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RadioWorld®



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Radio's Best Read Newspaper

October 5, 1994

Long Arm of Local Law Wreaks Havoc

by Thomas Pear

LOS ANGELES Los Angeles Christian station KKLA(FM) got a bit of shock in August when a Los Angeles County electrical inspector refused to approve a new transmitter facility the

station was building, citing that the transmitter did not have an Underwriter Laboratory (UL) sticker.

"I absolutely freaked," KKLA Chief Engineer Mark Pallock said "I was really really angry."

What upset Pallock was that radio trans-

mitters are type-accepted by the federal government through the FCC, not local governments and the chief engineer saw the failed electrical inspection as an attempt by the county to gain regulatory control of transmitters.

"Their big claim to fame is that they have authority over the transmitter," Pallock said, adding that in the future, L.A. County could use its self-proclaimed authority over KKLA's transmitter to set a "dangerous precedent."

If the county is permitted to regulate a few stations, then it could assert its newly acquired authority over all radio stations and require transmitters to pass county electrical inspections, Pallock noted.

Pallock said that eventually QEI, the manufacturer of the transmitter his station was installing, would also have to get local government approval and that could increase the price of a transmitter by as much as \$10,000, he estimated.

"UL approval would cost several thousand dollars per unit," QEI Sales and Marketing Manager Jeff Detweiler said, confirming the high costs estimate.

The cost would be astronomical because

the production of radio transmitters is too small an industry to support the UL inspection process, Detweiler said.

Detweiler also noted that UL inspections are only affordable in industries where millions of the same products are sold each year.

Unfortunately, KKLA is not the only station thrust into UL local regulatory oblivion. Its sister station KPRZ in San Diego went through a similar situation when an electrical inspector refused to pass the station because its three Arrakis consoles did not have UL stickers.

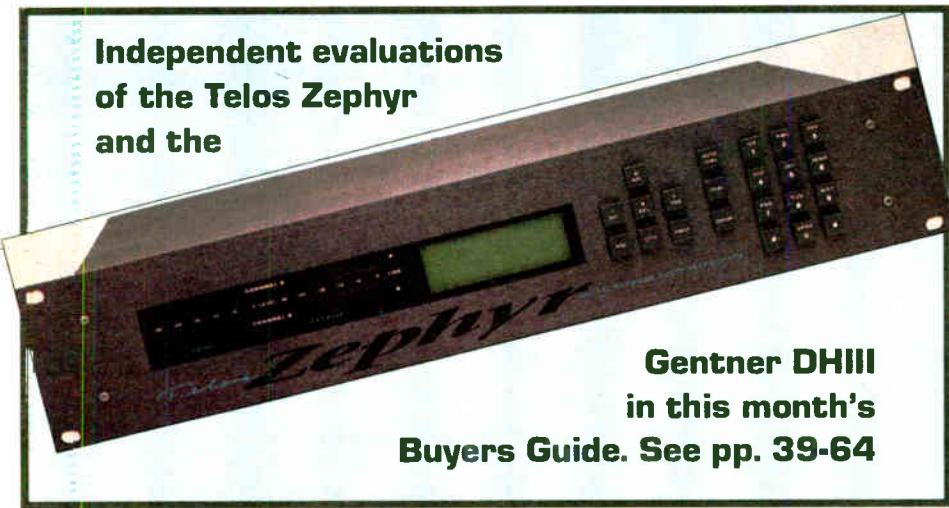
The problem is "there is no UL standard for that type of equipment *per se*," KPRZ Director of Engineering Douglas Schleutker said.

The San Diego electrical inspector did agree, however, that if the equipment was not there during her follow up inspection, it would not be counted against the station," Schleutker said.

Because it was a sort of "see no evil, hear no evil" situation, the station temporarily removed the consoles and anything else the inspector could conceivably dub as "not UL approved." This

continued on page 6 ▶

Independent evaluations of the Telos Zephyr and the



Gentner DHIII in this month's Buyers Guide. See pp. 39-64

WOWO(AM) to Power Down After Sale and 70 Years On-Air

by Thomas Pear

WASHINGTON Last month, the FCC approved the sale of Fort Wayne, Ind., 50 kilowatt clear channel legend WOWO from the Wayne Broadcasting Company to the Inner City Broadcasting Company (ICBC).

"We are pleased it happened," said attorney Arthur Goodkind, who is representing ICBC before the FCC during the application process.

Another application filed before the FCC by ICBC to resell the station is still pending.

The application for the first sale of WOWO between the two New York-based companies was made in March of this year and has been the object of much speculation and controversy in the radio industry.

ICBC is purchasing WOWO-AM-FM from Wayne Broadcasting, which is a subsidiary of Price Communications, to reduce the AM station's nighttime signal on the 1190 kHz frequency.

After it reduces WOWO's nighttime signal, ICBC intends to establish a nighttime contour for its 10 kilowatt New York station WLIB, a daytimer on the same frequency.

Sources say that for now ICBC does not have any intentions of turning WLIB into a clear channel station.

Presently, WLIB, a news-talk station

that also airs Caribbean music, goes off the air at sunset so it will not interfere with WOWO's nighttime signal, which, according to WOWO Program Director Gary Noe, covers 28 states and four Canadian provinces.

After ICBC lowers WOWO's signal it intends to resell the station to the Pathfinder Communications Corporation, which plans to run the station locally in the Fort Wayne area. Pathfinder already owns other stations in Fort Wayne.

Processing of the July-filed application for the second sale of WOWO from ICBC to Pathfinder could take until the end of this year. If allowed by the FCC, ICBC intends to use a two-pronged approach to lower WOWO's nighttime signal. Inner City Broadcasting will reposition WOWO's directional tower and lower the station's nighttime wattage.

ICBC still has not yet determined how much it will reduce WOWO's nighttime signal, Goodkind said.

When ICBC does determine the contour it wants for WOWO, the signal change will involve another application to the FCC.

Goodkind did promise however that most WOWO listeners would not be affected by any changes to WOWO's daytime signal in the near future.

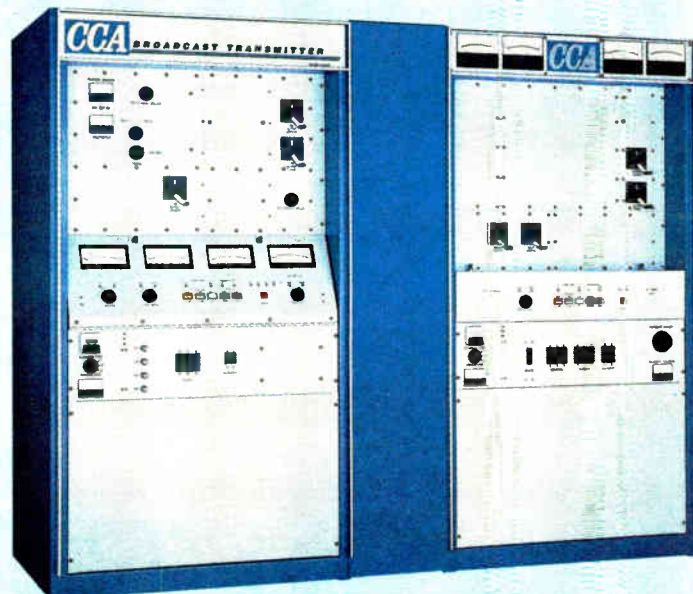
"Everybody who listens to it (WOWO) during the day will be unaffected and the

continued on page 7 ▶



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NEWSWATCH

Radio Show Costs Up for 1994

WASHINGTON The National Association of Broadcasters (NAB) Radio Show to be held in Los Angeles as part of the World Media Expo this month will cost \$900,000 more than last year's, NAB President and CEO Edward Fritts said during a recent press conference at NAB headquarters.

The NAB is hoping to pull in enough revenue this year to pay off the extra cost of the enhanced show and joint exhibit floor—World Media Expo—and add an additional \$900,000 to its till.

Despite the extra costs, Fritts promised that registration fees will not be raised. "Exhibitors are paying the extra freight," he said.

Various events added to the expenses, including an industry-wide luncheon, breakfast and the Marconi Radio Awards Dinner and Show.

Awards from 22 categories will be given to selected stations and individuals from a list of 100 nominees to honor this year's best radio personalities, best formats and best stations.

"It's a celebration about what's really good in our industry this year," NAB Radio Show Steering Committee

Chairman and Apollo Radio President Bill Stakelin said.

The awards ceremony will be hosted by Rick Dees who does a popular weekly top 40 countdown. This is the second Marconi event hosted by Dees.

Performing at the Marconi show will be Huey Lewis and the News.

Digital Link Planned For World Media Expo

LOS ANGELES This month's World Media Expo will feature an Ethernet Local Area Network link between the ENCO Systems, Orban and Harris/Allied exhibits as a demonstration of the interconnection possibilities between the ENCO DAD486x Digital Audio Delivery System and the Orban DSE 7000 Digital

Audio Workstation.

"This is the first instance of two audio digital system manufacturers cooperating to provide integrated broadcast facilities," Orban Product Manager Geoff Steadman said.

This demonstration illustrates what the future of digital audio systems can and must be," ENCO Systems Inc. Vice President of Sales and Marketing Larry Lamoray added.

Orban is scheduled to exhibit DSE 7000 in booth 2806 and ENCO Systems Inc. is scheduled to exhibit the DAD486x in booths 2727 and 2729. Harris/Allied, which is a dealer for ENCO and Orban is scheduled to exhibit both systems in booth 2300.

All systems will be interconnected via an Ethernet ThinNet Local Area Network to accomplish real time digital audio file transfer.

continued on next page ►

When looking for a digital audio system for automation of satellite programming or live assist, there would appear to be many choices. But if you're looking for a system which is flexible enough to give you total control without sacrificing your sanity, there is only one choice. The Phantom by RDS.

You will see the difference as soon as you see the Phantom in action. The display provides you with all of the information you need to see in a clean, concise manner, without the crowded look that you'll find in other systems. If you are familiar with the most popular software on the PC, then you may already know how to use the Phantom. The Phantom's pull-down menus guide you through all of the steps involved in setup and daily operation, from creating and scheduling clocks to creating and editing logs.

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The Phantom ends the confusion of automation by keeping everything organized. The Phantom simplifies your daily operations by keeping information such as input changes, voice changes, and clock changes in their own individual schedules rather than in the log. You can leave those liners and other voice drops out of the log because the Phantom will do them for you. The Phantom allows you to date new schedules to begin weeks, months, or even years in advance. When your satellite network informs you that there will be a voice substitution on Thursday, two weeks from today, you can prepare for it *today*.

The Phantom can retime spots to fit them cleanly into a satellite break without inserting silence, overlapping, or running late. The Phantom



can create reports to keep you informed on a number of topics, from a list of expired spots to an analysis of potential mistakes in your log. The Phantom also maintains a history of system activity.

The Phantom has the features that others would want you to believe are theirs exclusively. The Phantom remains *completely* functional during recording, sensing relay closures and starting breaks as easily as it does when it is not recording. The Phantom can fill incomplete breaks with spots from a list you specify without ruining product separation.

While other systems tie your hands and limit your flexibility by only offering 3 or 4 inputs, the Phantom gives you 6 stereo inputs, using its AMX-84 solid state switcher, with the option of increasing the number of inputs to 14 or more. If your station is News/Talk, you know how important this can be.

The Phantom allows you to change the sampling rate, digital format, and stereo/mono settings at will to meet your needs for an individual spot. The Phantom offers a number of digital formats, including the new Dolby AC-2 format, as an option.

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Panasonic Manufactures New RDS Encoder

FRANKLIN PARK, III. Through its Automation Division, electronics giant Panasonic has jumped into the RDS encoder business with its new VP-7662A encoder.

Spokesman Kevin Dunoon said the encoder is targeted to receiver manufacturers that need test equipment for manufacturing of consumer receivers with RDS capability and GPS devices that use RDS.

The VP-7662A features will include EON Data Save functions, error rate measurement, a built-in ARI signal generator and RS-232-C and GP-IB interfaces.

Although Panasonic has targeted the receiver industry as its main buyers, Dunoon said the encoder can work in a radio station.

For more information, contact Panasonic Automation at 708-288-4431.

Coupon Radio Gets Nod For Florida Stations

NEW YORK Coupon Radio Inc., a company that uses RDS radio receivers to send and receive retail information, has signed an agreement with seven Miami/Ft. Lauderdale radio stations to transmit the information in late 1995.

In conjunction with The Interep Radio Store, a radio station representative firm, Coupon Radio will apply its technology through WEDR, WTMI, WHYI, WPOW, WAXY, WSHE and WKIS.

The CouponRadio introduction project will involve sponsors, record retailers, radio manufacturers, record labels and auto retailers

Exodus Hits NAB Science/Technology

by Thomas Pear

WASHINGTON The Science and Technology Department of the National Association of Broadcasters (NAB) is trying to cover the workload of two recently vacated key engineering positions from its 10-person engineering staff.

The NAB is actively recruiting candidates to fill vacancies left behind by Staff Engineer Andy Butler and Director of Engineering Ken Springer.

The loss of the two Science and Technology engineers follows an exodus of NAB employees leaving the powerful broadcasting lobbying organization.

Others who have resigned from the NAB during the past year include: NAB Senior Vice President of Conventions and Exhibits Rick Dobson, who will leave Nov. 1; Recruiter-Personnel Specialists Julie Perez and NAB Vice President of Radio Membership Donna Leonard.

Two critical areas of NAB concern are affected by Butler's and Springer's vacancies: the NAB's input on key National Radio Systems Committee (NRSC) issues and NAB's planning of technical conferences for its conventions.

"I think it was a loss to have them leave," NAB Senior Vice President of Science and Technology Michael Rau said. "They were working on a lot of important things."

Butler, who has worked at several radio stations across the country, left the NAB in July to join Broadcast Electronics Inc. He is now the company's marketing manager of RF and studio products.

During his tenure at the NAB, Butler planned technical conferences and seminars for NAB conventions.

Butler was with the NAB for only three

years, but left the NAB because the offer from Broadcast Electronics Inc. was "too good to pass up."

He said his position with Broadcast Electronics allows him to experience the broadcast industry from the perspective of electronic vendors.

"I've been on the consumer end (of the radio industry) for a number of years and now I am working on the supply side of the industry," said Butler, who described his tenure with the NAB as "extremely interesting."

NAB Manager of Technical Regulatory Affairs John Marino was promoted to replace Butler as the director of technical conferences. His prior position as manager of technical regulatory affairs had him working on such NRSC issues as high speed data subcarriers, differential global positioning systems and AM data broadcasting subcarriers.

The NRSC is a body of industry officials representing consumer audio and broadcasters. The committee develops standards and guidelines for radio/audio technology.

Until the NAB recruits someone to fill his old position, Marino said he will continue some of his NRSC work as he assumes Butler's former position. Rau also is sharing some of the workload, according to Marino.

"Its sort of double and triple duty," Marino said. "It's all being covered."

Springer, who recently completed Georgetown University law school, left the NAB last month to pursue a career as a patent attorney in Los Angeles.

Springer followed the development of digital audio broadcasting (DAB) technology and provided the NAB with a wealth of information on DAB issues, according to the NAB.

Marino noted that Springer was the sole representative for the NAB on the NRSC's DAB committee, which was guiding the in-band testing procedures during the systems testing at the NASA Lewis Research Center in Cleveland.

"Ken was working on DAB issues almost entirely," Marino said.

Adding even more strain to the department's workload, is the loss of clerical worker Hollis Fuller, according to Marino, who is now in New York pursuing an advertising career.

Despite the vacancies, Rau said the NAB Department of Science and Technology is still able to address the important issues. "We're coping as best we can," he said.

McReynolds said the NAB will fill the engineering positions in the "very near future." Qualified candidates will have at least a BSEE, she added.



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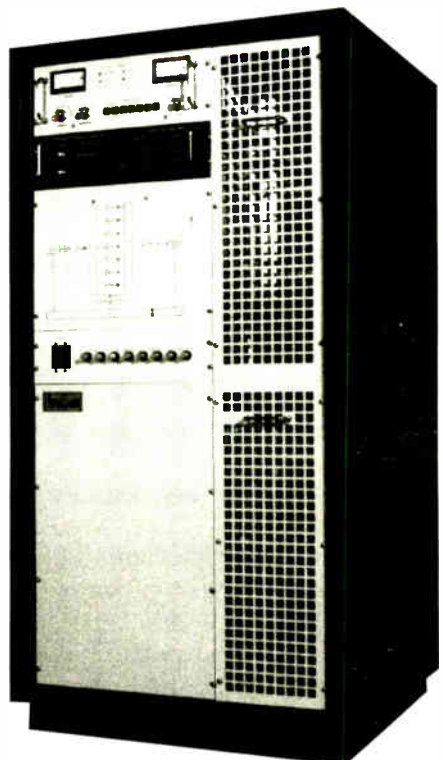
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Radio Moves Onto the Fast Track

WASHINGTON Convention time is always exciting, and this year's first World Media Expo has been no exception. I just heard a sizzling tidbit about Arrakis Systems and Wegener Inc., who have combined forces in a strategic alliance to create the first integrated digital satellite controlled workstation.

The Arrakis Gemini and Digi-Link workstations, combined with Wegener's patented ANCS (Addressable Network Control System) and DR96 series MPEG-II digital audio receivers, will create DISC (Digitally Integrated Satellite Control). Wegener and Arrakis will unveil this truly integrated satellite point-to-multipoint radio distribution, storage and production system at World Media Expo.

The system combines digital storage, playback operations, full-function editing, production, addressable satellite network control and distribution. It also brings E-mail, news service, tagged text, RDS and multimedia to each affiliate.

The Arrakis/Wegener alliance represents a combination of resources of two of radio's biggest and brightest companies. If the industry was merely heading toward digital before, it is now barreling down the track at full steam. World Media Expo should prove a wonderland of new and improved ways to have fun and make money with radio.

★ ★ ★

Not that radio seems to need much help making money these days. The last several months have brought continued good news from the Radio Advertising Bureau's (RAB) radio revenue index. The story is the same in July. Radio is making money.

Not only are salespeople seemingly more aggressive in their efforts, but, according to an analysis prepared by CBS Radio Representatives Research, radio has become the medium of choice for advertisers who want to target the "coveted" upscale audience.

The rep company reports that in 1970, 78

percent of adults read a newspaper. In 1994, that number is 62 percent. Radio, says the rep, reaches 77 percent of adults 18 and over on an average work day.

The rep company cites a recent Media Audit/International Demographics report, which shows that on any given weekday, radio reaches an average of 84 percent of adults 18 and over who are college graduates versus 75 percent for newspaper; radio reaches 89 percent of proprietors/managers compared with 72 percent for newspaper; and 86 percent of business owners/corporate officers versus 76 percent for newspaper.

Terry Drucker, director of research for the



CBS rep firm, noted that nearly 40 percent of adults 18 and older cite radio as their favorite source of news at the beginning of the day—nearly twice that of those who identify newspaper as their favorite source.

More importantly for radio owners and salespeople, in the face of newspaper's dwindling reach, the cost of newspaper advertising has increased considerably.

★ ★ ★

News like that can only keep the radio train rolling. In July of this year, combined local and national spot grew by 9 percent over July of 1993, says the RAB. Local radio revenue grew 8 percent in July, but national spot shot up 12 percent versus July 1993 (compare that to a mere 8 percent gain for national in June).

Year-to-date revenue gains through July continue strong for a combined year-to-

date growth of 11 percent.

★ ★ ★

Dwight Weller (Baltimore SBE Chapter chairman, and principal Weller Audio-Visual Engineering) recently dropped me a line sharing an anecdote he thought you'd find interesting. It seems a jock "wannabe," at one of the stations where Dwight does some work sent in for his restricted radiotelephone operator permit application with what they thought was the correct fee of \$35.

Several weeks later, the application was returned by the FCC with a note attached that said "insufficient funds" and no further explanation.

Dwight did some checking with the Baltimore FCC office and discovered that the RP fee went from \$35 to \$45 on July 18, 1994 (check the Newswatch section of the August 24, RW, for a more detailed list of new FCC fees).

Dwight also writes: "The folks who do not have a restricted permit probably hold a general radiotelephone license to operate radio stations.

"It is worthy to note that only the general tickets that were issued as diploma-size documents prior to or on Jan. 2, 1985, can be used for broadcast. The general licenses that are the wallet-sized card type were issued after Jan. 2, 1985, as renewals or new issues, and bear a statement that plainly says, 'Not valid for broadcast use.'

"The bad news is that, if a first or second class licensee waited until after Jan. 2, 1985, to renew his or her ticket, he got the small one not valid for broadcast use, and he must still have a restricted permit to run a broadcast transmitter." Dwight adds: "Just doesn't seem fair, does it?"

Harold Hallikainen will be going into the whole matter in a little more detail in an upcoming issue.

★ ★ ★

In the past, I've included coverage of DirecTv's DBS system, a subscriber-based video/audio package that requires the purchase of a digital receiver and

window sill antenna. RW has also featured coverage of Digital Cable Radio, now Music Choice. I think it is important to keep tabs on emerging technologies and companies, just so you can better prepare to compete against them. And they are on a roll. As we went to press, Music Choice was scheduled to become part of DirecTv's digital DBS service as of Sept. 19, according to DirecTv Spokesperson Linda Brill.

Music Choice, which already operates a subscriber-based cable digital audio music service, was scheduled to offer its multiple channels of music programming via DirecTv's recently launched system. Music Choice expects 500,000 subscribers through its cable-based and DirecTv outlets by the end of the year.



Shamrock Broadcasting Inc. announced the appointment of Marty Loughman as the company's CEO. He succeeds Bill Clark, who will continue as Shamrock's chairman.

Company officials said the appointment is a continuation of a succession plan enacted when Loughman was named as Shamrock's president and chief operating officer two years ago.

As CEO Loughman will continue his duties of overseeing the company's 18 radio stations located in 10 U.S. markets.



Barry Ariaz

Barry Ariaz joined Sine Systems as director of sales and marketing. A 20-year veteran of the broadcast industry, Ariaz will be responsible for the sales and marketing of Sine Systems products for the U.S. and world markets.

His previous experience includes stints with Billboard Broadcasting, Varian, Continental Electronics and CCA Electronics. The company is a Nashville-based corporation that specializes in DTMF control devices used to control and monitor various types of RF transmission facilities.

Jim Bradshaw joined LBA Technology Inc. as vice president of marketing. Prior to joining LBA, he was Latin American sales manager for Harris Corp. LBA Technology is a manufacturer of highly specialized antenna systems.

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Where are the radios?

Dear RW,

After reading favorable comments in RW, I recently set out to find a Sony SRF-42 AM stereo/FM stereo Walkman so I could experience the results of the NRSC changes in AM transmission.

Being in the San Antonio market, I felt sure I could find one of these units in town. After all, we have Best Buy, Circuit City, Conn's, Sears, Montgomery Ward, Target, Kmart, Wal-Mart, several major department stores and a retail Sony-only outlet called The Source.

Guess what? No luck. No one had heard of this unit, including the people at the Sony-only outlet, who declined to order the unit for me from Sony because they would have to order several units and didn't think they could sell all of them.

Undaunted, I finally convinced an audio department head at one of our major department stores to order two units for me. That was three weeks ago, and he has yet to receive a confirmation from Sony that anything is being shipped.

While on this expedition, I also found no car radio receivers equipped for RDS at any of the above-referenced stores. I even tried a retailer who specializes in high-end audio and video equipment. Nothing.

Once again, it appears that hype has far exceeded manufacturers' commitments to provide products featuring new technologies. To which I say, "Why should broadcasters purchase and install this stuff when there are no receivers to hear/see it?"

Thank you, Chrysler. At least you made a commitment to AM stereo that has yet to be matched.

Hal Widsten
Owner/General Manager
KGNB-AM/KNBT-FM
New Braunfels, TX

Editor Replies: In the April 6 issue, RW published a special Sony phone number, 800-833-6302, for radio stations to order the SRF-42. Availability through chain

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stores depends on the region, but mail order firms, such as J&R Music World in New York do stock the SRF-42. As for RDS radios, Denon and Philips are the only companies currently making auto RDS receivers. Both companies have said the products are available at dealers.

Give credit to originator

Dear RW,

Regarding your feature on WDRE(FM), Garden City, N.Y. (RW, June 29), WDRE is to be congratulated for its success in marketing its alternative music format through visionary technical and program management.

However, I take exception that Tom Calderone takes credit for listenership in the early '80s on the 92.7 FM dial position. Programming on the frequency prior to 1988 was provided by WLIR, a separate entity to which WDRE has no claim. The alternative format that WLIR first created in 1982 was much more adventurous a move for its time, and Program Director Denis McNamara, Station Manager Elton Spitzer and a staff of talented WLIR DJs who made the station truly a pleasure to listen to should be credited for building part of the alternative music listener base WDRE now shares.

