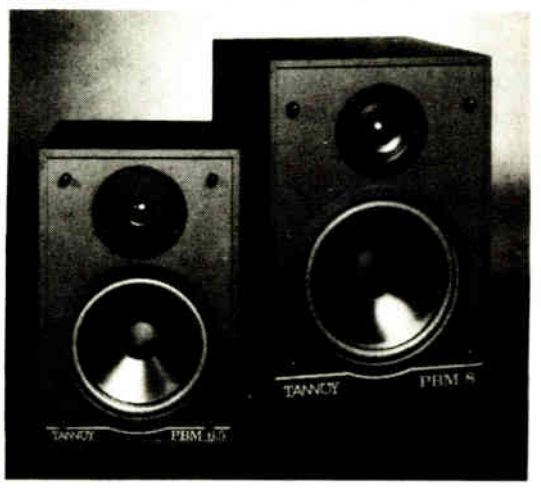


Synthesized signal generator

Leader Instruments new Model 3220 AM/FM synthesized RF signal generator has a frequency range from 100 kHz to 1.3 GHz with ±1 ppm accuracy, and a resolution of 10 Hz below 650 MHz and 20 Hz to 1.3 GHz.

RF output units are selectable between dBu or dBm with a range of +13 to −133 dBm and 0.1 dB resolution.

For information, contact **Joseph Fisher at Leader: 516-231-6900**, or circle **Reader Service 54.**



Playback monitors

Tannoy's PBM 6.5 and PBM 8 studio monitors can be used in mixdown, for dubbing or in the editing suite.

For information, contact **Bill Calma at Tannoy: 519-745-1158**, or circle **Reader Service 55.**

Capacitor analyzer

Sencore Electronics has introduced the LC102 Auto "Z-Meter"™. The unit measures capacitors for value from 1.0 pF to 20 Farads. The LC102 is fully automated.

For information, contact **Sunshine Snyder at Sencore: 605-339-0100**, or circle **Reader Service 48.**

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ST's Test Set Put To Work

by Dennis J. Martin, CE
KOLA-FM/KMET-AM

Los Angeles CA Sound Technology unveiled its most impressive array of audio measurement hardware and software to date at the recent AES convention in Los Angeles. Shown were the 3100B programmable audio generator and its companion, the 3200B programmable transmission/audio analyzer.

Together they form a comprehensive microprocessor-based audio test system that permits fully automated tests *with* or *without* an external computer.

Designed to exceed test equipment requirements in the 16-bit digital era, these units are unique in offering three distinct modes of operation: manual front panel control for design or troubleshooting; built-in automation for quick equipment proofs; and complete computerized tests using external menu-driven software.

USER REPORT

Manual or auto measuring

This unified system will manually or automatically measure operating level, frequency response, total harmonic distortion (THD) vs. level or frequency, SMPTE intermodulation distortion (IMD), SNR, quantizing noise, channel separation and phase error between channels. The newest analyzer feature adds sensitive wow and flutter measurements.

Front panel switches, LEDs and digital readouts on each unit allow usage as standalone units. When separated at remote sites, the generator sends FSK signals over the audio channel being tested to configure the analyzer for each test.

And by using the rear panel RS-232 ports—or optional IEEE-488 interfaces—either or both units can be completely controlled and interrogated by a compatible terminal or PC. No other known test instruments on the market today offer this multi-function versatility.

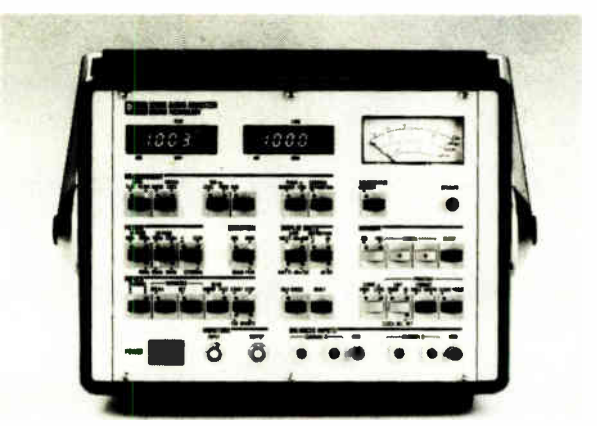
Making waves

The 3100B generator, like its 3100A predecessor, uses digitally controlled analog oscillators to produce sine- and square-wave signals in addition to SMPTE intermodulation, tone burst and sine/step waveforms.

Sine waves range from 1 Hz to 102.39 kHz, with incredibly low 0.0008% distortion, and square waves from 1 Hz to 50 kHz, with a rise time of less than 1 μs. Internal crystals insure that frequency accuracy is within 0.03% for fixed frequency and selected frequency sweeps.

The sine/step waveform is a sine wave burst immediately followed by a DC level step. This type of signal displays audio filter overshoot caused primarily by time delay distortion (non-linear phase response).

The generator will now store 91 different front panel setups. Whether testing in a manual or automatic mode, recalling a panel setup speeds the procedure and insures repeatable test conditions.



The 3200B Audio Generator from Sound Technology.

Automated testing

For automated tests, users can specify either an "instrument selected" logarithmic frequency sweep—with a resolution of four to 255 points per decade—or the new user-defined frequency sweep. Up to 200 discrete frequencies can be stored in the user-defined mode.

To simplify automated sequences at different levels, the 3100B generator now accepts level offsets. Regardless of how the tests are stored in memory, an offset from +20.00 to −90.00 dB can be entered in 0.05 dB increments.

Conducting, for instance, spot frequency and distortion sweeps at three

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Test Gear Slow To Automate

by Richard Farrell

Falls Church VA A number of factors, highest among them cost and portability, have prompted many stations to continue using manual test sets in the face of what seems a growing need for the kind of testing which some of today's automated equipment may be able to provide.

"It is like the author who has to write a big article and finds it so much easier to go back to the old typewriter he knows as opposed to the word processor he does not," offers Wayne Jones, president of Amber Electro Design—manufacturer of AudioCheck software, which drives the company's automation equipment using any IBM PC XT/AT or compatible.

Jones has provided an apt analogy. Strangely enough, in this era where a mouse is no longer a creature scurrying across the kitchen floor, fear of—or at least a strong apprehension about—computers is one of the reasons for resistance to automation put forth by manufacturers.

"A spectrum of users out there are not comfortable with computers and feel it is simpler to flip on a manual instrument," says Robert Metzler, president of Audio Precision, makers of the System One automated test system.

More pertinent reasons

More likely reasons for stations hanging on to their old gear are based on practicality and the economic choices a station's GM must make.

