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Receiver Tagging Rejected

by David Hughes

Hartford CT ... For the second time in three months, the state of Connecticut has rejected proposed regulation that would have required that all AM stereo radios on store shelves display a label or tag with information on which stereo system or systems they can receive.

According to Carol Swift of the Electronic Industries Association's (EIA) Consumer Electronics Group, the Connecticut Legislative Regulation Review Committee voted 10-2 against a tagging requirement on 21 January. The EIA has opposed the tagging law.

The Connecticut proposal was a revision of an earlier tagging plan that the Regulation Review Committee rejected "without prejudice" on 22 October 1985, leaving the plan open for resubmission within a year.

Both receiver tagging proposals were submitted by the Connecticut Department of Consumer Protection, which said it received complaints from consumers who purchased AM stereo receivers only to find they could not receive all AM stereo broadcasts in stereo.

However, Swift said that the Regulation Review Committee said that there were virtually no consumer complaints filed.

Two AM stereo systems, Motorola and Kahn, are battling to dominate the AM stereo market. Several receiver manufacturers make radios capable of receiving Motorola's C-QUAM system and some make multimode receivers capable of receiving both systems. However, no manufacturer makes Kahn only units.

Receiver manufacturers and their lobbying group, EIA, oppose all forms of state tagging requirements, fearing that each of the 50 states could implement a different requirement. Responding to a variety of notification requirements would be costly, manufacturers argued.

Even though the proposed regulation has been rejected, it is not completely dead. Swift said that the proposal still could be resubmitted by the state legislature, which was scheduled to begin session 5 February.

A similar plan to introduce receiver tagging legislation in South Carolina has been "permanently tabled," Swift added.

She said the South Carolina legislation was "prefiled" in late 1985 to be introduced into the January 1986 legislature session. It was sponsored by State Senator Glenn McConnell.

McConnell, at the urging of a station using the Kahn system, "believed at the time (that) consumers were being hurt," Swift said.

However, after she explained the receiver manufacturers' point of view to McConnell—that the imposition of individual state labeling requirements could hurt the overall development of AM stereo—he decided on 3 January to shelve the legislative effort, Swift said.

Swifted added that no other states have proposed AM stereo tagging requirements.

For more information, contact Carol Swift at EIA: 202-457-8712.

SBE Modifies Promotion Pact

by Edward Wytkind

Washington DC ... At an executive board meeting held 16 January in Washington, DC, the Society of Broadcast Engineers (SBE) modified an alleged product endorsement it gave in return for promotional support and editorial space in *Broadcast Engineering* (BE) magazine.

According to the minutes of the 26 September 1985 SBE Board of Directors meeting, board member Chuck Kelly presented a one-page bulletin displayed at the St. Louis SBE convention, held in early September, 1985, announcing the "alliance of *Broadcast Engineering* magazine and SBE."

BE Editor and SBE *Signal* Editor Jerry Whitaker then presented a "proposal for cooperation" between SBE and BE. "In return for a statement from SBE about the value of BE, the magazine will provide free advertising and other types of publicity for the Society," the proposal said.

The SBE board then unanimously approved a motion made by SBE Treasurer Wally Dudash: "The Board of Directors recognizes *Broadcast Engineering* magazine as the preeminent technical publication serving the broadcast industry."

Past SBE president Roger Johnson then put forward a motion approving the Dudash motion based on "the approval of the SBE attorney," Chris Imlay. This motion was also unanimously approved by the board. According to SBE president Richard Rudman, following this meeting, Chris Imlay approved the language of the Dudash motion.

Executive committee meets

Stevan Dana, SBE member and publisher of both *Radio World* and *TV Technology*, attended the January executive committee meeting to explain his concerns with the Dudash statement.

According to Dana, the Dudash statement amounted to a product endorsement. He added that it was improper for SBE to engage in that type of activity.

Dana also discussed problems he had with a promotional convention packet sent to potential exhibitors. The packet included a letter promoting the "alliance" and a form indicating that exhibitor checks be sent to the "SBE National Convention & *Broadcast Engineeering* Conference."

Dana said the form was unclear on how the checks were to be made out and how the funds were to be dispersed between SBE and BE.

Later that day, Rudman announced that the society would officially change the Dudash statement to "a preeminent monthly technical publication," as opposed to " ... the preeminent ... "

Rudman said the SBE board had enough industry evidence to issue both the original and revised statements. However, he admitted that the evidence he referred to was not based on any survey of members or chapter chairmen.

"This should not be misconstrued as anything other than a clarification," SBE VP Jack McKain explained.

However, a Federal Trade Commission spokesperson said that a "material claim" (endorsement) with potential for "legal significance" must be "substantiated" with proof. Such a claim cannot even be made unless the organization involved in the endorsement has gathered substantial facts that support the action.

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Regulatory News

FCC Clips

Women and Minorities

Women employees made up 13.2% of all "technical" jobs at broadcast stations in 1985, up from 12.7% in 1984, according to a recent FCC report on employment trends in broadcasting.

Women comprised larger percentages of the workforce in other positions— 29.7% of "officials and managers," 29.9% of "professionals," 45.4% of "sales workers," and 87.9 of "office/clerical" (down from 1984's 88.2%).

The report also indicated that "minorities" made up 18.8% of all broadcast related technical jobs in 1985, up from 18.1% in 1984. For other categories, minorities made up 26% of "office/clerical," 14.3% of "professionals," 10.2% of "officials and managers," and only 9.4% in sales.

For more information, contact Max Dalton at the FCC: 202-632-7069.

General Licenses

General Radiotelephone Operator Licenses (GROL), renewed after 31 December 1985, will not be valid for any broadcast purposes, the FCC has announced.

The Commission said it has eliminated the need for licenses for radio station duties, expect to operate and maintain transmitters.

Any GROL renewal applicant who needs a FCC license to work with transmitters can obtain a Restricted Radiotelephone Operator's Permit. The FCC said these are granted without examination, and convey the same broadcast authority as the GROL.

For more information, contact Damon Martin at the FCC: 202-632-7240.

Pirate Crackdown

The Commission is continuing its crackdown on pirate radio stations. On 25 November 1985, the FCC shut down a pirate FM radio station in St. Paul, Minnesota, calling itself "KSMR."

The FCC, which claimed that the station had been operating for "several years," fined the alleged owner and operator $750.

The Commission said it has received reports of pirate stations in 13 areas, including: Newark, DE; Hollywood, FL; Green Bay, WI; Pierce, AL; Lake City, SC; Cincinnati, OH; Waterbury, CT; Long Beach and San Francisco, CA; Ponca City, OK; Waynesboro, VA; Gorham, ME and Minneapolis/St. Paul, MN.

Pirate operators can be fined $10,000 and receive up to one year in jail, the FCC said.

For more information, or to report a pirate, contact the FCC's Grand Island, Nebraska, office at 308-382-4296.

RFR Issue May Create Conflict

by Edward Wytkind

Washington DC ... A rash of state and local activity in radio frequency radiation (RFR) standard setting has created the potential for regulatory conflict by forcing broadcasters in some markets to comply with both local and FCC-mandated RFR standards.

On the federal level, radio and TV stations with pending applications, whether for new facilities, modifications or renewals, must certify with the Commission that they comply with the American National Standards Institute (ANSI) human exposure limit, which became effective on 1 January 1986.

Meanwhile, on the state and local level, government officials continue to examine the merits of implementing RFR standards that essentially preempt FCC regulations, and may inhibit broadcasters from operating Commission-authorized facilities.

Due to this potential for regulatory conflict, the NAB and other broadcast interests continue to lobby the FCC to exert its so-called "statutory right" and preempt adoption of state and local RFR standards.

However, despite the Commission's statutory claims, the National League of Cities has argued that the FCC will have great difficulty preempting the rights of local governments to set standards relating to public safety.

Local activity

On the local level, the Portland (Oregon) City Council held a series of ongoing hearings, beginning in January and to continue through February, to consider adoption of human exposure RFR standards (proposed by the city's Planning Bureau) equal to 1/5 of the federally recognized ANSI standard.

Steve Gerber of the Portland Planning Bureau said he expects the standard to be adopted. He also said that some Portland citizens are lobbying for RFR standards that would be 1/10 the ANSI exposure limit, which would be far more stringent than the FCC national standard.

According to Gerber, Portland citizens' current lobbying efforts for greater stringency were fueled in part by recommendations made in the summer of 1984 by an office of the Environmental Protection Agency (EPA).

More than two years ago, officials from the EPA Office of Radiation Programs, after conducting several studies, recommended consideration of public exposure limits equal to 1/10 the ANSI standard. However, EPA policy officials disagreed with the prescribed exposure levels and withheld issuing any sort of federal RFR recommendations.

At present, the EPA says it plans to issue a wide range of possible exposure limits, but a timetable for this action has not been set.

Seattle FMs cited

Meanwhile, the Commission recently ordered eight Seattle, Washington FMs located on nearby Cougar Mountain to reduce the risk of excessive RFR human exposure around their towers by building new fences and posting new warning signs.

The Seattle case has been at center stage since the US Environmental Protection Agency (EPA) conducted RFR site surveys there last summer.

The Commission's intent, according to FCC Mass Media Bureau Engineer William Hassinger, is that broadcasters will have to either reduce levels of RFR where people are present or prevent public access to areas with unavoidably high levels.

Government officials from King County, which includes a portion of Seattle, are also considering adoption of new RFR standards.

Another local case involves a battle between a Vernon NJ-based citizens' group called Citizens Against Towers (CAT) and state and federal officials.

CAT has blamed microwave radiation from a satellite uplink antenna farm for a statistically high number of Down's and Edward's syndromes, as well as cancer and other health disorders, among residents of the rural township.

The US Center for Disease Control reviewed the case late last year and recommended that New Jersey officials investigate several clusters of birth defects in Vernon. New Jersey officials said they will probably comply with the recommended action and conduct an investigation.

In addition to the various local cases, the Commonwealth of Massachusetts has adopted an occupational exposure RFR standard equal to the ANSI limit, but with stringent administrative requirements that have attracted great criticism from broadcasters.

Although this new standard became effective 23 December 1985, broadcasters were granted a three-month waiver (until 1 April 1986) by the state to begin performing the new administrative tasks.

"Provisions for variance"

The new rules essentially make it illegal for technicians to be exposed to RFR exceeding the ANSI standard unless a particular case of overexposure falls under "provisions for variance."

Exposure violations must occur only in the case of unavoidable operational emergencies. Employers must provide adequate shielding devices, train and designate a RF safety officer and report to the state after each exposure violation.

The NAB has critized the Massachusetts standard as "duplicative and unnecessary" because the FCC's rules already mandate compliance with the ANSI exposure limit.

Moreover, NAB legal counsel Barry Umansky, who also serves as president of the Electromagnetic Energy Policy Alliance (EEPA), said the Massachusetts case is a perfect one on which the NAB can base its preemption argument.

Featured this issue

Regulatory News

Comments Reject MBI Petition

by David Hughes

Washington DC ... Most broadcasters filing comments with the FCC, and both the NAB and NRBA, opposed a proposal that would allow noncommercial FM stations to feed their translators via satellite or microwave link.

In October 1985, Chicago-based Moody Bible Institute (MBI) asked the FCC to allow it to feed its noncommercial FM translators via satellite or terrestrial microwave instead of using the traditional directly broadcast, over-the-air signal, which FCC rules now authorize.

In April 1984, the FCC rejected a similar MBI plan, explaining that, with the then ongoing FM/TV 6 interference problem and the Docket 80-90 proceeding, it was not the proper time to allow satellite fed FM translators to undertake the significant expansion of the FM service which would likely have resulted from the proposal.

MBI said that, with the FM/TV 6 ruling and the implementation of the Docket 80-90 program, the FCC should consider the rule change.

The NAB maintained that the MBI plan would "impede the growth of full service noncommercial FM radio."

NAB supports rejection

"Intervening circumstances since the FCC's latest rejection of these earlier Moody efforts have not rendered moot the public interest, allocations policy and administrative considerations that still support rejection of the Moody proposals," the NAB said.

"Alternative efforts already underway to expand the noncommercial radio service, coupled with the TV interference considerations that would be raised by expanded use of translators in the educational portion of the FM band, militate against the grant of the Moody proposal," the association added.

The NAB said, "Moody's latest petition asks, for the third time in three years, for relief that the Commission has

(continued on page 8)

AM Improvement Plans Boosted

Washington DC ... Efforts to improve AM radio were boosted by the NAB's announcement that it plans to start its antenna testing program by March, while the National Radio Systems Committee (NRSC) announced that it hopes to develop a preemphasis proposal by June.

The NAB AM Improvement Committee met in January to discuss the site requirements for an antenna testing program that was announced in December.

It will conduct a two-year study to construct and field test two prototype AM antennas that, through advances in technology, are designed to redirect skywave radiation to increase groundwave coverage, NAB Engineer Mike Rau said.

The antenna designs were developed by Richard Biby of Communications Engineering Services, and Ogden Prestholdt of A. D. Ring and Associates.

Computer design

Using a VAX computer, Biby has developed an antenna that, Rau said, "is flexible enough to alter any of its input variables to see what happens to field strength as a function of azimuth and elevation angle from the antenna."

Prestholdt has proposed an antenna that would provide separate control over the ground wave and skywave portions of the electromagnetic field, he added.

Three sites near Washington DC are currently under consideration, Rau said. The sites are located in Beltsville and Frederick, Maryland, and in Quantico, Virginia.

The committee, Rau added, is also examining antenna and equipment donations and insurance for the study. By March, Rau said he expects a final site selection to be made and ground to be broken.

NAB said the tests would take place at 1650 kHz, just above the AM broadcast band.

Preemphasis standard

Discussion of an AM preemphasis/deemphasis standard dominated an NRSC meeting at the January Consumer Electronics Show in Las Vegas.

Rau said the NRSC Methods and Procedures Subgroup set a 3 June deadline to develop a preemphasis proposal.

The NRSC discussed continuing efforts to explore the relationship between AM listening trends and signal strength.

The issue, Rau said, is whether most AM listening is centered in urban areas, which feature high signal strengths, or in rural areas, which have generally weak

(continued on page 4)

NAB Merger Vote Unanimous

by Edward Wytkind

St. Maarten, Netherlands Antilles ... With an official decision still pending NRBA board approval, the NAB Board of Directors unanimously voted to merge the two associations at a 13-17 January meeting in St. Maarten.

Final approval of the merger is dependent upon an NRBA board vote, which was scheduled to take place at a 21 February meeting in Ft. Lauderdale.

Among the bylaw changes ratified by the NAB's board is a provision allowing the NAB radio board and TV board to act independently of each other if the joint board should fail to agree on a motion after successive attempts.

If the two boards were logjammed on a particular issue, then either board would be empowered to lobby Congress, the FCC or any other government body or organization without seeking approval from the other.

To ensure parity between radio and TV, the NAB said television board votes will be "weighted to equal radio votes."

According to NRBA VP Peter Ferrara, past merger efforts were snagged in part by the NAB's reluctance to allow independent motions to be enacted by the radio board.

NRBA Director-at-Large Louisa Henson of WLRS, Louisville, said she will support a merger only if she is "really satisfied" with NAB organizational and bylaw changes implemented. "I'm not an NAB member, and never have been."

Other merger details

The NAB board also announced it will add one NRBA person to serve on NAB's Executive Committee for at least three years. The NAB Radio Board will be expanded to include 12 additional seats "to accommodate NRBA's directors." The 12 seats will be divided into three groups of four, with four one-, two- and three-year terms each.

With the intention of strengthening radio's lobbying efforts, the NAB will also appoint one legal and one government relations representative to be used primarily by the radio board and executive committee.

The NAB also said it would not "assume" NRBA leases or liabilities. In addition, the board granted non-NAB members in the NRBA a one-year dues moratorium.

Unified goals

NRBA Director-at-Large Gary Edens of Edens Broadcasting said he supported a merger because "the NAB and NRBA have the same goal, which is to promote the radio industry."

"I'd say their (the NAB's) position is that over-the-air broadcasters have more in common than radio and TV have differences," Edens speculated.

"An opportunity"

"This is an opportunity that has been a long time coming. The agreement gives TV and radio broadcasters a unique representation marked by unity and independence," NAB Radio Board Chairman John Dille of Federated Media said.

Bill Burton, an NRBA director-at-large and vice-chairman of Eastman Radio, said that even though the two associations have had their differences, they probably realized that a merger was a "realistic move" because a "splintered-off" industry is ineffective.

Some industry sources have said an NAB/NRBA merger would be an ideal opportunity to split the focus of the spring and fall shows into TV- and radio-only events.

The NRBA's Ferrara said that if the two associations merged, it would be logistically ideal to split the spring and fall shows.

The splitting of the shows has been one of several continuing issues among broadcasters due to the continuous growth of the spring NAB convention and its consequent crowding problems.

However, Joint Board Chairman Ted Snider confirmed the NAB's commitment to offer an "all-broadcasters" event. Snider emphasized that there is a great deal of radio/TV "overlap" in the industry among manufacturers, station owners and programming firms.

For more information, call the NAB at 202-429-5350 or the NRBA at 202-466-2030.

SBE Modifies BE Promotion Pact

(continued from page 1)

In the wake of the executive committee meeting, SBE and BE officials met in St. Louis on 20 January to firm up details regarding the joint convention.

Convention details

Rudman said the society will coordinate the exhibit part of the event and collect money from manufacturers. He added that attendees could enter the exhibit area free of charge, and needed only to "prove their connection with the industry."

Concurrently, BE will offer a technical seminar, which will be run by John Battison, the former head of the defunct WOSU, Ohio State University technical conference.

The seminar will cost $25 per attendee, according to Rudman. All the funds for the exhibit area and seminar will be channeled through the St. Louis SBE chapter, and BE will "invoice" the SBE to cover "costs."