The article was a bit unclear on this point, and I believe in giving credit where it is due.

Joseph B. Schepis
Scarsdale, NY

Beware of thefts

Dear RW,

Alan Peterson's column in the Aug. 10 edition of RW about radio station thefts reminded me of a bizarre situation that happened several years ago at stations where I worked.

The stations, an AM/FM combo located in the southeastern part of the country, began experiencing mysterious thefts soon after I began working the overnight shift on the AM. There was seemingly little rhyme or reason regarding what was stolen or how or when. A secretary had a hole puncher taken off the top of her desk. The engineering department had to replace several of the little Radio Shack amplified speakers used in various places as monitor amps. T-shirts, records and even carts disappeared. My own personal losses included a decrepit black and white TV, which used to keep me company on overnights, and a single speaker that I had tucked out of sight (I thought) on top of a shelf. Unfortunately, it was not out of reach of Mr. Thief.

Locked offices, desks and closets did not deter the thief. Paranoia spread among the management and staff of the station. Harsh penalties were imposed for unauthorized after-hours visitors, and alarms were installed on all outside entrances. The management even forbade use of the loading dock door, which was a royal pain for those of us doing remotes. The thefts continued.

The capper came with the disappearance of 13 Sony AM stereo radios from a locked closet. Shortly thereafter, the station got a call from the local police asking for information about one of our

Avoiding Dangerous Precedents

A little power can be a troublesome and dangerous thing, as this issue's front page story on electrical inspectors and radio station KKLA makes clear. That a Los Angeles County electrical inspector can refuse to approve a new transmitter facility at a station, citing the lack of UL certification on the transmitter, is outrageous.

Radio transmitters are type-accepted by the federal government through the FCC, not local governments, and chief engineers around this country

do not need the added headache of having to educate and appease local officials making a quick grab for power. They have no business being there.

Nautel Manager of Sales and Marketing Jorgen Jensen is absolutely correct when he said that, "UL inspects consumer products, and transmitters are for specialized use on federally licensed premises by federally licensed operators."

Or Jeff Detweiler at QEI, when he said, "We are required to answer to a higher authority, and that's the FCC."

The reality is that other stations around the country have run into similar problems with local electrical inspectors. And each of these stations has had to creatively skirt around the inspectors to pass inspection.

It may be time for the SBE and the NAB to jump in and take steps to help broadcasters before this becomes a bigger problem. An information service from NAB or SBE that stations could tap into that explains type-acceptance and FCC regulations to local officials would be a nice place to start.

This page understands the importance placed by county governments on protecting their citizens. But, like unreasonable local RFR ordinances, UL certification for broadcast gear is not needed and will only serve to drive up the cost of the gear, a move that would hurt manufacturers and stations for no reason. Consumers have no access to a broadcast transmitter; they cannot be hurt by having to work with it.

The NAB and the SBE have shown they can work well together (World Media Expo, for example). They need to do it again and provide information and relief to engineers and owners who run afoul of local inspectors.

—RW

employees and, by the way, were we missing anything? It seems the individual in question had attempted to unload 13 radios at a local pawn shop, which attracted the attention of police officers watching for stolen goods traffic.

Our thief turned out to be one of the weekend part-timers, an average so-so disk jockey who was popular with the PD because he was almost always available for last-minute fill-ins. He had apparently been able to get copies of the keys to almost every lock in the building, perhaps by making wax impressions of keys left carelessly lying around. Most of the items stolen were never recovered, although the hole puncher was found in his car's trunk.

Of course, the fellow was immediately terminated and reportedly prosecuted by the management, although we never knew if he was convicted. Some months later I heard him pulling a weekend airshift at another station in the market, and I had to wonder if his new employer was aware of his background and if he was continuing his second career as a petty thief.

Allen Sherrill
Chief Engineer
KQKQ-FM, KKAR(AM), KOIL(AM)
Omaha, NE

Unwarranted engineering cuts

Dear RW,

In this day of budget cuts, stations tend to look at the engineering department as the first place to trim. Working in a major market does not always mean the station you work for thinks of itself as a major station, even when it is a minor station. My general manager came to me the other day and said that he wanted to let my assistant go to save money. What brought this to the table is a report from some so-called research firm which sent a letter around to the GMs. This letter states that of the six stations with full-time assistant engineers in town, which this survey claims to have researched, the average salary is lower than what my assistant is paid.

According to my GM, my assistant "makes 36 percent more than this report says is the market average." I came out of my chair. No one who knows anything about RF would work for that. I knew roughly what a couple of the other assistants made, and I set out to prove this report wrong.

I called the other chiefs in town that have assistants, similar ratings and engineering demands to explain my plight and the need to combat this "study." One of them had also been approached with this very same report. As a result, I now have a report of my own for the real average salary. My guy is under the average market salary by some 22 percent! Even with this, I am still forced to show why I should be able to keep a full-time assistant.

I presented my figures to the GM, and he said he couldn't understand how the study could be wrong. When he told me which six stations had responded to the survey, only one of them has a full-time assistant. They must have included engineering wannabes, remote babysitters and the like. The lesson here is do your homework. I will be sharing my findings with the chiefs that were understanding enough to help me compile it.

For all the GMs who might be reading this, listen up. Every now and then you hear of a GM or PD who is killed or seriously injured attempting to "fix" a transmitter. Why does this happen? If their kids were ill, they would call a doctor. If they had a legal problem, they would pay \$100 to \$200 an hour for a lawyer. Broadcast engineers are highly skilled persons who perform a job which fewer and fewer persons know how to do. I know five good engineers who have been forced out of jobs, and they have since left the industry entirely. They were not followed by five new engineers-to-be. As this pool of talent decreases, the industry can only suffer. Why let go of someone whose job you yourself cannot do? Think about it.

Larry Yaroch
Detroit

Canadian DAB: AMs Equal to FMs

by James Careless

OTTAWA Canada came down squarely in favor of treating AM and FM stations as equals when allotting coverage patterns and frequencies on the L-band for Digital Audio Broadcasting (DAB).

A government endorsement of frequency allotment recommendations also illustrates that Canada is making progress toward establishing commercial L-band DAB within the next few years, action that broadcasters south of the Canadian border can no longer ignore.

"It should send a very strong message to the Americans that the world is getting

on with it, whether or not they are," said Steve Edwards, vice president of corporate engineering and technology for Rogers Broadcasting, a leader in Canadian DAB development.

Task force recommendation

This and other allotment recommendations come from the "Non-Technical Coverage and Service Area Issues" report released by Working Group I of the government/industry "Task Force on the Introduction of Digital Radio," which is spearheading the transition to L-band in Canada.

The working group report delivers its

recommendations through a series of seven "principles." In summary, the proposals call for:

- Allowing broadcasters to more or less

of the highest-power FM station in the future. To achieve this, such stations will have to establish "coverage extender" transmitters at the edges of their contours because DAB pod signals typically extend only approximately 35 miles.

- Allowing stations located in "bedroom communities," which penetrate large

"It should send a very strong message to the Americans that the world is getting on with it, whether or not they are."

—Steve Edwards
Rogers Broadcasting

duplicate analog coverage on L-band, to a maximum distance of 60 miles, the current reach of the highest-power FM signal contour in Canada. Those wanting to extend coverage to new areas would have to obtain approval from the regulator, the Canadian Radio-Television and Telecommunications Commission (CRTC).

- Switching AM stations to the principle of covering the same area, at the same power 24 hours a day.
- Ensuring that the technology used within each of the Eureka-147 transmitting "pods," capable of carrying up to five stereo services, could allow lower-power stations to increase their coverage to that

urban markets on analog, to continue this presence on DAB but within some limits.

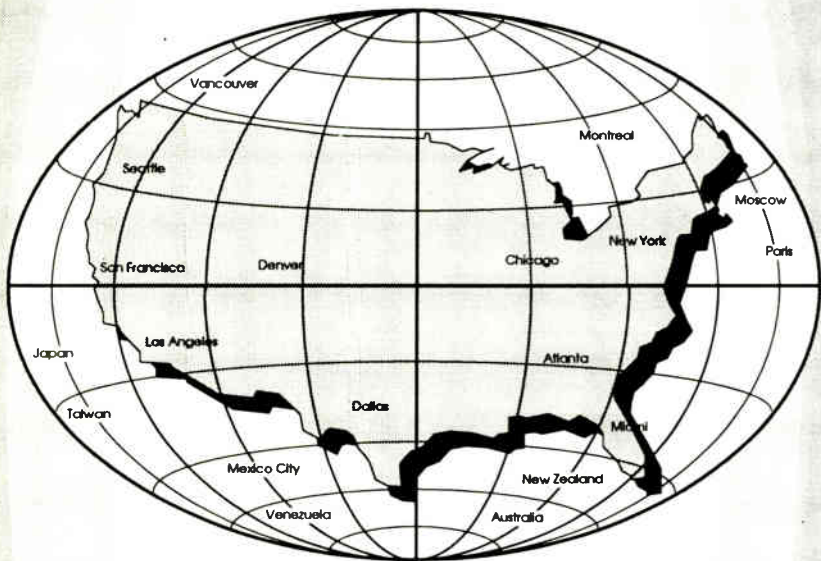
They would give existing services the first pick of DAB frequencies, followed by the extension of Canadian Broadcasting Corp. (CBC) analog signals to unserved areas, new terrestrial DAB services, new satellite DAB services, and, at the bottom of the list, provision for U.S. border stations.

- Asking the World Administrative Radio Conference (WARC) to increase the L-band to 70 MHz, to allow room for future expansion.
- Leaving the ownership of DAB transmitter pods relatively open to all, provided

continued on next page ►

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Local Law Can Hinder

► continued from page 1

included a plug-in power supply the phone company was using and a personal computer sitting in Schleutker's office.

On occasion, other stations around the country have run into similar problems with local electrical inspectors claiming transmitters and other professional equipment need UL approval, according to the NAB's John Marino. He said that if the practice increases, the transmitter companies will have to address the issue.

Pallock tried to resolve KKLA's transmitter matter through the L.A. electrical inspector's supervisor, Soo Pot Ying. He even brought a copy of the FCC Type-Acceptance rules for radio transmitters and a copy of QEI's transmitter manual to prove that transmitter regulations fall under the auspices of the FCC.

But the meeting was to no avail. Pallock then tried a creative approach to his station's dilemma. He researched the law books and found out that the county's electrical authority ends with electrical devices that disconnect, or to put it simply: plug in and out of an ordinary outlet.

Pallock then called the electrician who initially wired the transmitter facility and had him put a plug in the transmitter.

"It's just like a toaster," he said. "Actually it's more like a clothes dryer," he added.

After the electrician finished his bit of electrical wizardry—plug and all, Pallock called the county for another electrical inspection.

Despite the electrical-legal loophole Pallock plugged into the regulatory mess, a different electrical inspector again refused to pass KKLA's transmitter facility, citing that the station still did not get UL approval of its transmitter and, therefore, did not correct the pre-existing condition of

the first inspection.

Fortunately for Pallock, the new inspector did agree to take a walk on Mount Wilson—the home of numerous L.A. transmitter facilities, including KKLA's new facility—to let Pallock show him that all the other stations do not have UL approval of their transmitters.

The little stroll down transmitter facility lane convinced the inspector that transmitters indeed do not need UL stickers and the inspector in turn was able to convince inspection supervisor Ying not to give KKLA's plug-in transmitter the regulatory yank.

Alan Pendleton, the general manager of WUST in Washington employed the same strategy in early 1993 when a local electrical inspector tried to require his station to get UL approval for its Nautel-made transmitter.

The manager told the inspector that if his transmitter was required to have a UL sticker all other stations in the area, including television stations would have to be shut down because their transmitters did not have UL approval.

"I told the county we didn't want to be singled out," Pendleton said.

"Let face it," Nautel Manager of Sales and Marketing Jorgen Jensen said, "UL inspects consumer products, and transmitters are for specialized use on federally licensed premises by federally licensed operators."

"The bottom line is that counties don't have authority to require stations to use UL approved equipment," Detweiler added. "We are required to answer to a higher authority and that's the FCC."

KKLA received final approval for its transmitter facility inspection Aug. 25.

Pallock noted that the entire situation has made his station unique. "I've still got the only transmitter on Mount Wilson that has a plug in it." ◉

WOWO Sold, Signal to Be Diminished

► continued from page 1

majority of people who listen to it at night will be unaffected," Goodkind said.

Group W Director of Engineering Glynn Walden, who is also a noted expert on clear channel stations, concurred that most of WOWO's listeners would not be affected by a change in the station's signal.

That's because people in the outer fringes of a clear-channel station's signal usually get poor reception, so they avoid the clear-channel stations and tune into stations within their local markets that have more accessible signals, Walden said.

Walden speculated that WOWO probably does not have too many listeners outside of the Fort Wayne area.

"Radio has become a local medium and

most stations do not rely on audiences outside their local markets," he said.

Walden pointed out that there are advantages to clear-channel signals. Group W owns several clear-channel stations across the country and Walden noted that clear channels are a great way for stations to assure their signals will thoroughly cover their local markets.

In many markets on the East Coast of the U.S., AM clear channels are the only AM stations that cover an entire city and therefore they are the only AM stations that can compete with FM, according to Walden.

"Generally speaking, AM's that can cover the entire market can generate some ratings," he said.

When the application process for the first sale began, letters from people who feared that changing the station's signal

would mean shutting the station down flooded the FCC mail room.

But Goodkind denied that would happen and Peter Tannenwald, who is an attorney representing Pathfinder during the application process for the second

sale of WOWO from ICBC to Pathfinder from ICBC.

"It's a travesty to let Inner City acquire WOWO..." Crouse's filed petition says.

WOWO received its large contour when it was established in March of 1925, a time when the radio industry was still in its infancy stage.

During that time, large, clear-channel contours were considered by the FRC

After it reduces WOWO's nighttime signal, ICBC intends to establish a nighttime contour for its 10 kilowatt New York station WLIB, a daytimer on the same frequency.

sale of WOWO from ICBC to Pathfinder agreed with Goodkind.

Intent on running

"Pathfinder intends to run the station," Tannenwald said.

Walden believes that lowering WOWO signal will be beneficial.

By reducing WOWO's signal to allow WLIB to come on at night "you are taking the Fort Wayne station and splitting the signal so that it services two large markets," Walden commented.

A political factor that strengthened the application for the recently approved sale of WOWO from Wayne Broadcasting to ICBC is that ICBC is one of just a handful of minority managed companies in the country that owns radio stations and recently there has been a push for minority ownership of stations, Goodkind noted.

Although there is formal petition to deny the second sale of WOWO that was filed before the FCC by former WOWO employee Barbara Crouse, it is expected to have little impact.

The wording of the petition objects to the now approved sale of WOWO from Wayne Broadcasting to ICBC, even though it is filed against the application

(now the FCC) to be in the public interest, convenience and necessity, because the contour allowed the stations to reach people living in rural and remote areas of the country.

Eventually, though, other AM stations made their way to those remote areas (many of which have now been developed) and the FCC allowed the new stations to broadcast locally during the day on the same frequencies as the clear channels, blocking the clear channel signals. But the new stations were required to lower their signals at night to clear a path for clear channel signals.

Despite the WOWO transaction, Walden does not believe that the sale of WOWO represents the end of the clear-channel era for political reasons.

The United States had to negotiate with Canada and Mexico to establish the clear-channel stations and is continually negotiating to keep the clear-channels, he explained.

"I don't think the government is going to give away something it has fought so hard for," Walden said.

WOWO's format is full service Adult Contemporary. It includes news, talk and sports, Noe noted.

Canadian Digital Radio Allotment Fair to AMs

► continued from previous page

that the owners give "fair and equitable" access to all licensed service providers.

That the task force, which has representatives from both private and public broadcasting as well as government, was able to agree on a detailed frequency allotment plan is "yet another indication of how much goodwill there is on everybody's part," said Edwards, a member of Working Group 1.

"We all want to make it work, and we all want to see it happen as quickly as possible," he said.

Certainly the endorsement of the report by the Canadian government is a big step in that direction. The endorsement came from the Honorable Jon Gerrard, secretary of state for science, research and development, in a speech delivered to the Inter-American Telecommunication Commission (CITEL) meeting in Ottawa.

"The task force recommendations and its seven proposed principles will be incorporated into the planning process to the fullest extent possible," Gerrard said.

Still, all this positive action does not hide the fact that there are still issues to be worked out.

Other difficult questions

Most difficult is the issue of "bedroom community" station broadcasters in places such as Barrie, Ontario.

Under the proposed rules, the current coverage patterns of these small stations would result in them being included on "pods" located in the Toronto market, something that never was really intended when they were licensed by the CRTC.

"In the interim, the initial goal would be to cover your three millivolt contour," Edwards said, "because that's going to cover 90 percent of your present audience anyway."

Eventually, bedroom community stations would be allowed to extend DAB coverage to duplicate their analog coverage. But this will not occur until sometime in the future, Edwards said, when the industry will presumably have a "better understanding of how to deal with those kind of issues."

The other issue likely to raise a few questions—internationally at least—is Canada's renewed push for more space on the L-band. "We originally suggested a requirement for 70 MHz going into WARC '92, and the 40 MHz that we got was really a political compromise that allowed us to get anything," Edwards said. "What we've got now is, we believe, not enough to do everything we would like to do for the future, so 70 would be ideal."

The task force, however, believes that the 40 MHz currently allocated is sufficient for the transition of analog broadcasters onto DAB, a process they believe will begin in earnest in the next few years.

□ □ □

James Careless covers the industry for RW in Canada from Ottawa.

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Life of Piracy Leads to Career in Radio

by Alan Haber

HYDE PARK, N.Y. Talking over the phone to Allan Weiner, the ex-pirate radio broadcaster, one is unwittingly struck by the curious image of an imposing, burly character peering through his one good eye into the quivering souls of the crew of a ship he has just plundered.

That's only an image, of course. In reality, Allan Weiner is a 1994-edition land-lubber who's left the pirate's life behind. And he's advising would-be scourges of the airwaves to look to the letter of the law for their inspiration.

Weiner is perhaps most famous for concocting Radio New York International, the off-shore enterprise that attracted the attentions of the FCC and the U.S. Coast Guard in 1987. Believe it or not, that's just one chapter in this ex-pirate's fascinating broadcasting life.

Kid broadcaster

An electronics buff since elementary school, Weiner built a crystal radio when he was seven. After seeing a television documentary on the history of radio in the mid-1960s, he was hooked. Towards the latter part of the decade, he was aware of the unrest surrounding him, the demonstrations being held in his high

school—Lincoln High School, in Yonkers, New York. He remembered thinking it would be great to build a radio station so his friends, who were active in the anti-war movement, could broadcast their thoughts. And play some of the music of the day.

Weiner was only about 16 years old. He looked into the possibility of becoming a ham operator, but realized he wasn't into two-way communication. "I want to broadcast!" he remembered saying. He called the FCC and asked how he could get on the air. "They said, 'Do you have a million dollars?'"

Undaunted, Weiner took out the Constitution and read the First Amendment. "I said, 'Well, wait a minute. This is all wrong. I have every right to go on the air.'" he said. "I felt that the Constitution guarantees me free speech, and no government has a right to regulate me."

He hit the books at the library, studying everything he could find about radio, perusing engineering manuals from MIT, and soaking up information on building broadcast transmitters. Armed with this knowledge, he bought an old military surplus 50-watt AM transmitter, modified it, and converted it for use on 1620 AM on WRAD, his first pirate station, operating right out of the basement of his house in Yonkers.

WRAD (RAD came from R-A-D-I-O) was a short-lived enterprise: about two weeks after going on the air. Weiner experienced his first brush with the law. He says he was "ratted out" to the FCC by one of the local hams in the area, and that people who claimed to be FCC agents entered his house and pulled out the transmitter tubes and cut wires. They left the equipment, though. "My mother got hysterical and it was a real crazy mess," he said.

His parents handled the situation pretty well, he remembered—especially his father, who he said "had an understanding of the oppressive nature of the government, being that he was an attorney. He understood what I was doing. He didn't agree with it, he didn't like it, but he understood it."

Illegal

Did the Weiner family know that what young Allan was doing was illegal? "I don't know if my parents fully knew, no," he said. "And to me, I looked at it as something this important can't be illegal... You know, I looked at it as a violation similar to maybe getting a parking ticket." He remembered that he and his friends felt they were "protected under the first amendment, and anything that happened was just a nuisance."

About six months after WRAD's plug was pulled, Weiner put his second station, WKOV-AM, on the air, once again with some modified military surplus equip-

ment. This time, he was simulcasting on FM with WXMN-FM. He'd also helped set up an AM/FM combo at his friend's house, with the call letters WFSR-AM (Falling Star Radio) and WSEX-FM (take a guess). Politically-oriented programming, seasoned with music, was the order of the day, as was the taking of live phone calls on the air, without a delay.

"That's what we believed was totally free radio," he said.

Freedom, however, was once again to be short-lived, because, in August of 1971, the

government paid another visit to Weiner, arresting him and his partner and confiscating all of the equipment. "They pulled up these big rigs... that [were] as big as mountains," he remembered, and "cleaned out" both stations.

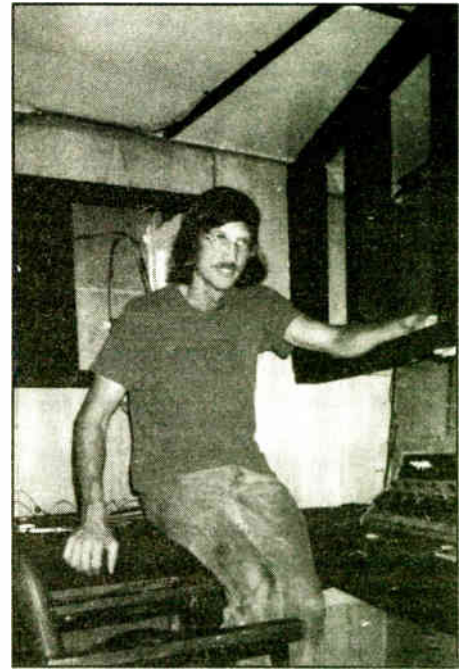
Weiner had just turned 18, and now was saddled with an arrest for broadcasting without a license, a violation of section 301 of the Communications Act. He eventually received a suspended sentence and a year of probation.

At this point, he did the only thing that made sense to him: he packed his bags, and, under the guise of Gentleman Farmer, moved to Maine.


Gentleman Farmer

Living on a farm in the northern part of Maine near the Canadian border, Weiner enrolled in small Ricker College, for which he built a legal FM station and a cable television station; he also started a communications department. During his years at Ricker, he also studied electronics

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Ex-Pirate Legitimate

► continued from page 8
and taught radio.

After Ricker College closed, Weiner signed on as chief engineer at WEGP-AM in Presque Isle, Maine. At the time, he said, management was impressed with his pirate activities. "They figured anybody that could build their own transmitter is worthy enough to be an engineer," he said, laughing.

Two years later, Weiner and his wife decided to purchase WELF-FM (which he changed to WOZI-FM) in Presque Isle for around \$75,000. He also applied for and was granted a license to build a 5,000 watt AM daytimer on 710 AM. Weiner said his pirate activities never came up in the application process.

Soon, though, Weiner's pirate streak was evident once again. He decided to provide a once-in-a-while forum for political expression to his friends and pirated the clear channel AM signal on 1616 AM. Soon thereafter, his friends at the FCC paid him a visit after hearing his pirate broadcasts. Weiner said he promised one of the Commission's field



Allan Weiner on the air at 18

agents he would never engage in pirate activity again. This was in 1983.

"That was the end of any pirate activity from me, at least as far as I'm concerned," he said.

Looking for a way to get on the air legally, "where great areas could be covered," Weiner applied to the FCC, and was granted a license to build a 100 watt auxiliary station on 1622 AM in Yonkers. After two weeks on the air, the FCC told Weiner auxiliary stations were not designed for originating broadcasts. Weiner told them he didn't agree, noting that he thought there was nothing in the FCC rules that said that. The FCC responded by notifying him they were going to revoke all of his licenses, including the ones for the stations in Presque Isle, Maine. Later, the revocation was changed, allowing him to sell the Maine stations to a minority interest, which he did in 1986.

High seas

Never one to sit still, however, Weiner took the opportunity to investigate an idea he'd first had around 1984 to put a radio station on a ship. "It had kind of a romance about it," he said. After voluminous research, he bought a vessel in 1986 and outfitted it with AM, FM and shortwave transmitters. In July of 1987, he took the ship, which carried Honduran registry, about four miles off the coast of Long Island, New York, and dubbed the broadcasts "Radio New York International."