"Management or somebody at the station or group level has to say 'we are concerned about audio quality.' If they are not concerned about audio quality, there is no way they can be sold an automated test system on the concept of speed or bit checking or anything else," says Kent McGuire, director of marketing for Sound Technology, manufacturers of the 3000 Series Programmable Audio Test System.

McGuire cautions that manufacturers must be practical and must ask themselves "what is going to get the job done? What does the CE *really* need to concern himself with?" McGuire says companies must produce "automation that is usable at a station level and is not overwhelming to the technical people.

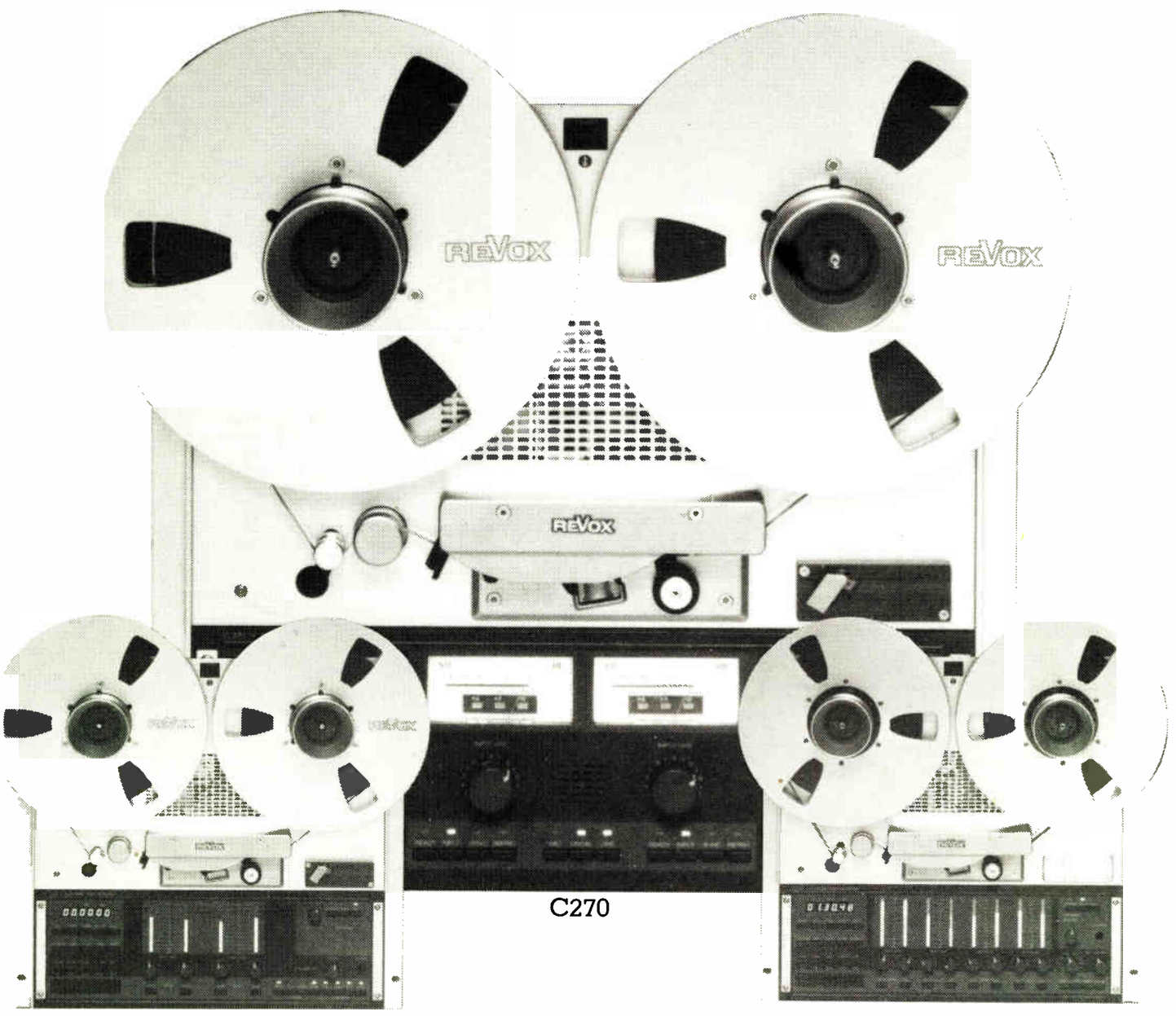
"You can go through six stations in a tightly competitive market and they may very well regard automated testing as

(continued on page 45)

BUYERS GUIDE INDEX

BATTERIES NOT INCLUDED*

But, almost everything else is.* The new Revox Series 270 is loaded with professional features you will not find on comparable machines at this price point. Many 270 standard features are available only as options on many other machines. Pro transport functions, pro audio quality, pro construction . . . That's value!



C270

C274

C278

- Dolby HX Pro® Headroom Extension
- Seamless and gapless punch-in, punch-out
- Integral scrape-flutter filter in head assembly
- Constant tape tension on both spooling motors
- One-hand cueing under full servo control
- Fully modular audio electronics
- Front access to all audio electronics
- Built-in variable speed
- Selectable library rewind and record inhibit
- Optical End-of-Tape Sensor
- 1-year parts and labor warranty

*We're only kidding . . . back up batteries are a part of the real time clock in case of loss of AC power.

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ALLIED Broadcast Equipment

NAB Test CD Offers 99 Tracks

by Chip Fetrow, CE
WAVA-FM

Washington DC Months ago, when I first learned that the NAB was going to produce a CD to be used in place of test generators, I was skeptical at best. But after reviewing the disc, I suspect everyone can find something on it useful enough to justify its $40 price tag for NAB members ($84.50 for non-members).

The disc begins with announcement tracks containing channel identification and phasing reminiscent of the CBS Labs test records. From there it has basic CD player performance checks. If you use CDs (and who doesn't these days?) this disc is useful for basic CD player testing.

Worth the purchase

I realize that many smaller stations have cut back so much in engineering that there may be no test equipment. In this case the NAB disc and a quality CD player is certainly a reasonable alternative to nothing.

A good quality CD player is necessary, otherwise the test signals will be inaccurate. The ideal player will have D/A converters and digital filters with oversampling.

There are uses for this disc that cannot be duplicated in any but the best equipped radio station engineering shops and a quality CD player is necessary to run these tests. Otherwise, your test signals will be inaccurate.

This is especially true for phase and frequency response. An ideal player would have dual D-to-A converters and digital filters with oversampling.