"Not-to-exceed" figure

According to SBE Board member Andy Butler, the SBE and BE have agreed on a predetermined "not-to-exceed" figure which would place a cap on the amount BE can invoice the society for running the seminar. Butler would not divulge this amount.

If the seminar financial intake does not cover BE's costs, SBE's national budget or exhibitor funds will be used to make up the difference, Butler explained. At press time, 97 10×10 booths have been reserved at $525 per booth. Butler said the society expects to sell up to 264 booths.

Butler added that the St. Louis chapter will retain 10% of any convention profits realized, and the remainder will go to the recently established SBE (Harold) Ennes Educational Foundation.

According to the SBE, it is to receive one full BE editorial page per month to be used for an SBE update column. The society will also have access to BE's subscriber mailing list, and it will receive promotional favors, such as convention advertisement and membership form inserts from BE.

Intertec Corporation (publishers of BE) Group VP Cameron Bishop explained that the SBE editorial page was not to be used as a "forum-type piece," and could only be used for society activity updates. Bishop added that the society would get "three to six pages" of free publicity and advertising.

AM Boost

(continued from page 3)

signals.

If most listening takes place in high signal strength areas, without as much of a need to protect adjacent channel interference, than wider audio bandwidth receivers could be incorporated, he said.

Future NRSC meetings have been scheduled for 5 March in Washington DC, 11 April at the NAB Convention in Dallas, and 7 May in Kansas City. At press time, a 4 February meeting in Kansas City was to be held as well.

The NRSC, a joint committee of the NAB and the Electronic Industries Association (EIA), is comprised of receiver manufacturers and broadcasters.

For more information on the antenna testing program or the NRSC, contact Mike Rau at the NAB: 202-429-5339.

Readers' Forum

Got something to say about *Radio World*? Any comments on articles? Call us at 800-336-3045 or send a letter to Readers' Forum (*Radio World*, Box 1214, Falls Church VA 22041).

Underwrite receivers

Dear RW:

It would seem reasonable that AM broadcasters work together to underwrite the cost of development of excellent AM receivers. This could be done by offering manufacturers free advertising equal to the amount of the development and marketing costs of these receivers.

Naturally, the receivers would need to be stereo, with variable bandwidth. They should be digitally tuned, with the capability of tuning in AM and FM bands without having to switch to either AM or FM, and would utilize PPL synchronous detectors.

Delco, Sharp, Hitachi or someone should be interested in a deal such as this. With, say, 2500 AM broadcasters and a $5 million effort, each broadcaster would be liable for $2000 worth of advertising on the company's behalf.

Without some effort on broadcasters' part, we may have quality receivers on the market within 10 years. With a good push, it might happen in one or two years. It would be worth the effort.

Dave Jordan, GM
WNRG, Grundy, VA

RW *replies: Not bad! Anyone else agree?*

Shocked and horrified

Dear RW:

Here's my response to Bart Walker's letter (RW, 1 December).

I was shocked and horrified to read his letter. While I may agree with his assessment of C-QUAM over the Kahn system, I could not believe my eyes.

"Engineers should be *silenced* by their management," and "Management should put its foot down" are statements I, for one, do not expect from the normally intelligent and fair-minded individuals involved in broadcasting.

Attitudes such as Walker's make the continuance of restrictive labor organizations necessary. Last time I looked, everyone (including engineers) had the right to free speech.

As far as I'm concerned, no one area of the country and no one city is so dear that I could not move on and find more tolerant management somewhere else, rather than be "silenced."

Dick Salter
CE WXVI, Montgomery, AL

Answering again

Dear RW:

Here's more on telephone answering devices.

At KDYN the RPU receiver was already at the FM transmitter on a nearby mountain, but the line cost was getting out of hand.

Therefore, we decided to use the standard telephone at the transmitter building to return the audio. Since our more distant ballgames are carried on phone anyway, the loss of quality would actually give us consistency.

I made two modifications. One was to loop the 24 V supply through the squelch relay contacts so that the unit will not answer the phone unless the RPU transmitter is on. I also added an R-C delay to the holding relay so that someone walking in front of the antenna or kicking the plug out will not immediately hang up the phone.

Maybe someone else can use this variation.

George Whitaker, Tech Consultant
KDYN-FM, Ozark, AR

RW *replies: Thanks for the ideas.*

Corrections

The phone number following the review of the QEI Model 691 was incorrect in the 15 January issue. The number is 609-728-2020.

Due to quirks in translating from software to software, several of the equations in the C-QUAM article by Delta Electronics' Tom Wright in the 1 January issue were garbled.

In the last line of the fourth paragraph, the equation should have read $t=0$.

In the second column, fifth line from the top, the equation should have read $W_c - W_m - W_c - W_{m'}$.

In the third column, the first two lines should read "If vectors U and V are added, U_I will exactly cancel V_I . . . ."

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

Should an organization such as the SBE engage in product endorsements? Is it appropriate for the editor of *BE* magazine—an SBE member who is also the editor of SBE's newsletter, *The Signal*—to suggest that the SBE endorse *BE* in return for advertising space? Does this type of activity constitute a product endorsement?

While the answers to these questions seem obvious to us, it appears that they weren't obvious to the SBE Board of Directors last September 26th.

Certainly most would agree that the society is an important organization in the industry, and that anything it can do to strengthen itself is wise. But, if the SBE feels it can benefit from an alignment with an industry publication, it must do so in a manner which does not demean the society.

SBE/BE: To Whose Benefit?

It should have been obvious to the members of the SBE board that the publication endorsement they were asked to give would be used, or misused (see sales letter below), in a competitive selling environment.

Fortunately, during the recent SBE Executive Committee meeting, the wording of the publication endorsement was changed slightly so that it no longer has much meaning. But this action neither undoes damage already done nor relieves the board from the responsibility of defining its relationship with *BE* in detail. Who is benefiting, how and to what extent?

This incident outlines a longstanding SBE shortcoming—poor communication between the leadership and the membership. At the minimum, chapter chairmen should have been advised of the *BE* endorsement, if not asked for an opinion *before* a vote was taken by the board.

As with the name change incident a few years back, the board would be better off postponing voting on matters of great importance to the society until it solicits the opinions of members. This can save the board from taking the wrong steps.

In this case, the SBE President and Board of Directors need to be much more businesslike in their current and future arrangements with *BE*. The appearance of improper action must be avoided at all costs in order to maintain credibility, a quality that is crucial for any professional society.

Lest we be accused of "sour grapes," it should be noted that neither RW nor its sister publication *TV Technology* is interested in aligning itself editorially with any trade organization or special interest group. As news publications, we cherish our editorial independence.

—RW

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[redacted]

Dear [redacted]

On September 26, 1985, the Society of Broadcast Engineers granted its official recognition exclusively to Broadcast Engineering magazine. In doing so, the SBE called BE "the preeminent technical publication serving the broadcast industry."

That, coming from one of the nation's largest and most respected broadcast organizations, is quite a testimony to BE's editorial excellence and influence in the industry. Which also makes it a testimony to the BE advertiser's good judgement. Because, simply put, if BE is the most highly regarded and influential broadcast publication, it is certain to be best-read by your prime buying prospects...engineers. No other magazine could support such a claim with independent verification.

BE is indeed proud of its long-standing and productive relationship with the SBE. And we look forward to continuing our dedicated service to the broadcast engineer--and the industry's advertisers--as "the preeminent technical publication serving the broadcast industry."

Sincerely,

Joe Concert
Marketing Manager

Station Facing RFR Deadline

by Edward Wytkind

Garberville CA ... A California FM station is in conflict with state officials, who claim the station's radio frequency radiation (RFR) levels pose a health threat to forest rangers working atop a watchtower located near the station's tower.

As a result of the conflict, the station, KERG, Garberville, Calif., has been operating at reduced power. The station must solve the RFR conflict before the next fire season, beginning approximately 1 May, or be faced with continued operation at low power, without a formal class C license.

> *"This conflict is only one of several around the US between broadcasters and state authorities."*

This conflict is only one of several around the US between broadcasters and state authorities. In this case, the FCC has shown a willingness to comply with the state's demands.

The KERG incident surfaced last August after officials from the Telecommunications Division of the California Department of General Services (CDGS) measured RFR levels around the fire watchtower, which preceded KERG's facilities.

State authorities discovered that KERG's transmitter emitted RFR levels exceeding the federally recognized American National Standards Institute (ANSI) standard, according to the CDGS Supervising Engineer Larry Mertens.

Severe power reduction

After receiving complaints in August 1985 from the California Department of Forestry, which mans the fire tower located only 66' from the KERG tower, the FCC reduced KERG's power level from 51 kW to 2 kW and granted the station a program test authority (PTA).

The station was given until California's next fire season to resolve the RFR problem, FCC Engineer William Hassinger explained.

Mertens said "(the) logical engineering approach would be for the station to increase vertical separation" by raising the broadcast tower. This move, Mertens explained, would decrease RFR levels and would probably improve KERG's signal.

KERG engineering consultant Neil Smith of the Washington DC- based firm Smith and Powstenko said the station is working toward a solution and will probably apply for a tower height increase, which should resolve the RFR problem.

In early 1983, KERG went on the air as a class A FM. Following rule changes created by the FCC's Docket 80-90, the station applied for a class C allotment in order to operate at a higher power level, which would help its coverage over the area's rough terrain, said Smith.

After it received a class C allotment,

(continued on page 8)

FCC Awaiting Final Accord with Mexico

Washington DC ... As of late January, FCC officials said they had no idea when Mexico would be ready to sign a final agreement that would allow US daytimers operating on Mexican clear channels to add nighttime operations.

"We just don't know. We're still waiting," said FCC Attorney Jonathan David. However, he said he hoped the agreement could be penned by March.

Though a preliminary agreement was signed 16 August 1985, the date of the final accord, which had been expected by November 1985, was delayed by damage that Mexico's communications authority suffered in a September earthquake.

David said that the Commission has received word from Mexican authorities that all necessary documents, including lists of affected stations, have been delivered to the appropriate offices in Mexico.

Once the final agreement is signed, it will take 90 days for the FCC to issue show cause orders to daytimers on 540, 730, 800, 900, 1050, 1220 and 1570 kHz specifying their nighttime power levels.

Once signed, the agreement will also allow other daytimers to expand their postsunset (PSS) authority past 6 PM, local time. Show cause orders are not needed because the FCC has informed stations of their PSS power levels.

For more information, contact Jonathan David at the FCC: 202-632-7792.

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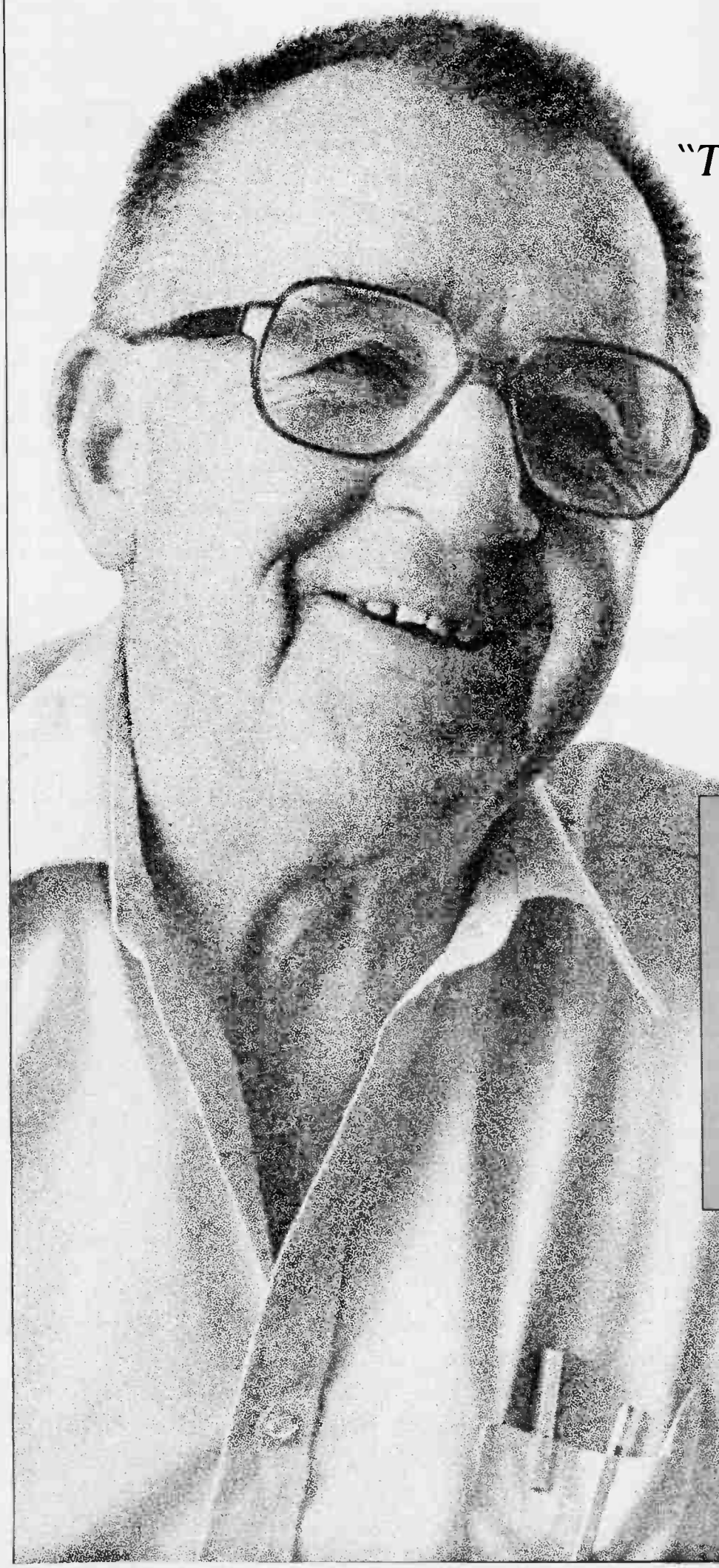

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Comments Reject MBI Petition

(continued from page 3)
rejected repeatedly."

The NRBA objected to the MBI plan because "it would enable primary stations to extend their coverage into areas they are not licensed to serve and for which they would have no legal responsibility in terms of meeting local community needs and interests."

"If permitted," the NRBA said, "the expanded coverage of translator facilities could eventually destroy the concept of localism and the present responsibility of licensees under the Communications Act to meet the needs of their communities and to be responsive to the people they serve."

> *"The expanded coverage of translator facilities could eventually destroy the concept of localism."*

Restrictions needed

KPSI Radio Corporation, Palm Springs, CA, recommended that if the FCC accepts the MBI plan, it should include a provision "that would restrict the use of satellite and microwave feeds to those situations in which the parent noncommercial educational FM broadcast station can show a bona fide need for the service to be provided by the proposed FM translator."

KPSI agreed with MBI in that the current rules prohibiting satellite and microwave feeds can limit the service of noncommercial FM operations.

"However," KPSI added, "if Moody's proposal is not limited in some manner, a single noncommercial, educational FM station could establish FM translators anywhere in the US, without regard to need or relationship" to the primary station's area.

In addition, KPSI said it did not want to see commercial stations having the right to feed their translators by satellite or microwave.

While no technological distinction can be made between noncommercial, educational FM translators and commercial translators, KPSI said that "enormous differences" in the needs of and impact on local broadcast services could result from satellite or microwave fed FM commercial translators outside the 1 mV/m contour of the originating station.

While MBI's request only involves noncommercial FM stations, the NRBA said that, if the Commission approved the MBI plan, it would be "hard pressed not to similarly liberalize its coverage rules with respect to commercial translator facilities."

"If there is a substantial increase in the number of FM translator facilities, the competitive balance would be upset as markets become increasingly fractionalized by outside signals," NRBA added.

Family Stations, Oakland, CA, which owns several FM stations, said it "supports without reservations" the MBI plan. It added that it would "create new opportunities to provide educational programming of the highest quality to unserved and underserved areas."

Unlike television, FCC regulations require that the FM translators must be able to receive their input signal over the air from the primary station or another translator. MBI said the requirement "limit(s) translators to the retransmission of a broadcast quality signal received off the air from the primary station or an intervening translator."

Satellite feeds would also allow translator service in more rural, remote areas, MBI said.

Docket number of the request is RM-5219. For more information, contact John Reiser at the FCC: 202-632-9660.

KERG Faces State, FCC RFR Deadline

(continued from page 6)
KERG was granted a PTA to operate on a 2000 ' tower at 51 kW. The state, after conducting site measurements, challenged the PTA by complaining to the Commission that fire lookout rangers working directly in the path of the station's main signal were being exposed to hazardous levels of RFR.

The FCC acknowledged that a problem existed and reduced the station's power to 2 kW, Hassinger said. KERG challenged this action and managed to obtain a power increase to 18 kW.

After the power increase, state officials went to the site to again measure RFR levels, and urged the FCC to reduce the station's power. The FCC again complied with the state's request and reduced KERG's power to 2 kW.

Justifying the Commission's action, Hassinger maintained that KERG's reduced power level on a 2000 ' tower in such a rural area was still sufficient to reach the station's audience.

With the problem still unresolved, the station has yet to receive a formal license and is temporarily operating at 51 kW until California's fire season begins in the spring. However, as ordered by the Commission, KERG must resolve the matter before the conflict begins again in May.

The state's position

Mertens said the station will either have to raise its antenna or relocate its tower. He maintained that the California Department of Forestry is not planning to move the lookout tower because it is a "vital part of the state's fire protection program."

"When we (the state) put the rangers back on the watchtower, radiation levels better be down, or we'll again request a power reduction," Mertens warned.

However, Hassinger said the RFR problem must be resolved before the fire season begins because the Commission "has no intention of going through this thing again."

Smith added that while he recognized that a problem exists, he was concerned that this could be a "lead case" on how the FCC plans to handle RFR conflicts with state authorities.