And then... well, you may have, by

now, seen a pattern emerging in this broadcasting life. After four or five days of broadcasting, the FCC and the Coast Guard seized the Sarah (named after Weiner's wife) and arrested Weiner, saying he was in violation of international law. The charges were later dropped, he says, noting that "the Justice Department didn't want to pursue charges."

Weiner tried to put Radio New York International on the air again in 1988, but, he said, the government got a restraining order against the ship and its operators. He added that his counsel told him that he can't fight the United States Government. "My attorney point-blank said, they have all the guns, there's nothing you can do about it," he recalled.

The lure of profit, and running an uncensored, free format radio station, were the mitigating factors in Weiner's decision to broadcast from offshore. "I'm a stubborn guy," he said, "and I do believe in the letter of the law, but I believe the law works both ways. I mean, I believe that an entrepreneurial person should have a right to explore any legal avenues...there are

some rights that you have that you don't necessarily have to ask permission for every single time." Such as? "Free speech—the right to be able to talk and speak to people," he said.

Brother Stair

Fast forward to 1993, when Weiner received a phone call from a friend who wanted to put a shortwave radio station on a ship. Weiner said fine, but he wanted his

friend to know that it had to be legal. He didn't want trouble with the FCC.

But that's what he got. The M.V. Fury was being equipped with four shortwave transmitters, one of which was going to be used by Brother R. Stair's Overcomer Ministry of Walterboro, South Carolina. After Weiner worked on the Fury, which was docked for about four months last summer in Boston, and then in Charleston, South Carolina, the FCC raided the ship and confiscated all of its broadcasting equipment after stating, according to Weiner, that there were illegal transmissions emanating from it. Weiner says the transmissions were most likely coming from a two-way radio telephone on the ship's bridge, probably as a result of somebody playing with it, because the ship's transmitting equipment was inoperable at the time.

"It's a damn shame, it really is," he lamented, "because it would have been a great station. It would have gone down to Belize and broadcast the religious programming and done some missionary work, and it would have been neat. You know, it might have only lasted a few months or a year or so, but it would have been neat."

Now chief engineer at WHVW-AM in Hyde Park, New York, and a consulting engineer as well, Weiner said he constantly gets phone calls from people wanting to go on the air with pirate radio stations. He says he discourages them from pirate activity because it's against the law.

Weiner said he regrets all of his pirate activity, calling it a mistake. "It wasn't the way to do it," he said. "There were

other things I could have done."


He said he "wouldn't recommend doing it (pirate broadcasting) at all."

Keep it legal

When he gets his calls, Weiner suggests legal outlets for getting on the air, such as leasing air time and volunteering at small, local AM stations. He even suggests that people who are "hellbent" to get on the air "probably could muster up enough people to get together to buy a fledgling FM or AM station."

Still, Weiner says: "There is an outrageous thrill to putting a pirate radio station on the air. Absolutely, positively, you can't deny human nature." He stressed, though, that it's a shortlived thrill. "When the (FCC) comes knocking on your door, and when they take all of your equipment, and when they confiscate everything in your house that has anything to do with radio...and then they hit you with a \$10,000 fine, the romance goes away."

"I mean, I'm a broadcaster. I'm a little bit of an on-the-fringe type of broadcaster. I do things a little bit differently, and I see the world a little bit differently sometimes, but I think I'm a responsible broadcaster. I do believe in free radio."

Mulling over his radio career, the hits as well as the misses, Weiner is looking ahead. "I like to think that as a person ages, gracefully, and one accumulates experience, (he) tends to accumulate wisdom," he opined. "I tend to think that I have changed a lot. I don't think I'm quite the same person that I was when I was 16...I tend to think that experience, knowledge, (and) wisdom give you an appreciation of things that have happened in the past and the present... I always view everything as a learning experience, and I sit down and I say, learn from this, you know, learn from this so it doesn't happen again, and continue on. And that's what I'm doing." 

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Arrakis Positioned for the Future

FORT COLLINS, Colo. Hindsight may resemble 20/20 vision, but foresight is often more elusive and clouded. In business, a keen eye on the endless possibilities of the future and the ability to anticipate and react to that vision often spells the difference between success and failure.

At the Colorado headquarters of Arrakis Systems Inc., talk is often of the future, and how the company can continue to fulfill its vision of radio's future.

The brainchild of Mike Palmer, Arrakis was founded in 1976 as a console manufacturer. In 1984, the furniture division was launched under the direction of Roderic Graham. Seven years later, in

1991, Arrakis entered the digital audio market, and one year later, in 1992, Digi-Link II was unveiled. Digi-Link II is the company's multitasking platform, capable of stereo production mode, manual mode, live-assist mode, satellite automation mode, and full automation mode.

It's who you hire

The company's climb to success and industry leadership has been achieved through hard work and a constant effort to hire the right people. Jon Young, vice president of world wide sales, believes it is a key part of the company's success:

"Persons we hire in primary positions are outstanding in their own field... We invest in our staff. We get the best and make sure they are in the right place within the company."

All of this effort is necessary, Young said, to help turn Mike Palmer's vision into "products that are a better business decision."

"We can turn out a product faster and at a lower cost," Young said. "But it is never just a product. It is always part of

a long time."

The new complexity of the intelligence needed in each product makes standardization all the more crucial, Young said. And Arrakis responds by putting in the extra features that might not be needed just yet. The idea, he said, is to provide stations with a system they can integrate into an existing facility and use as a building block for the future.

Complex intelligence

That added complexity means the role of the customer service department is more crucial as well. Where the manufacture of consoles and furniture requires some, but

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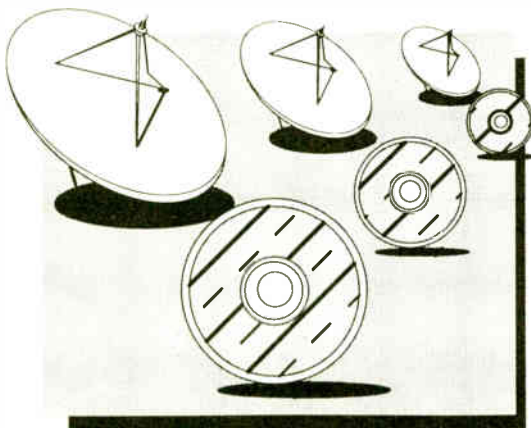
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Circle (29) On Reader Service Card



Jon Young (l) and Mike Palmer (r)

a system with future potential."

And that potential is built into every product—from the simplest piece of furniture to any one of the company's consoles to the Digi-Link II.

Entry into the world of digital audio was a natural step for Arrakis, and it did so employing the same philosophy that brought it success in furniture and consoles: Building system solutions.

"The challenges of digital audio are far more complex than anything we've addressed before," Young said. "The operational cost and risk in terms of implementation—it is not enough to do one box at a time."

Furthermore, he added: "When it comes to standards, owners have to be able to buy products they can rely on for

not much, customer service involvement after the product has been delivered, the delivery of a digital audio products to a customer marks the beginning of the relationship.

Arrakis provides one year of free customer service and will continue to add staff as the product lines and the demand grow.

Young believes the company is well positioned, with its product line and its internal structure, to continue its leadership role and fulfill its vision.

"We anticipate the standards. We lead them. Our vision for the future is to sustain our marketshare in our current markets and grow in areas of the market we have not historically gone in to without losing sight of the needs of the people who have been responsible for our success." ☉

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Circle (7) On Reader Service Card

Stern Saboteur Pleads Guilty

by Alan Haber

CLEVELAND The person accused of the sabotage that resulted in Howard Stern's June 10th on-air ritual "burial" of his Cleveland competition being temporarily silenced from the airwaves has been rewarded with the possibility of up to a two-year stretch in prison.

Former WMMS engineer William Alford pleaded guilty on September 7th to disruption of public service, one of the three charges levelled against him (breaking and entering, and possession of criminal tools were the other two).

Craig Weintraub, assistant prosecuting attorney for Cuyahoga County, Ohio, said he amended the breaking and entering charge to criminal trespass, a misdemeanor, and dismissed the possession of criminal tools charge. According to Weintraub, Alford faces up to two years in jail and a fine of up to \$5,000 for disrupting public service, and may also face incarceration for the misdemeanor charge. Sentencing was scheduled for September 28.

Alford had originally pled not guilty, a move Weintraub said was "just a legal formality." Weintraub noted that he did not expect Alford to change his plea, "especially in light of the fact that I wasn't really offering him much. I wasn't moving off of that third degree (disruption of public service) felony charge." Weintraub believes Alford changed his plea after Alford's lawyers took a look at the names on the witness list, which swelled to 30 as of September 7. They had talked the situation over with their client, "and (Alford) realized he was going to be buried."

Weintraub has a three-page written statement from Alford, which concerns his activities on June 10th, his involvement in the crime, and the implication of "others who might have been involved." The assistant D.A. says he feels that, based on his investigation "up to this point," and information he's received from witnesses, "that there might have been people involved in the management level of WMMS that inspired or used (Alford) to go down to the Stern show and disrupt the transmission."

Regardless of who may or may not be at fault, or whether there is anyone else at fault, Weintraub said that if he has enough evidence, he will take the case to a grand jury, and "let them make a decision whether there's probable cause to go ahead and indict for a conspiracy (to disrupt) public service."

Weintraub made it a point to say that Alford "sliced the wires" and didn't "cut them." By slicing the wires, Weintraub said, Alford "knew that it would be more difficult to detect the location of where the slice is, so Stern would be off the air for a longer period of time, and possibly for the remainder of the day if they couldn't find it."

WMMS-FM released a statement on September 7 that stated the station "...is pleased that this matter is now over." The statement noted that "WMMS condemns

and general manager of WNCX-FM, Stern's Cleveland station, said "We're pleased that Mr. Alford opted to be honest to the court, and I respect him for his honesty and being forthright." In addition, Tiburski said he wanted to "end this madness. They have to grow up over there, and stop these childish war games."

Paul Mako, acting engineer in charge at the FCC's Detroit office, said that the Commission still has the Stern incident under investigation.

Howard Stern was not available for comment, although he spoke about Alford's plea at length on the air on September 8. As he played a report from a

Alford faces up to two years in jail and a fine of up to \$5,000 and may also face incarceration.

such criminal conduct and fully cooperated in the prosecutor's investigation. The station believes that Mr. Alford acted on his own and is confident that any further investigation of this matter would reach the same conclusion."

Reacting to Alford's plea, Walter Tiburski, vice president

Cleveland television station concerning the incident, Stern said he believed his competition's management knew about the wire cutting incident. He wondered why his competition was concentrating on him. "Concentrate on your own dopey programming that's losing ratings," Stern said.

63 Years Ago

Reprinted from Radio World, October 3, 1931. Editor's note: The RW of old, printed for a time in the 1920s and 1930s and today's RW are unrelated except in name.

\$1,000,000 to De Forest Co.; Tube Dispute Settled

An agreement has been reached between the independent tube manufacturers, as the unlicensed ones were called, and the Radio Corporation of America, whereby all financial differences and suits are satisfactorily settled, and the independents become licensees. Also, all of the patents are pooled, so that the licensees obtain full protection, a situation not yet obtaining in the set licensing field.

The outstanding financial feature was the agreement by RCA to pay the DeForest Radio Company \$1,000,000 forthwith, in consideration of its tube patents.

The agreement brings an end to the suit against RCA for \$47,000,000 damages by independent tube manufacturers who, having obtained an injunction against a restrictive clause in RCA licenses to set manufacturers, claimed damages to their own tube sales. This restriction was clause 9 that provided all licensed set manufacturers must equip their sets initially with only RCA tubes. Before the injunction was granted RCA abandoned the clause as bad business policy.

Out of the tube clause suit grew the attempt to rule the stations of RCA and subsidiaries, both broadcasting and message-sending, off the air, because of violation of the Sherman act prohibiting monopoly and restrictions in restraint of trade. The Radio Law adds the penalty of license forfeiture for such violation as affecting communications. However, the Federal Radio Commission ruled, 3 to 2, that the tube clause did not affect monopoly of communications or restraint of trade thereunder.

The terms of the agreement newly reached include the acquisition of licenses under RCA patents by the active tube companies, including the De Forest company, the Gold Seal Electric Company, Arcturus, the Republic Radio Tube Company and the Diamond Radio Tube Company. In the same understanding, RCA and licensed concerns acquire tube-making rights under patents held by the De Forest Company.

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Radio Fun Is in Proper Selection of a Moniker

Dear Luci,

I'm somewhat alarmed that I lost track of a jock I used to listen to in the mid-70s. Perhaps someone who knows him is reading this right now. If so, please have Dr. Jay Michaels get in touch with me via this newspaper.

Get ready, Luci... here comes three thousand pieces of mail from DJs calling themselves "Dr. Jay Michaels." Many talented—and some not so talented—air personalities have used this name at one time or another during the period I mentioned. Some still do.

Air names... ah, what a perfectly amusing part of the broadcast entertainment industry. Stop and reflect for a moment on the teeming thousands who have performed as Jay Michaels, Joe Mama, Marv Ellis, Johnny Daniels, Scott Taylor or any number of plain vanilla handles to hang a voice on. Or the guys with a title, such as "The Real..." "The Other..." and "Just Plain..."

Where do air names come from? Station history, for one: owners of smaller stations who hire their new "Dave Watson" to replace the one just fired... new guy, old name.

Station formats dictate air names too. Country stations have Billy Joe-Bob Travis McCormack, while Churban FMs are hosted by DJ MC Kool Bloo Ieepop. Strangely, the jock's actual name (regard-

less of format) will be about as exotic as Bob Reilly... Bobby, if he hosts a sports talk show or weekend racing update.

Stations with a slant for fun give their personalities novelty names... Tom Zarecki at RCS was fond of staffing stations with Swampwater Pete, Lily Padd, Willie B. Wright, Arthur Mometer and others.

There's the guy who drops his last name and uses only his first and middle names. The shy type who adopts a macho "secret identity" name and becomes the dynamic persona he wouldn't dare to behind his real name. The female sidekick who management sticks with a single-word name resembling an exotic dancer's.

Then the hand of fate spontaneously invents an identity: The Greaseman's future was cast permanently when he quipped "I'm cookin' with hot grease tonite" during a shift. A woman who simply wandered in off the street into a studio referred to Bruce Morrow as "cousin," starting a long and legendary career.

Fate stuck me with an alternative identity during my college radio days when my normally-illegible signature got me on WHPC-FM Garden City, N.Y.'s lineup as "Stan Paterson." I used it all of nine months.

Relatability is all but guaranteed with a name that comes close to a celebrity's.

FROM THE TRENCHES

by Alan Peterson



Anyone notice a small spike of "Kevins" three years ago? Thank Kevin Costner for that one. My old stomp, 98Q in Connecticut, chewed on the name Kevin Michaels for a few days before bestowing it upon our new PM drive guy.

Somewhere there has to be mass lists of data (at a healthy price) showing jock names that "test well in extensive research for your particular market." Lemme save these stations a few bucks, Luci: spend the big cash on a new sofa for the jock lounge and drop fifteen dollars on a road atlas. Name your jocks after area roads. No kidding.

Some may sound like fanciful movie star names, but all become instantly familiar to listeners. Syracuse, N.Y., could have James Drumlin, Addison Poole or Vann Euclid. Here in Central Pennsylvania we could conceivably have an Emily Drexler, Ross Simpson (whoops, that's taken) or a Luther Geary. Apply some artistic license to a landmark: Richmond, Va.'s Midlothian Turnpike could be the springboard for Matt Lothian, traffic reporter. Best of all, the cost of research could be squat, because

the remote van already has an atlas!

When a winning name is lucked into, do what Bubba The Love Sponge did: protect it. Copyright it, servicemark it, trademark it, do whatever can be done to see to it that name only goes around once. Nothing is more aggravating than watching someone else hit the heights with the name you cooked up.

My guess is, good old Dr. Jay Michaels (anyone of them) is out of the business by now. But perhaps he's still performing as Cameron J. Alexander. Or Tommy Parks. Or MC Phat Mo Stoooge. Or Garth Doyle Parton McAllister.

That's what's unique about radio performance—when the act goes flat, you can just invent a new one with a new name.

Til next month—
Al

□□□

Al Peterson is production director for WTCY(AM)-WNNK(FM) Harrisburg, Pa. To avoid a market conflict, he was WHYN(AM) Springfield, Mass.'s "Pete Thompson" in 1986. Reach him at 717-238-1041.

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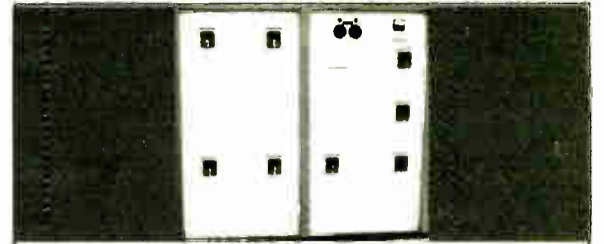
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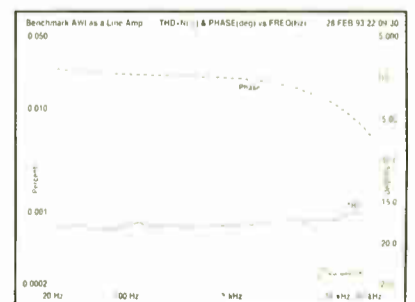
The Audio World™ Interface is a two-way recorder interface that is switchable to a line amp or a mono mix amp.

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READER SERVICE NO. 158

A black and white photograph showing a hand holding a computer mouse. The mouse is positioned over a musical staff with several notes. The background is a light-colored surface with faint grid lines and numbers. The text "Where can you get a feel for digital audio production?" is written in a bold, sans-serif font across the middle of the image.

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Jingle Studio Undergoes Renovation

The following is the first in a two-part series on renovating a radio spot/jingle production facility.

by Ken R.

TOLEDO It was getting serious. Our jingle and production facility had become so busy that we had long outgrown our

space to work with, about 23-feet by 14-feet.

I learned many years ago that I have limitations, so my next step was to contact a consulting engineer/studio designer. This is the same capable fellow who designed our current facility, which worked very well for many years. He asked me questions which really made

was a bigger board, so we decided on a Tascam 32-channel M-3700 automated console. The reasons included price, flexibility, and ability to read and generate SMPTE code for audio sweetening. We also wanted to install an easy-to-use digital audio workstation. Eventually, I decided on a SADIE system.

Ergonomically planned

In our ergonomic planning, it was decided that by putting a client desk behind the operator's position at the board, a number of requirements could be met. It would get the clients out of my face, they could still hear whatever is being mixed through our near-field monitors (and they'd have a place to hang out and eat their pizzas and talk on the phone without bothering me).

This design has an added bonus of using the client's desk (the side behind my position at the controls) as an extra rack space for things like power amplifiers that I don't need to see very often.

The shape of the room and the position of the large plate-glass windows dictated that most of the other equipment remain on my left as I face forward, with all the remote controls for the tape recorders at my left hand. Meters for the 16-track would be close at hand on my left, and the new 32-channel meter bridge for the new board which to go right in front of me under a formica shelf for the monitors.

Phone options

At Ken R. Inc., many of our clients never visit us in person so a phone patch

system was planned to allow me to patch test mixes down the line. This set-up can also play audio through the phone when the receiver is hung up, allowing me to hear what a jingle will sound like through a small radio-like speaker.

Okay, we assessed our needs for our new control room, designed the basic layout and budgeted for the work. It was then time to begin construction.

Ours was a total renovation, including moving most of the walls of our suite, expanding the control room to twice its size, putting in all new parquet floor and carpeting and replacing our 16-channel board with a 32-channel automated one. A schedule was prepared, and I must say, our workmen adhered to it very well. The whole process took about 10 working days, late June into early July 1993, from demolition of existing walls to repainting and finishing touches. While almost everything went according to plan, there were a few surprises.

For example, we never thought it would cost \$600 to completely rewire our phone system. Apparently those guys charge \$70 an hour, and our needs required more than eight hours. (We put a client desk with its own phone station behind the operator position in the control room, for example.) Here's a tip: it's much easier to rewire for phones before the drywall is finished. Our plans called for attractive brown cork for the control room walls... but have you priced that stuff lately? Wow! And by the way, measure your square footage carefully because you'll feel really dumb returning to the home supply store for two or three more panels of the stuff.

continued on page 27 ►



Ken R. (far right) and company in their new studio

mixer. The patch bays were stuffed to the gills, outboard equipment was jammed everywhere and visiting clients were crammed into the corners. But the final straw was the morning I couldn't find an open space on the countertop for my donut. Clearly we had to make a change, which was planned for the summer of 1993.

I started with the givens. Our whole office/studio suite, located at 1806 Madison Avenue, is about 2000 square feet, and certain walls could not be moved. I made a list of equipment we currently owned, and what we were likely to own in the near future.

Then I discussed my situation with my landlord, who has been most accommodating over the 10 years we have occupied the building. He offered to contribute about \$1700 in construction costs for each year of our new lease. I was willing to commit to five more years, so we started with an office renovation budget of about \$8500, which isn't much. I determined that if I could "trade out" floor covering by producing jingles for local merchants, I could get about another \$3500 to work with. Hey, you have to be resourceful!

I drew up a rough floor plan of the suite on paper, enlarging my control room by about 50 percent. This took space away from our beautiful lobby, but trade-offs were inevitable. Now I had a nice sized

me focus on my needs.

Some of the questions I hadn't previously considered included: Which pieces of equipment do I actually need to see in front of me when I'm sitting at the console, and which could be put in a rack behind me? How much space do I need for MIDI musicians? (Because recording has moved largely from the studio to the control room over the last 5 years, we produce lots of projects right in the control room). Where do I want my clients to sit? How do I actually produce? Which movements are the most awkward with my current setup? Would a remote controller keep me from sliding from side to side so darn much?

My designer also asked me about power requirements. How many quad boxes, and where should they be? In a way, the hardest part of designing a new studio is focusing on what you really need today...and tomorrow.

Equipment

Our pre-renovation/upgrade set-up included a Tascam 16-track, two Otari 2-track machines, four DAT recorders and a 16 x 4 Ramsa mixing console. Our monitors included JBL 4411's and the more-utilized Tannoy PBM 6.5's. I won't bore you with a three-page list of processors, mics and other toys in the studio.

In the upgrade, our biggest requirement

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SHORT TAKE

Alpha-Core's Flat Cable

by Rich Rarey

WASHINGTON Alpha-Core Inc. has introduced a novel line of high-end speaker cable that looks less like wire and more like thin electric bus bars. Based on the design of OI Goertz, it's composed of two slender-width bands of oxygen-free copper, laminated together to make an almost flat (0.05-inch), 0.8-

inch-wide cable. The company claims that many artifacts that afflict other cables (distortion, skin effect, etc.) are eliminated or greatly reduced with this cable, and that high frequency resolution is maintained—even in very long runs.

Where high-end users will want the cable for its small electrical profile (0.0022 ohms/ft., 0.600nF/ft., 10nH/ft.), others

will like the cable's small physical profile, suitable for concealing behind walls, under carpets or even under automotive upholstery. The Alpha-Core product line ranges from "modest home use" MI 1 (\$4.95/ft.) to "industrial-strength" MI AG 2

(\$88.70/ft.), with other models in between. The cables are supplied, at an extra charge, with whatever connectors the user needs (gold-coated spades, banana plugs, pins).

we compared a 10-meter length of Alpha-Core MI 2 cable against an equal length of 16-gauge Belden 8471 cable in a very subjective listening test. We sampled one of my favorite

The company claims that many artifacts that afflict other cables (distortion, skin effect, etc.) are eliminated.

In National Public Radio's main listening/recording studio,

CDs, Aja by Steely Dan. While skeptical about claims of audible improvements of esoteric cables, three NPR engineers (including myself) concluded that there was a slight audible improvement in the clarity of higher frequencies—even at short cable lengths.

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Fred Venisky (pictured) and Jimmy Regan have the distinction of owning and operating the most used Foundation 2000 on the planet.

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Fostex



Goertz M1 speaker cable

(Radio World Managing Editor John Gatski, in a separate but equally subjective and unscientific test in his home studio, also reported small, but audible improvements in midrange and treble clarity as well as bass resolution when using the Alpha-Core versus zip cord.)

One warning about this kind of cable: While it's easy to connect the cable to Alpha-Core's slotted terminals, repeated vigorous flexing can break the conductors. However, for cables that are connected and left in place, this stress should not be a problem.

For more information, contact Alpha-Core Inc. at 203-335-6805; or circle Reader Service 194.

□ □ □

Rich Rarey is technical director for National Public Radio's "All Things Considered" and a contributing writer to RW.