The first tests are frequency response/harmonic distortion tests, followed by SMPTE & CCIR IMD test signals. It would seem, however, that stations having the ability to measure THD and IMD must have the ability to generate the tones.

You will find precision audio phase test signals next. This set of tests has the right channel leading the left in 10° increments to +180°. The same applies to the left leading the right. These could be used to check the calibration of your phase meter.

A series of various test signals follow: white, pink, USASI, CCIR and SPN (Synthesis Program Noise, which simulates processed audio) and partial, unclipped SPN.

NRSC test signals

The NRSC test signals, which follow, were the original reason for this disc. The NRSC had suggested that a CD would be the ideal method for distributing special noise test signals to stations, realizing that many AM stations are not in a position to buy expensive test equipment.

USER REPORT

The first NRSC test signal is 200 Hz at 0 dB (maximum CD output level). The second is 9.50 kHz at 0 dB. The last is NRSC (pulsed USASI) noise at a peak level of 0 dB, stereo 1.4 to L+R to L–R ratio. If you are AM stereo, or even mono—and hopefully your station is NRSC—these test signals alone justify buying this disc.

The next test tones are preemphasis/deemphasis curve sweeps. There are curves for NRSC (AM), 50 μ, 75 μ and 150 μ pre- and deemphasis.

Next are pilot and TV sweep frequencies. 19 kHz for FM, 17.73426 kHz for TV stereo and horizontal sweep and 15.625 kHz for PAL and SECAM horizontal sweep frequency.

The automation transfer tone is next at 25 Hz for 15 seconds. In my experience, however, most automated stations generally have several encoders and decoders and may not find this signal critical.

Next are two tones, 50 Hz and 15 kHz with the zero crossings aligned. If the zero crossings do not occur together then there is a phase linearity problem—something I saw with several of the older CD players I tested.

I think this test should have been included with the basic CD player performance checks. Most tape machines will have problems with this test, too, but less so when new tape formulations are used that need less high frequency boost during recording.

Frequency sweeps

Next come frequency sweeps. Both L+R and L–R are provided from 20 Hz to 20 kHz. Like any test that requires both channels, a very good CD player will be needed for these test signals to be reproduced properly.

The indexed level sweep's level, at 400 Hz, is reduced from 0 dB to –60 dB in 5 dB steps. The guide states that this test can be used for precisely calibrating level indicating devices. I might check my audio analyzer, but I do not have a VU meter in the plant with a linearity adjustment.

Square wave and flutter

Square wave tests are also on the disc, but anyone critical of the standards chosen for the CD, as I am, will realize that even if square wave data is on the disc the reconstruction filters will obliterate them. The disc's guide warns of this problem.

The NAB tells me that these square waves are included more for educational purposes than as useable test tones.

Flutter tests also fall into the "why was this included" category. You certainly are not going to test the flutter of a CD player and if you are going to test a tape machine you need precision test tape.

DTMF tones are also included, with a warning that they should not be used on the air. Other than that they run for 30 seconds—as opposed to 25—I cannot see why they should not be used on the air. The tones from this disc and a CD player should be as good as those generated by most encoders.

Additionally, the closed loop test function of most EBS systems will not tell you if it is the encoder or decoder that is bad (hint: it's the decoder).

This test signal will verify the decoder operation, and then you can use the decoder to check the encoder. Again, a frequency counter is a useful piece of test equipment if you have one.

THD calibration and bursts

THD analyzer calibration tones are next. A signal of 400 Hz is mixed with 800 Hz at 0.1%, 0.3% and 3% distortion levels. This is a great test of your audio analyzer.

The next useful tones are used to test and calibrate PPM and VU meters. A test

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Delta Monitors Splatter in AM

by Marty Sacks, CE
WGAY/WRC

Washington DC Over the last several years, a number of pieces of test gear specifically designed for use by radio engineers have been brought to market. The Delta SM-1 splatter monitor is such a device.

Splatter—the existence of undesired sidebands with the presence of modulation—interferes with the reception of stations adjacent to the station generating the excess splatter. Further, it raises the noise level in the AM band and wastes energy.

USER REPORT

Splatter can be caused by excessive preemphasis and/or clipping of the audio applied to the transmitter. Other causes might be overmodulation, transmitter or antenna problems.

NRSC 1 and 2

As most of us know by now, the National Radio Systems Committee (NRSC) has established a suggested transmission standard for AM radio stations with respect to audio bandwidth and preemphasis characteristics.

To make a long story short, this standard has been suggested to encourage receiver manufacturers to build radios with wider bandwidths since the standard theoretically reduces second-adjacent channel interference.

To date over 800 stations have converted to the NRSC-1 standard.

Now the NRSC has released an RF mask, appropriately called NRSC-2. This standard specifies the minimum permissible attenuation of sideband energy versus frequency offset from carrier and should be attainable by a station in compliance with NRSC-1, assuming its transmitter and antenna are operating properly.

To operate the SM-1, one dials in the station frequency, adjusts the carrier reference level and is then ready to take measurements.

Realizing that it would be difficult for many AM engineers to confirm compliance with NRSC-2 without an RF spectrum analyzer, Delta has introduced the SM-1 splatter monitor.

The Delta splatter monitor is a basic spectrum occupancy analyzer that is easy to operate and can be used to observe sideband emissions which fall between 11 and 100 kHz away from the carrier.

Setup of the splatter monitor is easy. RF is applied to the unit from either an optional active antenna—for use away from the transmitter—or an RF feed from the point that normally feeds the station modulation monitor.

At WRC we used a toroidal current transformer mounted at the phasor common point. The SM-1 is equipped with a switchable attenuator to handle RF voltages from one to 20 V—a handy feature that should be duplicated by modulation monitor manufacturers.

To operate the SM-1, one dials in the station frequency, adjusts the carrier reference level and is then ready to take measurements.

Since the splatter monitor is equipped with dual synchronous detectors, there is a choice of measuring the in-phase conventionally generated splatter or the quadrature splatter due to incidental phase modulation of the transmitter. This feature is useful in properly adjusting the neutralization of a transmitter.

The Delta SM-1 Splatter Monitor can help confirm NRSC compliance.

More detailed analysis can be obtained with the SM-1's offset mode.

Offset mode

This function allows the user to specify the frequency offset from the carrier (plus and minus) where the check is to be made, select the bandwidth of the measurement: 0.5 kHz, 3.0 kHz or NRSC deemphasized, and select one of two measurement ranges, 0 to −40 dB or −40 to −85 dB.

Any offset frequency from 11-99 kHz in one kHz steps can be chosen by a front panel thumbwheel switch. To test for compliance with the NRSC-2 "mask" one selects the NRSC position on the offset bandwidth switch.