An example

Electromagnetic Energy Policy Alliance (EEPA) President and NAB legal counsel Barry Umansky said this case should serve as an example to broadcasters of how complaints regarding hazardous RFR levels can cause a station severe hardship.

Umansky urged stations, regardless of whether a renewal or facility modification is coming up, to determine compliance with the FCC's new RFR regulations, which became effective 1 January 1986.

"This is good evidence to have in the event of a complaint," he added.

For more information, call William Hassinger of the FCC at 202-632-6460.

Run Program Using BASIC Dialects

by Peter Burk

Harvard MA ... In the 1 October RW, I presented a short Basic program for calculating pads. Bob Groome from Allied Broadcast Equipment tried to run the program on his OSI machine. He found that his Basic didn't like a couple of the instructions, and provided a more universal approach.

In particular, the SWAP and INSTR commands need to be implemented discretely for many dialects of Basic. Listing 1 (Figure 1) is a corrected version of the program that should run on just about any Microsoft Basic.

Other Basics may still require some adjustments. Northstar, for instance, doesn't know about LEFT$. Just substitute T$(1,1) in line 45. The listing also corrects a problem in calculating "O" pads.

To save you the trouble of digging out the original issue, the program asks you for the input and output impedances, desired attenuation and type of pad ("T", "H", "PI", or "O"). It then calculates the necessary resistors. You'll find it especially useful when you have to match oddball impedances that aren't on your chart.

The second listing (Figure 2) is another program that comes in handy for sizing cables, especially for long runs. If you have relays or contactors in a tuning house some distance from the transmitter, for instance, you want to make sure you've got a good, healthy source of power so that they pull in reliably.

This program asks you for the length of run, the source voltage and the load resistance, then prints the voltage that will make it to the load for various wire gauges.

Listing 3 (Figure 3) is a trial run of this program. Try this one on your existing cabling. It may explain why those changeover relays are a little sluggish.

Let me know if you find these programs helpful. We'll try to include others within subsequent articles.

Peter Burk, with Advanced-Microdynamics, is a regular RW contributor. Call him at 617-456-3570.

Figure 1. Corrected PAD Program.

```
10 DEF FNA(Z) = F*(Z*NT-R3) : DEF FNB(Z) = 1/((1/Z)*NT-1/R3)
15 A$ = "" : B$ = "EACH " : C$ = "" : F = 1
20 A1$ = "SERIES " : B1$ = "SHUNT " : D$ = "RESISTOR: "
25 INPUT "   Desired attenuation (dB): ",DB
30 N = 10^(DB/10) : NT = (N+1)/(N-1)
35 INPUT "   Input Impedance:          ",Z1
40 INPUT "   Output Impedance:         ",Z2
45 INPUT"  Type   (T,H,PI,O):     ";T$:  T$=LEFT$(T$,1)
50 IF T$="H" GOTO 55
51 IF T$="T" GOTO 60
52 IF T$="O" GOTO 65
53 IF T$="P" GOTO 70
54 GOTO 45
55 A$=B$ : F = .5
60 R3=2*SQR(N*Z1*Z2)/(N-1) : R1=FNA(Z1) : R2=FNA(Z2) : GOTO 80
65 A$=B$ : F = .5
70 T$=A1$:A1$=B1$:B1$=T$:T$=C$:C$=A$:A$=T$
75 R3 = (N-1)*SQR(Z1*Z2/N)/2 : R1 = FNB(Z1) : R2 = FNB(Z2)
76 R3 = F*R3
80 PRINT : PRINT A$ "INPUT " A1$ D$ TAB(30) R1
85 PRINT C$ B1$ D$ TAB(30) R3
90 PRINT A$ "OUTPUT " A1$ D$ TAB(30) R2 : PRINT : GOTO 15
```

Figure 2. EDROP Program for Microsoft Basic.

```
10 FOR J = 1 TO 10
20   READ G(J),R(J)
30 NEXT
40 INPUT "Length of Run (Feet): "; L
50 INPUT "       Source Voltage: "; ET
60 INPUT "      Load Resistance: "; RL
65 PRINT
70 PRINT "AWG";TAB(10);"Voltage at load"
80 FOR J = 1 TO 10
90   PRINT G(J);TAB(10);ET/(L*R(J)*.002+RL)*RL
100 NEXT
110 PRINT
120 GOTO 40
130 DATA 4,.2485,6,.3951,8,.6282,10,.9989,12,1.588
140 DATA 14,2.525,16,4.016,18,6.385,20,10.15,22,16.14
```

Figure 3. Trial Run of EDROP program.

```
RUN
Length of Run (Feet): ? 1000
      Source Voltage: ? 24
     Load Resistance: ? 100

AWG       Voltage at load
 4          23.88131
 6          23.81184
 8          23.70221
 10         23.52992
 12         23.26122
 14         22.84627
 16         22.21564
 18         21.28226
 20         19.95013
 22         18.14333

Ok
```

Microsoft BASIC Interpreters Different

by Bob Groome

Richmond IN ... The PAD program in the 1 October RW is both an excellent and compact way to derive resistant pads.

However, as written, it would not run on my computer, which sports a Capitol Microsoft 8K Basic interpreter.

As unusual as it may seem, not all Microsoft Basic interpreters are the same. For those folks who have OSI, Apple, Commodore, etc., Microsoft interpreters, substitute lines 45 through 54 and add 55, 65, 70 and 72 below to make this program play (see Table 1).

The SWAP command simply interchanges the values for the two string arrays.

The INSTR command searches through a string looking for the (N) character, counting over from left to right the number of spaces until it finds it, and reports this back as the answer.

Bob Groome is a sales engineer for Allied Broadcast Equipment. He can be reached at 317-962-8596.

Table 1.

```
45    INPUT"  Type  (T,H,PI,O):      ":T$: T$=LEFT$(T$,1)
50    IFT$="T"GOTO60:                REM WAS "ON INSTR
51    IFT$="H"GOTO55:                REM ( "HTOPI",T$)+1
52    IFT$="P"GOTO70:                REM GOTO 45.45,55,60,
53    IFT$="0"GOTO65:                REM 65,70"
54    GOTO45

NEW NUMBERS

55    S1$=A$:A$=B$:B$=S1$:F=.5:          REM SWAP A$,B$
65    S1$=A$:A$=B$:B$=S1$:F=.5:          REM SWAP A$,B$
70    S1$=A1$:A1$=B1$:B1$=S1$:           REM SWAP A1$,B1$
72    S1$=A$:A$=C$:C$=S1$:               REM SWAP A$,C$
```

Audio Processing Growth Rapid

Editor's note: The following article is the first in a series on the evolution and current state-of-the-art techniques used in electronic audio processing.

by Steve Keating

Tarzana CA ... Back in the early 1960s, when I began my career in radio, audio processing was nothing more than an automatic, electrically controlled amplifier that was designed to condense the widely varying studio program levels feeding the transmitter into a more narrow range.

Simply stated, this device "read" the audio level coming into it at any given moment, and then quickly adjusted the output level to stay within preset limits. One of the shortcomings of these units was their inability to differentiate between segments of the audio spectrum. This resulted in bass transients, such as a bass kickdrum, "punching a hole" in the overall program content, producing an obvious, and often annoying, momentary drop in total volume which sounded very unnatural.

As recording equipment manufacturers achieved greater fidelity, lower distortion and minimal noise levels in professional broadcast gear, it became apparent that unconventional program processing methods were called for by broadcast stations to allow transmission of technically higher quality program content while permitting simultaneous maintenance of maximum transmission volume levels. These two complex technical demands were seemingly contradictory.

Marked success in this difficult endeavor was realized by the electronic "separation" of the entire music range into specific "groups." This is done by applying the same gain control technique—as had previously been used on the total spectrum—then combining the individually treated segments of the tonal range together. Now, however, the new mix was free of undesirable side effects, with no one range of tones substantially affecting any other. Careful mixing of the controlling signals of each of the separate groups of tones produces a smooth final product that is largely free of audible processing characteristics.

This was a major step forward in the improvement of broadcast audio processing technology. The result was a higher apparent loudness on the dial, without totally ruining the program's original dynamic range. Eventually, "loudness wars" broke out in the major markets and quickly spread to all markets.

Rise in FM popularity

During this time, the shift in popularity from AM to FM stations grew, largely due to the inherent higher fidelity and

> *"The result was a higher apparent loudness on the dial."*

lower noise and static content of the FM transmission/reception process. Increased availability of combination AM/FM-stereo "mobile" radios in everything from bicycles to RVs encouraged the transition.

FM's limitation of signal range became less of a factor to audiences due to the growing number of FM stations signing on and filling in the FM broadcast band.

Burgeoning FM popularity required that a modern program source's "high fidelity" be preserved, (i.e., the elimination of second generation cart or reel dubs); FM also had to have lower secondary defects, like transient noise content (i.e., clicks on a vinyl disc), and less of any form of distortion previously acceptable for AM broadcast stations. These discrepancies were often "masked" by the narrow AM transmission limits and receiving equipment.

As the competition among all broadcasters intensified, a myriad of revolutionary processing techniques were explored. Evidence surfaced quickly in major and small markets alike that, if local broadcaster's were programming similar formats, more listeners tended to select the station that sounded more powerful. Though the station that seemed louder on the dial was not necessarily electrically potent, "dial presence" or sheer den-

(continued on page 13)

'Real-World' Capacitor Behavior

by Bill Sacks

Arlington VA ... The capacitor is one of the oldest of electrical components. They even pre-date the chemical battery.

Volta, the inventor of the modern chemical battery, coined the term "condenser" (for you young folks, that is the antique term) in 1782. The popular belief at that time held that the "electric fluid" was being condensed. The modern term

Straight Talk

"capacitor" came into use with the advent of alternating current applications. The Leyden jar, first produced by Pieter van Musschenbrock, dates from 1745 and is named after his town of Leyden, Holland.

Leyden jar progress

This first 'condenser' consisted of a glass vial containing water and plugged with a cork. The cork was pierced by a nail which touched the water. The water (impure) acted as one electrode and the hand of the person holding the vial acted as the other electrode. The glass vial was the dielectric.

In a major development for the time, Mr. J. H. Winckler of Leipzig wrapped a chain around the vial to replace the hand electrode. In 1746, Dr. John Bevis of London placed a lead lining inside and outside the glass, giving birth to the modern capacitor. This is the form that Leyden jars took for over 200 years. Please note that a 1 μF Leyden jar would have been the size of an office elevator.

Shocking experiments

Leyden jars were instrumental in early electrical experiments, as evidenced in a quote about Winckler's experience:" ... the first time he tried the Leyden experiment, he found great convulsions by it in his body and that it put his blood into great agitation; so, that he was afraid of an ardent fever, and was obliged to use refrigerating medicines. He also felt a heaviness in his head, as if a stone lay upon it. Twice, he says it gave him a bleeding in his nose, to which he was not inclined. His wife received the shock twice, and found herself so weak that she could hardly walk; and a week after, upon recovering courage to receive another shock, she bled at the nose after taking it only once." That quote is from *The History and Present State of Electricity* by Joseph Priestly, c. 1775.

The first "practical" use of the Leyden jar was to kill small birds in order to entertain the ladies of the French court.

Ben Franklin subsequently found that by 'cascading' the jars, he was able to kill a chicken. He was not, however, able to kill the tough native American bird, the turkey. Perhaps a few more kite flying experiments would have done the trick.

Capacitors remained a laboratory curiosity until the proliferation of alternating current. Michael Faraday, affectionately known as the father of the farad, systematically studied the dielectric characteristics of materials. He called this property "specific inductive capacity," or "dielectric constant." The latter term is still used today.

The first commercial application of capacitors was in connection with the telegraph. In 1845, the first mica/tin capacitor was produced. In 1876, the first paper capacitor was produced. Although I cannot find any historical references, I believe that electrolytic capacitors also began to appear around the turn of this century.

Capacitor manufacturing technology became much more refined in response to defense needs during WW II. The plastics industry (which grew partially from electrical requirements and the production of bakelite) spawned many new and exotic dielectrics at this time.

Cellulose esters were the first commercial film dielectrics. They were developed in the search for better impregnants for paper capacitors, leading to a synthetic wax impregnant for paper called chlorinated naphthalene. It's better known by the brand name Halowax, which is derived from coal-tar products.

Halowax paper capacitors were first used extensively in the telephone system, because of their enhanced reliability compared with natural wax paper capacitors. The majority of modern plastic capacitors are constructed with the same basic technique as the old extended foil paper types.

The most exciting plastics development at that time was the invention of polystyrene. I would like to quote from the book which I have used as a reference for some of the above historical information. The book is called *Capacitors: Their Use in Electronic Circuits* by M. Brotherton, Ph.D., published in 1947 by Van Nostrand Company as part of a series by the technical staff of the Bell Telephone Laboratories.

"Indicative of the possibilities of the class of synthetics known as plastics are the unusual characteristics of polystyrene. The flexible material comes in thin sheets which can be wound like paper. Polystyrene capacitors are remarkable for their low AC loss (that is, high Q), in which respect they equal or excel mica. They are also remarkable for their low dielectric absorption, outstripping even mica in the speed with which they take up and release electric charge; a valuable characteristic in circuits where speedy electrical response is essential."

Capacitors affect audio

Polystyrene capacitors are still among the finest sounding capacitors available today. An ideal capacitor is simply a device for storing electrical energy, and should not have any sonic characteristics of its own.

In order to understand how capacitors can affect an audio signal, we should review the complex characteristics of real world capacitors.

The characteristic of dielectric absorption is the reason why high voltage capacitors must always be stored with a shorting strap across their terminals. If you were to fully discharge a large capacitor, then leave it alone with its terminals open and came back later to measure it, you will find a potential across the plates. This potential appears because some energy is absorbed by the dielectric material and is released slowly (after the capacitor has been apparently fully discharged by a short circuit).

Tantalum and aluminum electrolytic types as well as cheaper ceramic types are notorious for having high dielectric absorption factors. I believe this characteristic is an important factor in maintaining the subtlety of an AC waveform. The only dielectric which has virtually zero absorption is a vacuum.

DC Leakage: Dielectrics vary greatly in their DC leakage characteristics. The DC leakage of a capacitor is analogous to a high value resistor in parallel with a capacitor.

Vacuum capacitors have the lowest DC leakage, which is dominated by the leakage of the glass case. This is why vacuum capacitors should be kept clean, especially when high DC voltages are present, since surface deposits are generally much better conductors than the glass. Electrolytic types are the poorest performers for leakage.

Effective series resistance, or ESR, is an important factor whenever speedy response is required from a capacitor. ESR is the resistance of the plates, leads and welds. Anyone who has observed the heat rise in aluminum power wiring can understand why aluminum electrolytics are poor ESR performers.

Series inductance is another critical capacitor characteristic. All real-world capacitors behave as though a small coil were in series with them. The requirement for low-series inductance becomes more acute as the operating frequency of an AC circuit increases. At a critical frequency the capacitor becomes self resonant, and inductive above that frequency. This is why wound capacitors are never used for RF coupling or bypass applications.

AC resistance is another important characteristic for real-world capacitors. A capacitor dissipates some AC energy in the form of heat. This is why motor capacitors get hot, and are prone to failure.

The combination of inductance, resistance and capacitance produces a complex impedance (hopefully dominated by the capacitance) which must be considered in selecting the proper capacitor. Sometimes the only thing that will fit in the box is an electrolytic type (and nothing beats them for raw energy storage in a power supply). Electrolytic capacitors also have the highest volumetric efficiency of any type.

(continued on page 14)

Bill Sacks, president of Straight Wire Audio, Inc. is a regular Radio World contributor. Call him at 800-368-2081.

Digital Multimeters Win Admirer

by Mark W. Persons

Brainerd MN ... I've been a fan of quality Beckman Digital Multimeters since the purchase of my first Beckman Tech 310 in 1979. I purchased two Beckman Tech 360s when they were first made available in 1981. The price was $289 each and worth every penny. Digital multimeters made a profound difference in my troubleshooting ability. Accurate, RF-free indications helped me do the job far better.

Mark Persons is an engineering consultant and president of M. W. Persons and Associates in Brainerd, MN. He can be reached at 218-829-1326.

Beckman recently introduced the Circuitmate DM10 and DM10B Digital Multimeters which follow in the famous footsteps just described. However, this series is extremely inexpensive. List price is $39.95, or $49.95 for the "B" model with audible continuity beeper.

The folks at Beckman must have known years ago that they would be able to produce a truly inexpensive multimeter someday. The model numbers on earlier series meters are higher than the one described in this article.

The meter comes with test leads, spare fuse, 9 V battery and an operator's manual. A model VC-12 soft plastic carrying case with Velcro lid fastener is available for a few dollars extra.

The DM-10 has a high contrast ½", 3½ digit LCD display. It measures DC voltage in five ranges from 200 mV to 1000 V, with a rated accuracy of ±8% +1 digit. Yes, that's right, with 200 mV full scale, you can see 0.1 mV of DC.

The AC scales are not so elegant. However, 0.1 V can be resolved on the lowest (200 V) scale and 1 V on the highest (1000 V) scale. The resistance function is good, and has the ability to read 0.1 ohm on the 200 ohm scale. The upper resistance limit is 2 megohms, which is a practical limit for most applications.

The DM10 has the ability to read DC current to 200 mA (0.2 amperes). A 0-20 ampere scale would have been more appropriate for today's low-voltage, high-current solid state circuits. I personally have not found much use for this function in my day-to-day troubleshooting. It's easier to determine current in a circuit by metering voltage across a resistor, when one is available. This is better than cutting a lead to insert the meter.

The unit has a "diode" function to read the forward voltage drop on a diode. This is a very nice feature, as the user can easily tell if the diode he is measuring is germanium or silicon. The germanium diode will have about 300 mV forward drop, and the silicon about 700 mV. This same test can be used on the junctions of a transistor.