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SIGNAL-TO-NOISE

Simultaneous Multi-Edits from MIT

by Frank Beacham

NEW YORK For those who work with audio tape, the very act of locating a sound bite or other segment from among hours of recorded material can be a slow, tedious process. Now comes news from MIT's Media Lab of AudioStreamer, a new technology that allows one to monitor—and comprehend—three simultaneous audio sources at once.

Developed by MIT student Atty Mullins as his master's thesis, along with Chris Schmandt, director of the Media Lab's speech research group, AudioStreamer is supported by the lab's News of the Future Consortium and may eventually have an impact on how we edit and consume news and other spoken word programming.

In using the AudioStreamer system, the listener wears headphones, over which three simultaneous newscasts are presented. The newscasts appear to come from distinct locations in the three-dimensional space of the listener. The listener interacts with AudioStreamer via a special chair equipped with proximity sensors that can detect the listener's movements by measuring the body's influence on an electric field. By tilting one's head in the direction of a sound source, the listener brings one of the newscasts into focus by increasing its volume. This amplification slowly decays with time; if the listener reasserts interest, the audio stream gets louder again.

Listener interaction

The interplay between the listener's selections and the computer's suggestions produces a continual shift of emphasis among the three channels and makes it easy for the listener to shift attention from one item to another. AudioStreamer's computer can also use its knowledge of how a story is structured to alert the listener to new stories on the other two channels by briefly turning up the volume when the speaker changes or when a new story begins.

The basis for AudioStreamer's technology is the "cocktail party effect"—the phenomenon that occurs in a group when in the midst of concentrating on one conversation we overhear someone mention our name in a different conversation. Among the things that helps us separate these various conversations, Schmandt said, is that people with different voices sound different from each other and that each conversation has a distinct spacial location.

"You can perform this task when conversations happen in different places in space," he explained. "Now we are talking about synthesizing the locations and we're using some hardware that actually computes what the sound should sound like in each ear. It's basically doing some filtering... doing some transformations to make the sound come from different points in space."

Now, as some readers are no doubt wondering, why would anyone want to listen to three audio programs at once? "I admit that at least a third of the people that listen to this just don't get it. They say 'this is horrible. Why would I want to listen to this?'" Schmandt admitted. "I have a number of answers."

"First, this is not for recreational listening," he said. "This is listening where

you are searching for information that somehow is coming in multiple audio files. Let's say I have twenty voice mail messages and I'm trying to quickly locate the one who wanted to talk with me about AudioStreamer. Well, I could get through those messages three times faster by running them simultaneously."

Many uses

Schmandt said AudioStreamer struck a chord with a control room operator at a radio network handling multiple audio feeds from satellites. "I can listen to all these channels at once," the operator said.

Schmandt said the technology might also have newsroom applications where editors or librarians are searching for sound bites from audio archives.

Major credit in the development of AudioStreamer also goes to Neil Gershenfield of the Media Lab's Information and Entertainment Physics and Media Group. Gershenfield developed the proximity sensors used in AudioStreamer's chair. These sensors may have their other applications for news in the future.

Recently Gershenfield demonstrated that sensors placed under a tabletop can create

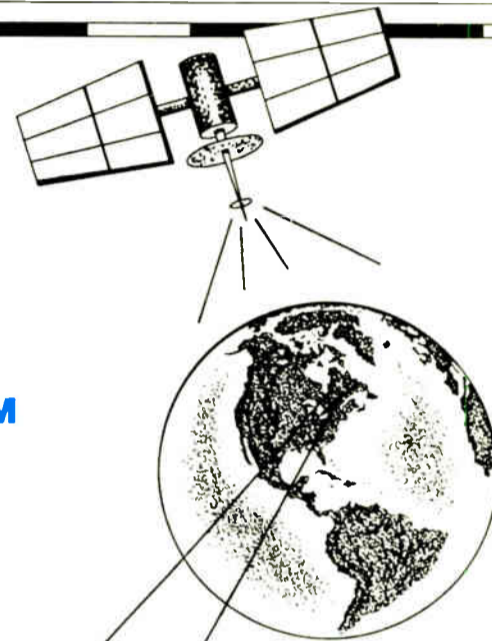
an information space above: a sweep of the hand turns the pages of an electronic broadsheet forward or back. Raising or lowering the hand changes the section from the front page to, say, business or sports. The idea here is to replace the keyboard and mouse and improve the way humans interact with computers.

At this stage, AudioStreamer is not a product, but a continuing research project. "We think it's promising in terms of its potential," Schmandt said. "For us it's part of exploring how to listen more effectively."

□ □ □

Frank Beacham is a writer, director, producer and consultant. His address is 163 Amsterdam Ave. #361, New York, NY 10023. E-Mail: beacham@radio mail.net.

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Crystal Semiconductor 20-bit A/D Converter

Crystal Semiconductor has introduced the CS5390 high performance stereo A/D converter. The 20-bit delta-sigma chip is said to have specifications of 110 dB dynamic range and can support sampling rates of 32 kHz, 44.1 kHz and 48 kHz. The power dissipation specification is 550 mW. Recommended applications include digital audio workstations and digital mixers.



For more information, contact Crystal Semiconductor at 512-442-7555; or circle **Reader Service 6**.



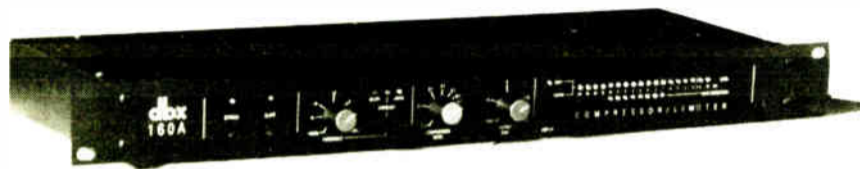
RADAR Digital Recorder

OTARI has announced it is now marketing the RADAR multitrack hard disk digital recorder, produced by Creation Technologies in Canada.

The hard-disk based recorder is available in eight-, 16-, and 24-track configuration. Each unit comes with 1.2 GB drive (22 minutes of stereo audio). The optional remote features shuttle/jog wheel, number and QWERTY keyboard, track keys for arming and soloing and dedicated function keys.

RADAR is intended for radio, recording, project and post production facilities, according to Otari.

For more information, contact Otari at 415-341-5900; or circle **Reader Service 3**.



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For more information, contact Jesse Walsh at 616-695-5948; or circle **Reader Service 200**.

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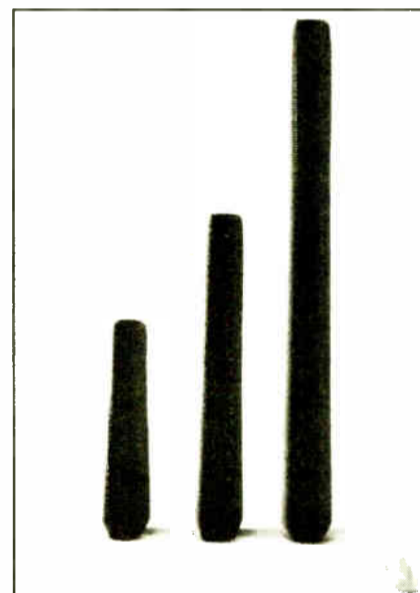


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continued on page 30 ►

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PRODUCER'S FILE

Do Not Take Your Copywriting for Granted

by Ty Ford

BALTIMORE I've been talking with a number of radio stations about writing copy and producing spots for some of their clients, and about doing voicers for the stations themselves. It's ironic. Even though TV ad dollars are being redirected to radio because of advertising budget cutbacks, cutbacks in radio operations have made taking advantage of this turn of events very difficult.

This should be a glorious period in which radio reaps big rewards for being economical and quick. However, timing is everything, and at this point in history a lot of radio stations are not particularly well-positioned to respond. Blame it on Rule 80-90 and the invasion of broadcasting industry investors back in the '80s. Blame it on the fact that the aging Baby Boom generation has become distracted by things other than listening to the radio 18 hours a day, like having a life.

The wake up call I want to make is to the people at the radio stations who are responsible for writing, performing and producing spots and promos. For example, a service I subscribe to regularly sends spots produced by radio stations across the country. I'm sorry, but a lot of the spots don't work. As a creative production-type person.

Not easy

I've done your job, I'm still doing it. I know it's not easy. I know that most of your time is spent writing "Price and Product" copy for direct clients who think they are advertising wizards. I also know clients usually want to squeeze too many words into a piece of copy. I also know that LMA and Duopoly situations have really increased your work load, usually with little or no extra pay.

Having said that, let's get back to the problems: content and delivery. I hear more and more people on the air who may do an "okay" air show, but who lack the ability to perform commercial copy. When they try, the result is perfunctory at best. This isn't something new, but what I'm hearing makes me believe that there used to be more people on the air who knew how to do production.

The performance of commercial copy requires the use of special breathing and projection techniques, timing and the ability to project a variety of different attitudes. Without these performance abilities, the work of the best copywriter in the world will be unconvincing.

How do you fix this problem? Hire people with good production experience and pay them so they don't have to leave. Training members of your existing staff can work, but it requires time and patience. The first obstacle is that the performer may not be able to "hear" the difference between what's good and what's not. If they can't, the burden is on you to teach them. Some will never "get it." In fact, they may not even be interested.

If you're a production director already this far down the road you may by now have realized that forcing commercial performances out of an unqualified airstaff usually ends up with spots that sound amateurish. The gap in credibility that results becomes part of the message communicated to the listener. Compromises

here do your clients a disservice, and they also negatively impact the listeners' feeling about the radio station.

I have great sympathy for the person who must come up with yet another new idea to sell the local bar, car dealer, hardware store, clothing store or soft drink. The truth is that in trying to come up with another amazing idea, you may be reaching too far, especially if your reach exceeds the performance capabilities of your airstaff.

There used to be more people on the air who knew how to do production.

I know what you are saying; you don't have enough time to write prize-winning copy every time, and there are clients who wouldn't let you if you DID have the time. A lot of the copy I hear sounds like it came from some "punch-in-the-name-and-address-and-phone-number" data base. It's a dangerous thought, but you need to take more control.

(Caution: Type A personality people are at high risk of losing their jobs unless they have been socialized properly. Under no circumstances consider the following suggestions unless you have been certified as Type A: In full remission or Type A: Socialized.)

• **Suggestion 1:** Start taking more control of the copywriting. Taking control, of course, means taking more responsibility. It means talking directly with the client. More specifically, it means learning how to prompt the client so that he tells you as much as he can. The most important information is that which makes the client's product or service differ from the competition's. It also may be the most difficult, because the client may not know, or because the difference may not be of interest to the listener.

Remember to listen

I can not overemphasize the importance of listening first. If you blow into the meeting with your latest "great idea" without listening first, you might discover too late that the client has already tried that approach and found it to be unproductive. There's a difference between being an authority and being a know-it-all. The professional knows, from personal experience, what they mean. If you're copywriting is getting crispy around the edges, one good way to jump start your creativity is to get a copy of the NAB's "Guidelines for Radio: Copywriting," Second Edition.

I bought a copy of the original book in the early 1980's because it covered both analytical and creative approaches to the task of writing copy. Whenever I got stuck for an idea or an approach, a quick scan of the book, a fresh cup of coffee and a moment of quiet usually resulted in a workable concept.

I had the pleasure of revising and editing the original text late last year. (Incidentally, I don't get a dime if you buy the book.) and in the process I opened up the spectrum of possibilities a bit, added some sound and production elements and a multipage appendix of music and sound effects suppliers.

• **Suggestion 2:** Start directing your talent

during recording sessions. Be careful. Your first attempts at directing may not be appreciated. Try talking about how you envision the spot sounding and how you hear the characters.

Prepare for discussion

Be prepared for some discussion and be prepared to let the concept evolve, as long as it's as good or better than the original idea. Be prepared to explain why a suggested concept doesn't meet the client's goals. Giving good direction is an art within itself. Some people find that using the amount of energy level, speed of read, amount of smile, sincerity or other applicable emotion works. You

can also simply tell the talent what words you want hit hardest. Another method is to give the name of another talent the person you're directing might know. If a talent is not giving you the "read" you hear in your head, read the line for them. If they've got a good ear, you'll get what you want. Even if they don't, be open enough to consider alternatives that will work as well or better.

Know what they want

If you can't read the line the way you hear it in your own head, or you read it differently each time (this happens), it's

your problem. Believe it or not, I've had ad agency people who can't reproduce what they hear in their heads. For them I try to get around the issue by asking what words they want me to hit. Most of the time this works. The talent can have a similar problem. After hearing your "read" of a line, he or she will say, "okay, I got it," but the read may not be what you asked for, and they may never get it.

This is one of those strange mysteries of human communication. There's probably a 30-page dissertation about the phenomenon somewhere, but the bottom line is, they either get it or they don't. If they don't, be prepared to move on.

In conclusion

I'm bringing these ideas up because the fewer tune-outs your station suffers, the longer the TSLs, and the more your airtime is worth. The way I see it, it's a win/win situation. The stronger radio becomes, the more work there will be for advertising agencies and production services like me.

□ □ □

Ty Ford has been trying to convince the NAB to have production seminars at the NAB Spring Convention so that production people can attend and see the latest equipment and techniques. Call him with your ideas at 410-889-6201 or e-mail him at MCI, 347-6635.

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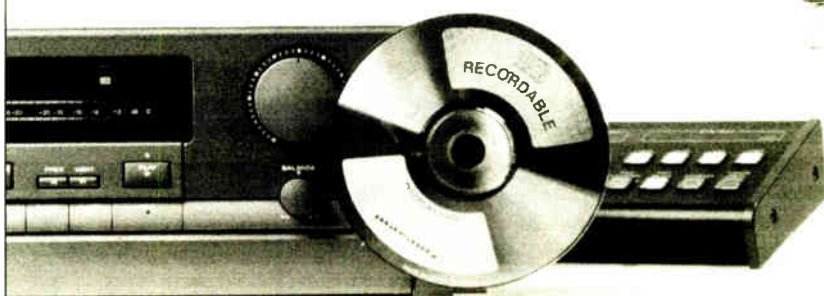
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Circle (106) On Reader Service Card

PRODUCT EVALUATION

CardD Provides Budget PC Editing

by Steve Murphy
with Alex Zavistovich



BETHESDA, Md. Digital audio workstations come in a variety of flavors these days, from complex dedicated multitrack recording devices to editing cards that plug right into your personal computer. Of the latter variety, Digital Audio Labs' CardD Plus, with its Windows-based EdDitor Plus software companion, is one that is easy to learn, with a considerable number of features for its price range.

Technical specs

First, let's get the technical information

out of the way. The CardD Plus plugs into any IBM AT-compatible PC (and we

Product Capsule: CardD Plus Audio Editor

 Thumbs Up	 Thumbs Down
<ul style="list-style-type: none"> ✓ easy to use ✓ digital I/O card option ✓ great customer service 	<ul style="list-style-type: none"> ✓ mouse-controlled scrub
<small>For more information, circle Reader Service 11, or call Digital Audio Labs at 612-473-7626.</small>	

found it quite easy to install). It has selectable sampling rates from 22.05 kHz to 48 kHz. Digital Audio Labs recommends a 50 MHz 486 PC with 4 MB RAM, Windows 3.1 and a 200 MB hard drive as a minimum system configuration. We experienced a configuration problem, but Digital Audio Labs was quite helpful in providing assistance, so we give them high marks for customer service.

Analog-to-digital converters run through consumer-grade RCA connectors (-10 dB). To incorporate the system with a professional recording medium, of course, would require ++ balanced connectors. Fortunately, Digital Audio Labs offers the optional I/O CardD, which provides digital ins and outs through coaxial connectors. With that option, the unit can be connected, as it is in our case, with a professional DAT machine.

Although some folks might view the -10 dB connectors as a disadvantage, many PC-based editors don't even have a digital I/O option. At least Digital Audio Labs has had the foresight to make such an option available. A stand-alone card for digital I/O in the S/PDIF format, with Windows driver, should now be available.

Software

On the software side of things, Digital Audio Labs offers the EdDitor Plus for Windows, which provides a non-destructive waveform editing program, customized fades and crossfades, bass and treble EQ, simultaneous record and play, preset punch-ins and a scrub function.

Together, the CardD Plus and EdDitor Plus are a tremendous tool for complex

audio editing. For example, if you have a complicated read for a voice-over, you can record straight to the hard disk. The EdDitor software allows you to drop letters as markers, enabling you to, in essence, label your takes. Once the takes are finished, it's easy to tab from one marker to the next and quickly delete unwanted takes, without having to rock reels or listen back to every take as you would with tape.

Like any other piece of software, the EdDitor Plus has a learning curve, but in general the system is very intuitive. It allows you to do two passes of two stereo tracks for basic multitrack emulation. It also enables you to record while listening

ambivalent about. When you use the mouse, it has a tendency to overshoot, rather than immediately stopping. A little refinement would make this feature much more useful.

The EdDitor Plus enables the CardD to speed up or slow down the tracks, but it changes the pitch, like the speed control on an analog recorder. Therefore, unless you're changing speed no more than one or two percent, using the speed change feature is not the best way to fit a spot that might have been recorded slightly over or slightly under time. Other software by companies like SAW and Turtle Beach Softworks enables the CardD Plus to do time compression without pitch shift.

Ample precision

On the other hand, the system is precise enough that you can fit audio within a spot by removing or shortening the



The CardD was put through its paces at Avalon Studios.

back. This is a useful feature, because it's always better, of course, to lay down a music bed and have the DJ do a voice-over on a second pass, rather than doing both on the fly.

EdDitor Plus also has a scrub feature, which originally was removed when the software was changed from DOS to Windows format. In the DOS environment, "rocking reels" was accomplished via cursor keys. That made it pretty easy to find the click of a kick drum or the beginning of a vocal part. The Windows version uses a mouse to scrub, which I'm

breaths and pauses in the announcer's delivery. Even whole words and phrases can be edited out easily to trim down an overly long recording.

How precise is the system? One of my most taxing uses for the CardD was editing national standardized tests for court stenographers. I had to edit a series of five-minute depositions so that there were exactly forty syllables per each ten second interval. After a workout like that, cutting out a breath or two to fit a spot into 60 seconds is no big deal.

But editing is not the only application that the CardD Plus and EdDitor Plus has in the radio environment. The system also makes a decent live assist device for disc jockeys. A separate Sound Catalog program allows individual sound files to be named displayed and played back with the click of the mouse. You can click on as many selections as you want and the system will play them back in that order. A disc jockey could at least keep track of commercials and PSAs that way. With a big enough hard drive, he or she could even play back music programming.

Summary

In short, at \$795 for the CardD Plus, \$295 for the I/O CardD and the EdDitor Plus at \$349, Digital Audio Labs has created a powerful, cost effective tool for radio production. Now all you need is the computer.

□ □ □

Steve Murphy is owner and chief engineer of Avalon Sound Studio in Bethesda, Md. Alex Zavistovich is a freelance writer and principle in Positive Spin Communications. Steve Murphy can be reached at 301-951-3900.

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World Radio History

SHORT TAKE

Aphex Easyrider

BALTIMORE Four channels of easy-to-use gain reduction in one rack space for only \$449; that's the Aphex Easyrider Model 106. The front-panel controls couldn't get much simpler.

Each channel has a drive knob and an output knob. Front-panel buttons allow the first two and last two channels to be linked in pairs. During link operation, the channel that has the most compression applies that amount of gain reduction to both channels. Input drive levels and output levels remain independently adjustable in link mode.



Inputs and outputs are 1/4-inch TRS and are configured for both balanced or unbalanced plugs. Each channel also has its own -10 dB/+4 dB operating level switch on the back panel. Power is supplied by a wall wart, 24 VAC at 600mA.

Behind the simple exterior, dual-action circuits detect short-term from long-term passages and control them accordingly. A Fast/Slow button for each compressor allows for separate adjustment of how aggressively the audio is processed, and how loud the processed audio sounds.

Similar to "easy-over" compressors, the Easyrider differs in that the gain reduction ratio varies continuously from the time the audio crosses the threshold until it reaches a 5:1 ratio and 20 dB gain reduction.

With some compressors, 20 dB of gain reduction can sound pretty "crunched," but the Easyrider remains fairly open sounding. At maximum gain reduction (20 dB), my voice track kept quite a bit of its edge. Because it lacks a gating circuit, the compressor "turns up" the level when no audio is passed. If you've got a mic in a noisy environment, or if there are other noisy sources upstream, this could be a problem.

In summary, the EasyRider is no Aphex Compellor, but then again it doesn't cost nearly as much.

For more information, contact Aphex at 818-767-2929; or circle Reader Service 108.

-Ty Ford

Toledo Jingle Studio Gets Major Refurb, New Gear

► continued from page 19

• **Dust:** I can't stress enough that there will be lots of dust during a remodeling. Plaster is the main culprit...and reel-to-reel machines, CD players and control boards run much better without fine dust clogging up the works. We removed almost all our control room equipment down the hall to another room far from the action. The remainder of the equipment (in the racks) was covered with plastic and sealed completely with duct tape. If you have computers anywhere near construction, cover those too.

• **Downtime:** Ours is a very busy recording studio. We have agencies, retailers and radio stations all over the country that count on us to complete their projects on-time and on-budget. These folks are not interested in your renovation or the fact that you don't have a studio for a week or two.

We put off what we could, but to take care of our workload we actually had to run several announcer sessions in another studio across town, which cost us all our profit on those jobs. But you can never say to a client "call someone else," because they will and that'll be the last you see of them. If someone asked us if we could have their production done on time, the answer was always "yes," and

after we hung up the phone we had to figure out how to get it done.

• **Details:** Here are some items you probably forgot. Wire (estimate your needs and have it ready). Cleaning supplies (the day you put your new equipment in you'll want lots of Windex, paper towels, a sweeper and a Dustbuster). Camera (It's fun to take pictures in progress for your scrap book. I've discovered, however, that the only pictures I really like have human beings in them.)

• **The Future:** We learned our lesson on a mini-renovation we did a few years ago. You can't predict your equipment needs in the future, but bet money that you'll need a lot more space. Get patch bays bigger than your wildest dreams. Leave rack space for processing toys not yet invented. If you don't have a hard-disk editing system and TV screen, you will soon, so plan on a space for it.

The worst thing you can do is undertake a renovation that's not going to get you where you'll be in a year or two, because then you'll have to do this all over again.

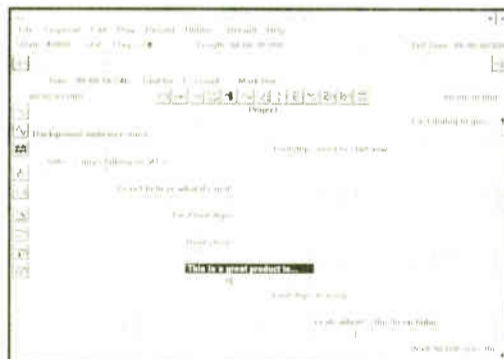
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Ken R. is president and owner of Ken R. Inc., a audio production facility located in Toledo.

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World Radio History

PRODUCT EVALUATION

Sequerra Jumps into Market with NFM-Pro

by Bruce Bartlett
with Jenny Bartlett

ELKHART, Ind. For the past several months, we've been reviewing nearfield monitors in the \$250 to \$500 range. In this issue, we decided to step up to the \$1,200 to \$1,500 per pair level to see what you get for the extra money. A recently introduced high-end monitor is the Sequerra NFM-Pro (\$1,200), designed by noted tuner and speaker designer Dick Sequerra.

Surprisingly, the NFM uses a cone tweeter instead of the more popular dome tweeter used by most manufacturers today. Why use a cone when dome tweeters are so popular? According to Sequerra, domes are weak and go into "multimode vibration" if stressed. If an impulse hits the dome that exceeds the dome's rigidity limits, he explained, "the driver is prone to nasty breakup modes."

Features

The NFM Pro's large 1.5-inch tweeter cone is highly directional, which reduces the effect of room acoustics on the speaker's sound. However, you have to aim the speakers at you and sit in the "sweet spot" to get the best sound.

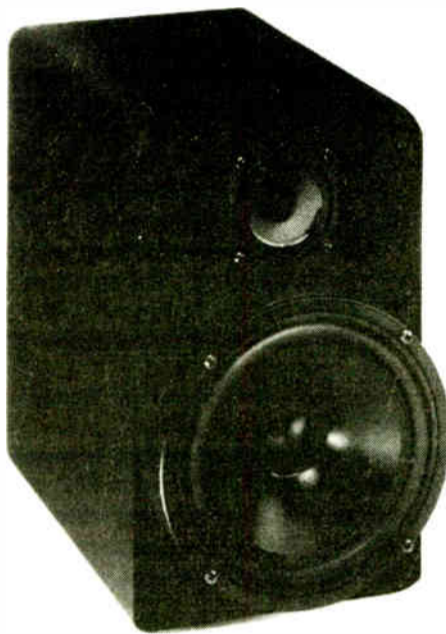
Supplementing the tweeter is a 6.5-inch polypropylene woofer with a butyl surround. The first-order crossover uses a large air-core inductor on the woofer and a polypropylene capacitor on the tweeter.