In the 0.5 kHz position, the SM-1 responds like an RF spectrum analyzer. The 3.0 kHz selection will yield measurements that mimic a typical narrowband AM radio.

The unit was a breeze to use. We managed to check two transmitters from start to finish in less than an hour. The SM-1 is also equipped with a 12 V power option for mobile use.

Delta also includes little extras that make things go smoothly such as a front panel speaker, a headphone jack, outputs for feeding a remote control and an alarm (with the contacts brought out for remote control uses) that can be used to warn of significant changes in splatter level.

There is also a provision for feeding external audio into the SM-1 to test NRSC compliance of an audio processor. The only thing missing from the unit that might be desirable would be a peak-hold function on the meter.

All in all, the Delta SM-1 will allow stations that are serious about NRSC to confirm compliance with a minimum of hassle and cost.

■ ■ ■

Editor's note: Marty Sacks has been CE at WGAY/WRC since 1985 and was previously a staff engineer at WPGC-FM. He may be reached at 703-587-4900.

For more information on Delta's SM-1 splatter monitor, contact John Bisset at Delta: 703-354-3350.

Holaday Solves RF Riddle at WBJW

by Don Anglin, CE
WBJW-AM/FM

Orlando FL When the Environmental Policy Act was enacted by Congress, one of the issues which concerned the FCC was human exposure to RF radiation.

The FCC then adopted ANSI guidelines for determining the threshold where potentially harmful RF radiation is present.

These limits for FM, AM and TV stations are contained in the Office of Scientific Technology Bulletin No. 65, along with methods for calculating and predicting RF radiation levels around antennas.

Compliance with the FCC's environmental rules is generally done by self-certification, which means that each station must determine that there is no harmful radiation in any area accessible to the general public and that its maintenance procedures protect station personnel who work in areas where high RF levels exist.

USER REPORT

Holaday's HI-3002 broadband exposure meter, with hand-held probe attachments is lightweight and battery operated.

AM harder to measure

For FM and TV stations checking for compliance is fairly simple, using the formulas in the OST Bulletin 65. But for AM stations the calculations are much more complicated because of being on the "near-field" area of the antenna system.

Because of these more complex calculations, the bulletin's Appendix D contains a table predicting radiation levels at various distances from the AM antenna.

At WBJW, our predicted "safe" distance was five meters—well outside the chain-link fences surrounding each of our five towers. One obvious solution was to enlarge the fenced area around each tower, which would require considerable expense.

Another possible solution was to actually measure the field around each tower. In taking this route we held the hope of finding the existing fences to be adequate and we would also come to know the actual distance from each tower wherein the ANSI guideline might have been exceeded.

We decided to make the measurements, and chose the Holaday Industries isotropic broadband field strength meter Model HI-3002.

This instrument is lightweight, battery-operated and easy to use. The manual contains useful information on the proper procedure for taking radiation measurements.

The HI-3002 with attached Data Logger (left)

The Holaday meter measures both the E-field in volts squared per square meter (V^2/m^2) and the H-field in amps squared per square meter (A^2/m^2). You then convert to volts/meter or amps/meter for comparison with the ANSI guidelines.

We made measurements around the perimeter of the fences at each of our towers, and on eight radials out to about 200′ in the E-field. The H-field was too small to measure beyond about 30′.

We found that the E-field readings were affected by re-radiation from metal objects (guy wires, guy anchors and transmission lines).

Test results in

We then plotted the data on log/log field intensity paper and the data for each tower on polar graph paper. Near-field correlation of the E- and H-fields was closer than the literature had led me to expect.

The good news: the radiation at all points outside the fence perimeters was below the ANSI guideline. We did not have to rebuild the fences and I was able to certify WBJW's compliance with the FCC's environmental rules.

We have developed adequate safety measures for our engineers and saved the cost of enlarging the fences, which has made the price of the Holaday meter a small one to pay indeed.

■ ■ ■

Editor's note: Don Anglin is an SBE-certified Broadcast Engineer and former chairman of the Orlando chapter of the SBE. He is also the SBE Frequency Coordinator for Central Florida. He may be reached at: 407-629-5105.

For more information on Holaday's field strength meter, contact Burton Gran at Holaday: 612-934-4920.

McMartin Resurrected in Iowa

by Clifford W. Koch, Corp Eng
Great Empire Broadcasting, Inc.

Wichita KS A news flash: Repairs and service for McMartin modulation monitors are still available.

We at Great Empire Stations still use McMartin's FM modulation monitors. We have models TBM 4500A, TBM 2200 stereo modulation monitors and TBM 2000A and TBM 2000B SCA monitors.

Your station, too, may have some of this equipment and since at the very least recalibration and regular check-ups are necessary, you may be in need of assistance but are unable to find factory service due to the closing of McMartin Industries, Inc. in Omaha NE.

McMartin Incorporated, located in Coucil Bluffs, Iowa, is a new company (not affiliated with the previous McMartin Industries) that has legally obtained the rights to employ the name of McMartin as well as the rights to manufacture the same product line and provide parts and service for that line.

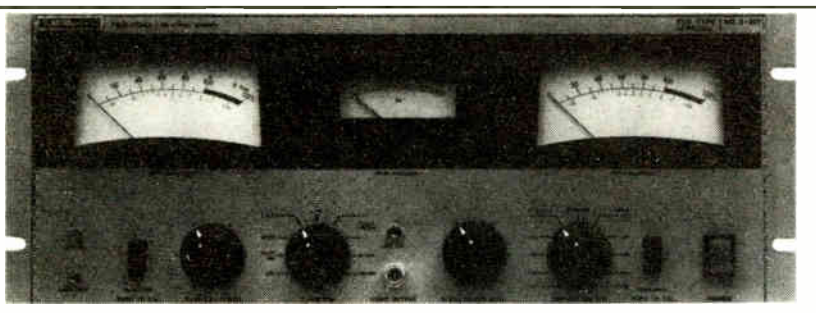
USER REPORT

Great Empire Stations have in service 15 McMartin modulation monitors for our FM and SCA facilities and nine McMartin consoles. Some of this equipment is 20 years old and is still trouble free, except for normal wear and tear and recalibration of the monitors.

A company's demise

I have, over the years, witnessed the fall of a great company—McMartin Industries—due to financial problems. In the process I observed a manufacturing plant dwindle to three employees, with the plant's air conditioning shut down to conserve costs and delay foreclosure.

Many of the employees during the decline worked every other week without pay, so employee loyalty was never a problem. But foreclosure inevitably arrived.



McMartin's 2200A FM Stereo Monitor is still available.