Power to run the meter comes from a standard NEDA 1604 9 V battery. Beckman says battery life is 150 to 200 hours. There is a "LO BAT" indication on the LCD display to warn the user when the battery is down.

As you can see, the Beckman DM 10/10B is not an expensive lab instrument, but is instead an inexpensive service meter. Its 4¾"×2¾"×1" size makes it handy to put in a tool box.

The frosting on the cake is that it works in high AM and FM environments. Not bad for $39.95.

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Telco Circuit Simple

by Gary Street

Grundy VA ... After reading and looking at all of the telephone answering circuits sent in, I would like to describe a simple one that I built and use.

The circuit uses an opto coupler to answer the telephone line, a 560 ohm resistor to hold the line while information is passed to and from the line through a transformer, a 7402 IC to give the circuit some logic signals outs, and a NE 555 IC for automatic timing out shutdown.

The circuit has external connection for audio in and out; external switching; logic high or low out for logic starts; external out for holding timing longer than auto internal; timing selectable in long or short timing cycles for automatic time out shutdown; test run switch for setting automatic time out cycle period, and answer for just about any ring voltage.

Our stations are located in a remote, mountainous area of Southwest Virginia (the studios are located in a valley between sharp mountains). NOAA Weather Service reception is near zero at this location.

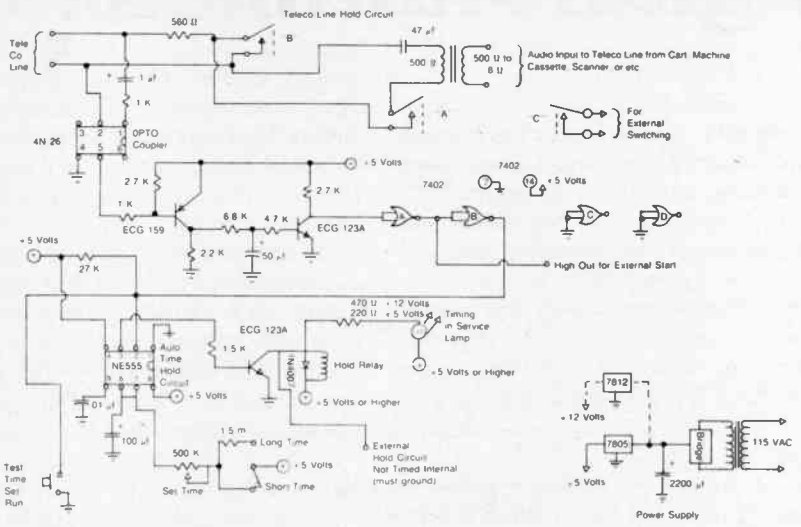
A weather receiver was set up at our remote mountaintop transmitter site (approximately 2300' above sea level) to receive NOAA Weather from approximately 90 miles south.

A full quieting signal at this elevation is received from NOAA. The problem is how to get the NOAA Weather from the transmitter building to the studios. By dialing our transmitter building phone number, the telephone answering device answers, the phone line is connected to the weather receiver, and for a period of automatically preset time, the signal is sent to our studios via phone line, where it is recorded and edited for usage.

This is only one use of the answering device. The inquiring mind could come up with many more.

Gary D. Street, CE of WNRG-AM and WMJD-FM, can be reached at 703-935-2587.

Figure 1. Telephone Answering Circuit with Automatic Time Out cut off Dual Timing Period



Device Low-Cost, Easy to Build

by Mike Rabey

Indianapolis IN ... I think WTPI's auto-answer device stands out in terms of both simplicity and low cost. If you have the audio transformer lying around the shop, you can build this thing for about $5.

Mike Rabey, CE of WTPI, can be reached at 317-638-1079.

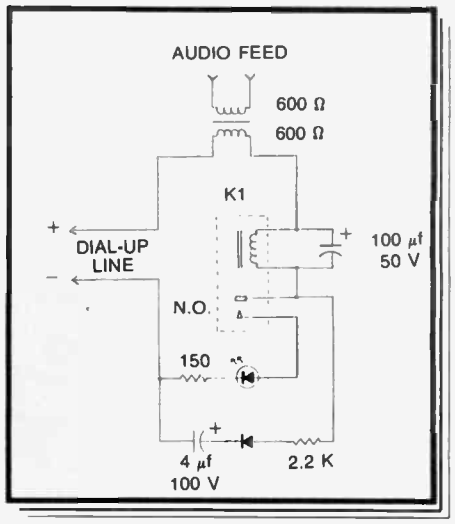
The heart of the device is a sensitive, low current relay. Radio Shack #275-004 is ideal, and the price is right ($3). The other components were chosen to match the characteristics of the relay.

The bottom leg of the circuit passes the AC ring voltage, rectifies it and applies it to the relay coil. When the relay closes, it latches and holds the line until the caller hangs up. When the line voltage drops, the relay opens, freeing the line for the next call.

The LED indicates line usage. When it is conducting, it looks like a straight wire to the audio riding on the DC line voltage. Select an LED rated at least 40 mA forward current.

The 100 µF capacitor serves two purposes. When the ring voltage is applied to the relay coil, this capacitor smooths it and helps hold the relay closed until it is latched. Then the capacitor bypasses audio around the 500 ohm relay coil.

This circuit has worked well for us here at WTPI. Try it—it's just the thing if your PD wants to monitor the morning man while he's on vacation in Aruba.



Audio Processing Grows

(continued from page 10)

sity, resulting from use of new audio processing techniques, allowed listeners to think them so. Commonly owned AM and FM stations, whether simulcasting or programming vastly differing formats, soon found themselves in competition with each other.

A barrage of new processing schemes and mysterious new devices flooded the broadcast equipment marketplace. All claimed to deliver a louder, more powerful on-air sound.

Competition among manufacturers became as intense as the competition between their customers. New products emerged from established and new companies alike almost overnight.

A by-product of this revolution was the dramatic alteration in the dynamic range from that of the original program (the difference in volume between the loudest and softest passages of any audio material) to a more condensed, "punchier" version. Out of numerous units developed to achieve this goal, many unique textures or styles of "enhancing" the final broadcast program resulted.

Some traditional engineering personnel resisted the suggestion of employing the new techniques that substantially changed the character of the sound for the sake of sheer loudness, sometimes at the expense of "quality." However, increased competition placed greater demands on programmers who were under the gun to use whatever tools were available to them to deliver higher ratings.

In the next installment of this series, I will delve deeper into the history of the transition from the early, simple audio processing schemes to the rapid development of the more elaborate and complex devices created to substantially "improve" the package of the final broadcast product.

Steve Keating is CE of KMET, Los Angeles. He can be reached at 213-464-5638.

Muttered Midwinter Miscellany

by Mark Durenberger

Minneapolis MN ... In the 15 December RW Readers' Forum, Bob Hoy was taking someone to task on another version of a telephone auto-answer system. I first met Bob several years ago and have always been impressed by his work; it's innovative, practical and well thought out, and his auto-answer idea is a good one.

Engineering Views

That's not to suggest, however, that there aren't another dozen ways to build an auto-answer. As part of this month's miscellaneous mutterings, I too succumb to the temptation and hereby offer still another version or two. The interesting thing about the circuit of Figure 1a is that it will sense a line drop and disconnect itself.

My candidate for the simplest of all auto-answer detectors is the Texas Instruments TCM 1520A, shown in Figure 1b. It provides a logic output upon ring sense, is powered by the phone line itself, and is available in blister packs at your favorite electronics house. However, it does not provide a disconnect function.

Ever wonder why most telco DC interface circuits display a bridge rectifier in the tip/ring path? It's called a "polarity guard," and one of its purposes is to deliver the same DC polarity "downstream," even when tip and ring are reversed. You may be aware that a tip/ring reversal will prevent a phone from performing its tone-dial functions unless such a polarity guard has been installed. Indeed, most newer phones have them as standard equipment.

You can build your own, or buy type-approved bridges from TI, Motorola and many other telecommunications chip-set manufacturers.

Here's one final fone idea. Credit for this one goes to Bob Rotzoll of our KOB, Albuquerque engineering staff, who came up with the line-powered oscillator shown in Figure 2. The 850 Hz oscillator turns off when the phone line rings. You may find this of some use outside the station.

The December issue of *IEEE Communications* magazine is a treat for those of you who are watching the AT&T divestiture and calculating its effects on your life. Called "Divestiture: Two Years Later," this issue will bring you up to date.

Included are the results of a USTA-sponsored Gallup poll of residential telephone customers. Results include what I would call some surprises, such as the fact that a majority of respondents say they understand many of the changes in the industry. This issue is recommended reading. If you're not an IEEE member, try your local library, or call a member friend.

It had to happen ... digital creates the ultimate player piano!

In this case it's the superb Bosendorfer concert grand. An AES-related press demonstration in New York recently introduced the 290SE, which is interfaced with high-speed optical sensors. Sensor outputs were digitally recorded as a remarkably faithful reproduction of the action of the keyboard. Variable-velocity solenoids accept the playback of the digital recording system (I think it was a floppy disk), and translate the digits into piano action!

While you watch the unattended Bosendorfer keys moving, you at once realize this is far more than someone's idea of a toy; it will have immediate practical application in recording studios and elsewhere.

But analog fans take heart! The inter-

(continued on page 17)

Mark Durenberger is a senior RW *columnist and director of Technical Development for Hubbard Broadcasting, Inc. His phone number is 612-642-4257.*

Figure 1a. Another Auto-Answer Dual Opto is MCT-6 or Equivalent

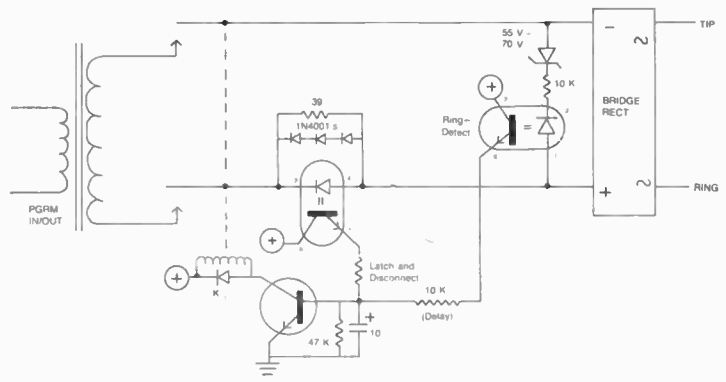


Figure 1b. TI Line-Powered RING-Dector

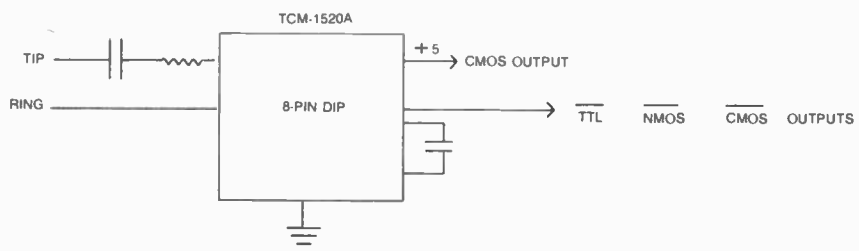
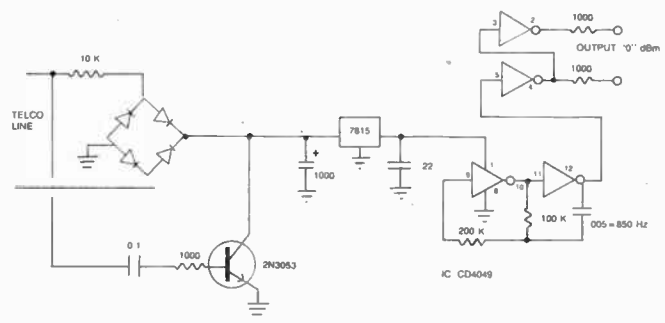


Figure 2. Line-Powered Oscillator Shuts Down When Line Rings



Capacitor Characteristics

(continued from page 11)

It is good practice to place a film bypass capacitor in parallel with any electrolytic which must pass AC. Look at any digital logic board power supply and you will find many high frequency capacitors bypassing the electrolytics. The electrolytics are virtually invisible when it comes to bypassing the high frequency spikes encountered on digital power supply rails.

It is also important to remember that the AC voltage across the capacitor (that is, ripple riding on the DC) must not exceed the DC breakdown voltage of a polarized capacitor. The DC value of the opposite swing of the AC must not reverse bias the capacitor under any circumstances.

Polarized electrolytics act just like diodes in that they conduct DC only in one direction. Two polarized capacitors may be connected in series to form a nonpolarized capacitor. They should be connected like series diodes, to block in both directions; that is either the anodes or the cathodes may be connected to each other.

I'll continue this discussion of capacitors next month with a practical method for judging the quality of audio capacitors.

Until then, happy trails and stay straight!

Satellite Uplinks Cost Effective

Editor's note: The following article is part of a continuing series on alternatives to telco.

by Kent Malinowski

Jefferson City MO . . . Satellite uplinking service is becoming more commonplace today at local radio stations. Broadcasters find satellite uplinks are a cost-effective method of program backhaul service and regional network distribution (see Figure 1).

This article will highlight the various ways radio broadcasters are using satellite communications systems for their programming needs.

Program backhaul

For years radio broadcasters have used telephone lines or Marti units to get their remote broadcast back to the studio. Today, four factors are proving satellite systems can do the job better.

- Cost: The cost of equalized audio lines for the radio broadcaster has become unreasonable for long distance remotes.
- Availability: The availability of equalized lines is a serious problem. Sometimes circuit conditioning is available, but long lead times are required; sometimes phone service is not available at all.
- Flexibility: Phone companies aren't known for their ability to get a circuit moved from one location to another on short notice.
- Quality: High grade lines (up to 15 kHz) are simply impractical in many remote locations.

More radio stations are beginning to realize satellite communications systems will work for their remote broadcast needs.

During President Reagan's Geneva Summit, KMBZ Radio, Kansas City sent their morning team to Moscow. KMBZ wanted to broadcast their morning show from the Soviet Union without changing the format. KMBZ's morning team needed to monitor "air" for their cues, and the remote feed had to be high quality.

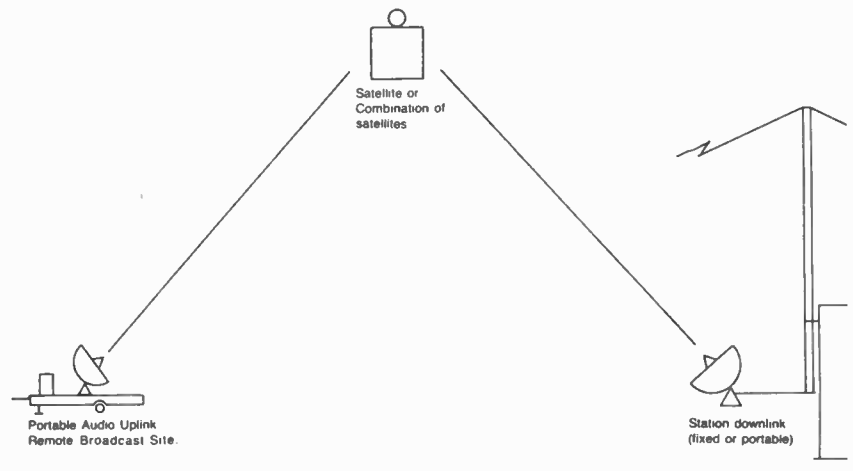
KMBZ contracted with Learfield Communications and IDB Communications for a two-way interactive satellite feed. The Learfield portable uplink provided the link to Moscow for "air audio" from the KMBZ parking lot. It also was the downlink for remote audio coming from the Soviet Union.

The KMBZ Moscow remote was a week-long success.

WLS, Chicago recently contracted for satellite feeds of a remote broadcast a-

(continued on page 16)

Figure 1. Remote Broadcast Backhaul.



Kent Malinowski is GM of Learfield Communications' Satellite Division. He can be reached at 314-636-5141.

Uplinking Now Cost Effective

(continued from page 15)
board a luxury cruise ship while at sea.

Local sports stations have used portable or fixed satellite uplinks for play-by-play backhaul for years. Satellite transmission has also proved practical for the transmission of concerts and other high fidelity remote broadcasts.

There's a variety of occasional transponder time available, with rates below $100 per hour. Fixed and portable uplinks are located at many locations around the country. Fixed uplinking rates can be as low as a couple of hundred dollars per hour.

Portable uplink rental is more expensive, and rates for a broadcast remote can run into the thousands of dollars. Price varies depending upon the length of the event, the distance the portable uplink has to travel, and the audio quality requirements of the broadcast.

Satellite transmission is obviously not ideal for all remote broadcasts. However, whenever high quality, long distance backhaul is required, satellite transmission is worth investigating. Radio broadcasters looking for ways to broadcast unique remote events from great distances have found satellite communications very reliable and cost effective.

The next time the program director dreams up a special week-long remote from the other side of the country (or globe), consider doing the remote via satellite.

Network distribution

By 1990, few (if any) sports network flagship stations will transmit to their network affiliates via AT&T landlines. The cost of mileage and local loops has now exceeded the cost-effectiveness curve of satellite transmitted network feeds.

> *Local sports stations have used portable or fixed satellite uplinks for play-by-play backhaul for years.*

Most of America's baseball networks now use satellite transmission, and professional football team networks are switching from landlines to satellite. Learfield Communications provides network distribution for the St. Louis Cardinals Baseball Network for KMOX Radio, distribution for the Kansas City Chiefs' Network for KCMO Radio, and distribution for the St. Louis Cardinals Football Network for KMOX Radio.

In most cases, satellite transmission is more cost effective when the number of stations on the network exceeds 10. Flagship stations can either purchase the downlinks and uplink system, or can rent services from Learfield's Satellite Division.