The cabinet is made of a unique material—laminated phenolic which is very stiff and inert. It's covered with grey nextel paint which reduces reflections. When you knock on the cabinet walls, there's no ringing. The cabinet design is acoustic suspension, which in my view tends to give tighter bass than vented cabinets. Baffle re-radiation is reduced by making the front baffle as small as possible. The speaker is 11 inches deep and 6 inches

wide. Each weighs 17 pounds.

The monitor is signal aligned or coherent, in that the acoustic centers of the woofer and tweeter are the same distance from the listener. Since the woofer responds slower than the tweeter, the woofer is mounted closer to the listener so that the two signals arrive at your ears at the same time. Mounted in a short pipe, the woofer juts out in front of the tweeter by 1.5 inches.

This design looks functional rather than aesthetic; some people may not like the appearance. There are no grills to cover the drivers.



NFM-Pro

Signal-aligned

If a speaker is not signal aligned, Sequerra said, you get smearing of transients: the rising waveform of the transient is spread in time, and the time position of harmonics is confused.

On the back of the cabinet is a step attenuator which allows variable settings of the tweeter level. There's also a binding post connector. This connector lacks holes that accept bare wires, but you can use a dual-banana plug.

Sequerra recommends the speaker be placed on a stand or on a console meter bridge, at least a meter away from room surfaces, with the woofer at ear height. (My observations confirmed his recommended placement.)

Sequerra also recommends that you burn in the speaker to relieve the stress in the woofer surrounds and increase their com-

pliance. In turn, this extends the low-frequency limit. I agree with this recommendation. After I burned in the NFM-Pro with pink noise for several hours, it had deeper

Product Capsule: Sequerra NFM-Pro



Thumbs Up

- ✓ accurate tonal balance
- ✓ tight bass
- ✓ detailed transient response
- ✓ sharp imaging



Thumbs Down

- ✓ slight closed-in sound
- ✓ lacks deep bass
- ✓ small sweet spot
- ✓ expensive

For more information, circle **Reader Service 62**, or call Sequerra Assoc. Ltd. at 203-325-1791.

bass and a smoother sound. The company also recommends that you use high-end speaker cable, which is available from Sequerra, or a pro or consumer hi-fi outlet.

As for specs, the rated sensitivity is high at 90 dB SPL/W/m, and maximum SPL is claimed to be 114 dB at 3 kHz. Pulse rise time is less than 30 microseconds. Impedance is 8 ohms.

Listening tests

The opinions expressed here are mine, and do not reflect any judgement by RW.

I listened to the NFM-Pro with the tweeter set at -1. When I did mixes, I noticed that each instrument sounded extremely detailed and clear. The audible bass was very tight. The monitors played very loud. Images were so well resolved, I could hear time and spatial details in the reverb-return signals better than with other speakers I have tested. This speaker puts everything in sharp focus. Image sizes were accurate, and images were precisely located.

In my initial listening tests, however, I noticed a closed-in characteristic. This seemed to be true no matter what recording I played. Sequerra said the problem was in the lamp cord cable I was using for speaker cable. He sent me some of his own cable, and I listened again. The new cable did reduce this closed-in effect somewhat.

(Because the speaker is very revealing, the anomalies I heard could have been from other components, such as my amplifier or the CD player. Sequerra recommends testing various components to get the best sound.)

On the CD "Kamakiriad," by Donald Fagen, there was plenty of midbass, but no deep bass—which is normal for small speakers. For \$1,200, however, I would have expected the speakers to produce more deep bass. Of the bass that was there, it produced excellent detail, such as bass guitar strings rattling on the frets.

On the jazz quartet recording "Time on My Hands" by John Scofield, cymbals were crisp and the bass lines lean and clean. The electric guitars and drums in Bryan Adam's "I Need Somebody," were reproduced with edge and punch. Paul McCartney's vocal in his "Unplugged" album was lean rather than warm, but the guitar strums and plucks were very detailed. Images were sharp.

On "Secret Story" by Pat Metheny, the tinkly triangle and 12-string guitars were extremely well resolved, but not ultra-smooth in tone quality. Midbass coloration is low. Metheny's guitar was not

continued on page 30 ►



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 **HARRIS
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Sequerra's NFM Nearfield Monitor

► continued from page 28

muddy as it can be on some speakers. But again the deep bass notes were weak. It also was easy to separate the instrumental lines in this complex mix.

On the classical CD Stravinsky's "Firebird," recorded by Telarc, the very deep bass drum roll at the beginning was audible only if you listened at high volume. Strings sounded fairly smooth. Percussion and pizzicatos were clearly resolved.

On the bench

My anechoic frequency response measurements of the Sequerra NFM-Pro

confirmed my listening impressions. I placed the mic a meter away, and one inch above the woofer axis, where the response was flattest. The tweeter setting was -1. The response measured 90 Hz to 20 kHz +/-3 dB, and was flat within 2 dB from 180 Hz to 14 kHz.

Overall, the response shape was flat except for a slight emphasis at 1800 Hz. This anomaly might cause the mild closed-in effect heard in the listening tests.

Burning-in the speakers and using high-quality cable helps the problem. There definitely was no midbass hump. At 50 Hz, the response was down about 6 dB

when the speaker was placed in half-space near a mixing console.

As I mentioned before, speaker placement is critical. When I placed the mic at tweeter height on axis, an 11 dB notch appeared at 3.5 kHz. At 30 degrees off-axis horizontally, the high frequencies rolled off above 1 kHz, down 15 dB at 15 kHz. So it's important to sit in the speaker's "sweet spot." If you're the mix engineer, a producer sitting next to may hear less high frequency content than you.

The Energy Time Curve revealed a very sharp, coherent direct sound spike. Delayed sounds were 16 and 21 dB down from the direct sound spike. This shows

that the transient response is excellent, and cabinet vibrations are well damped.

In spite of the NFM-Pro's flat measured response, its sound is a little confined. This may be due to its tight tweeter pattern or limited low end. The lowest bass notes are there but weak, as you might expect in a small speaker. I suspect that a flat response might not be psycho-acoustically correct for nearfield monitors with narrow dispersion.

Summary

Although it may be comparing apples and oranges, the recently reviewed Alesis Monitor One (\$395 per pair retail) has more bass, and by itself is more listenable, in my opinion. This impression might be due to the NFM's narrow tweeter dispersion and less-extended bass.

To make the NFM Pro's sound more full range, I would suggest adding a subwoofer, which is offered by Sequerra and many other companies. (To complete the ensemble, Sequerra also offers his ribbon-tweeter modules.) Overall, with the NFM Pro's very good midrange and high end, excellent transient response and imaging, adding the subwoofer could well make this an ideal (though expensive) setup.

□ □ □

Bruce Bartlett is a microphone engineer and technical writer for Crown International, and the author of "Stereo Microphone Techniques," published by Focal Press. Jenny Bartlett is a technical writer. Bruce can be reached at 219-294-8388.

Product Guide

► continued from page 24



Digital Designs Magma Monitors

Digital Designs has introduced its Magma Series of nearfield monitors, the M6 and the M26a.

At \$283 per pair, the M6 is housed in a 9-inch (high), 13.5-inches (wide) and 11-inches (deep) ported cabinet. Using a single 6.5-inch woofer, audible bass is said to extend below 50 Hz. The M26a cabinet dimensions are 10-inches (high), 18-inches (wide) and 15-inches deep. The M26a uses two 6.5-inch woofers in a port configuration to achieve audible bass below 45 Hz. Price is \$429 per pair.

For more information, contact Digital Designs at 405-946-4500; or circle Reader Service 123.

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Circle (13) On Reader Service Card

World Radio History

WORKBENCH

Amplifier Chips for Home-Brewed Circuits

by John Bisset

SPRINGFIELD, Va. I just received a copy of the Tascam User Guide newsletter. If you're not on the mailing list, and you own Tascam equipment, circle **Reader Service 144** and information will be sent. When you reply, ask for a copy of the August 1993 issue.

In the newsletter is an article on Do's and Don'ts for DAT recording. Not only are the tips good for the engineer, but the suggestions are must reading for your production and on-air staff. Some of the tips are straightforward—like don't overuse the "CUE" and "REVIEW" modes, since the tape is in contact with the heads, and overuse can wear both the tape and the heads.

Other tips, like refraining from using pens or pencils when labeling DAT tapes are unique to this system. The rationale behind this thinking is that graphite or ink particles could flake off into the transport. TASCAM recommends labeling with a felt-tip marker that won't leave any residue.

TASCAM also recommends keeping two backups. Only one is updated at a time, so if a problem occurs during the backup process, the older backup is still available. Finally, keep that bottle of alcohol out of the DAT machine. DAT transports and heads need cleaning, but only with a dry-cleaning cassette. Dirty heads show up as an increase in errors.

★ ★ ★

Walt Lowery is the Customer Service Manager at Symetrix, and a frequent contributor to this column. Walt wanted our readers to know about a possible board-stuffing problem that was recently uncovered, that could involve several model years of Symetrix 104 and 108 multiline phone interfaces.

The products in question may exhibit a poor high frequency null due to the wrong value component being stuffed in the hybrid board when constructed. The symptom is that little or no null improvement will be noted when adjusting the H.F. NULL pot. Symetrix Senior Technician Beverly Smith discovered that in some units, C-16 had been stuffed with a 0.001uF ceramic capacitor. The proper value is a 0.01uF ceramic. C-16 is located on the plug-in hybrid card, behind and above the null test point jack.

To check your 104 or 108 for the stuffing error, remove the unit from your rack and remove power and the top cover. Remove the 5/64-inch Allen-head screws on the front panel, which hold the hybrid cards in place. Remove the No. 6 Phillips head screws from the rear panel of the hybrid cards. Lift the hybrid cards up and out of the chassis.

Verify that C-16 is a 0.01uF ceramic capacitor (marked 103). The improper part which was used by the factory in some units was marked 102. If necessary, replace C-16 with the proper value of capacitor. Before reinstalling, Walt suggests that you clean the hybrid board edge connector contacts and sockets before replacing the boards in the chassis.

Replace all screws and the lid. The

hybrids will need to be renulled after this procedure, the instructions are found in the Symetrix tech manual.

It is not known when the stuffing error occurred, so checking your 104 or 108 multiline phone interface isn't a bad idea. By the way, if you need the 0.01uF ceramic capacitors to repair your hybrid boards, fax your request to Walt Lowery at Symetrix, and the caps will be sent to you at no charge. (Talk about more great customer service!) Walt Lowery can be contacted by fax at 206-787-3211.

★ ★ ★

Those of you who still have the time to home-brew circuits will be interested in National Semiconductor's Boomer™ audio power amplifier series. These little

chips operate off +5VDC and will deliver up to 1 watt into a standard 8-ohm speaker. The chips boast less than 1 percent



Boomer audio power amplifier chip

THD at 5VDC, but can operate as low as 2.7VDC with little performance degradation. Half watt and one watt output versions are available. If you'd like more

information on the LM4860/ LM4861, contact National Semiconductor's Customer Response Group at 1-800-272-9959 from 7 a.m., to 7 p.m. Central Time.

★ ★ ★

Andrew Corporation has just published its new HELIAX supply catalog. You can obtain a free copy by circling **Reader Service 218**. In addition to highlighting half-inch and smaller Heliac cables, the catalog describes several new Heliac products.

One that caught my eye was a 3M Cold Shrink Weatherproofing kit. Installation time is less than 3 minutes (try that with a torch or shrink gun) and the cost is under \$20. Larger diameter cable weatherproofing kits are slightly higher. The best feature of this new product is that it can be easily removed.

□ □ □

John Bisset is a principal with Multiphase, a contract engineering and special projects company based in Washington, DC. He can be reached at 703-323-7180. Fax submissions for the Workbench column to 703-764-0751. Printed submissions qualify for SBE Certification credit.

BOTTOMLINE BROADCASTER

Junkbox Yields Valuable Audio Meter

by James R. Murphy

MORGANTOWN, W.Va. Tracing audio signals around the station can be a hassle sometimes, and usually is handled by "borrowing" a pair of headphones from anyone who isn't looking.

Although clumsy and uncomfortable, headphones can be effective troubleshooting aids in a pinch. They can also cause problems if, for instance, you try listening to an on-air signal

are AC-powered which limits their usefulness.

Even with these professionally built test sets, there is something missing: The ability to hear the signal.

Being able to listen to a sound as well as measure its level is an important troubleshooting aid, as well as an efficient method of setting levels and identifying signals.

The audio level meter shown in Figure 1 is made from common components which keeps the costs low, and is capable of good sound quality. It is not laboratory accurate, nor would the sound impress Mr. Bose, but overall, the quality and accuracy is acceptable for all but the most critical measurements.

The front end

I wanted my meter to have minimum loading effect and also to provide a 600 ohm termination. After some head scratching, I decided on using a resistor string, tapped for different measuring points. This keeps the price down—only a single-pole rotary switch is needed, and it is readily available. And, with a resistor switched in to shunt the input terminals, we can obtain a reference 600 ohm reading.

Developing the resistor values is an interesting project, and I used a method known as "ohms per volt." If you are not gray around the temples, you probably have never heard of the principle of ohms/volt. If you have heard the term, it was probably the common 20,000 ohms/volt rating of an analog multimeter. We've all been told that these load a circuit and cause false readings. Hence, many believe that this meter has an input resistance of 20,000 ohms. Wrong.

Let's examine this multimeter for a moment.

At the 500 volt scale, the input impedance needs to be 10 megaohms to provide a sensitivity of 20,000 ohms per volt.

The 100 volt scale would need 2 megaohms in order to maintain the same sensitivity. As you can see, this loading factor is constant throughout all the scales of a multimeter, and the input resistance is actually quite high.

continued on page 33 ►

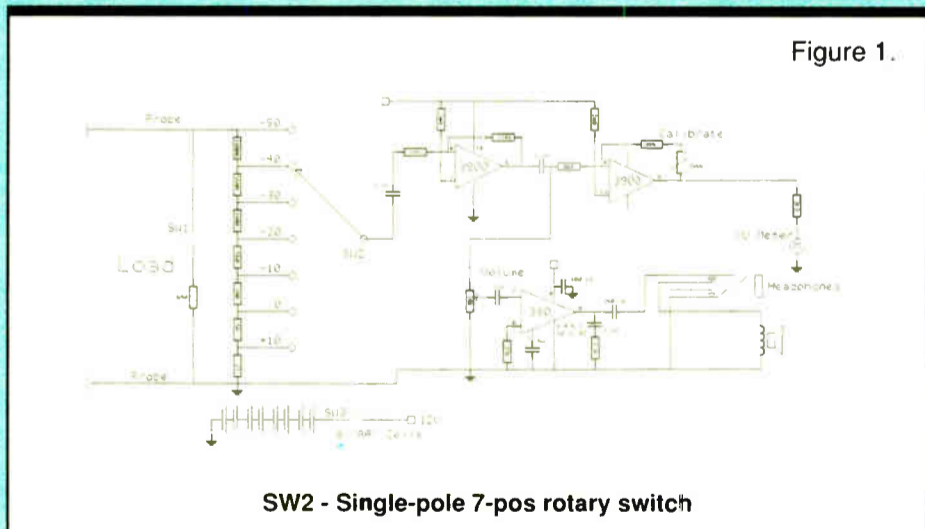


Figure 1.

SW2 - Single-pole 7-pos rotary switch

with a pair which happen to have an impedance of 4 ohms.

There are more bizarre devices which give indications of sound, I was, in one instance, forced to use a small, one cell flashlight bulb. A weak flickering indicated the presence of audio... or something, maybe Radio Free Europe, or was it a data stream?

Not entirely accurate

While all these methods work to some extent, they fail to give you an accurate reading of audio level and any measure of sound quality. These are very important features, particularly if you wish to set up a stereo system. For this, you need to step up to some type of metering and monitoring device.

There are a few AC voltmeters on the market and a couple of older telephone test sets that are very accurate and rugged. They are limited in frequency response, however, and most

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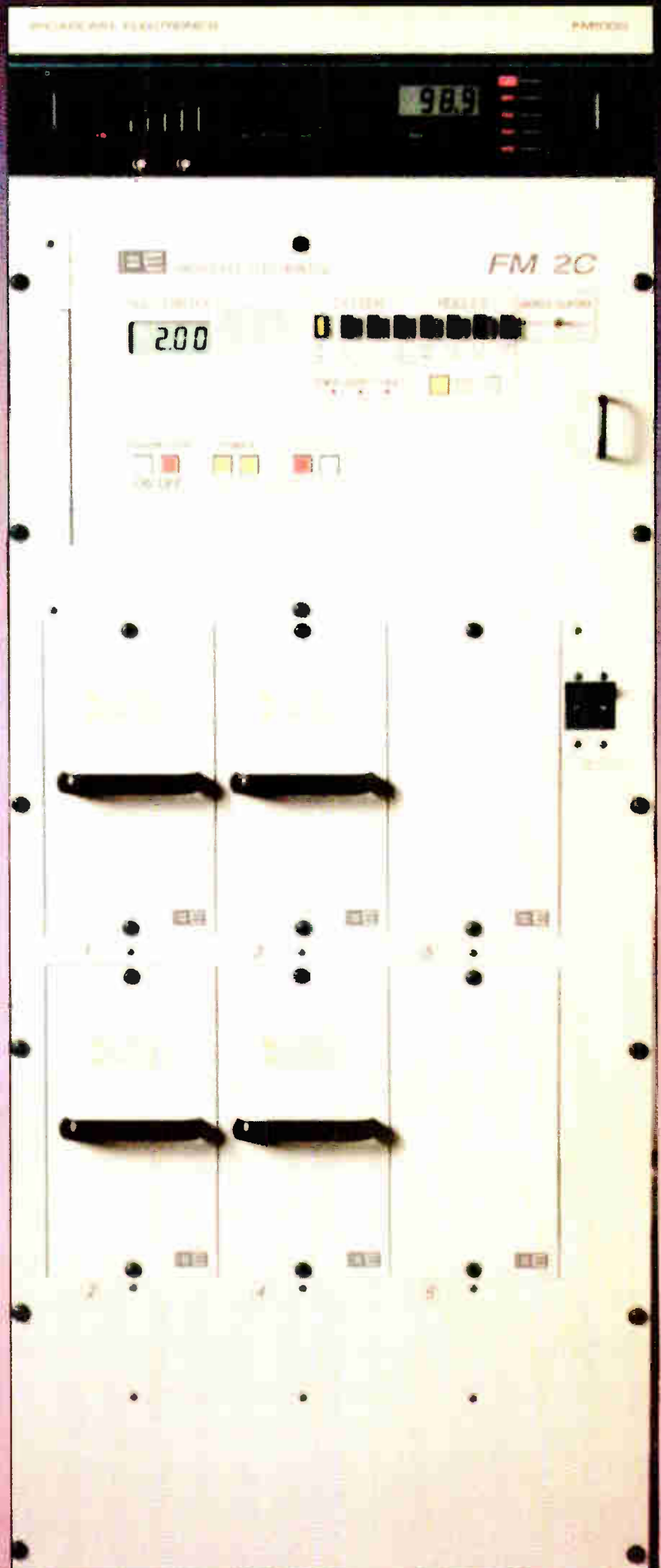


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Junkbox Yields Meter

► continued from page 31

You can also use ohms-per-volt as a tool, much like Ohms law, to determine the parameters of any series resistance. It provides a quick method of figuring the resistance needed to produce a 1 volt drop in any series resistance circuit, and our input ladder provides an excellent showcase for our ohms-per-volt calculation. Mathematically, ohms-per-volt is simply the reverse of the current in the circuit. Here is how I approached it.

I wanted the meter to have a sensitivity of around 10,000 ohms/volt. While this may seem low, remember we are not measuring high voltages. Our maximum signal will be around 2.5 volts AC. At this voltage, current through our input impedance is only a few microamps. Because our lowest AC signal (-50 dBm) is over 400 μ A through 600 ohms, our meter is practically invisible to the circuit.

Now, how much input resistance will we have? Well, assuming that our maximum signal will be +10 dBm, or 2.45 volts, our resistance divider will be $2.45 \times 10,000$, or 24,500 ohms total. The next step is to determine how much resistance we need between each 10 dB step of our selector.

The input to the level meter's amplifier is -50, so, because we are using just an input resistance string, all readings must be attenuated to this level.

Attenuation needed

To find our maximum attenuation needed, subtract 0.00245 (-50) from 2.45 (+10). The difference is 2.44755 volts. If we then multiply this by our ohms/volt, we get 24,475.5 ohms. Subtracting this from the total of 24,500 gives us 24.5 ohms. This is the bottom of the input resistance, and the +10 voltage tap.

The 0 dBm signal must be reduced by 50 dB, our -10 signal by 40 dB, and so on. Our -50 dBm signal will be applied directly to the input of the meter amplifier.

Working upward through the resistance, the next tap will be 10 dB higher, i.e., 0.00775 volts. The drop is $0.00775 - 0.00245$ or 0.0053. Multiplying by 10,000 gives us 53 ohms. The next 10 dB is from 0.00775 up to 0.0245, a difference of 0.01675 volts. Our resistance is, for this interval, 167.5 ohms.

Carrying this through, we get 530 ohms for -20, 1675 ohms for -30, 5300 for -40 leg, and 16750 for the last.

Calculations

These calculations yield numbers far from the standard resistor values of 16,000, 5100, 1600, 510, 160, 51 and 22. Trying to use them will change the 10 dB increments by as much as 3 dB.

Rather than fiddle with these values, I raised the sensitivity to 10, 746 ohms/volt. This is even better, and the resistances are much closer to the standard values, i.e., 18,000, 5700, 1800, 570, 180, 57, 27. You might need to hand pick your resistors, but you should be able to come close with standard 2 percent tolerance units. With this sensitivity, our input resistance is 26,327 ohms ($10,746 \times 2.45$).

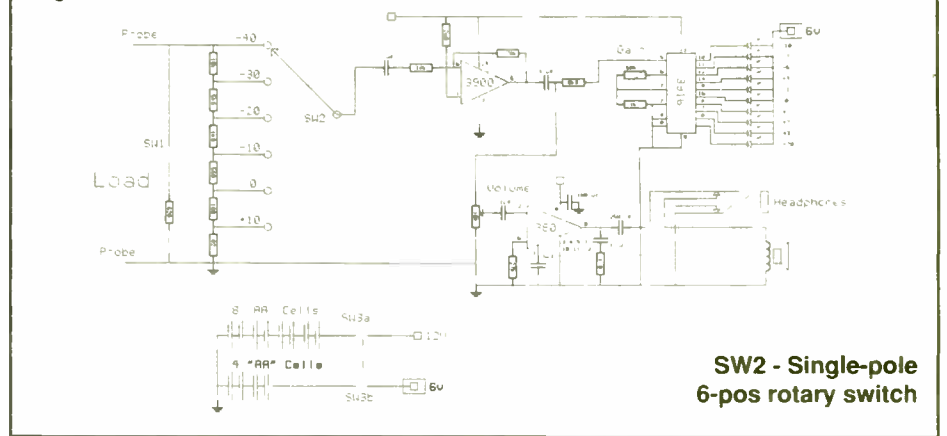
Again, with cost in mind, I used the popular LM3900. This is a quad op amp which uses a single-ended supply and can be found in old automation systems, distribution amps and consoles. You should find some of these around your shop.

The specs are acceptable for our purposes. By the way, this is a current mirrored op amp, thus the non-inverting terminal is tied to the positive rail through a large resistance.

I split the gain required between two amplifiers. This keeps the bandwidth flat and stabilizes the system.

The audio amplifier, an LM380, is also a common IC, and you should have a couple back in the corner somewhere. Even if you need to purchase one, it is cheap. The 380 is a bit touchy, so be sure to bypass the +12 volts at the pin. The RC network on the output is important, too, so don't leave it out.

Figure 2.



The amps are powered by 8 AA batteries, which makes a hefty 12 volt supply which will last a long time under

normal usage.