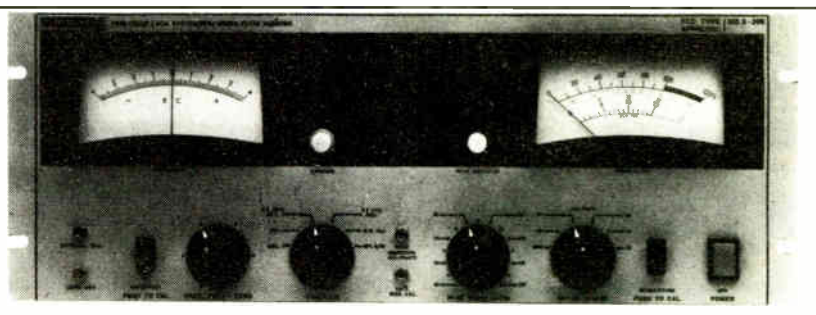
I was worried, as were other broadcasters, about where we would obtain the parts and service necessary for our operations. But four former employees came to our rescue and we therefore owe a big "thank you" to Bill Abbot, Charlie Goodrich, Dick Dennis and Stanley Martinkus for continuing service after the company closed.

The new roster

A gentleman named Jerry Martin formed McMartin Incorporated and Mr. Martin proceeded to set up plant operations in Council Bluffs, Iowa (street address, 201 35th Avenue, Council Bluffs, 51501) and become company president.

Charlie Goodrich is now McMartin Inc.'s vice president and heads up engineering; Bill Abbot represents field service and parts; Stanley Martinkus is the company's technical specialist and Joe Krior its sales manager and manufacturing coordinator.

This new company has thus far repaired and recalibrated three sets of Great Empire Stations monitors and the service has been excellent.



The McMartin TBM-2000B SCA Frequency/Modulation Monitor

Another tip you may want to investigate might be that McMartin Inc. is still producing its microphone preamp model LX-10D at a price of $70. This preamp has transformer input and output and requires a small 24 V power supply.

With a slight modification it makes an excellent utility amplifier with bridging input and balanced 600 ohm output. I now have 30 of these amplifiers in use, with excellent results. So, to reiterate for emphasis: McMartin, in its resurrected version, is alive and well.

■ ■ ■

Editor's note: Cliff Koch has spent 20 years as Corporate Engineer at Great Empire Broadcasting, which is comprised of stations KFDI-AM/FM; KTTS-AM/FM; WOW-AM/FM; and KWKH-AM/FM. Koch is a member of the SBE, has a Professional Certification and is a former field service engineer for Collins Radio Company in Dallas. He may be reached at: 316-838-9141.

For more information on McMartin equipment and service, contact Joe Krior at McMartin: 712-366-1300.

Onkyo Tuner Boasts Improved Reception

Mark Humphrey, Asst GM/CE
WRTI-FM

Philadelphia PA As the audio quality of FM transmitting equipment continues to improve, many broadcasters have discovered that their old modulation monitors are inadequate for critical listening.

Since the FCC has eliminated the requirement for a type approved monitor, several products have been introduced to add a peak modulation monitor indicator to a "consumer-type" FM tuner.

The new Onkyo T-9090 II has a number of unique features which are especially suitable for FM broadcasters who need a high quality tuner to monitor their signals or those of the competition.

Onkyo has included an improved version of its Automatic Precision Reception (APR) system in this tuner, which selects the optimum settings for IF bandwidth, high frequency blending, RF gain and mono/stereo mode as each station is tuned in. The tuner features two antenna inputs, also controlled by the APR system.

You can connect a directional antenna, aimed at your transmitter, to antenna input "A," and a non-directional or rotor-mounted antenna to input "B."

The tuner will automatically select the input which provides the cleanest signal —a handy feature when comparing your signal with the others in town.

Three IF bandwidths (wide, narrow and super-narrow) are provided. Of course, the wide bandwidth is intended for strong local signals and offers THD

(continued on next page)

WRTI Gives Onkyo High Marks

(continued from previous page)
as low as 0.02% in stereo, and SNR of 85 dB according to the manufacturer. For reception of distant signals, the super-narrow bandwidth can work wonders.

Onkyo claims an adjacent channel selectivity of 45 dB, improving to 80 dB at ±300 kHz in this mode. The T-9090 II tunes in 25 kHz increments, making it possible to tune off the center of the channel to avoid interference from strong signals.

The RF strength signal is displayed on a ten-segment bar graph, calibrated in 10 dBf increments. By pushing a button, you can measure the input signal on a numeric display in 1 dBf steps. However, the accuracy of this feature is questionable; it varied more than 15 dB in tests comparing it against our field strength meter.

The APR system does an excellent job of choosing the proper mode settings for each station, but it can be overridden if necessary. LED indicators show which modes have been selected, with the "normal" mode appearing in green. There is no shortage of memory presets; Onkyo has provided 20 of them.

By pushing the "auto memory" button, the tuner will scan across the band and actually enter the first 20 stations which exceed the scanning threshold, which can be set at 17, 27 or 37 dBf. Each preset memorizes the selected mode settings as well as the frequency of a particular station.

USER REPORT

Both fixed and audio outputs are included. The variable output is regulated by a motorized knob on the front panel, which can be adjusted by the wireless remote control. There is also a composite output jack and "multipath" jack for connection to a scope to check peak modulation or align the receive antennas.

As expected from the excellent specifications, the T-9090 II sounds great in both the wide and narrow IF bandwidths. The super-narrow bandwidth causes a noticeable but tolerable loss of audio quality, but makes it possible to receive signals that would be otherwise unlistenable.

At a list price of $750, the Onkyo T-9090 II is more expensive than the average consumer tuner, but actually a bargain when its many features are considered. You should be able to save about $200, as we did, by shopping around.

■ ■ ■

Editor's note: Mark Humphrey contributes frequently to **RW** *and may be reached at 215-787-8405.*

For more information on the Onkyo T-9090 II, contact Onkyo at: 201-825-7950.

NAB CD

(continued from page 37)
generator for them is not likely to be seen at most radio stations.

The last tones are tone bursts. The first set is for testing compressors and limiters, followed by bursts for peak flasher calibration. Using these with the Bessel null calibration tones, you can completely calibrate the FM modulation monitor.

It is very easy to be critical of an effort such as this disc. Even though it seems that some of the tests are there only to fill out the disc, I would be even more critical if they were not included. Many of the test signals would be difficult bordering on impossible to duplicate in most radio stations.

My only great fear is that the disc will be used with the many truly bad CD players and will be thought of as inferior when the CD player is actually at fault. The NAB reports that they have enough additional test signals for a Volume II test disk.