Many collegiate sports rights holders now use satellite transmission to feed network affiliates. Learfield owns the rights to half the schools in the Big Eight, and all its networks use satellite feeds. (The only Big Eight school with broadcasts not fed by satellite is the University of Nebraska.)

In addition, Learfield transmits the University of Illinois Sports Network by satellite under contract from Anheuser Busch Sports Production.

Case history: KCMO

In the spring of 1985, KCMO Radio, Kansas City won the radio broadcast rights to the Kansas City Chiefs. KCMO called upon Learfield to construct a turnkey, high quality satellite system for the

(continued on next page)

Satellite Uplinks Cost Effective

(continued from previous page)
Chiefs' broadcasts.

Learfield purchased a mobile audio uplink unit from Advanced Communications Engineering of Palm Bay, Florida. The electronics and antenna are contained on the trailer unit, which can be transported easily behind any tow vehicle. (Learfield uses a mobile home for extended stays to save on hotel bills.)

The uplink unit can be used at KCMO's studio or transmitter, or it can go on the road with the broadcast crew.

Learfield provided occasional transponder time and downlinks. As a result, KCMO's Kansas City Chiefs Network had more affiliates than ever before, and distribution is less expensive and of better quality than that of AT&T.

Instant network

Last year, KNOR Radio of Norman, Oklahoma called upon Learfield Communications to construct an uplink transmitter to be located at KNOR studios. The fixed uplink allowed Stephenson Broadcasting to become a state-wide network overnight. KNOR broadcasts various sports and news programs to a variety of stations across Oklahoma.

Typical fixed, single channel uplinks cost under $75,000. With a survey of radio station downlinks, the proper mix could put flagship stations in the satellite network business overnight.

Background

Learfield Communications Satellite Division is the newest division of the company. The satellite division uses a network of satellite uplink and downlink earth stations around the country to distribute audio programming and data to a variety of clients.

Learfield Communications has recieving earth stations in place at more than 430 radio stations throughout the country. In addition, three master uplink earth stations complete the distribution system.

One is located west of Jefferson City, near Marion, Missouri. It is a fully redundant transmission system with duplicate electronic systems and backup power. The second is a portable audio-only system, and the third is a portable KU band television transmitter.

Learfield Communications provides system design, construction, installation and network operation.

With an extensive audio and data distribution in place, Learfield can provide radio, television video and data distribution for clients, including radio program syndicators and the national weather service with its NOAA state weather wires.

Using other satellite distribution systems at its disposal, Learfield Communications' Satellite Division can offer radio program syndicators satellite distribution to more than 3500 radio stations across America.

'Fundamentals of FM' Class

Annandale VA . . . "Fundamentals of Frequency Modulation," a seven-part course on FM radio basics, will be offered in **Radio World** beginning March 1.

Included in the course will be lessons on: electromagnetic radiation; fundamentals of frequency modulation; the VHF signal; FM broadcast transmission systems; an introduction to subcarriers; FM stereo and FM receivers.

Offered through Northern Virginia Community College, the class will be worth 3.0 CEUs. Cost is $15. Course number is BCST910.01N. Those wishing to take the course should return the registration form to: Office of Continuing Education, Northern Virginia Community College, Annandale Campus, 8333 Little River Turnpike, Annandale, VA 22003.

NORTHERN VIRGINIA COMMUNITY COLLEGE
Director of Continuing Education, Annandale Campus
8333 Little River Turnpike, Annandale, Virginia 22003

Social Security No. _____

Please enroll me in the Community Service Program listed below.

Name _____ (FIRST NAME, MIDDLE INITIAL, LAST NAME) Home Phone _____

Address _____ Business Phone _____

City _____ State _____ Zip Code _____

Course Title _____ Fee: $ _____

Course Code _____ Course Dates and time _____

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

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

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

Midwinter Mutterings

(continued from page 14)
face between the piano and the computer will remain an analog . . . there's just no other way to play a good piano than *smoothly*, and I can't imagine what a Bosendorfer would sound like if every key were hit exactly the same way.

Minnesota winters are long and hard and long and cold and long. Seems that's when we get a chance to get some reading accomplished. I've been getting into the lives of the great inventors and turning up some interesting info . . . I'll share that with you next time. Meanwhile, I've got to go split some firewood.

Last LA Assignment Memorable

by Floyd Hall

Crestline CA ... DID YOU KNOW THAT ... ?

The very last AM assignment to the City of Los Angeles was made in 1949?

Since that time, a lot of people have tried, unsuccessfully, to find another allocation.

Old Timer

The permittee obtained the call letters KPOL, ostensibly for the "People of Los Angeles." The only reason any of this is of any importance is that I built it, and had a lot of "fun" in the process!

First of all, in those days of long ago, we didn't have to specify an exact antenna/transmitter site. In fact, in most cases, "site to be determined" was written in the application. However, the KPOL grant was made out of hearing, and the FCC wrote in a condition; the antenna/transmitter site must be within the city limits, and at least 20 miles from the coastline.

This provision, without question at that time, placed the only possible location in the northeast section of the city, in a district known as El Sereno. The entire area consisted of rolling hills, with built-up valleys in between. The permittee, a wealthy philanthropist named Hugh R. Murchison, engaged my services, and directed me to find a suitable piece of land and build the station.

It soon became apparent that the only possible site was on the top of one of those knobby hills. After a lot of scrounging and research, I finally found the owner of a hill I had picked out (a very old man, living all alone in an ancient mansion nearby) and persuaded him to sell us the hill (the CP at that time was for 10-kW nondirectional, daytime).

Well, to shorten the story a little, we hired a bulldozer to knock about 50' off the top of the hill, dig out a hole down the side on which to put a studio/transmitter building, and to make us a little road up to the top. It took a lot of agony and time to get a building permit from the City of LA for our proposed 300' tower (nobody had filed for one in the last 20 years), and to get a contractor to build a building and a road up to it, etc.

My son-in-law and I put it together—which included running 800' of hard line up the side of the hill and repairing a defective plate transformer—in order to meet the deadline of the third extension of the CP!

We fired it up on 22 September 1952 and, much to our surprise, everything worked.

I hired a crew, and got the whole bunch of us in the local IBEW. In those days, first class operators were required on the transmitter. Additionally, at first, neither the IBEW nor AFTRA allowed the announcers to run their own records. Later we got this modified a little, and put turntables in the announce booths, and then the transmitter operator ran only tapes, transcriptions, and the like.

For several months, my young son-in-law fired up at 0600 hours, while I took it down on Sunday night with the afternoon boy, and we both did weekly maintenance.

Just inside the old Gates 10 kW transmitter there was a horn gap, consisting of two chrome-plated brass balls, about an inch in diameter, connected across the transmission line.

Now, the Los Angeles basin often experiences what we call a "Santa Ana," a warm, dry, northeast wind which, even in early winter, can put the temperature

(continued on next page)

Floyd Hall is a regular RW *columnist and an engineering consultant at Consulting Radio Engineers, Crestline, CA. Call him at 714-338-3338.*

64 Years Ago in Radio World

Editor's note: The **Radio World** *of today and the* **Radio World** *of old fortuitously share the same name.*

Unlike our publication, the **Radio World** *of old was printed only in 1922. We have found no further record of it beyond that year.*

The modern version of **Radio World** *that you hold in your hands has been around in various forms and guises for nearly 10 years.*

After the beginner has surveyed the radio field, he may be so mixed up and dizzy that his mind is not fixed upon any specified type of receiver.

There are two receiving sets on the market at present, and they are commonly known as the crystal set, and the set that employs a vacuum tube or audion. Both of these receivers will receive both spark and telephone messages. Still, there are none that will simply just receive telephone. However, with the better class of receivers made today, tuning is so sharp that the undesired spark stations can be easily eliminated.

The present market has quite a number of different types of crystal receivers, which are simple for the beginner to adjust, but remember, these sets will only bring the music in for short distances, as the receiver is what is termed Non-Regenerative.

At the present time there are many beginners complaining about interference from other stations and most of this can be laid to the crystal receivers, as they do not tune sharply. Remember that interference is our great difficulty of today, as there is no such thing as having the air clear entirely for broadcasting purposes.

The regenerative set is far superior to the other type just mentioned and will bring in the signals much louder, but the great advantage of this type of receiver is that, with the aid of a step or two of amplification, we can tune our circuits to such a degree of efficiency that we can eliminate most of the stations undesired. A loud speaker can be easily used on this type of receiver.

When purchasing a receiver of this type (regenerative) be sure and ask the salesman for a set that tunes from 200 meters to at least 2000 meters or above—the higher the better—as some broadcasting stations are working on much higher wave lengths than others. It is wise to get a receiver that will work on the wave lengths mentioned. Any particular set cannot be recommended as there are good ones and bad ones, cheap and expensive ones, but the old saying applies to radiophone receivers just as well as any other—you cannot get something for nothing. Think before you buy.

Reprinted from Radio World, 1922.

Last LA Assignment Available

(continued from previous page)
in LA up to 100° F.

Under those conditions, our 300' tower, way up in that Santa Ana wind, was a dandy lightning arrester. The static not only popped across the horn gap at the base of the tower, but it cracked and buzzed across our two chrome balls inside the transmitter! So-o-o, to be able to get in there and dust, I stuck a screwdriver across the gap, and grounded it off.

Now you guessed it—when we got through work, I forgot to take it out! And, when my young son-in-law pushed the plate button precisely at 0600 hours, the fire flew! Breakers tripped all the way back to the 3-phase.

I don't remember now how long it took him to find my screwdriver that first time, but he cussed me out plenty.

After a month or so, we all had forgotten about it when, came a warm Sunday night, and I did it again. Wham! Bang! Ever after that, whoever opened up on Monday morning first checked to see if the old man had left a screwdriver in the horn gap!

GM relations

Now, I want to get back to this engineer/manager relationship business I brought up last month. I really believe that most GMs will listen if you tell them that the overall technical performance has deteriorated, maybe to the point where a GM is selling an inferior product.

Young engineers tell me, "but he doesn't know what I'm talking about." Well you've got to explain it to him.

I think part of the problem at least, is that most engineers want to avoid any confrontation with the GM. A psychologist will tell you this is a phobia, or a fear of criticism. It may be partly justified sometimes, when, after some small disruption—or maybe you goofed a little—he chewed you out.

Ninety-nine point nine percent of the GMs I have known or met are high-speed, high-pressure executives. Even in most small stations, an engineer has to be something of a salesman, too. Keep in mind that you are working for him; he may have hired you, and he knows he can fire you, too!

Make an arrangement with your GM. Get an appointment with him once a week,and bring him a report of "his" technical operation. Make it concise, and definitive, and don't take up too much of his time, but try to educate him a little about the technical operation, in layman's terms.

And, of all things, don't go in to see him looking like a stupid engineer—in dirty jeans and shirt—no tie or jacket. No self-respecting GM will go see a client unless he is dressed neatly,and properly. Take your cue from that.

To get him to cooperate in a continuing maintenance program, the best argument you can have is how you can help him avoid false economy. I'll get into that in a later column.

See you later.

How to 'Let the Buyer Beware'

by John Bentley

Richmond IN . . . When a package is delivered to your home, do you put it away or open it to see what it is? Most people open it.

Why then do most people fail to open and inspect packages received at their places of business?

When you stop to think about it, there are several very good reasons why packages should be opened and unpacked as soon as possible after delivery:

- If there is any concealed damage to the contents, your chances of receiving an equitable settlement from the carrier are greatly enhanced if the carrier is notified the same day the package is delivered;
- Your warranty from the supplier or manufacturer usually begins on the date of the invoice. Should the contents be defective, your supplier or manufacturer will be more receptive to replacing it than they would be several weeks later;
- Occasionally the wrong item is packaged, or accessories are accidentally left out of the package. Again, your prompt inspection ensures that you will receive the correct items.

Do you know that when a package is delivered by a common carrier and it is crushed, or the corners are crushed, or creased, or the ends are split open, that you have a legal right to insist upon opening and inspecting the contents before you sign for them? The only exception is a COD shipment, where you are required to pay the invoice value to the carrier before you can take possession.

> *There are several very good reasons why packages should be opened and unpacked as soon as possible.*

When a common carrier's agent receives packages at the shipper's place of business, a receipt—called a bill of lading—is given that states the package is in apparent good condition. "Apparent good condition" means that from outward appearances there does not seem to be any damage to the package, and the package appears to be a proper one, fit for normal transportation.

Once the carrier has received the package in apparent good condition, he is responsible for it under common law that dates back to the 15th century English courts. The common carrier liability may also be governed by federal and state statutes.

Under these laws, the common carrier is required to deliver the packages entrusted to it in the same condition and quantity as when received from the shipper, or else be liable for their value.

It is very important that you, the receiver, do not sign for a package that has been visibly abused before inspecting the contents. If you sign for the package and do not make a notation of damage, you are stating that the package was received by you in apparent good condition, and that the carrier has delivered the package in the same condition it was in when tendered to the carrier.

When a receipt does not contain an exception or notation of loss or damage, it is said to be a "clear delivery receipt." Your chances of any recovery for loss or damage at a later date are almost none.

"Concealed" damage

There are times when a package will not appear to be damaged, yet the contents are damaged. This situation is known as concealed damage. Quite often "concealed damage" is really unnoticed or non-notated damage. In most cases, the damage could have and should have been noted at the time of delivery.

When the damage is completely hidden, and it is discovered after delivery, it is very important to immediately notify the carrier's local office and request an inspection.

Common carriers are required by federal statute to perform an inspection within five working days from the date of the request. It is recommended that you also follow up your verbal request with a short letter requesting the inspection.

After having requested the inspection, return the article to the package exactly as it was prior to being removed. Keep the article and all of the inner packaging and the container in a safe place while awaiting the carrier's agent.

When the carrier's agent arrives to inspect the item, have your copy of the receipt available. Stay with the agent to answer any questions and assist him in evaluating the extent of the damage. The inspection should be a joint inspection, meaning both you and the agent examine the damage and agree on the extent of the damages to the best of your abilities.

The inspection is not an admission of liability, nor does it serve as your claim against the carrier or stop the time limits in which a claim must be filed. The inspection only serves as a written record of the shipment and the extent of the damages to the contents.

If the carrier is to be held responsible for the damages, a claim must be filed in writing and within the time period specified in the carrier's bill of lading contract terms and conditions of carriage.

Receiver responsible

In most sales contracts, the receiving customer (also called the buyer) becomes the owner of the property when the carrier receives the property for transportation. It therefore follows that the receiving customer has the responsibility of filing and pursuing settlement of any claims for loss or damage against the carrier.

As in all things, there are exceptions

(continued on next page)

John E. Bentley is Traffic Manager for Allied Broadcast Equipment. He can be reached at 317-962-8596.

Consultants

Take Time, Care When Shipping

by Paula I. Persons

Brainerd MN . . . When you are shipping a piece of equipment somewhere, take the time to pack it right. With a little effort, you can almost always be assured of your package arriving in one piece.

First, you need to find a box larger, by at least 2" or more, than the equipment you are shipping. This is one place you don't want to skimp. Many packages come to us dented or with holes poked in the side, and the extra 2" can make a difference between a claim or no claim.

Packing equipment

Ideally, you have saved the original shipping cartons from any equipment you have purchased and can use them when sending equipment in for repairs. Don't ever throw away a shipping carton from a tape machine you have purchased. The bags and packing materials are nearly impossible to come by, and shipping tape machines without the correct cartons is very difficult.

The heavier the equipment, the more difficult it is to pack.

Foam is best for packing material, then styrofoam packing peanuts, but newspaper is good, too. I have found that it is best to separate the pages and crumple them separately, as they absorb the bumps of shipping much better.

If you are really in a pinch, radio stations always have teletype paper, which will work as well.

Finally, don't skimp on packing material; you don't want the equipment to move at all in the box.

Be especially careful about face panels and plugs in the back. Meter faces will break in shipping if you aren't careful. Take a piece of foam or cardboard and lay it in front of the glass, then put your packing material around that.

Plugs in the back of equipment have a tendency to poke a hole in the back of a box if the packing material isn't tight enough. It is especially important that you have allowed yourself the 2" here or the plugs can get broken off.

Power cords should be wrapped in a piece of bubble wrap or newspaper and taped to the top or side of a unit. If not, the cord could scratch your equipment.

I like to wrap my equipment in a plastic bag if I send it in packing peanuts. There's nothing like getting equipment with the peanuts lodged inside—it takes quite some time to get them out.

If you are shipping any instruction manuals or letters with the equipment, tape them to the top of the equipment. There is nothing worse than searching high and low for a letter you aren't sure was included in the box.

Small extra parts should be placed in a plastic bag and taped to the top of the unit. If they can scratch the unit, place a piece of bubble wrap or newspaper between the items.

Be sure to enclose some type of identifying papers on the inside of the box just in case the mailing label falls off. An extra mailing label works great for this.

If you are shipping more than one box to any address on any one day, UPS will keep them together. If you are including a letter with a multiple order, make copies of the letter and include a copy with each package. If by chance they do become separated, at least the receiving party will have something to go by.

Including more than one item in a package can be a problem if you don't pack everything tightly enough. If one item should start to move in the box, it could easily damage anything else in the box—another reason to make sure you use enough packing material.

Ready to ship

Make sure your box is sturdy enough for the weight of your equipment. A flimsy box will not hold a heavy piece of equipment. Don't use a box with a dented corner because it just isn't as strong as before. Reinforce the bottom of the box, if necessary.

Use good quality tape—the poly-sealing type tape is a good choice. Remove any excess packing tape from the outside of the box. Too much tape just gets in the way.

Make sure there are no extra labels on the box. Your label should be the only one visible. Do not place the label on tape, as tape can get ripped off and then your label is gone. When necessary, use directional arrows to indicate which side of the box is up, and/or mark "fragile" on the box. Use bold letters which are clearly visible.