Now, for the meter. Don't get some
continued on page 35 ►

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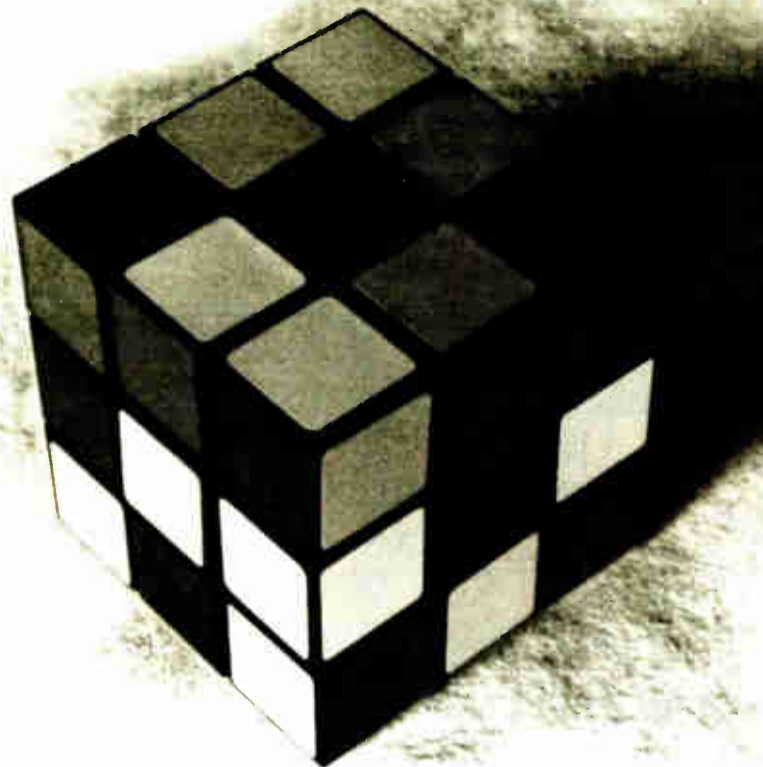
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Junkbox Yields Valuable Audio Meter

► continued from page 33

wimpy little import meter. Scrounge around, find a meter from an old Gates board or from some old processing equipment, or from an antiquated automation system. Any standard VU meter will work nicely. I use a 4-inch VU meter from an old Collins board, and it is classy. Use your resources here.

Don't try using a standard DC millimeter. You would need to rectify the signal, but even then the unit won't have the proper ballistics. Get an old-fashioned VU meter.

It makes meter reading a lot more fun.

Digital version

Figure 2 shows a digital readout version of the level meter.

Because the LED driver chip affords some gain, only one audio stage is needed. Also, the input switching only goes to -40. Since there is an LED assigned as -20, your resolution extends down to -60.

I added another small battery pack, using 4 AA batteries, to power the LEDs. The drain on them is very low and should normally last for years.

I mounted my LEDs in a semicircle, resembling the curvature of a meter pointer. Call me old-fashioned.

Using the digital version is a bit awkward since the LEDs respond much faster than a VU meter. It is excellent for reading steady state tones, however.

The speaker should also be selected carefully. A heavy magnet, high-compliance type will work well. Check into automobile speakers, the small ones for door mounting, etc., and try to keep the size to about 3 or 3-1/2 inches. The better the speaker, the better the sound, of course.

Construction

This is an easy board to lay out and etch, since there are few components and the chip pinout is friendly. If you make your own etched board, make sure you leave a strip of copper about .5" x 1.25" grounded and centered directly under pins 3, 4, 5 and 10, 11, 12 of the LM380. This heat sink will allow the chip to develop about a watt of audio for long periods. Normally, you won't run the level that loud and long, to conserve batteries, but if you are rack-mounting the unit with an AC power supply, you'll need it.

Mount your resistors directly to the rotary switch. Use toggle switches for power and loading, and make sure your headphone jack is the interrupt type.

Fit the speaker tight behind some fiberglass screen or acoustical cloth, put the dB switch on a large knob, then install banana plugs, an XLR and a tip, ring, sleeve—all in parallel—for the input. That way, you can measure a variety of items without test leads.

Operation of the unit in a high RF field might be tricky and will need shielding and bypassing. I have used mine only in studio environments with no RF present.

Calibration

You'll need an audio source capable of at least 0 dBm (.775V) with your 600 ohm loading switch on. Then, with the meter switch set to the 0 dB scale, set your meter to read zero (dB) with the CAL pot. That's all there is to it.

If you really want to get precise, you should check each 10 dB step. Sometimes resistor tolerances will cause a slight

error, and you might need to add or subtract a little to make it read accurately.

Operation

Try to set the meter to the highest setting, then work down until you get an on-scale reading. Keep the volume control down as much as possible, unless you want to change batteries often.

Checking microphones is a breeze. Make sure you have your headphones plugged in, then plug the mike directly into the front panel XLR. Setting the switch to -50 will produce almost a full scale meter reading if the mike is good. You might want to install a switch and

150 ohm resistor across the input resistance to load your microphone properly.

So, the next time someone says the left channel is down a little, grab your level meter and start tracing.

A 2 or 3 dB difference in audio is quite apparent on the meter, especially when you are listening at the same time. You can also spot thin, tinny-sounding or muddy audio.

Clipping it to the output terminals of tape and cart machines and running level or response checks on the spot can save you much time and effort and may prevent you from carrying equipment to your workbench when it isn't necessary.

I have even used mine to trace audio on a circuit board. Just keep in mind that you are using a 10,000 ohm/volt device, which can indeed load a high impedance circuit.

While the LED version is perhaps more state-of-the-art, I prefer my nice, big analog VU meter. Most of my techs, when given a choice, will also choose it over the digital version.

Once you have your junkbox level meter up and running, you'll wonder how you ever got along without it.

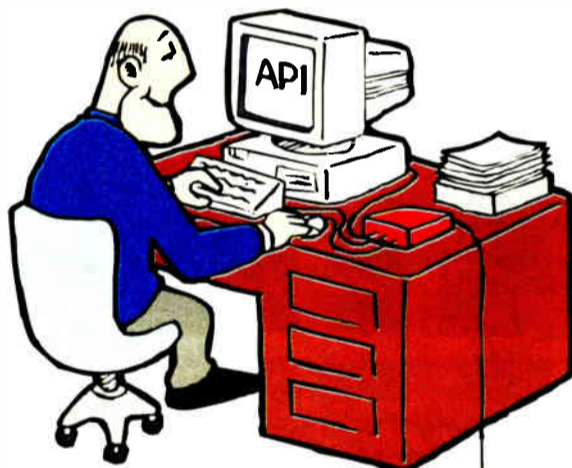
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James Murphy is director of engineering for West Virginia Radio Corp. He has an ASEE degree, senior radio certification from SBE, and an original FCC first class license. He can be reached at 304-296-0029; fax: 304-296-3978.

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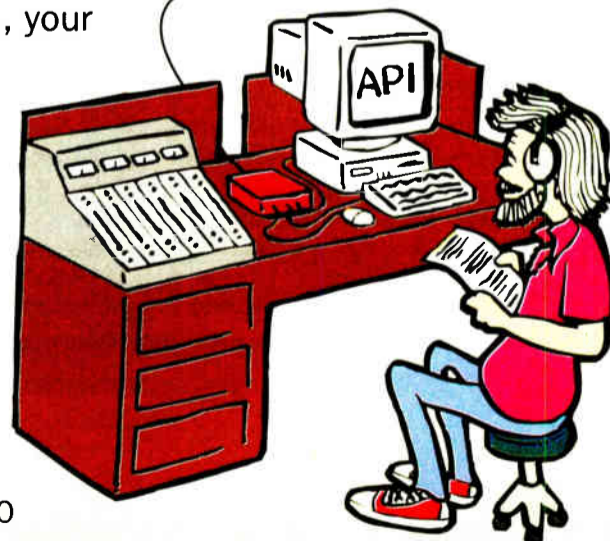
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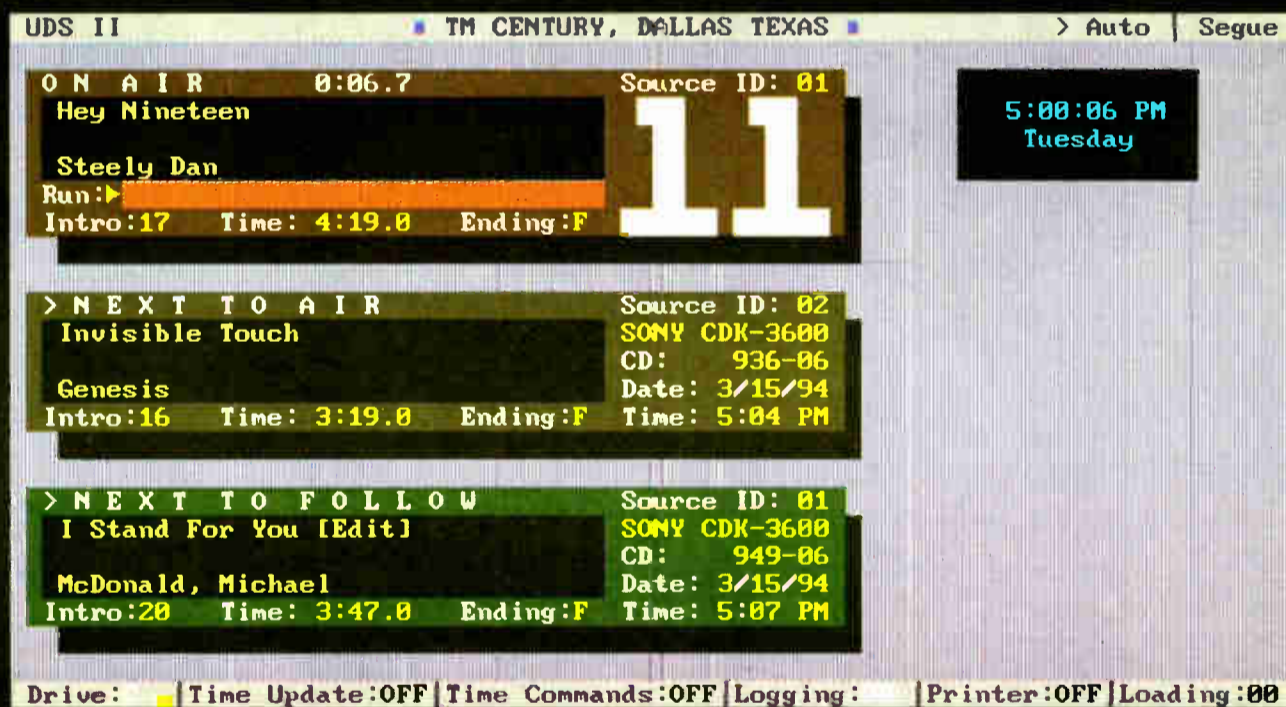
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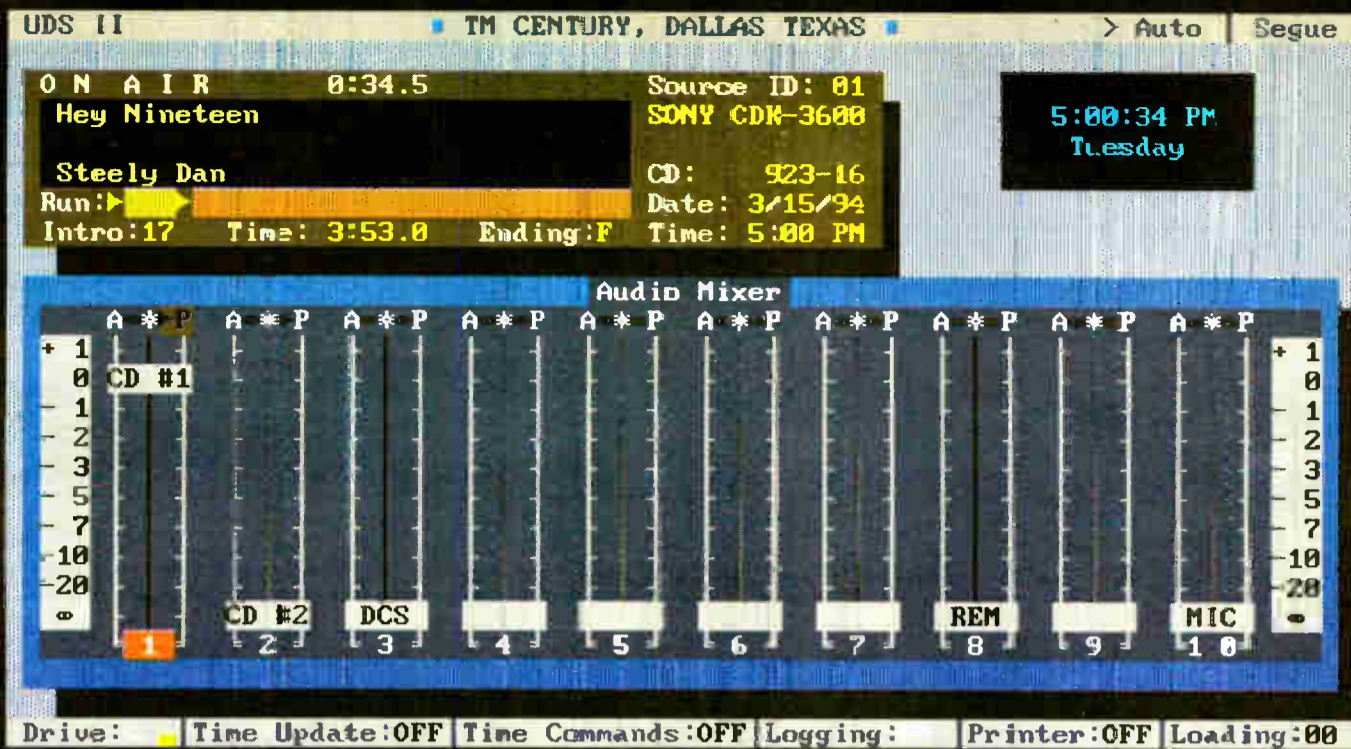
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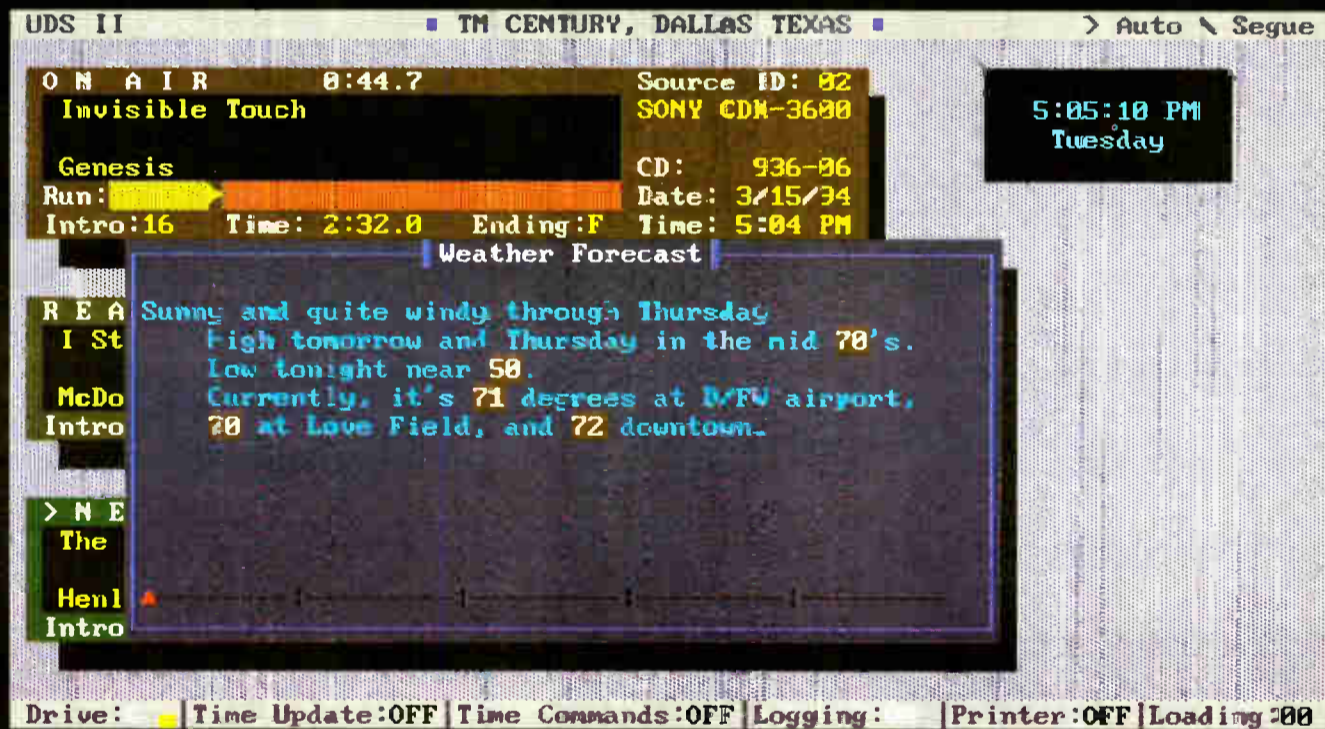
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PRODUCT EVALUATION

Gentner Digital Hybrid a Winner

by Richard A. Majestic

ANNAPOLIS, Md. As far as telephone hybrids go, the **Gentner Digital Hybrid III** is a winner for talkshows. The latest addition to Gentner's digital hybrid line, it is a quality product through and through. The unit performs superbly both on the test bench and in the studio, even when connected to the most revered telephone guest.

The Gentner DHIII is simple to install, as either a standalone telephone-caller record unit or integrated into a complicated multiline, multichannel mix-minus talkshow setup. I tested it in simple single line interviewer/phone-call record systems, right up to multiline PABX key systems connected to four digital hybrids with four mix-minus buses.

Clean caller audio

Because the DHIII processes the digitized audio signal in a digital signal processor (DSP), it produces clean caller audio, free from send audio interference. As the audio signal is 100 percent digitally processed, the DHIII adapts automatically and continuously to telephone line conditions and programming content.

Bandpass filters on both the send (studio) and caller (receive) audio channels effectively minimize line hum and central office switching noise.

The DHIII uses two-times oversampling (20,000 samples per second) at 16-bit resolution and includes a good-quality analog hybrid transformer. This combination provides excellent null performance (tras-hybrid loss), while continuously nulling the telephone circuit.

The DHIII includes full remote control I/O with hybrid tally status outputs. It also includes an internal test tone generator, for simplified system set up, and a built-in power supply that works with domestic and international power sources.

The front panel contains eight setup pots and switches, mounted behind a removable panel. Installer controls include: main and cue send level pots; caller and caller control level pots; and two analog hybrid null controls.

User programmable

Ten DIP switches let the installer program the DHIII to auto-answer and disconnect, change the function of the remote control output and activate the test oscillator and other setup functions. The front panel includes LED indicators for send audio and caller audio activity, as well as large, lighted pushbutton switches for activating a remote recorder, a Cue button to mute caller audio, an Off button to mute caller audio and release the telephone line and an On button.

When On is pressed, the DHIII seizes the telephone line and starts the nulling process. It emits a 200 millisecond burst of white noise that causes the hybrid DSP circuit to produce the best line null. After auto nulling, the DHIII output audio is unmuted and the caller can be heard.

Multiple callers can be conferenced and aired by using multiple DHIIIs and a

multi mix-minus bus audio mixing console or a dedicated mix-minus mixer.

The rear panel contains the AC power voltage selector and connector, two remote control I/O connectors (DB9 and DB25), XLR 3M balanced caller audio output, XLR 3M balanced send/receive mixed audio output, XLR 3F cue audio input, SLR 3F main audio send and the telco modular RJ-11C line and set connectors.

The factory set level for the balanced XLR audio connectors is +4 dBu, and the telephone line send level is nominally adjusted at -15 dBu. The DHIII connects easily to most modern key systems, as well as the old AT&T 1A2 electro-mechanical key systems. On digital telephone equipment, the DHIII has a very low noise floor and clean sound.

Figure 1 shows the published specifications

for the DHIII, and Figure 2 shows the specifications measured in my bench test of the equipment.

Bench test

Measurements were taken using a Tektronix SG505 audio oscillator and AA501 audio analyzer. The DHIII was connected to a standard commercial analog telephone line equipped with a 2500 telephone set. A second line was dialed and answered with another 2500 set. The noise floor when both lines were connected through the telco switch measures

continued on page 45 ▶

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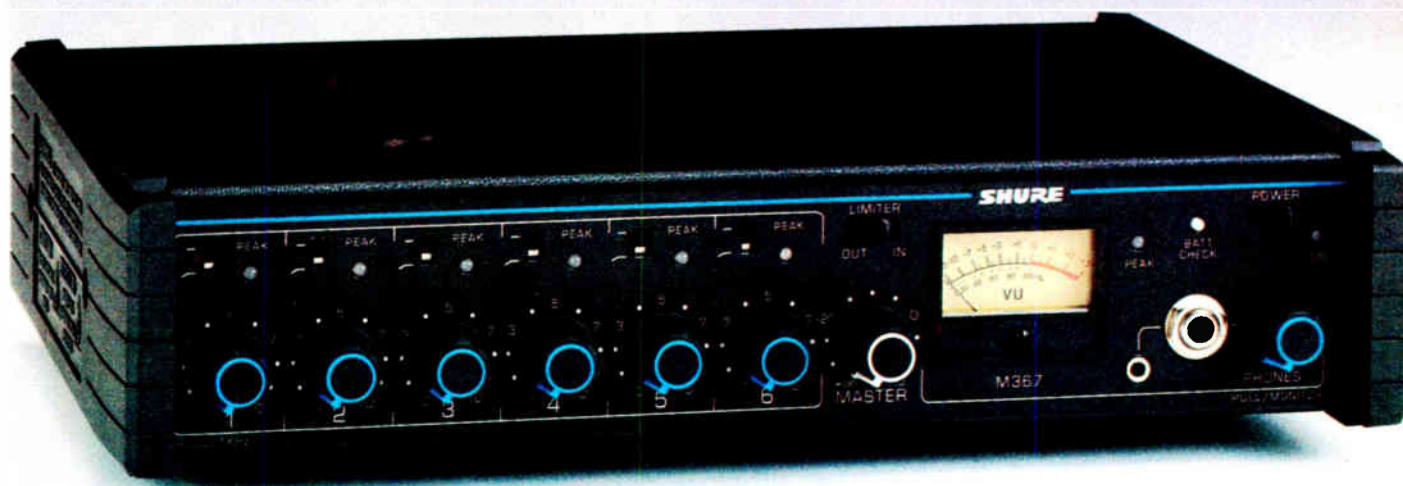
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PRODUCT EVALUATION

Built-In TA Expands Zephyr Functions

by John Bisset and Edwin Bukont

SPRINGFIELD, Va. The makings of a good product lie not only in its ability to solve a problem, but also in how well information is imparted through the instruction manual. The Telos Zephyr meets both of these requirements.

Company President, and a former-chief engineer, Steve Church, blazed a trail through the Switched 56/ISDN jungle by developing a product designed for a variety of broadcast applications. Concurrent with this development is the provision of a resource manual, instead of just a technical manual. From the basic

overview of these new telco services to explaining how to order ISDN service, the Telos manual is well designed with concepts that are easy to digest.

We have used the Zephyr previously with external terminal adaptors (TA) and experienced good results. Now, Telos offers a Zephyr with an internal TA. An external "NT" Network Termination device is still used to link the ISDN phone jack to the Zephyr, regardless of internal or external TA use.

TAs permit, among other things, the ability to store ISDN numbers and SPIDs (service profile identification numbers). For stations using several ISDN lines at various

locations, this feature reduces the need for technical expertise at the remote setup.

Although some external TAs include a facility for storing numbers, the Zephyr's internal TA takes this feature a step further by adding an alpha-numeric identifier to the numbers. The information is displayed on an LCD screen and is changed easily via the DTMF (Touch-Tone) keypad on the front panel.