I hope they produce it.

■ ■ ■

Editor's note: Chip Fetrow is a Radio Amateur, private pilot and avid Scuba diver. He is also chairman of SBE Chapter 37 in Washington, DC because "nobody else wanted it." He may be reached at: 703-534-0320.

For more information on the test disc, call the NAB at: 202-429-5376.

ACM-1 Tackles AM Noise in FM

by John C. Huntley, CE
KCRW-FM

Santa Monica CA KCRW is an NPR member station licensed to Santa Monica, CA and serves Los Angeles county and parts of Orange and Ventura counties. With a format that is neither Classical nor Jazz, KCRW's eclectic blend of music, radio drama and news gives us good cause to take critical care of our signal quality.

KCRW has two subcarrier tenants (a Russian language service at 67 kHz and a data service at 92 kHz) and also a single sideband metering return in the SCA region between the two tenants.

The ACM-1 Amplitude Component Monitor

More than eight million people reside within our the primary signal coverage. Given the competitive nature of the market (yes, even for non-commercial stations) and the concerns of the subcarrier tenants, the KCRW transmitter has always been carefully tuned to minimize AM noise.

I have paid careful attention to the discussions of proper transmitter tuning that have appeared at trade shows (i.e., at SBE and NAB) and in the trade magazines over the past several years. I have made use of a method of tuning for minimum AM noise "by ear" and passed the information on to all the NPR stations.

I had been searching for a simple device to assist in tuning for minimum AM noise because I had become convinced that this was *the* critical factor in minimizing multipath on KCRW. (And tuning for minimum AM noise certainly did cut down on tenant complaints.)

When I was first told about the Radio Design Labs ACM-1, I was intrigued, so I arranged for a demonstration of the unit. I was delighted to discover all of its useful features.

The ACM-1 is extremely simple to install and set up. Front panel LEDs display a 20 dB range of signal. A selector switch sets the range in 10 dB steps. The calibrate control is on the front and setup is as easy as setting the display to 0 dB/full scale in the calibrate position.

There is a selector switch for wideband or de-emphasized measurement and a control to set an alarm point which can provide a closure if the AM noise exceeds the set point.

The unit also has an output that can be connected to a remote control to provide an average sample of the reading and a BNC output on the front allows the noise signal to be viewed as the transmitter is tuned.

USER REPORT

This helps get the transmitter tuning to the center of the passband, where symmetrical sidebands minimize incidental AM noise.

The crowning touch of the demonstration was the manual. After years of dealing with manuals that were an afterthought, if that, here was a manual that reflected concern for the person using and maintaining the ACM-1. There were indeces, layout drawings, cross-referenced part locations and full schematics. Wow!

. . . I convinced my manager . . . to purchase an ACM-1 for permanent use at KCRW. It has proved well worth the money.

We moved on to testing the units at the transmitter. All of the tests were made with normal program modulation present, since this is what the unit was designed for and crosstalk is evident during program peaks.

We first connected the ACM-1 to the forward sample port on the Cablewave (Phelps Dodge) power sample that is part of our CSI transmitter and then to the Bird thruline® sample on the output transmission line. These samples were nearly identical, and they closely correlated (within 2 dB) with the diode sample provided with the ACM-1.

The AM noise minimum obtained while tuning the transmitter using the ACM-1 indicator for the CSI FM12, 000E in use at KCRW (operating at 7410 W) was about −52 dB. We then spent about 30 minutes varying the tuning of the transmitter stages and the level of the drive from the exciter.

I must admit that I discovered more about the tuning of the transmitter over that short period than I had learned over several years of careful tuning. Oh, the joy of having the proper tool for the job!

I was impressed enough with the unit that I convinced my manager to juggle the budget and purchase an ACM-1 for permanent use at KCRW. It has proved well worth the

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3000B Makes Testing Automatic

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different levels is quick and easy to accomplish. Even this minimal level of automation adds to the engineer's efficiency and productivity.

The updated Sound Technology 3200B audio analyzer, introduced about six months ago, offers a variety of new features including the ability to make measurements at increased operating speeds.

Autoranging analyzer

The autoranging analyzer measures levels from below 4 μV to 100 V in volts, dBm—referenced to 600 or 150 ohms—or watts (one to 99 ohm reference) in greater than 300 kHz bandwidth. Three high-pass, four low-pass or one of three weighting filters can be selected. In addition, input impedance is now switchable between 600 ohms and 100 kohms.

THD and SMPTE IMD offer residuals of less than 0.002%; phase is measured over a range of ±180° to 40 kHz with a resolution of 0.1°; and channel separation measures crosstalk levels lower than −100 dB. Since the analyzer is a two-channel device, troublesome cable swapping is avoided for tests like separation.

Printing test results stored in the analyzer has previously been as easy as connecting a dot matrix printer to the rear panel Centronics port and specifying what tabular data to print. But, as a new option, 29 different graph formats are permanently stored in memory.

When it's time to print the results the analyzer selects which graph offers scale factors best suited to the measured data. This automatic feature relieves the engineer of setup duties and trial and error test printing.

In addition, the time and date of each test sequence is now stored and printed along with the proof—or "test" number—and a user-specified 64-character title will print at the top of each page.

The 3200B analyzer has also been modified to accept a "noise floor" limit. When set, measurements will not be made if the input signal is at or below the level specified.

Programmable from one mV for ratio and level measurements (10 mV for all other tests) to a maximum of 775 mV, this feature prevents noise floor readings from appearing as performance measurements.

Wow and flutter

One of the new refinements which makes the analyzer even more versatile is the abililty to measure wow and flutter. Tests can be made with or without weighting, using detection and meter dynamics corresponding to NAB, JIS or DIN/ANSI standards. Residual is an outstanding 0.003%.

To purchase individual instruments capable of performing all the tests afforded by this generator/analyzer combination would probably exceed the financial reach of many stations. But the multi-purpose "all-in-one" design approach produces an affordable solution.

Best of all, since the units are expandable you can add whatever options your budget permits. The new Sound Technology 3000B series—whether operated side-by-side benchtop, separated at remote sites or controlled by a PC—offers the engineer unsurpassed flexibility and versatility.

■ ■ ■

Editor's note: Dennis Martin is Director of Engineering for House of Music in Costa Mesa, CA, as well as a consulting engineer and freelance writer. He is a member of the SBE and AES and may be reached at: 714-684-9992.

For more information on the 3100B and 3200B, contact Kent McGuire at Sound Technology: 408-378-6540.

AM Noise

(continued from previous page)
money.