UPS now has Next Day Air in addition to Second Day Air. Most packages can be shipped one day and received the next in many areas. But keep in mind that this service is not inexpensive.

Taking some extra time to correctly pack your packages will, no doubt, save you much time and effort later.

Paula I. Persons, with M. W. Persons and Associates, can be reached at 218-829-1326.

'Let the Buyer Beware'

(continued from previous page)

to the general rule. Shipments transported by express companies such as UPS, Purolator Courier and Federal Express are usually insured against loss or damage by the shipper. Because it is the shipper who pays the extra premium for this insurance, express companies usually require the shipper to file the claim.

Trucking companies are required by federal law to carry their own cargo liability insurance and be fully liable to the owner for any loss or damage.

When a loss or damage has occurred, you should notify the shipper as well as the carrier. While it may still be necessary for you to file the claim and pursue settlement, the shipper may be able to assist you.

Of course, if the shipper must file the claim, it is your duty and responsibility to act promptly to protect the shipper's filing rights of recovery. Remember, even though the shipper files the claim, you, the buyer, are still the legal owner of the goods, and are not relieved of the burden of paying for them.

If you fail to protect the claim filing and recovery rights of the shipper, you also fail to protect yourself from being required to pay for the damaged goods and bear the monetary loss.

Circle Reader Service 50 on Page 31
Circle Reader Service 41 on Page 31
Circle Reader Service 49 on Page 31

Circuit Switches Transponders

by Phillip H. Ramsey

Laramie WY ... In the everyday world of hi-tech, we often overlook simplicity when attempting to "make something work."

We use Scientific-Atlanta equipment to receive both ABC and NBC at our stations. Due to the distance from the operator to the receiver, we need to switch from one transponder to the other on a remote basis.

Scientific-Atlanta says it can't be done. They make a switch unit that is designed to be switched at the receiver. If one of the slide switches is removed and reed switches are installed, the whole unit becomes very unstable, with the end result being a series of "pops" on the air.

After spending considerable time and effort to stabilize the circuit, I started asking other engineers if they had a better idea. One fella back East had already designed a switching unit that worked just fine, but it involved several transistors.

John Shideler, owner of KFBK in Cheyenne, Wyoming, came to my rescue. He had designed a switch unit that was simplicity personified!

By design, if anything happens to your power supply, the switch automatically goes to whatever source you have selected as the "primary" source. The cost is low, and is sure a lot easier to swallow than the $175 for a commercially built switch that can't be switched from a remote location. The unit is also dependable.

Power for the relay can either be from an outside source, or from the back of the test point on the Scientific-Atlanta power supply. Note, however, that you have to drop the voltage off the test point from its normal 15 V to a +12 V.

In Figure 1, the relay (K−1) is activated by the switch (S−1), which in our case, is located on the console. In the normal, or off, position, crystal #1 is in circuit, but when the switch is turned on, crystal #2 is switched in circuit, and crystal #1 is taken out of the circuit.

If desired, you can build it on a printed circuit board. The layout is shown in Figure 2. If you don't have the time or talent to etch a board, then use a perf-board.

The whole unit just plugs into the normal crystal socket on the Scientific-Atlanta receiver. Use about any pins that will fit the holes in the socket to plug it in with.

Table 1 is a list of the materials you will need for construction of your remote transponder switch.

Keep it small. The whole unit should fit right in through the hole in the frequency select door on your receiver.

Phillip H. Ramsey is CE at KOWB/ KCGY, Laramie, Wyoming 82070. He can be reached at 307-745-4888.

Table 1.

Materials:

K-1 Potter-Brumfield
R-50-E2-Y1 12 VDC Relay

S-1 spst
X-TAL 1 ABC CRYSTAL
X-TAL 2 NBC CRYSTAL

Figure 1.

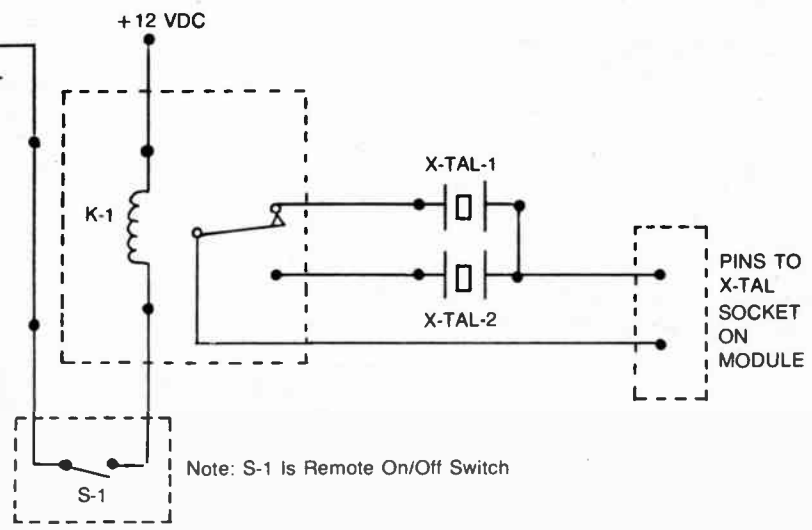
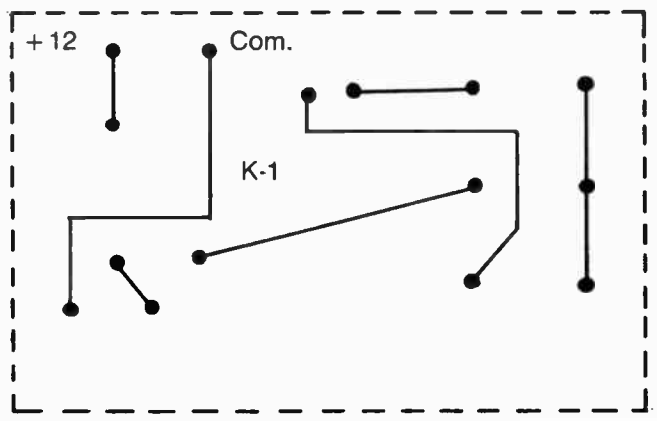


Figure 2. Printed Circuit Board Layout



Buyers Guide

Automation & Satellite Equipment

Sentry System Design Ideal

by Jim Servino, GM/Owner
KAYO-AM/FM

Aberdeen WA ... The computer hardware and software designed and built by Sentry Systems has revolutionized automation event storage, and has also made the purchase of a system affordable.

User Report

Having worked with an automation system eight years ago that our station eventually shipped back to the manufacturer because of operational problems, I was skeptical about any new system, no matter who designed it. When I was told that this new system operated on a $500 Commodore computer, my fears were not immediately relieved.

Attractive feature

The most attractive feature of the Format Sentry System is the ability to store all of the event numbers—including the source and tray numbers for commercials—on a common 5¼" floppy disk.

This allows my operations manager to key the next day's commercials into the computer, and then to back up the completed day on a floppy disk. My overnight announcer simply loads the next day's programming from the disk into the system at midnight.

The process is fast, and is a lifesaver if you have a power loss and need to get the system back up as soon as possible.

Cost

The other big consideration for my station was cost. Previously, we simulcast country music on our AM and FM stations, but decided the time was right to introduce a new station into the market. After exhaustive survey research, we decided to use Broadcast Programming's "Modern Country" format on our AM and their "HitRock" service on our FM.

Going to two automation systems was the logical plan for on-air consistency and staffing costs. After meeting with Sentry Systems for an explanation and demonstration of their system, imagine my surprise when the cost for the package came in at half the price of bigger names in the field.

Sentry Systems Tape Sentry

Designed for broadcasters

Don Winget and Lee Hurley collectively have had 45 years of automation experience. Because of programming inadequacies in other products on the market, they decided to research and build their own system.

They wanted a system that could leave a music rotation in order to play commercials, and return to the rotation where it left off, rather than at the top of the rotation. After accomplishing that, they made it the most user-friendly package on the market.

They knew that most stations need more inputs than previous systems provided, so they built 12 into the Format Sentry. The Format Sentry is a system

(continued on page 27)

Control 16x Live Assist Flexible

by David J. Evers
Sales Mgr, Automation Products
Broadcast Electronics

Quincy IL ... One-hundred-percent fully automated programming is becoming rarer and rarer these days. While stations continue to recognize the benefits of program automation in the areas of personnel efficiency, cost control, and consistency of sound, more and more stations are beginning to utilize the impact of a live announcer, with the attendant spontaneity and excitement that only a real "warm body" can generate. Even if live assist programming is used for only short periods (such as drive times), the effect on the station's sound is invariably positive.

However, automation systems were designed to run by themselves, not in concert with human beings. Even though live assist has been a highly-touted "feature" of automation systems ever since their introduction, in actual fact the process of making people and machines work well together has usually proved more trouble than it's worth.

Problems of live assist

To put it quite simply, automation systems and live operations just don't work the same way. An automation system works by having *everything* it is supposed to do, down to the smallest detail, pre-programmed in its memory. It then executes these instructions in a precise, controlled manner.

Live operations, on the other hand, are prone to last-second changes. If the DJ talks a little bit too long, for example, he can leave out a jingle he might have otherwise played. Conversely, if he finds he's running a little short, he can throw in a 30-second PSA.

It's easy to see how a typical automation system could "roll over and die" when faced with such demands. What is needed is someone to program the system "on the fly," as the show progresses. That "someone" is most likely the live announcer on the air, and his creative process is undoubtedly going to be disturbed by all the details of keeping the automation system up with him. More than likely, he will curse the system, shut it off, and do his show 100% live, forgetting about live assist.

On the other side of the coin, if you force the announcer into a pre-programmed format in the automation system and don't allow him to make any changes, you lose the spontaneity and excitement that the announcer is meant to provide.

BE recognized the appeal and the immediate benefits to be gained from live assist, but only if it was done right. So we took a hard look at just what the role of both the announcer and the automation system should be in a live assist environment. This is what we came up with:

- When in true live assist, the announcer should "call the shots." He should be the master of the operation, with the automation system subservient to his needs.
- The automation system's purpose is to free the announcer from the drudgery and minor details of running a live show, such as cueing up music selections, adhering to format restrictions, cueing up and playing commercial breaks, logging commercials as played (with exact times for affidavit purposes), etc.
- The automation system should be used to provide as little or as much format control as desired. For example, virtually any live assist operation would have all commercials pre-programmed for operator convenience, and would make certain that all are aired as scheduled. However, the music choices can either be left strictly up to the operator

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Buyers Guide

Mid-Am Readies Deck System

by David MacFarland
Pres., Mid-America Automation

Manhattan KS ... Mid-America Automation Corporation's low-cost Automate-64 radio programming automation system is now operating at two commercial and three noncommercial stations. The system was introduced in 1984. There were start-up glitches at most installations.

But we expected some problems, since we designed the system to be installed by local people, and to operate with virtually any existing audio source equipment.

Mid-America Automation Corporation supports users with telephone consulting, and also customizes software for specific hardware configurations.

Once users get the system installed properly, they're usually pleased at what Automate-64 does for the price. In fact, designing the system for well under $5,000 has probably limited our market. People think that, unless it costs $20,000, or runs with an IBM-PC, that it won't work.

For the past year, Mid-Am's research and development efforts have centered on developing software for several applications of a computer-controlled cassette deck.

New applications

Closest to being completed is a cassette-based delay recorder which will replace cartridge delay recorders in both live and automated stations.

The cassette deck has markedly better wow, flutter, frequency response and noise characteristics than the cart machine.

Unlike cartridge-based machines, which simply flip-flop from record to play and back again, Mid-Am's cassette-based delay recorder will be able to record more than a dozen short programs on a single cassette, and random-access them to play in any given order.

For example, a program recorded at 8:30 AM can be delayed until noon, while another recorded at 10 AM can be played back at 10:15. When the designated playback time approaches, the machine automatically pre-cues the cassette.

In a live operation, the deck can be set to play automatically at the designated time, or it will wait for a start command from the live operator.

User friendly

As with the original Automate-64 automation system, ease of operation has been a high priority in writing the delay recorder's software. Names of programs and the times to record and play them back are entered on an ordinary computer keyboard in English in response to simple English prompts.

The keyboard and display screen can be located remotely from the cassette deck, and the system is being designed to run with virtually any brand of microcomputer.

We think our Automate-64 slogan—"Costs less, does more"—will apply to the cassette-based delay recorder, too. Prices will be competitive with existing cart delay recorders. The first units should be ready by early summer 1986.

Mid-America Automation Corporation is also proceeding with design and testing of a computer-controlled cassette-based program automation system.

The first version, also due in summer of 1986, will use a minimum number of decks and is intended to handle the local breaks in network-delivered automated music programming. A later version will employ more decks for local music playback.

Where the Automate-64 system uses the station's existing playback equipment, the cassette-based system is designed for new builds.

Editor's note: For more information, contact David MacFarland, president of Mid-America Automation Corporation: 1822 Laramie Street, Manhattan KS 66502, or call 913-537-3289.

February 15, 1986

s a Bird! A Plane! It's Transtar!

Larry Wilson, DE
Transtar Radio Networks

Los Angeles ... If your station's General Manager just notified you that the technology of the 1990s had just come up the driveway, and that you are now solely responsible for installing this new stargazing gadget, *and* you don't know the Clarke Belt from an LNA, don't panic!

As more and more radio stations rely on satellites as their only source of programming, there seems to be a growing panic among station engineers that they cannot handle this new technology. The terminology alone is intimidating, let alone the installation and fine tuning of the finished system.

To integrate the satellite programming source with the local radio station doesn't require a great deal of satellite knowledge. Like all other engineering projects, one must apply the basics of the trade to successfully complete the marriage of this new technology with the existing radio stations.

SCPC transmission

SCPC Transmission relates to the type of satellite transmission. SCPC, or Single-Channel-Per-Carrier, is the system Transtar uses as its transmission format.

This system uses two different carriers to transmit audio; the left channel is one carrier and the right channel is the other carrier. These carriers correspond to the two IF frequencies explained later in this article.

The earth station

The earth station is a name given to any system that can transmit or receive from an orbiting satellite. In Transtar's case we will be receiving (downlinking) the signal from the satellite. Our earth station will contain all the necessary elements, such as an antenna, a LNA, a downconverter, demods, cue demods and interfacing equipment needed to complete our project.

Parabolic reflector

The parabolic reflector is the antenna used to receive the RF signal from the satellite. We refer to it as the "dish." The antenna is designed with a specifically shaped reflector that will direct all incoming RF energy to a central point, called the focal point (Figure 1).

The gain of this antenna is measured in decibels and is a factor of the diameter of the antenna. The larger the diameter, the higher the gain factor.

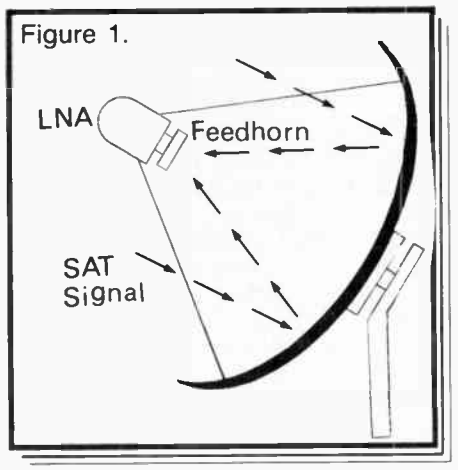
For Transtar's use we like to use a 3.8 meter dish with a gain factor for the antenna of around 42 dB.

To sight in a satellite, we use *azimuth* (left to right, horizontal direction) and *elevation* (up down vertical direction) as the "headings" to find a particular satellite.

Low-noise amplifier

The low-noise amplifier, or LNA, is the second gain stage of our antenna system. The LNA amplifies the reflected RF energy collected by the dish from the stellite. It is located at the focal point of our antenna.

Figure 1.



The feedhorn is a part of the LNA that directs the incoming RF energy into the waveguide port on the LNA.

The support legs of the LNA are of the right length to allow the LNA and feedhorn to be positioned at the focal point of the antenna. The feedhorn is usually packed with the LNA—it's the machined metal tube with the concentric rings.

The overall performance of the LNA is measured in degrees Kelvin (K), with the lower numbers indicating better expected signal-to-noise performance.

For Transtar's use we like to use a 100°or better LNA. The overall gain factor, typically 50 to 55 dB, is not generally improved with the lower noise temperature LNA.

Downconverter

The Downconverter is the tuner of the satellite receiver. Just as there are so many FM radio stations in the total FM frequency band, there are also many channels or transponders in the satellite transmission system. In general, each satellite will contain either 12 or 24 transponders.

While the total RF transmitting frequency band is between 3.7 GHz and 4.2 GHz, each transponder has a corresponding RF carrier.

Polarization is used in satellite design to increase the capacity of the transmit channels by reusing transponder frequencies. On a newer, 24-transponder satellite, half or all of the even-numbered transponders transmit their signal in a vertically polarized mode, while the odd-numbered transponders transmit their signal in the horizontally polarized mode.

The two sets of transponder frequencies overlap, but are 90° out of phase with each other, and therefore will not interfere with each other. The feedhorn must be set and adjusted to the proper polarization to receive the desired transponder.

The Transtar system uses vertical polarization. Within each transponder is located the IF (intermediate frequency) that contains the audio and cueing signals needed. The downconverter selects which transponder or channel is received from the total RF spectrum of the satellite. Transtar uses Transponder 21 on Satcom IR. The IF frequencies are 65.6 MHz and 66.0 MHz.

Audio demods

Like the discriminators in an FM radio, we use audio demods to demodulate the audio from the IF carriers in our satellite system. The demods are tuned to receive only the 65.6 MHz and 66.0 MHz carriers from Transponder 21.

There are many other IF carriers on Transponder 21.

The audio output from these demods is then sent to the station's audio input device.

Cue demod

The cue demod, similar in design to the audio demod, demodulates the FSK data stream that contains the cueing information we need. This data stream appears on a separate 65.80 MHz IF carrier.