While programming is very intuitive, the delay that returns you to the main menu should be made longer. Sometimes, while entering a description, we waited too long to select a letter, time ran out and the system reverted back to the main menu. It

Product Capsule:

Telos Zephyr



Thumbs Up

- ✓ simple, intuitive operation
- ✓ great tech manual
- ✓ rugged constructed
- ✓ excellent customer service

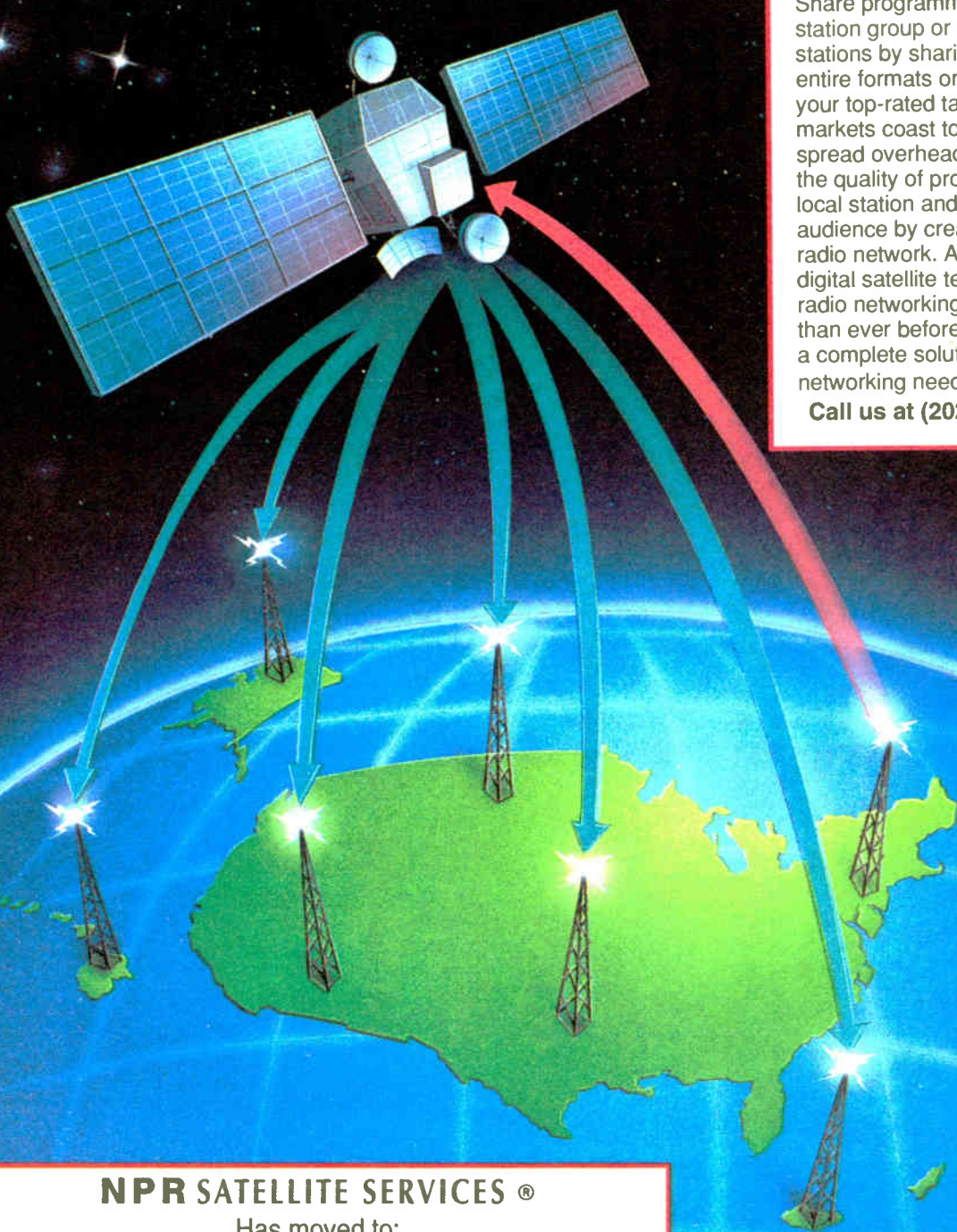
Thumbs Down

- ✓ increased programming delay time



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was more frustrating than a real problem.

ISDN service is being touted by recording studios and voice talent as an excellent means for distributing their wares. Having the ability to store up to 20 different ISDN contact numbers, SPIDs and an alpha-numeric designation (like "ABC Ad Agency") is an impressive feature.

As more stations tie into the ISDN network, the ability for voice talent in different parts of the country to instantly provide a new sweeper, promo or drop to meet the immediate needs of the PD make the Zephyr an attractive investment.

In one evaluation test, we entered three stations used by a local voice talent. After the initial programming, auto-dialing was quickly accomplished.

Should the Zephyr stop operating, it is possible to initiate either a warm boot or a cold boot, which erases all stored data and restores the default values. This feature is selected from the "Help/Status" screen, but it was of little value the one time the system locked up completely. We have had this kind of experience using other ISDN equipment, so we cannot say it is endemic to the Zephyr.

In one application, the ISDN equipment was mounted in an Anvil rack case. Lockup meant pulling off the back, fishing around for the power cord and pulling it. These kind of lockup problems may disappear as telephone companies become more adroit with ISDN.

For problems you simply cannot figure out, Telos has installed a test line you can use to connect your Zephyr to the factory. In typical Telos fashion, a technician is always on hand to help you through the problem.

In addition to the ISDN number memory, the same front panel display is used to quickly adjust headphone and send audio levels, as well as change the basic operating modes. When you select one of these utility screens, brackets move up or down, indicating which feature is being selected. Pressing the "Yes" button selects the feature.

After working with the Zephyr for awhile, its applications abound. We tested the Zephyr in a backup STL application. Its FM-quality stereo performance must be heard to be appreciated.

The slight delay might be a problem for DJs not used to this phenomenon. Telos solves the problem by suggesting a unique mix-minus scheme, where the talent's mic is mixed locally with a mix of the studio feed. Again, the folks at Telos rise to the occasion to foresee any practical operational problem, and describe it fully in the manual. Our applications demonstrated their suggestion as a workable solution to the problem.

With the Zephyr, Telos provides a broadcaster-friendly product that takes you into the digital telephone era.

□ □ □

For information from Telos, contact Danielle Cline in Ohio at 216-241-7225; fax: 216-241-4103.

John Bisset and Ed Bukont are principals for Multiphase Consulting, based in Springfield, Va.

SADiE 2.1

There's a lot more behind a SADiE™ than you might think. Our job doesn't finish when you purchase your SADiE™ system.

For a start you can telephone for advice, support or just a chat from early morning 'til late evening, seven days a week and because we combine our sales and service into one customer support operation, you'll most likely be speaking to the same person that sold you your SADiE™. And if your system stops working (don't let anyone tell you "breakdowns never happen!") customer support will get you up and running again as rapidly as possible. As our support team often work with clients on actual projects, we really understand SADiE™ and the pressures of audio production. Every SADiE™ user has the latest software - we know you are the best advertisement for SADiE™ so free software updates are a sound investment for all of us.

Finally, we don't try to make money out of maintaining your SADiE™ - an extended 3 year hardware maintenance contract will cost you less than \$1,500 and you don't have to purchase it until the end of the 12 month free maintenance period. The price of a SADiE™? - same as ever - a complete system for \$9,995 (plus the odd local tax, duty and delivery, where applicable)



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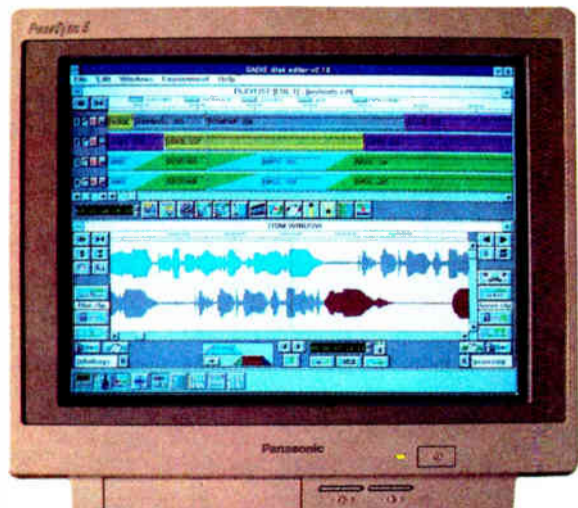
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USER REPORT

CCS Codecs Help Rally Cowboys

by Mike Simpson
President
MIDCOM Inc.

DALLAS To transmit high-quality stereo audio across the street or around the world, consider digital audio codecs from **Corporate Computer Systems (CCS)**, interfaced with ISDN lines from your local telephone company, as the ideal alternative to satellite paths or equalized broadcast loops.

MIDCOM Inc. provides remote audio origination services for the 100-plus station Dallas Cowboys Radio Network. We

provide the equipment, technical crew and backhaul transmission for all Dallas Cowboys football games, both at home and on the road.

1,300 pounds of equipment

Our remote broadcast package consists of approximately 1,300 pounds of equipment, including a 20-channel mixing console, two stereo cart machines, six UHF wireless microphone systems, four parabolic microphones, a 10 W full-duplex FM repeater/IFB system and much more.

Over the past four years, we have broadcast games from across the U.S. as

well as Tokyo, London and Mexico City. We traveled to more than 15 stadiums and two Super Bowls.

During the 1993 NFL season, after several bad experiences including blimps and thunderstorms that interrupted our Ku signal, we decided to discontinue satellite backhaul.

Our broadcasts are in full-fidelity stereo. To accomplish this we selected



MIDCOM's ISDN rack uses Adtran TAs to interface ISDN with the CCS codecs.

the CDQ-2000 encoder/decoder from CCS for our backhaul transmission. When used with an ISDN terminal adaptor (TA) and a standard ISDN/BRI circuit, the CDQ-2000 E/D provides 20 kHz stereo transmission to and from the remote site. In addition to the main stereo signal, there is also a program return (IFB) line, eliminating the need for a dial up "listen" line.

Our switch to ISDN was not without trouble, however. The line we ordered for our initial ISDN-transmitted game was the first ISDN line to be installed in Philadelphia. At the same time,

Our road games actually sound better than the home-game broadcasts from Texas Stadium.

Southwestern Bell installed our line at the Network Operations Center. It was the third ISDN line in Dallas. Needless to say, there were many problems.

It took about 60 hours and eight people working non-stop over three days to make things right, but eventually the circuits worked and "crystal clear digital audio" began flowing. Since we began using ISDN, things have improved for the most part with the ISDN providers.

Remarkable and amazing

The audio quality of the CCS system is remarkable. Frequency response and clarity are amazing. The all-too-familiar "carrier whine" and other noisy artifacts associated with analog broadcast loops are gone. Our road games actually sound better than home-game broadcasts from Texas Stadium, where we still use the 15 kHz loops.

Another feature of the CDQ-2000 is the ancillary data port. It provides a serial data stream configurable between 300 and 9600 baud that can be used for a number of applications. We use this data path to remote one of the sports wire services to our broadcast booth on game days. Other potential uses include remote control of cart machines, computer-based logging and talk show caller information.

Interface between the CDQ-2000 and the associated TA for an ISDN line is via V.35 or X.21 connectors on the back panel. The unit is solidly built, and its road worthiness has been pushed to the limit during our travels.

The typical ISDN/BRI line (also known as a 2B+D line) is comprised of two 64 kilobits per second (kbps) bearer (B) channels and one 16 kbps data (D) channel for packet switched data. The data produced by the CDQ-2000 rides down the two B channels. The D channel is used mainly by the telephone network for

continued on page 49 ►

FlexRoute

**THE SATELLITE DIGITAL
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FOR TOMORROW.**

The *FlexRoute* system was created in response to the present and future needs of our customers. The expertise of our customers, gained from operating thousands of sites in diverse systems worldwide has been combined with the design and manufacturing experience of International Datacasting Corporation to create this revolutionary new satellite based digital audio system. The open architecture of the *FlexRoute* system encourages network operators to implement the ISO/MPEG audio encoder of their choice to take advantages of the continuing improvement in encoders. QPSK modulation, which minimizes the recurring space segment costs, is complemented by the flexibility of dual speed operation at either 128kb/s or 256kb/s. Initial implementation of networks using SCPC *FlexRoute* minimizes space segment costs in the early years of network operation, yet leaves the 2CPC mode for future, low cost expansion of the network. The 2CPC mode can be used to partition the channel into an audio service plus a high speed data service, thus enabling multimedia applications through one receiver platform. Two additional auxiliary data channels are implemented to facilitate E-mail, data broadcasting, paging or RDS applications. Full network control and addressability is available with the use of the optional RadioNet addressable network control software package.



- SCPC/2CPC QPSK with 1/2 FEC
- Switchable Rates (128kb/s or 256kb/s)
- ISO/MPEG Audio coding
- Addressable Network Control
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128 or 64+64 or 96+32kb/s



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The ADX is specifically designed for radio production. It has all the features you need to create the most complex multitrack productions: true 8 channel recording (expandable to 32 channels), non-compressed linear PCM digital audio, removable storage media and expansive timecode facilities. But the most powerful feature of the ADX is its intuitive operation. No other workstation has combined all this power with the ease-of-use that makes even the most complicated production virtually effortless.

ADX is the only workstation to offer the optional Mixstation™ automated mixing system. In fact, the ADX is the only completely integrated radio production tool on the market. What else would you expect from PR&E? Call today for your full color brochure.



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DESIGNS THAT MAKE THE DIFFERENCE

USER REPORT

ISDN and RE Suit Voiceover Business

by Eric Gordon
Proprietor
Gordon Communications

PARK CITY, Utah The desire to expand my voiceover business and still provide myself and family the opportunity to live outside of a major metropolitan area motivated me to investigate digital audio transport. I found that the RE600 MUSICAM encoder from RE America and ISDN phone service create a solution that is amazingly affordable, enhances the service I provide my customers, and gives me the freedom to live wherever I want.

As an independent announcer, I am the

voice of many different TV and radio stations. The biggest limitation facing my business is the fact that every station wants a market exclusive deal.

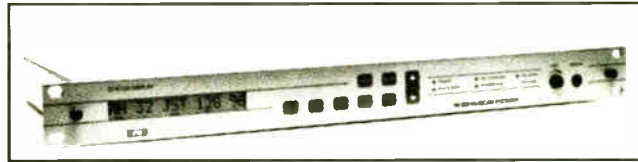
Work at home

Commuting between markets is not practical, so I work out of a studio in my home. Stations fax me copy, I do the voice tracks and then overnight courier the materials to the stations.

The first problem with this approach is that I cannot provide services to stations requiring same-day service. As competition heats up and stations want to promote their evening lineup or newscasts with scripts

that are pertinent to the day's events, more and more stations require same-day service.

The second problem is that the



The RE660 MUSICAM Encoder

overnight charges quickly become a significant cost for my customers.

With a little bit of research, I discovered that digital audio compression and switched digital services from the local

phone company make it possible to send CD-quality digital audio via the phone networks at a fraction of the cost of overnighting DAT tapes.

With this technology I can provide same-day service to stations across the country. It is affordable and the quality is nothing short of magnificent.

As business picked up, I knew this would be a godsend: No more rolling off tape, filling out labels or completing waybills and waiting for couriers. Now I can dial up stations and

feed them instantaneous audio whenever they want it.

First I had to find the right system. I work with some big stations and networks that want optimum audio quality—full bandwidth, if possible. Once I began shopping, I was immediately faced with choosing a compression algorithm.

Dynamic field

Audio compression technology is a very dynamic field, and a number of compression algorithms are currently in use or in development. The primary issue in choosing an algorithm is standardization: Which algorithm provides inter-operability with the broadest base of users.

My algorithm of choice is MUSICAM, also called ISO MPEG Layer II. MUSICAM is one of the most widely used high-fidelity compression algorithms out there today.

I found the foremost manufacturer of MUSICAM equipment to be RE America. The RE660 MUSICAM encoder is flexible, easy to use and gives me the high-quality audio my customers demand.

The next step was to contact the phone company and to order a digital connection. The key issues with digital service are data rates (kilobits per second [kbps]) and price. The bottom line is that Switched 56 is limited to 56 kbps, while ISDN gives you 128 kbps, and Switched 56 is generally more costly than ISDN because phone companies want to promote new ISDN services.

Admittedly, getting ISDN service established was a challenge. Be prepared to give yourself several weeks for line installation.

There are several important things to remember when you order ISDN service. ISDN is sometimes incorrectly associated only with BRI (basic rate interface) service. BRI is defined as a package of three channels, two 64-kbps bearer (B) channels and one 16-kbps data (D) channel. For high-quality audio applications, you only need to order ISDN with two B channels.

128 kbps of data

Two B channels provide you a total of 128 kbps of data capacity and 20 Hz to 20 kHz of mono or stereo audio bandwidth with the RE660/661 codec.

When ordering ISDN service from the phone company, you need to specify circuit switched data and you need to specify simultaneous access to both B channels. At 128 kbps, the RE660 makes it sound as if you are there in the station's studio.

RE was very helpful from the beginning. They explained in detail the procedure for installing the unit in my facility, and worked as an intermediary with the telephone company to ensure I received the proper ISDN configuration.

The RE660 encoder is a 1U rackmount unit about the size of a radio receiver. It

continued on page 48 ►

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"The increase in system gain using the DSP 6000 allowed us to eliminate one of the hops in our STL system."

Robert Reymont, KVMY, Phoenix, AZ

"It's truly amazing to drive 120 miles from the studio, hear an FM broadcasting with a totally quiet signal, and know it originated five hops back."

Jim Travis, Family Life Network, Bath NY

"The DSP 6000 allowed us to run both our FM's from one studio over one STL. We got cost savings and digital fidelity."

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USER REPORT

Bext STLs Much Used in Michigan

by Ed and Jennifer Czelada
Broadcast Technicians
ETC Communications

IMLAY CITY, Mich. Composite STL systems from Bext Inc. offers many useful features for about half the price of some other brands. The LC Series STL is available from 1.5 to 6 W. Frequency changes are straightforward thanks to front panel programmability.

Presently, three of our clients use 1.5 W Bext LC Series STLs, all of which were purchased directly from Bext's San Diego sales office. One of the most practical features of these STLs are the four composite outputs—this makes it easy to feed the main transmitter as well as the backup transmitter.

Saves more than \$500

By adjusting the multitrans pots, you can set modulation on each transmitter. This feature saves more than \$500 by eliminating the need to purchase a composite distribution amplifier. I also like the four composite inputs, which let you feed in the composite baseband and multiple SCAs. Bext STLs are ready for digital modems, thanks to a digital output port option.

The front panel of the STL incorporates an easy-to-read digital bar graph multimeter that shows modulation, signal strength and other readings. You can also change the STL frequency right from the front panel—all that is needed is a tweaker and an accurate frequency counter.

Frequency is set by turning the rotary numbered switches to the operating frequency and then fine tuning a trimmer capacitor inside to reach the exact frequency. Bext will ask for the operating frequency when

you order, so the STLs will be ready to go when you receive them.

LC Series STLs operate off of either 117/230 V or 12 VDC. The 12 V feature is especially handy in emergency situations. We once needed to check STLs from a mobile setting. The STL receiver was set up in the car, the antenna connected to a two-meter amateur antenna, and with a pair of headphones plugged into the STL receiver's front-panel headphone jack ... presto, a mobile STL receiver. This also helped in troubleshooting a bad 7/8-inch cable at a radio station. It might also be helpful for determining which STL frequencies are in use. All you need to do is park on a big hill and start listening.

The STL receiver has a very selective front-end that is not easily affected by high-level signals from adjacent transmitters. One station has a 300 W paging transmitter on 930 MHz and its antenna, all located 15 feet from the STL's grid dish. Another station has a 930 MHz pager and a STL transmitter for a different FM station at the same tower as its receive STL. Both STLs operate without any interference problems.

As mentioned earlier, all of our clients use the 1.5 W system because of its excellent value, but for stations needing more power or distance, Bext offers a 6 W unit and a 15 W STL amp. The company also has STL translators for a double hop to your transmitter site.

Mechanical and electrical construction of the unit is very good. Shielded modules are used throughout, and a helical-type front end is used with gold piston capacitors. Most connections to the modules are made by soldered feed-through

capacitors and BNC connectors.

All three STLs have worked smoothly since their installation. Among the three stations, the STLs have run for a total of nearly six years. We did have one minor problem with one unit when we needed to change the frequency—the unit failed to lock-up on the new frequency. With the assistance of the support line at Bext, we determined that the synthesizer was not getting the "8" bit.

Under warranty

Bext offered to overnight us a replacement unit, as it was still under the

standard two-year warranty. While Bext was boxing up a replacement unit, however, I discovered that the problem was actually the solder joint on a switch connection. I was able to quickly resolder the connection and get it back up and running.

Anytime you are looking to replace your STL system, or when installing a new one, give Bext serious consideration. They will get your signal where it needs to go for a very reasonable price.

□ □ □

For information, contact Bext in California at 619-239-8462; fax: 619-239-8474; or circle Reader Service 79.

Ed and Jennifer Czelada do contract engineering work for about 10 mid-Michigan area radio stations and can be reached at 810-724-1158.

Gentner Hybrid a Winner

► continued from page 39

-72.1 dBu, 400 Hz. Hi-pass filter inserted.

The nominal +4 dBu audio send and receive signal levels, and -15 dBu tele-

main send audio coming from the minus buses that feed the hybrid's main send. The discrepancy in the measured send and receive filter characteristics and harmonic distortion is

due to testing the DHIII on a real-world analog telco line, versus the manufacturer's measurements taken using an ideal phone line simulator.

□ □ □

For information from Gentner, contact Paul Anderson in Utah at 800-945-7730 or 801-975-7200; fax: 801-977-0087; or circle

Reader Service 207.

Richard Majestic is a broadcast engineer based in the Washington, D.C., area.

Published Performance Specifications:	
Send Distortion @ +4 dBu input level (telco line level -15 dBu):	0.3% THD, 270 Hz to 2.8 kHz
Send SNR:	60 dB
Send Bandpass Filter characteristics:	270 Hz and 2.8 kHz, 1 dB down 100 Hz and 6.3 kHz, 30 dB down
Receive Distortion @ (telco level -15 dBu) +4 dBu output level:	0.15% THD 270 Hz to 3,300 Hz
Receive SNR:	60 dB
Receive Bandpass Filter characteristics:	270 Hz and 3.3 kHz, 1 dB down 100 Hz and 6.3 kHz, 30 dB down
General Specifications:	
Dimensions:	19" wide, 1.75" (1RU) high, 12" deep
Weight:	10 pounds
AC Power Requirements:	100-120 VAC or 220-240 Vac, 50-60 Hz, 5 Watts
Operating Temperature Range:	32° F to 122° Fahrenheit, 0° C to 50° Centigrade
Telephone line and set connection:	Modular RJ-11C
Common mode protection:	230 volts between tip/ring connection and ground

Figure 1.

phone line send level were used, except for testing the low receive and send input overload characteristics. The DHIII performance, on telephone line receive levels as low as -35 dBu, was also measured. To stress the DHIII, elevated send signal levels were tested. This was done to simulate the high send audio levels typically encountered in broadcast applications.

Typically, broadcasters do not level compress

Measured Performance:	
Send Distortion @ +4 dBu input level (Telco line level -15 dBu):	0.07% THD, from 320 Hz to 2.5 kHz
Send SNR @ (-15 dBu Telco line level):	59 dB
Send Bandpass Filter characteristics:	320 Hz and 2.5 kHz, +0, -3 dB 110 Hz and 5.6 kHz, -30 dB
Receive Distortion @ (telco line level -15 dBu) -4 dBu output level:	0.16% THD from 270 Hz to 3.3 kHz
Receive Distortion @ (telco line level -35 dBu) -19 dBu output level:	1.3% THD from 270 Hz to 3.3 kHz
Receive SNR @ +4 dBu output level:	66 dB
Receive Bandpass Filter characteristics:	330 Hz and 2.6 kHz, +0, -3 dB 160 Hz and 6.3 kHz, -30 dB
Trans-Hybrid loss, input level:	+4 dBu @ 1.5 kHz, SRR 60 dB +14 dBu @ 1.5 kHz, SRR 65.3 dB +20 dBu @ 1.5 kHz, SRR 36.6 dB

Figure 2.

I COULD HAVE BOUGHT A DIGILINK!

Are you thinking about replacing your old cart machines with 'Digital Carts' such as floppies, flopticals, Bernoullis, or Opticals??? Well, think about it a little more! Add up the list price for a digital cartridge recorder, just a single player, AND the floppy disks--- and you will find that you could have bought a Digilink workstation for \$7,995 that gave you 'Live' -AND- 'Automation' capabilities!!!

A Digilink workstation stores audio on an internal hard disk and comes out of the box with a capacity of 547 one minute, stereo carts for only \$7,995. Even better, the Digilink hard disk has an average 15 year life. Imagine how many floppies you will break, wear out, lose, and replace over 15 years. That doesn't count all of the floppy disk mechanisms that will jam, break, and simply fail...