The ACM-1 saw further use last year when we purchased a new transmitter. I had visited the factory for final testing of the transmitter, and used the ACM-1, in conjunction with the traditional DC and AC Voltmeter method, to measure continuous AM noise (hum) before it was shipped.

We also used the ACM-1 to confirm that the transmitter/exciter met the tight specifications written into our bid document.

We compared the AM noise present on the reflected power samples and noted that it was greater than the forward sample. This encouraged us to contact the antenna manufacturer so that the antenna could be re-tuned to minimize its own reflected signal. (The result was a change from 1.16:1 to 1.02:1.)

We take the matter of minimizing AM noise seriously enough that we have installed an additional sample section (Cablewave 3-318-50) in our transmission line to provide permanent forward samples to the ACM-1 and our modulation monitor. The ACM-1 is a permanent part of our monitoring at KCRW.

One last note about the BNC output. I use it most often with an amplified speaker for "quick and dirty" adjustments. Radio is, after all, an aural business.

■ ■ ■

Editor's note: John C. Huntley may be reached at: 213-450-5183.

For more information on the Radio Design Labs ACM-1, contact Jerry Clements at: 805-684-5415.

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Automated Testing Slow To Arrive

(continued from page 35)
something esoteric—something they do not *need*. It all depends on what they think is absolutely necessary. Especially with so many stations making staff cutbacks."

Cheaper and lighter

Cost and portability are two other factors holding any onrush of automated test gear in check.

Cost factors run to two different paths: One being that a manual set is still less expensive than an automated set; and the other that test gear—automated or manual—is typically one of the items on a GM's budget list that is usually deemed less immediately necessary than some other equipment.

"Our evidence," says Jones "is that there is a lot of antiquated test gear out there, and test gear is always low man on the totem pole when budget cycles come around."

"We have run into a number of situations," says Metzler, "where an engineer saw our system three years ago, decided it was what he wanted his station to buy and we just now have received his order. It has taken him that long to convince the GM that the money needs to be spent."

Metzler links necessity with portability. "It all relates to how much testing you have to do," he says. "If the user only needs 30 minutes or an hour a week of testing, then the best thing for his needs might be a manual set. The set is lighter to carry and he just does not have enough testing to justify an automated test system."

All well and good for a station in a less competitive market situation, but for the radio station in a tightly competitive market the demand by listeners for better and better quality sound makes automated testing a near eventuality in manufacturers' eyes.

"There are people that are still very interested in audio quality and they are interested in doing more frequent proofs, and automated equipment gives them the ability to run proofs more often and therefore give the market the best possible audio quality," says McGuire.

"A spectrum of users out there are not comfortable with computers . . ."

"It is probably more a financial factor than anything else," says Metzler. "The station in the Midwest selling spots for ten dollars is probably never going to go to automated testing. But very little manual testing will be done in the next several years in many of the top markets."

Amber and Audio Precision are both of the opinion that automated sets are currently not meeting the more demanding test needs of digital audio.

Better digital testing

"You just cannot *really* test without being in the digital domain," says Metzler. To answer that need, Audio Precision has in "pre-introduction phase" a Digital Signal Processing (DSP) capability for integration with its System One automated test system.

"People have gotten by so far without being in the digital domain by testing analog to analog and then inferring from those results and changing parts. But you really do not know what you are doing until you test in each of those domains," says Metzler.

Amber Electro Design also promises new editions to its line that will allow for better digital testing. This is because, according to Jones, "all of the requirements of digital testing are not currently being addressed. On the other hand," he notes, "I have yet to meet anyone who knows exactly what those requirements are."

Switch is inevitable

But Jones ultimately classifies the switch to automation as inevitable. "Even though there might be some initial reluctance to move into the computer arena," he says, "stations will have to do it eventually."

In Jones' view, despite the initial fear of the unknown the industry is in the same place as that author poised anxiously between his faithful typewriter and this newfangled whatchamacallit word processor.

"Although it is arduous for him to make all kinds of mistakes while learning the word processor, once he learns the system he never wants to go back to the typewriter again."

INDUSTRY ROUNDUP

People Ted Pine has been promoted to marketing communications manager at **New England Digital Corporation**. Having been with the company since last year, Pine is now responsible for managing all of New England Digital's advertising, direct mail and PR programs. He will also aid the development of long-term business programs.

Elsewhere, **Harris Corporation** has appointed Gustavo (Gus) Ezcurra vice president of international sales effective 1 December 1988. Ezcurra will handle all coordination and management of Harris' international sales effort.

Ezcurra brings to Harris experience in the important area of countertrade and offset—skills established during tours of duty with both **FMC Corporation** and **LTV Corporation**. For the past year he has served as vice president of LTV's AM General Division.

The deck gets shuffled at **Otari Corporation** where David Roudebush has resigned from his post as sales manager. Marketing Manager John Carey will assume his duties for the immediate future. Of the departure, Carey said "David has been with us through our key growth years, and has been instrumental in shaping our distribution policy and presence in the market. We wish him the best in his future activities."

Roudebush—at Otari since 1982—commented that he believes "Otari is well positioned in the market, with good products and people ... I feel comfortable leaving the company at this time." Roudebush said he plans to take his experience gained at Otari and "use it to complement some skills that did not get exercised at Otari. My next step is to find that magical position where I can have maximum impact."

Roudebush will be with the company "through January," and no immediate search for a successor is planned, although the firm expects to begin looking "in the spring."

Company Expansions Microphone and speaker maker **Electro-Voice Inc.** of Buchanan, MI has built new engineering facilities in an effort to step up its research and development. The new three-story R & D center occupies over 28,000 square feet and houses over 50 engineers, technical assistants and support staff.

Electro-Voice President Robert Pabst said the expansion "will help to achieve the comany's five-year strategic goal of becoming one of the top three audio companies in the world."

Financial Reporting Gentner Electronics Corporation reports net revenues up 50% over last year's comparable figure for its first quarter ended September 30, 1988. The company also showed net income to be up 15% compared to last year's figures. Gentner CEO William V. Trowbridge attributes the net revenue increase to "increased unit sales through the implementation of a new, concentrated marketing system established during the middle of last fiscal year."

Trowbridge also said of his company's acquisition of **Texar Incorporated**, effected during this period, that Gentner has "established Texar business functions in a remarkably short period of time and are seeing continued increases in revenue and profit because of this venture."

Where credit is due For those of you who read the 15 November Buyers Guide Special report on KTHO's new FM site on Genoa Peak at Lake Tahoe, **RW** has been urged by its author, Don McBain, to make mention of Howard Cadot, KTHO's CE, without whose "skill and diligence" the project would never have been completed. Congratulations on your efforts, as well, Howard.