Transtar utilizies a separate carrier for the cueing information to prevent any audible side effects that might be caused by combining the cueing information with one of the audio channels. In the Transtar cueing system, we have a total of 12 channels of independent cueing. The individual channels allow us to direct start cart machines that contain your radio station's IDs. We also send a specific channel closure to signal when to take commercial breaks.

Mainframe

The mainframe refers to the rack mount shelf that holds all of the electronics. In some systems, the downconverter can be located either at the dish, in the mainframe, or combined with the LNA to become the LNC (low noise converter).

Installation

Now that we've learned some of the terminology of this new equipment, it is time to put it to work.

The first step in installing the system is to find the location of the antenna.

Consideration should be given as to the "look angle" of the satellite. The look angle tells us geographically where to look for the satellite, and is computed by using your local longitude and latitude location and the satellite's orbital longitude location.

From your proposed antenna site, can you adjust both azimuth and elevation

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Satellites Explained

(continued from page 25)

to see the satellite? Can you see the entire arc from this site?

To protect any future changes, it's a good idea to be able to "look" at the entire United States satellite arc from 67° to 143° longitude. Since the satellite arc is located around the Equator, and by the fact we are in the US, we will look in a southerly direction. You"ll need a compass to check your azimuth look angle and a plumber's protractor or similar tool to check the elevation look angle.

For testing purposes it's a good idea to locate the mainframe at the dish site while adjustments are made to the antenna system. Once the dish is mounted, and you have assembled the electronics and can monitor the demod output, you will be ready to find the satellite.

Finding the satellite

The method I use to find the satellite once you know your particular look angle can be condensed down to four steps:

First, using your compass, stake out your azimuth heading.

Second, set up your elevation heading using the plumber's protractor on the back of the dish.

Third, adjust the feedhorn for the correct polarization of the receiving transponder, and rotate the dish on the azimuth heading until you come in contact with the satellite signal. If you are not able to locate the satellite at first, adjust the elevation slightly up or down and resweep the azimuth heading. By changing only one axis at a time, you will not lose your general look-angle heading.

Finally, utilizing a spectrum analyzer or IF monitor, peak the azimuth, elevation and polarization adjustments until you have obtained the optimum signal.

After you have completed the antenna work outdoors, and have remounted the mainframe indoors, you will be ready for the next step: interfacing your studio equipment with the mainframe.

The basic elements of the Transtar Studio system as shown in Figure 2 can be broken down into two basic groups.

The first group consists of dedicated cart machines for station IDs. These are cartridges with your station's call letters voiced by Transtar announcers. These machines will be directly started by Transtar when needed throughout the hour. The audio from these cart machines must be combined to allow the simultaneous mixing of Transtar audio with ID audio. These cart machines will contain your up and down tempo call letters, the liner and the legal ID.

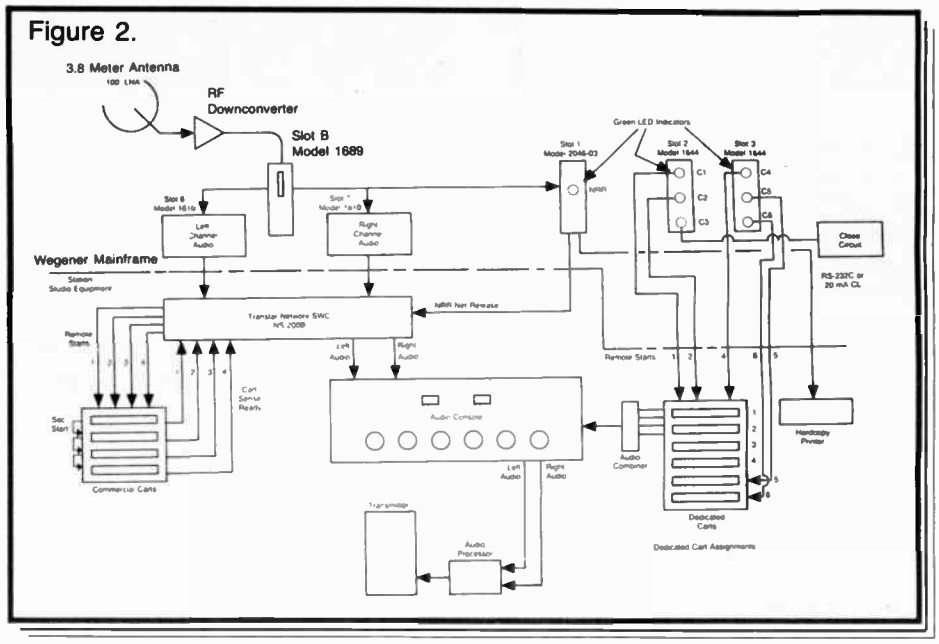
The second group consists of commercial cart reel automation interfacing. When Transtar releases to allow your radio station to play commercials, a clean breakaway is necessary. This cue signal can be routed to several different systems to allow the desired clean breakaway.

Commercial breaks

First, the audio source for airing the commercial audio must be chosen. The source for this is usually in the existing cart machine, a reel-to-reel unit or an automation system.

The system in Figure 2 shows the use of cart machines as an audio source for commercials. The network controller or switcher is then interfaced to both the cart machines and the Transtar cue system. In this manner, the start of the commercial break is directly controlled by Transtar.

Figure 2.



When Transtar is ready to play the break, and if a cartridge is loaded into the #1 cart machine prior to the break, the switcher will be activated by Transtar. In this application, Transtar audio is automatically interrupted while the airing of the commercials is in progress.

At the conclusion of the break, Transtar rejoins audio to allow a smooth transition back into Transtar audio. This is, however, only one application; there are many other ways to interface the cue signal for a commercial break.

Satellite/station audio match

The most important element in successfully incorporating your new audio source is to match the tonal qualities between the satellite audio and your local radio station. All of the other elements, such as dish alignment, interfacing, and fine tuning are important, but the studio work is the key ingredient.

If you apply the same engineering principles to this technology as you do to your everyday studio, you can achieve a match more easily than you might think. Below are some general points to help you achieve this match.

Audio levels

Since we are matching two different audio sources, pay particular attention to the calibrations of these levels. Although there are output level controls on the demod cards, some satellite mainframes are calibrated at +18 dBm output level before they leave the factory.

Tape head azimuth

Since the various IDs are prerecorded by Transtar announcers on different reel-to-reel recorders, take time to ensure that your reel-to-reel playback heads are properly aligned before dubbing these IDs to cart.

Using the level set and azimuth headtones supplied on your prerecorded ID package will reduce the tonal quality and phase errors that may be overlooked when fine tuning your studio system.

Break timing

Having all commercial material timed exactly will ensure a smooth rejoin when the break is finished and the network source audio returns.

I have only touched the surface of this new technology. Once you begin to understand the basic terminology, it won't seem like such a burden. Treat this new technology as you would any other new piece of equipment. Don't fear it, because you have already tackled the biggest job—understanding it!

Continue to practice basic engineering principles and you will not have any problem discovering that . . . "It's Live, and it's Satellite!"

By the way, the Clarke Belt is the subject of another report!

Editor's note: For further information, contact the author at Transtar Radio Networks: 800-654-3904 toll free, or 213-460-6383 in California. Transtar uses a combination of equipment from Modulation Associates and Wegener Communications.

Sentry System 'Revolutionary'

(continued from page 23)
that is designed by broadcasters, for broadcasters who want automation without the headaches.

Commodore system

As to the use of a Commodore computer, when you stop and think about it, all any automation "brain" has to do is send signals to relays on command and update itself based on an internal real time clock.

The Commodore system consists of the keyboard, monochrome monitor, disk drive, printer and power supply, and is more than adequate to do the simple functions required by the software package. The Commodore can also be replaced very inexpensively at your local K-Mart if a component should break down.

The software is loaded into the system via the disk drive only once, when the Commodore is first turned on. This procedure sets up the computer to successfully interface with the Format Sentry interface. It has all of the basic control functions, such as "Go" and "Stop" commands, a "Skip Next Event" command and an "Update Go-Carts" command.

When keying in the commercials in the edit mode, you can jump from the stop set you're in to the next one simply by keying in the event number without having to go to a special section of the screen first.

Our Sentry System automation and the traffic computer work very efficiently with one another, because the traffic system allows us to print the actual event numbers for our stop sets right next to the commercials on the log, and the cart rotation report serves as a convenient Go-Cart loading sheet.

Our AM station uses the Format Sentry automation, with four Otari reel-to-reel machines, two mono and one stereo Audi-Cord cart players, three IGM mono Go-Carts and an ABC news pulse unit that activates a cart recorder.

The FM station has the same equipment, but uses only two Go-Carts and has no network news requirements.

If you've been thinking about automation for your facility, take heart. Like most other computers, the price has just come down, and a system has been designed to meet the operational needs of just about every type of radio station.

Editor's note: For more information contact Lee Hurley, Don Winget or Bob Owen, Sentry Systems (div. Kaye-Smith Radio), 2211 Fifth Ave., Seattle WA 98121 or call 206-728-8651.

Buyers Guide

DI-TROL Powerful, Affordable

by Don Prentice, Pres.
Innovative Automation

Albuquerque NM ... DI-TROL is a new, very powerful automation system developed by Innovative Automation for the radio industry. It is a comprehensive, easy-to-use and easy-to-install system designed to run on the Apple IIe computer.

The radio automation system is packaged as a complete turnkey system including hardware, software, interface and manuals. Only systems costing three to four times as much include the features offered by DI-TROL.

The automation system can interface to most industry-standard audio equipment now in use, so it is not necessary to invest in new or expensive equipment. The power and performance of the system is software controlled, not hardware dependent. An investment in the system is protected, since further upgrades are software enhancements and not hardware changes.

DI-TROL was designed by programmers with experience and knowledge in both the computer and radio industries. The result is a cost-effective system that is easy to use, functional and can automate any radio station except one formatted for totally live talk.

The DI-TROL system has the capabilities to automate the most progressive station. It will handle up to 10 reel-to-reel decks or cassette machines, 4 single-play cart machines, 4 Carousels with 24 carts each, 3 satellite audio feeds and 2 studios.

DI-TROL handles a program log of up to 1,440 events per day for a maximum of seven individually programmed days or a total of 10,080 events per week. In addition, a maximum of 1,344 exact time events per week are programmable to the exact second. All this and more is available with the basic system configuration.

Program log

The program log allows the station complete flexibility in program format and entry into the system. The log is entered through a standard typewriter keyboard. A user-friendly, easy-to-follow screen display leads the operator through each entry. Thus, no prior computer experience is needed to program the system.

Program events can be entered randomly or in actual time sequence. The computer will sequence each event by device and code function. As each device number is entered, the system will display the device type on the screen for visual verification. As each code number is entered, the corresponding code description is displayed on the screen.

Once program log entries are in the system, the operator can randomly edit any future or current log entry. Simply by entering any given time slot, the system will display the stored data for viewing, editing or stepping to the next event. Any 10-minute time span in the program log can be viewed and stepped forward or backward throughout the day.

While in the view mode, the operator may select the edit mode and make program changes. The log can be recalled at any time to view, edit or print out.

With the use of a computerized system to automate the radio station, the program log is always backed up on a disk for safekeeping. This means that memory cannot be dumped should a loss of power occur.

Interface controller

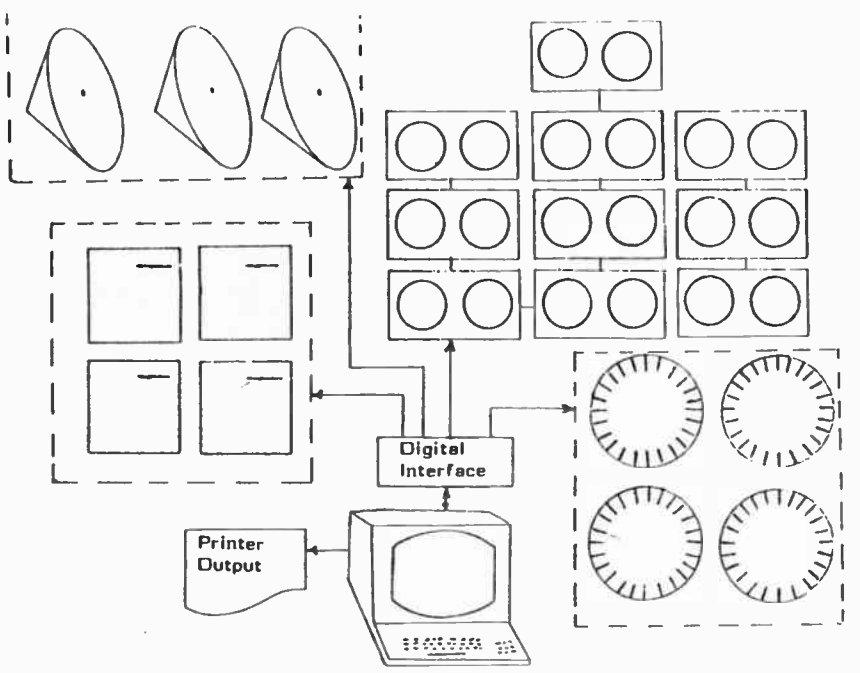
Included in the DI-TROL system is an interface controller designed by Innovative Automation. The interface is a DIgitally conTROLled module which directs action from the computer program DI-TROL to various program devices. Through this interface controller, the system can select which device to air. Once the device is selected, the interface module will monitor and control the device.

Features available from the Interface Controller include:

- Audio control—automatically turns on/off the audio in any combination: immediate turn on/turn off, fade up/fade down;
- Random selection—random selection of carts within Carousels to be play-

(continued on page 30)

Figure 1.



SYSTEM CAPABILITIES

3 Satellite Audio Sources	4 Carousels w/24 Carts Each
4 Single-Play Cart Machines	2 Studios
10 Reel-To-Reel Tape Decks or Cassette Machines	Tone insertion & sensing units for cassette decks (optional)

Buyers Guide

IGM Stars in Tunnel Broadcast

by JoAnn Roe
IGM Communications

Bellingham WA . . . Imagine a daily audience of 155,000 blocked off from outside diversions and forced to listen to your broadcast station for 30 seconds to 4 minutes. That was the intriguing potential for Tunnel Radio of Boston, but it took an ultra-reliable IGM Instacart to make it possible.

The Instacart's track record since 1969 was impeccable; it provided instant random access to any of its 48 cartridges to maintain flexibility of programming, while the audio quality of playback was outstanding.

Only a few communications systems for tunnels exist, and those have been fraught with maintenance problems. Fortunately, Tunnel Radio's creator, Alan Radding, had known Rick Sawyer (of IGM Communications) since Rick was an engineer at Boston's WHUE, a meeting that helped Radding solve an unusual problem.

That need came about in 1982, when the Department of Public Works planned major renovation of the Southeast Expressway (called the "Southeast Distressway" by commuters). Squarely across one end of the six-lane freeway was the Dewey Square Tunnel.

Expecting a horrendous tangle during construction on an already hectic stretch of road, the Department of Public Works asked Radding Sign Company about leasing electronic signboards along entrances to the tunnel. They hoped to warn motorists of lane changes, closures, alternate routes, etc.

Radding thought about the problem as he vacationed in Florida. When he drove through the Andrews Avenue Tunnel in Fort Lauderdale, he heard his first tunnel radio broadcast.

"*This* is the answer," he thought, and contacted the owner. He found that such broadcasts were possible because of a special transmitter. Since the tunnel firm admitted to some maintenance problems with their broadcast equipment, Radding returned to Boston to consult with Sawyer, who was now with IGM.

IGM Basic III

Sawyer recommended using an IGM Instacart for the tunnel messages, controlled by an IGM Basic III, the same unit used by commercial radio stations.

Upon receiving a command from Basic, any Instacart cartridge responds instantly. The operator is free to program any cartridge in the 48-cart system in any order, randomly or back to back, because each play position has its own playback head, solenoid for actuation, preamp, 150 Hz tone detector and 1 kHz stop detector, and moves only 1/16" to contact the capstan drive shaft for playback.

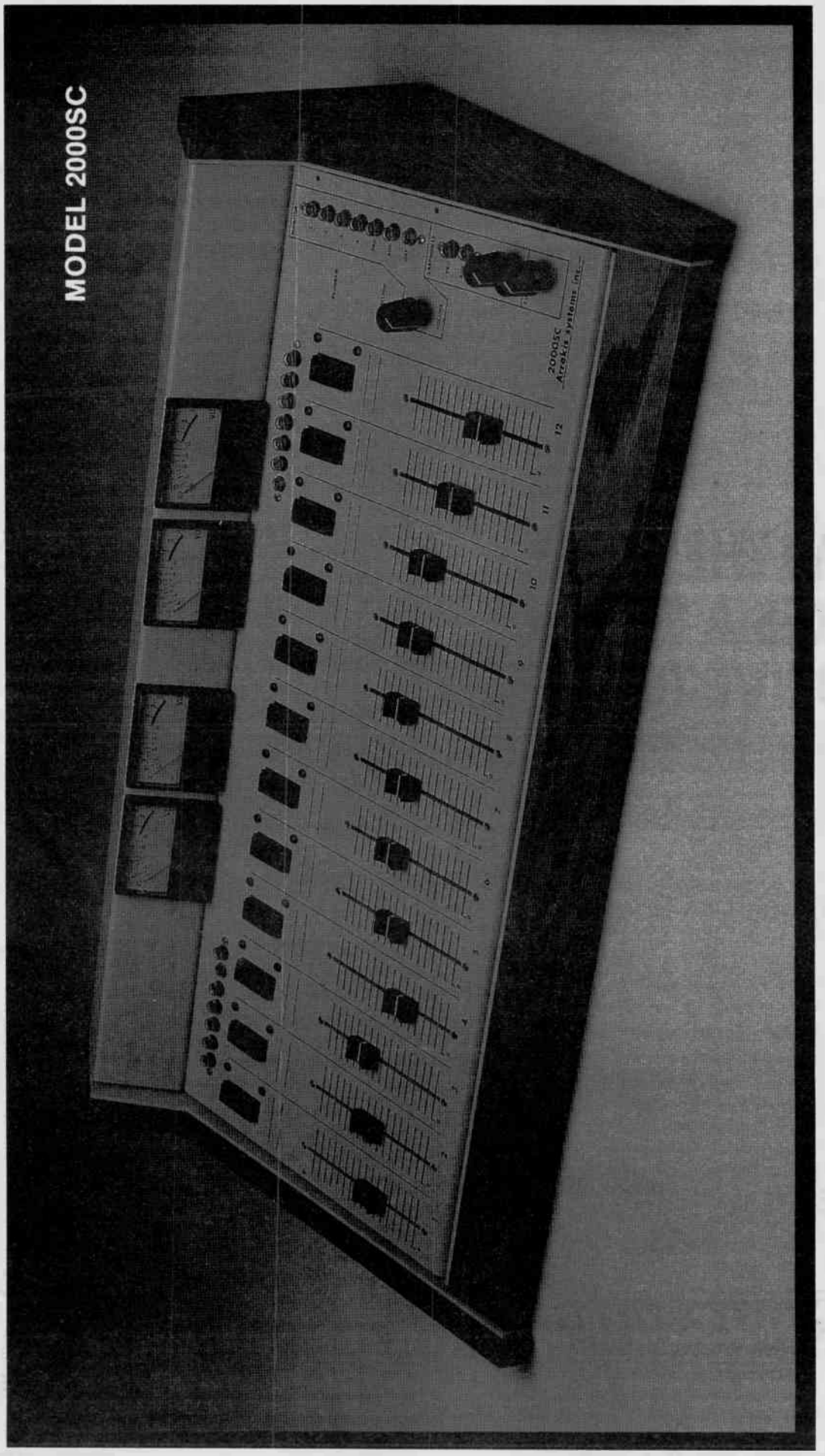
Possibility of a total breakdown of the message system was very slim; even if one capstan should fail (almost unknown), three other stacks of 12 cartridges each would run smoothly. Instacart's electronics were updated in 1982 to utilize the reliability and easy component change capabilities of microprocessor technology.

Not only was this proposed system far more flexible than an electronic billboard, but also it would cost only a fraction of the board. Indeed, the way Radding figured it, the Department of Public Works could get messages broadcast free of *any* cost if they would give Radding Sign Company permission to sell some of the broadcast time as commercials.

Alan Radding got the permissions he needed, with the stipulation that Tunnel Radio had to air a percentage of PSAs, information about car care, tax tips, gardening, etc.

About a block from the tunnel in a

(continued on page 31)



Buyers Guide

Systemation Cassette-Based

For its full automation system, Systemation of Decatur, Ill., uses cassettes for its storage/playback system.

The production system performs hard-sectoring on cassette tapes for cueing and information storage purposes.

Systemation offers random access to an entire record library, as well as random access to all commercials.

The data reading process allows reliability in back announcing. The Systemation tracker identifies the song being played and finds one of up to four back announce variations for the song, which it rotates automatically each time the song is played.

A live assist button allows an announcer total control over the system when needed. A stop button allows the announcer to stop the system at the end of the event in process. The system then automatically turns on the microphone.

Systemation's setup includes a countdown timer to cue the announcer when it is time to speak, and allows sequential scheduling of songs.

For further information on Systemation, contact Steve Bellinger, president of Systemation Corporation: 217-423-9744.

Music Satellite Programmer

Sono-Mag Corporation's MSP (Music Satellite Programmer) offers full size automation control, with full operator control and live assist functions built in.

Features include branching, linking, clear-text logging, delayed starting, under-programming protection and special insert capabilities.

The MSP has a 2,000-event memory with sub-routine capability. A 250-step user-programmable clock complements MSP operation.

The MSP interfaces directly to satellite receiver tone decoders.

For further information, contact Steve Sampson at Sono-Mag Corporation: 309-452-5313.

Satellite Filters

Microwave Filter Company's terrestrial tracer 4043A and tunable single channel bandpass filter 3923T isolate the desired channel and block all adjacent channels and interference.

The tracer identifies interfering frequencies and can be used as a trap to notch out any frequencies ±10 MHz away from the center IF frequency.

The 3923T reduces noise contributed by off-channel carriers.

Price of the 4043A is $795 and the 3923T is $395. For more information, contact Jim Carrick: 315-437-3953.

DI-TROL Powerful, Cost Effective

(continued from page 28)

ed by the system;

- Device control—starting, stopping and rewinding of devices;
- Source status monitoring—monitoring of the on-the-air source and the next-to-run device;
- Silence sensing—detection of silence and automatic stepping to the next program event, and
- Satellite tones—permits satellite tones to give the computer end-of-message tones, programmable by the Exact Time Clock.

Multiple sensors of the computer processor continually sense for silence from the source on the air. This system can sense for end-of-message tones from the source on the air, satellite, the Exact Time Table or any combination of these. Silent sensors can be turned on or disabled for any duration by the Exact Time Table. The system continually senses the active device for errors, as well as for those in the next-to-run device.

DI-TROL updates the time every second on the screen display, along with the day and date. Even while the system is monitoring all upcoming program data, new or different program information can be entered. Program or actual time logs can be printed out at any time. Error messages will display on the screen and trip an error alarm without interrupting normal operation.

DI-TROL compares the real time table to the Exact Time Table for a match and initiates appropriate action: start now, play now, stop now, turn on/off satellite tone card, update, turn on/off automation, turn on/off any relay (maximum of 32).

Support of DI-TROL is provided by Innovative Automation. Service for the system is provided through Honeywell Corporation, allowing for service within 24 hours. In addition, Innovative Automation maintains a 24-hour hotline.

Innovative Automation also manufactures a transmitter control system, called TCS, which automates the transmitter and provides automatic control of all transmitter perimeters. With the use of both the DI-TROL and TCS systems, a radio station can operate unmanned.

Total "walkaway" radio is the way of the future. Innovative Automation can provide it for you today.

Editor's note: For more information, contact the author at Innovative Automation, 5005 Sooner Trail NW, Alburquerque NM 87120 or call 505-898-2122.

Buyers Guide

Control 16x Live Assist Flexible

(continued from page 23)
or restricted by various degrees to conform to program rules established by the Program Director.

Once we determined how an automation system *should* work in a live assist environment, we set out to make the line of BE automation systems work in just that way. The result, today, is the capability for live assist operation unmatched in the industry.

Live assist remote control

Live assist with any automation system requires some kind of terminal or control panel for the announcer to operate the system. BE had an advantage over most systems using full CRT terminals since our compact, portable keyboard takes up less space on the desk and has fewer keys to confuse the operator.

The fact remained that this keyboard, like those for other automation systems, was meant for *programming* the system, when what was really needed was a simple panel to be able to efficiently *operate* the system during the course of a live show.

Our answer was the Live Assist Remote Control. This compact, attractive control panel occupies even less space on the already crowded studio desk than our system keyboard, yet it provides features specific to live assist programming that *even our keyboard* (much less any other automation system) cannot provide.

The Live Assist Remote Control consists of two groups of pushbutton switches. The System Control group covers actual automation control functions such as auto, manual, start, fade and special event. These switches are lighted to indicate the status of the system. In addition, four LED indicators are provided to show alarm conditions.

The other group, labelled Live Control, consists of 12 switches arranged as 3 rows of 4 switches. Each switch holds a unique, clear plastic cap with a removeable insert, so that every switch can be custom-labelled by the station for its particular use.

The Live Control switches are the key to the operation of the Live Assist Remote Control. Inside the unit, a small selector switch (one for each front-panel Live Control button) allows the station to select the function this switch will perform when it is pressed. This non-dedicated arrangement allows the station to customize the Live Assist Remote Control for its own unique requirements, rather than having to bend its operation to fit the manufacturer's ideas of proper control placement and labelling.

System functions

The real power of the Live Assist Remote Control lies in the system functions that can be initiated by a press of one of the Live Control switches. Any of these 12 buttons can be selected to perform any of the following operations in the automation system.

Direct Start of sources 01-30 (sources 17-30 are only available if the system is equipped with the Source Expander) is a key feature of live assist programming. It allows a particular source to be played through the automation system and logged, just as if it had been programmed in the memory. This feature allows the live announcer access to any source in his system merely by pressing the appropriate button.

Overstart of Sources 01-30 is similar to Direct Start in that it places a particular source on the air when the button is pressed. However, the source on the air is faded down, the overstarted source is played "over" it, and then the original source is faded back up again. This function is perfect for talk over jingles or talk over the intro to a song.

A Jump function is executed as a compare time in the system, causing the system to skip through its memory until an Update function is found. This can be used to skip a block of programming.

A Fade Jump is like a Jump, except that the audio on the air is faded down as the system performs the Jump. At the bottom of the fade, the event programmed immediately after the Update is automatically started, and programming proceeds from there.

Return causes the system to switch between main and sub-routines in memory, and is ideal for calling up a commercial break.

Net EOM is used to take the system out of a network source. This function provides a fixed audio overlap time to control any extra "blips"of audio.

An **NTR Advance** skips one event in memory for each press of the button.

Special Event #2 provides access to calling up the Special Event #2, which otherwise is only available from the system keyboard.

Start & Auto, unlike the Start button in the System Control group (which will only start one event at a time), will Start and place the system in Auto. This is ideal for the start of a commercial cluster, since the system will then play all the spots in the break automatically, rather than making the announcer start each one manually.

Successive presses of the **Log Display** button will switch the video monitor display from the regular Program Display to the LOG Display and back. The announcer can easily track the progression of his show using this function.

All of these functions can be set up in any combination on the Live Control switch panel by setting the internal selector for each switch. Because the station can label the switches any way they like, labels can be used to indicate the function of each switch.

Tremendous versatility is offered by the Control 16x in any live assist situation. It is safe to say that the Control 16x, teamed up with the Live Assist Remote Control, offers the capability to handle *any* live assist situation, and will do it *better than any other automation system you can buy.*

Editor's note: For further information on the Broadcast Electronics Control 16x, call Dave Evers at 217-224-9600.

IGM Instacart Stars

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spartan, two-room office were installed the Basic controller and Instacart. Programming is divided into 15-second increments for traffic announcements, PSAs and paid commercials. Messages go to the tunnel over telephone lines and are broadcast from transmitter lines stretched along the tunnel walls (what some broadcasters call a "leaky transmitter").

That's it. It's that simple.

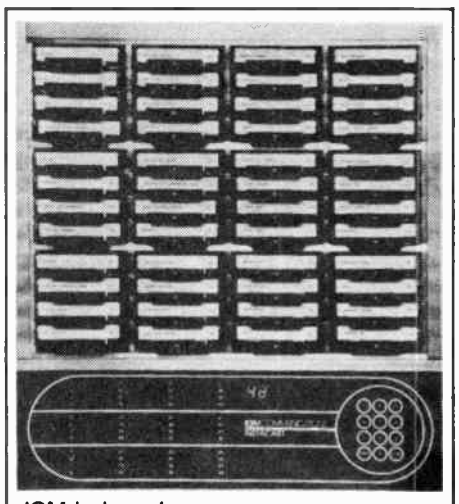
When motorists enter the tunnel, naturally their car radios are immediately blanked out. In the Dewey Tunnel, no matter what station motorists have tuned in, they will receive Tunnel Radio until they leave the tunnel. Thus, about 37 station signals are overridden for the limited 10 seconds to 4 minutes that a motorist is in the tunnel.

The Basic programmer gives Tunnel Radio the ability to change programming according to daypart, such as heavy traffic periods between 7-9:30 AM and 4-6:30 PM.

The Instacart really is the star of the Tunnel Radio show, because it must switch so frequently. Since its installation in 1982, it has switched an estimated 4,900,000 times, equivalent to 14 years of continuous use in the average radio station.

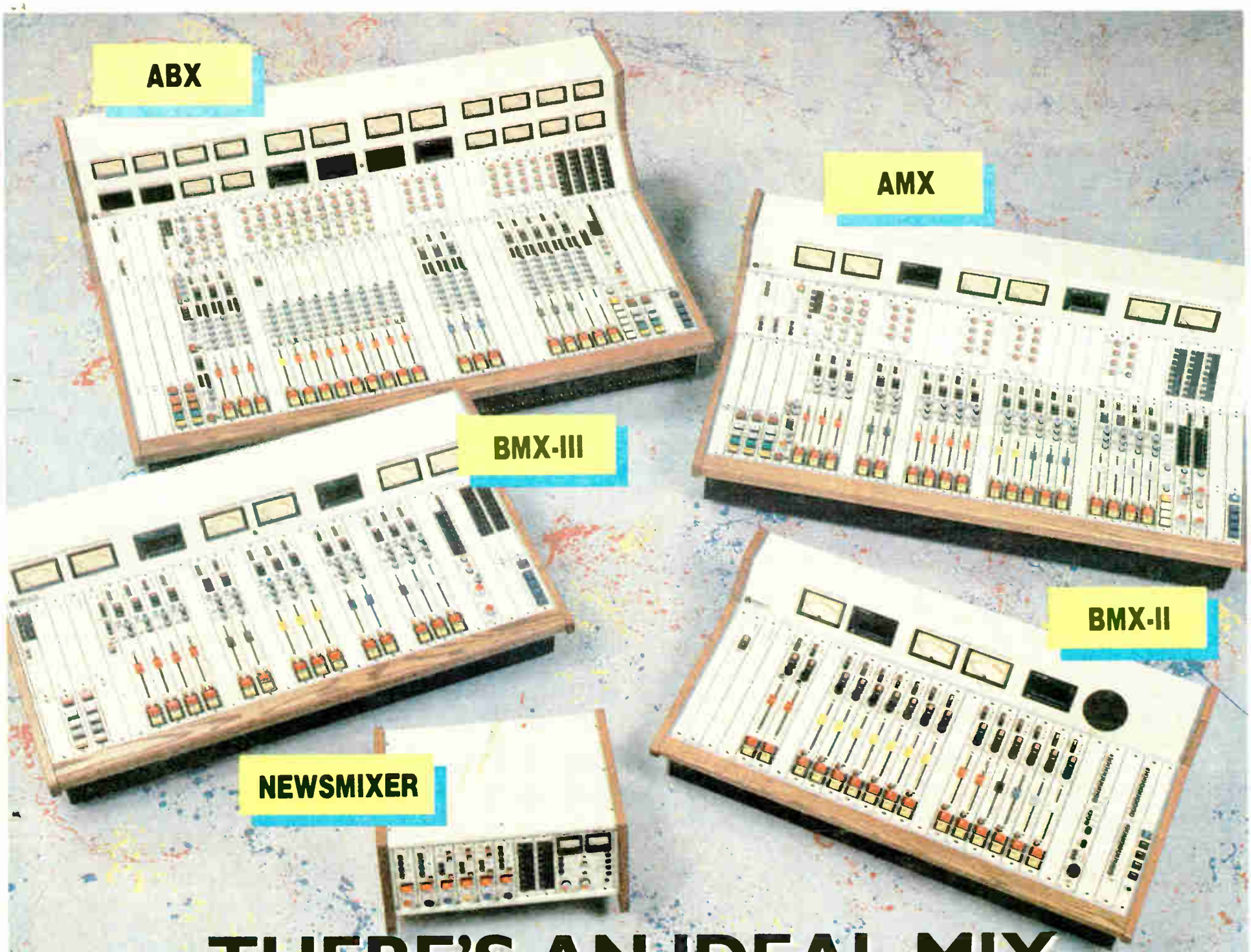
Maintenance has been phenomenally low. During the four years the monitor CPU panel has been reset a few times, the power supply failed once (corrected by a simple take-out, plug-in component change) and pinch rollers are routinely changed.

Meticulous cleanliness helps Tunnel Radio to achieve reliability. Each morning the office operator tapes several scheduled massages and has the system operate from the tape temporarily while she shuts down the Instacart and cleans all the heads. She restarts and returns operation to normal Basic control.


IGM Instacart

Since the Capitol Magnetics' Audiopak carts used also have a failure rate of less than 2%, the Tunnel Radio is so troublefree that Radding is able to concentrate on selling commercials and making money from the system. Simultaneously, he provides free of charge a service that the Department of Public Works (and the general public) expected to subsidize.

Editor's note: For more information on the IGM Basic III and the Instacart, contact Carl Peterson or Fred Harkness at 206-733-4567.



THERE'S AN IDEAL MIX FOR YOUR STATION.

For many top rated radio broadcasters, Pacific Recorders & Engineering consoles are essential to their operations. Our family of consoles was designed from the same set of functional and operational specifications, with each ascending model adding capabilities without giving up features or performance in the process.

Since their introduction, more than 750 of our BMX on-air consoles have been installed. There's now two models in the BMX family; the legendary Series II, and the new Series III (which offers many more features with the same reliability and performance as the original BMX-II).

A workhorse for production, our flexible, AMX console offers a powerful combination of sophisticated stereo production and advanced on-air features.

Because high quality multitrack capability has become a top priority for more competitive production, we designed the ABX-a serious multichannel, multi-featured production console which retains the control features of the BMX and AMX.

And, because it was high-time to improve a dismal equipment situation in news/edit rooms, we've built the compact and versatile Newsmixer.

Five consoles. Five different systems designed to help solve your station's unique operational problems-including the problem of operational ease since all our consoles have similar ergonomic designs.

You'll need more technical information of course, and we'll be happy to rush it to you. Just pick-up the phone.

Hands Down, The # 1 Choice.

Pacific Recorders & Engineering Corporation
2070 Las Palmas Drive
Carlsbad, California 92008
(619) 438-3911 Telex: 181777

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