BUYERS BRIEF

The **GL&M Engineering** BMK-1 is a modification kit for use with Belar FMM-1/FMS-1 FM monitors. The kit converts units from fixed-tuned to frequency agile, and leaves the converted monitor—with respect to modulation percentage, frequency response, crosstalk, noise and separation—virtually unchanged from the unconverted units.

Conversion is accomplished by the removal and replacement of the A1 assembly and LO crystal in the FMM-1. With instructions from GL&M, a tap from the 10.7 MHz IF of a user-provided FM tuner is installed and connected to the RF input of the modified FMM-1.

The system allows a user to monitor the competition's modulation monitor by providing an electronic interface between virtually any FM tuner and the Belar monitors. Any station that can be received cleanly on the tuner can be monitored to the specifications of the Belar equipment.

Included with the kit are the replacement A1 assembly and crystal, replacement stand-offs for the new A1 assembly, parts necessary for the conversion of the FM tuner and an interconnecting cable.

For more information, contact GL&M Engineering at: 408-373-2233.

BE Adds MVDS Remote Control

Kevin Clymer, Software Engineer
Broadcast Electronics Inc.

Quincy IL In 1984 Broadcast Electronics introduced the Microprocessor Video Diagnostics System (MVDS) as an option to the "A" series of FM transmitters. With MVDS, all important transmitter operation information is presented simultaneously on a built-in video display screen.

In 1988 BE introduced an upgrade to the system, MVDS Remote Control.

Remote control with PC

MVDS Remote Control adds remote control capabilities to the basic system. The remote control point is an IBM PC running special BE-designed software.

The software is a communications program displaying transmitter information in MVDS format for transmitter control.

MVDS is designed with three RS-232C serial data communication ports. One receives local keyboard commands, another sends transmitter logging data to a serial printer. The third serves as the MVDS Remote Control port.

That port has two modes of operation: constant and periodic. Constant mode is for use when MVDS Remote Control is active all the time without interruption. Periodic mode is for periodic transmitter inquiry and control, such as would be used by dial-up telephone lines.

Data must be transferred in two directions and a carrier detection signal must be given to MVDS. In studio to transmitter (STL) and transmitter to studio (TSL) microwave RF links, the RS-232C data can be modulated into audio and sent to the other site where it is demodulated back into RS-232C level data.

For sites where the transmitter is colocated with the studio and the distance is 50 feet or less, the communication path may be implemented by direct shielded wire connection between MVDS and the personal computer.

In recent years, the FCC has relaxed and amended its rules concerning transmitter remote control. That action has allowed remote control on a periodic basis, as long as there is some way to turn off the transmitter at all times.

TECHNOLOGY UPDATE

Such periodic control can easily be accomplished with standard voice grade dial-up telephone lines, which are more economical than leased lines.

For dial-up telephone paths, MVDS Remote Control uses standard Hayes Smartmodems for communication between MVDS in the transmitter and the personal computer's MVDS Remote Control program.

When using dial-up telephone lines as the communication path, the user types a simple command line on the PC with a security password and telephone number to call his transmitter.

The modem at the transmitter answers, the password is exchanged and, if valid, the PC displays transmitter data. The PC displays the data in the same format as is displayed on the transmitter's MVDS screen.

Refresh rate and error check

At a communication speed of 1200 baud, all of the screen's data is refreshed about every three seconds. The data is error checked before being displayed and a message is shown if the data is found to be corrupt.

Should the transmitter not be connected to an MVDS Remote Control point when an overload occurs, MVDS will dial a phone number in an attempt to make contact with a designated control point.

One of the advantages to using dial-up phone lines for remote control is that it allows access from different points. If a portable computer is used, access can be made from the studio, from the engineer's home or from some place on the road.

The MVDS customer configuration screen is also available at the PC control point. The user can set up operation of the whole MVDS system to suit his needs and then send the settings to MVDS. When MVDS receives this data it is stored in non-volatile memory. The whole operation is just like standing in front of the transmitter and doing the same thing.

Multi-transmitter control

Often there is more to control and view than just one transmitter. For such sites, BE's optional MT-3 multiple transmitter interface gives MVDS Remote Control the ability to control other equipment, including non-BE transmitters.

The MT-3 installs at the transmitter site and has three RS-232C serial ports. Two serial ports control up to two MVDS-equipped BE transmitters. The third serial port is used for connection to the communication path. A series of terminal strips on the back of the MT-3 are for connection to a non-MVDS transmitter and/or other equipment.

The MT-3 provides eight status inputs, eight analog inputs and sixteen relay control outputs to connect to other equipment. All have flexible designs, which make them suitable for connection to a variety of equipment.

Status inputs can be driven by a simple switch or relay contact closure, a transistor driver or a logic level circuit input.

Analog input voltages can range from −5 V to +5 V. The software does the scaling necessary to convert raw analog data to meaningful values and all relay outputs can be latched or momentary, as designated in the software.

MT-3 screen features

A separate screen displays data from the MT-3 and allows control of its relays. A nice feature of this screen is the user supplied custom labels. Since only the user knows what he wants to hook up to the MT-3, only he can supply meaningful labels for the different input channels and relay outputs.

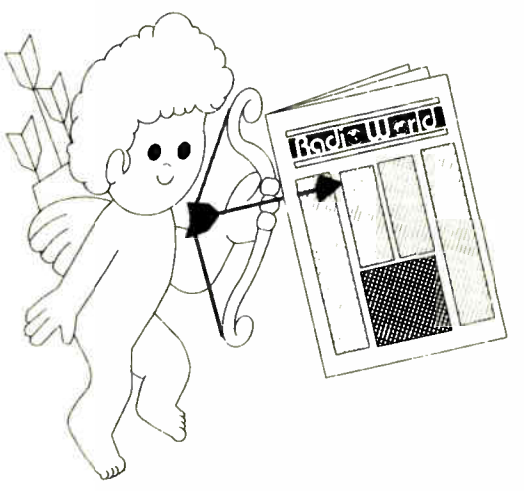
Each status channel has two labels: one for the "off" condition, one for the "on" condition. The customer fills in these labels as he wants to see them on the display screen.

One approach is to leave blank one of the label's conditions. For instance a user could leave the off label blank and have the on label be "Door Open." This way no message would be displayed when the door is in the normal state, only when opened would the message "Door Open" appear.

The cost and availability of personal computers and modems make MVDS Remote Control an attractive alternative to traditional remote control.

■ ■ ■

Editor's note: For more information on BE's MVDS Remote Control, contact Jan Vance at BE: 217-224-9600.



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