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Modulink

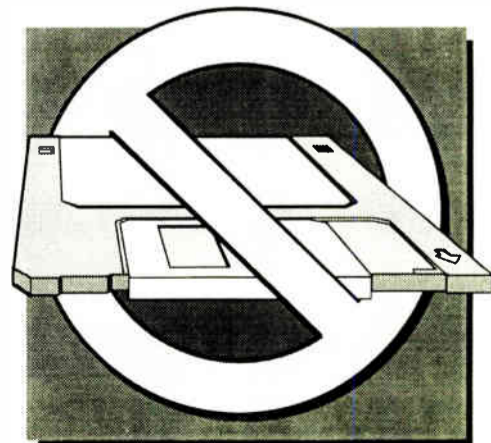
Also with a Digilink, you get much more! You can stack up hundreds of 'carts' in the play list and just walk away. You get satellite automation in the Digilink workstation and can optionally add CD players. A digital audio cut and splice editor even comes standard with Digilink. Because Digilink will play and record at the same time, you can play a spot to air while it starts a scheduled network autorecord. You can even network delay with Digilink.

With all of these features, it is easy to see why there are more than 500 Digilink workstations around the world from Paris to Moscow to Taiwan to Jamaica and in your own backyard. Don't suddenly come to the realization that you could have bought a Digilink!

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Circle (58) On Reader Service Card

USER REPORT

Comrex Lets SEC Take Full Advantage of ISDN

by Tom Stevens
President
Southeastern Conference
Broadcasters' Association

NASHVILLE, Tenn. The Southeastern Conference (SEC) Broadcasters' Association consists of the football and basketball radio rights holders for the Southeastern Conference. We formed the association in 1980 to set up reciprocal arrangements to provide telephone lines for visiting teams, and we meet regularly to discuss ongoing matters concerning the sports networks' broadcasts.

About six months ago, we began looking into forming a switched digital reciprocal agreement. We were interested in ISDN for two reasons—quality enhancement and economy. While quality is always important, the driving force behind our investigation of ISDN was cost savings.

Typical setup

For years, a typical network setup featured a two-line frequency extender feed from the game site and a program back-feed from the studio to the press box via telephone. Extended pre-game and post-game programming resulted in an aver-

age of three six-hour calls per game. Two of the twelve networks used three-line frequency extending equipment, resulting in four six-hour calls per game broadcast.

Many of our schools then backhaul the mixed audio feed from their studios to the NPR satellite uplink site in Washington, D.C., via two-line frequency extenders, resulting in two additional six-hour calls.

Assuming an average cost of 20¢ per minute, it worked out to approximately \$360 per game for a typical football broadcast and \$432 per game for those networks using three line extenders.

With a BRI/ISDN line, three or four regular telephone calls from the remote site to the studio are replaced by a single ISDN call, with the bonus of a high-quality backfeed on the ISDN full-duplex service. For those networks feeding a remote uplink, one call replaces two. The savings is \$144 per game for the feed to the studios and another \$72 per game for the feed from the studios to the uplink.

In addition, the installation and monthly costs of one ISDN line are substantially lower than putting in three or four regular phone lines.

At the Vanderbilt University radio network, for example, the ISDN charges were

personnel in Acton, Mass. This provided a good hands-on demonstration of how it all worked, and by the end of the session, we had enough support to go ahead with the project.

By working as a group, Daryl Doss, director of engineering for Host Communications, negotiated some excellent prices on equipment. The SEC networks selected Comrex digital audio codecs—DXR model at the studios and the DXP at the game site—along with Adtran terminal adaptors (TA). The Vanderbilt Network uses the Adtran 2x64, with one port for our feed and the other for the visiting network. The visitors bring their own Comrex DXP codecs to interface with the Adtran TA we provide.

While we will not recoup the entire equipment cost, approximately \$7,300, with backhaul savings this first season, we will halfway through the next season. After that, we will save \$5,000 per year, all the while enjoying the enhanced quality of digital transmission.

Very efficient

The commitment and cooperation of the Bell South companies, which deal with 11 of our networks, have been very satisfactory. In Nashville, we deal with a spe-

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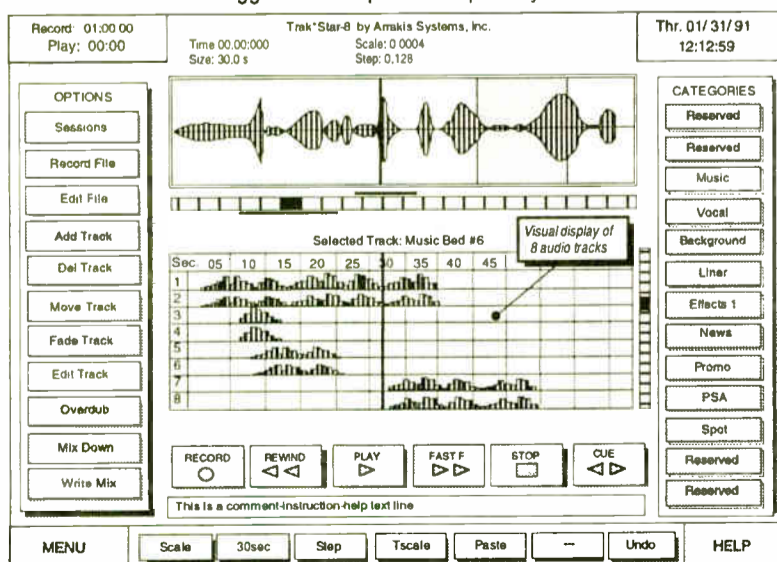
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Comrex equipment lets Tom Stevens (r) broadcast the first Vanderbilt game of the season via ISDN.

\$176 for installation and \$93.50 per month, but charges do vary somewhat throughout the Bell South region. That provides us with two digital circuits: one for our program feed to WSM-AM-FM, the flagship station, and one for the visiting network's feed.

Eliminates costly charges

The ISDN feed to WSM also eliminates costly charges for often unreliable equalized broadcast circuits. The ISDN installation fees compare very favorably to installation costs for either Switched 56 or equalized circuits, which are more expensive to operate.

From our research, we knew ISDN was the right way to go. To make the move, however, we needed to convince a majority of SEC members to join a switched digital reciprocal arrangement. Comrex Corp. offered to help us present our case at the March SEC Broadcasters' Association meeting.

Comrex ordered an ISDN line for the hotel in Memphis where the meeting was held and sent us equipment to use. We then did a live Q-and-A with Comrex

special Bell South ISDN office which is very efficient. However, things have been a bit more difficult for the University of Alabama.

After first being informed by the phone company that ISDN was available at the network studios in Bessemer, Ala., for a construction/installation charge of \$500, the Alabama network purchased its ISDN equipment. Bell South recently revised the construction charges to \$5,000. Discussions between the two parties are ongoing, and Bell South is showing a willingness to negotiate.

While there have been a few bumps along the way, six SEC schools are ISDN-ready for the 1994 season, with another three set to join in 1995. We eagerly anticipate the cost savings and increased quality that our ISDN arrangement will provide this season and for years to come.

□ □ □

For information from Comrex, contact Lynn Distler in Massachusetts at 508-263-1800; fax: 508-635-0401; or circle Reader Service 70.

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USER REPORT

Chicago Station Economizes with Intraplex

by Warren Shulz
Chief Engineer
WLS-AM-FM

CHICAGO A new audio and data transmission network installed at WLS-AM-FM is projected to save the station an estimated \$352,000 over the next eight years. This project has an estimated 16 percent return on investment with a four-year payback.

WLS simulcasts a talk radio format in the nation's third largest media market. WLS was ranked fourth in the 1994 Spring Arbitron with a combined 12+ rating of 4.6 for the AM and FM operations.

The location of the WLS studios did not have a line-of-site shot to the network satellite or STL links. Therefore, WLS ended up leasing a large number of copper analog circuits from Ameritech to make the connections.

Alternative to analog

In 1993, I began investigating digital T1 services as an alternative to analog leased lines. T1 lines ended up providing WLS several distinct advantages over individual analog copper circuits:

- The change to digital provided a

significant annual cost reduction to the station's profit and loss statement.

- The large bulk bandwidth of a T1 circuit allows for expansion without significant capital investment.

- Satellite channel delivered programs could be delivered on 15 kHz bandwidth audio channels in place of 8 kHz providing improved clarity for the simulcast AM and FM talk radio format.

- The digital T1 path provides a reduction of harmonic and intermodulation distortion of up to 10 times lower than leased Ameritech analog transmission facilities.

- The constant monitoring of the T1 circuit by both WLS and Ameritech provides improved problem response and improved reliability over leased analog copper facilities.

With these advantages in mind, WLS implemented a four-path T1 network using Ameritech fiber hub facilities and Intraplex program audio T1 multiplexer hardware.

In 1992, the analog configuration was 18 circuits from the studio to the Sears Tower for the FM transmitter, AM STL and RPU; eight circuits from the studio to the AM transmitter and from the satellite downlink to the studio; and six

circuits from the NBC Tower satellite downlink to the studio. A total of 32 circuits.

Cost reduction

We were able to drop 17 of the circuits to the Sears Tower; six circuits to the AM transmitter and from the satellite downlink to the studio; and the six circuits from the NBC Tower. A total of 29 circuits for an annual cost reduction of \$82,056.

For \$25,920, we added 34 T1 supported analog circuits: 15 circuits to the Sears Tower; 11 circuits to the AM transmitter and from the satellite downlink to the studio; and eight circuits from the NBC Tower satellite downlink.

As a precaution, we made sure that we kept the minimum number of analog circuits necessary to bypass a T1 failure. We added two new analog circuits and retained four leased analog copper circuits: three circuits to Sears Tower and three from the studio to the AM transmitter and satellite downlink to studio. The new circuits were conditioned metallic pairs with passive equalizers. The annual cost of these lines is \$8,980.

The digital T1 network exceeded all of our expectations. In essence, the four-channel T1 system provides 40 analog circuits versus the 32 we started out with. With the T1 we were able to add office PBX telephone paging and OPX extension telephones at our remote transmitter locations. Calls between the studio and transmitter are PBX calls, and we also have access to worldwide ABC tie lines.

Since the initial T1 installation, contract pricing of four T1 circuits went down 15 percent. Ameritech filed tariffs lowering the annual T1 cost to an annual cost of \$23,000. By contrast, the analog copper facility has risen over the same period. Thus, migration to digital transmission was treated favorably by Ameritech.

When it's all added up, the switch to T1 lines saves WLS a total of \$47,156 per year. We also have features that would not have been considered financially practical prior to the DS-1 service.

RBDS added

WLS recently added global positioning RBDS service to its FM operation. We simply added 9600 baud data cards to the T1 shelf and installed a reference receiver at the AM transmitter. Correction data was backhauled from the AM transmitter site to the FM transmitter site with surplus capacity on the T1 circuits. The Intraplex shelf has a surplus capacity of 40 percent ready for future additions.

WLS also achieved one of our technical goals of improving the FM STL audio performance with the Intraplex TP-350 linear 16-bit program transmission circuit cards. Installed measurements revealed a SMPTE IM distortion of 0.05 percent at operating level. The only possible improvement after that would be to move the studio to the transmitter location.

The reliability of the T1 circuits exceeds the performance of the copper analog facilities. The ability to fault monitor for data transmission errors makes it possible to observe degradation before a hard outage occurs. In one case, Ameritech called WLS to report a case of data corruption, but no audio faults were noted.

With the Intraplex performance improvements and resulting cost reductions, WLS can focus on providing quality product with increased reliability. The move to digital transmission was a natural complement to our ongoing signal improvement projects.

□ □ □

For information from Intraplex, contact Christine Doyle in Massachusetts at 508-692-9000; fax: 508-692-2200; or circle Reader Service 199.

Voiceovers On RE Gear

► continued from page 44

works in conjunction with a separate terminal adaptor (TA), the ISDN equivalent of a modem. The TA handles the dialing functions and all of the other phone network interfacing. The RE660 connects to the TA via a single 25-pin network cable, and the TA plugs directly into the ISDN phone jack.

Easy to upgrade

The RE660 is extremely easy to operate, you can set the data rate, the sample frequency and select between four audio modes—stereo, dual mono, joint stereo and mono—all through the front panel. Another important feature, which only the RE660 has, is firmware downloading via a rear-panel RS-232 port. This makes it easy to upgrade the encoder as new features are added to the ISO MPEG Layer II standard.

To receive an ISDN transmission, a station needs its own ISDN connection, a TA and a MUSICAM decoder. As MUSICAM is an ISO MPEG standard, decoder equipment is available from a number of different manufacturers.

RE America manufactures the RE661 MUSICAM decoder, which is a good choice. Using the RE661, a station can be completely equipped for less than \$2,400. Once a station is equipped with a MUSICAM decoder, the producer need only make a phone call and roll the tape. My voice is recorded live on the station's end as if I were there in the booth.

The entire process is quick and reliable, providing superb audio quality, affordable transmission, consistent operation and, most importantly, happy clients.

My equipment cost for the RE660 encoder, a TA and cables was under \$3,600. The ISDN service provided by the phone company was equally affordable: \$100 for installation, \$35 monthly access fee and standard long distance rates for two lines (one line per B channel) at 20¢ per minute.

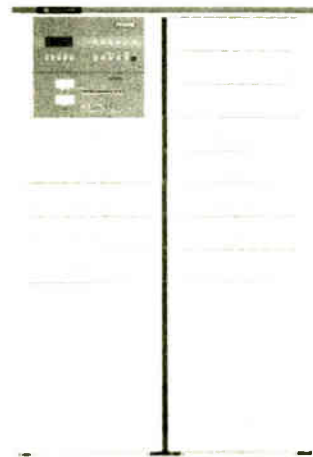
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For information from RE America, contact Steve Watts in Ohio at 216-871-7617; fax: 216-871-4303; or circle Reader Service 60.

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Circle (34) On Reader Service Card

CCS Rallies Cowboys

► continued from page 42
call routing and supervision.

Through the use of inverse multiplexing, the two 64 kbps B channels are combined into a contiguous 128 kbps data path. If ISDN is not available at a particular venue, two separate Switched 56 lines are used along with two CSU/DSU units and inverse multiplexed in a similar manner. Both scenarios support 20 kHz stereo transmission.

Terminal adaptor

Our choice of TA is the Adtran ISU-128 and 2x64. The 2x64 differs from the ISU-128 in that it is a true two-port device. While it requires twice the number of keystrokes, and can be a bit confusing to use, this type of TA is necessary when a

remote broadcast originates from a pair of Switched 56 lines.

In all other situations, the ISU-128 operating in Bonding protocol mode is much more user-friendly, setting up the digital call with a minimum of time and keystrokes. Adtran has a 24-hour technical support department. These people know ISDN inside and out and have rescued us from many disasters.

I have found that frequently the local telephone company knows less about its own ISDN services than anyone else. I have spent countless hours on hold while the phone company tries to fix an ISDN problem. In almost every case, the cause was traced to a translation error at the local telephone switch.

ISDN might be too much for the faint at



MIDCOM's Mike Simpson (r) and crew at Texas Stadium.

heart. Using it requires patience and attention to detail on the user's part. But thanks to companies like CCS and Adtran, digital backhaul transmission is not only practical, but the results are well worth the effort.

For information from Corporate Computer Systems, contact David Lin in Pennsylvania at 908-946-3800; fax: 908-946-7167; or circle Reader Service 162.

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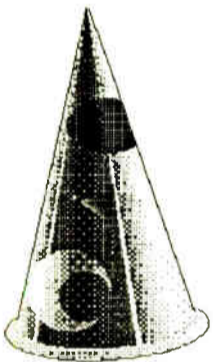
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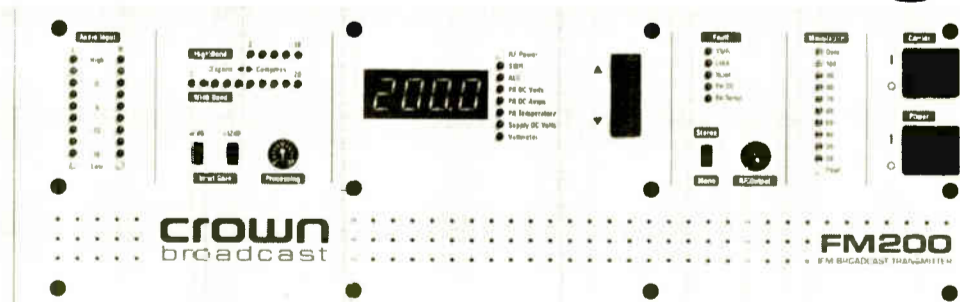
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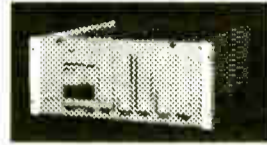
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USER REPORT

NBA Radio Relies on AT&T Digital Services

by **Tim Lindsey**
Assistant
NBA Radio

SECAUCUS, N.J. NBA Radio provides game-of-the-week or NBA playoff coverage to more than 140 stations around the country. The broadcasts come off flawlessly and smoothly to the radio listener, who never thinks about the technology supporting everyone from the station engineers to the on-air commentators. The technology comes from AT&T and local telephone company facilities, services and people.

ISDN technology enables NBA Radio to perform miracles everyone takes for granted. AT&T's Global Switched Digital Service (GSDS) uses ISDN technology to do the work. ISDN is a switched network arrangement providing end-to-end digital connectivity for simultaneous transmission of voice and/or data over multiple multiplexed communications channels. It employs transmission and out-of-band signaling protocols that conform to international standards.

Service is in place

Before a game, AT&T service is already in place. It is in every NBA building, including three new venues this year as the Chicago Bulls, Cleveland Cavaliers and Seattle SuperSonics are all changing arenas.

Much of the preparation work is done off-season, which is often the busiest time for NBA Radio and AT&T. First, I call AT&T to order the lines for new arenas and NBA Radio affiliates. AT&T arranges for GSDS Switched 56. Then we are ready for the season to begin.

For example, when the Bulls play the New York Knicks at Madison Square Garden, WMAQ(AM) Chicago, the Bulls' affiliate, dials into the unit we have at the Garden about an hour and a half before tipoff. The station's engineer is there in Chicago awaiting the call. The lines are tested, and the announcers do a couple of voice checks to make sure everything is OK. That's it: WMAQ soon starts the pre-game show and the game. The teams hire their own engineers, who bring their own equipment, such as mixers and headsets. We make it very simple.

Commercial breaks are easy to handle, even though half are network commercials and half are local. We cue the affiliate stations, letting them know when to start their commercials, and they know exactly how much time they have. We also play network commercials underneath, in case some stations haven't sold all their local commercial time.

AT&T's GSDS service lets us do many other special programs. For example, we have an ISDN line with AT&T Switched 56 service right to the home of Willow Bay, co-host of NBC's Saturday morning show "NBA Inside Stuff." She does voiceovers from her home that are transmitted to NBA Entertainment. NBA Entertainment then adds highlights to her voice, mixes a segment featuring the Friday night games into the show and it all airs a few hours later.

Another example is the way NBA Entertainment puts a championship video together. This past year, when the

Houston Rockets won the championship in Houston, the local engineers did not use AT&T GSDS because it was a home game. NBA Entertainment engineers dialed into the Rockets' network's flagship station, recording and logging the entire game. They looked for exciting plays, exciting calls. They then found the video to match the audio to create the championship video.

During the playoffs, NBA Entertainment staffers use the Switched 56 units to dial into other games and other flagship stations. They log the games and record calls and highlights. One reason this works well is that covering

a radio game requires the announcer to be descriptive and exciting. For example, the championship video, draws a lot of material from radio announcers, both from Houston and from NBA Radio.

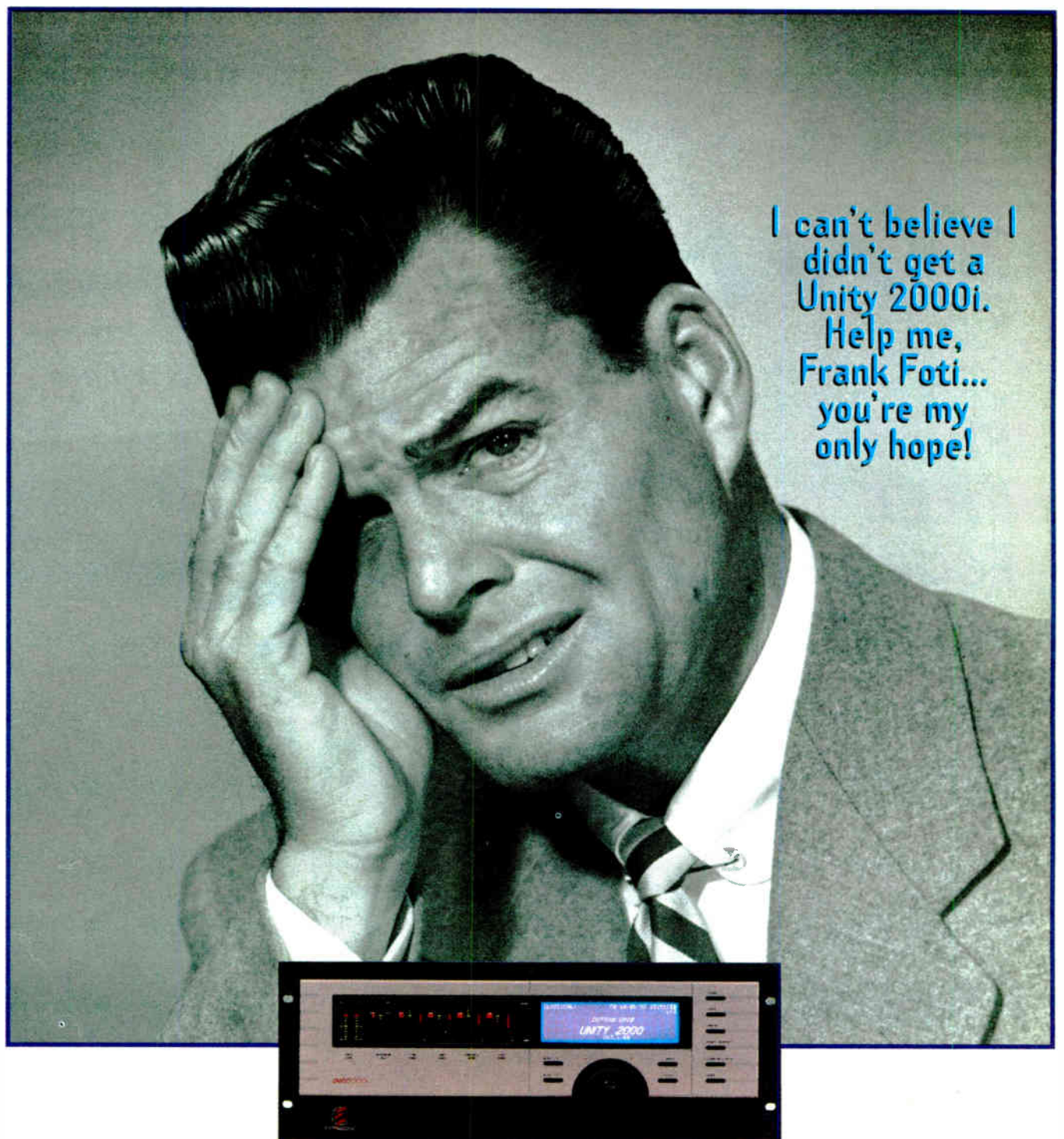
Highlights

During the season, producers frequently request a highlight on a player for use in a feature on TNT or NBC. If, for example, the request is for a Minnesota player, I call the Minnesota Timberwolves Radio network and ask for a highlight of Isaiah Rider (or whoever). The Minnesota station cull through its highlights tape and a

few minutes later, NBA Entertainment has the highlights. I pass it to the producer and when he mixes the feature, you hear the local announcers.

Also, we have found uses for GSDS that we never expected. We thought it would be used only by NBA teams on the road, but some teams use it for home games, too. For home games, there are several options. Teams can either install a broadcast line, which can be costly if their flagship station is far away from their arena, or they can opt for Switched 56. Teams also use the system for home game features, "I Love This Game" spots

continued on page 56 ►



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USER REPORT

Three Stations Link with TFT Gear

by **W.C. Alexander**
Director of Engineering
Crawford Broadcasting Co.

DALLAS During the past two years, Crawford Broadcasting purchased two stations in upstate New York to augment its long-standing Buffalo operation, WDCX(FM). The additional stations, WDCZ(FM) in Rochester and WDCW(AM) in Syracuse, were too far afield to economically and reliably link to WDCX for the two dayparts that would be fed from Buffalo.

For a while, an off-air pickup was done in Rochester using a tuned yagi and a Marti FM receiver; however, this proved unacceptable as the signal-to-noise ratio tended to be high and the link prone to fading and atmospheric effects. We decided to install a VSAT Ku-band uplink transmitter in Buffalo and a downlink station in Rochester and Syracuse.

Transmitter site

As the WDCX studios are located in downtown Buffalo, it was impossible to install the rather large uplink antenna at the studio. Instead, it was installed at the transmitter site, on a mountain near Boston, N.Y.

With a TFT 7700 composite STL system in place, a composite distribution amplifier was installed at the receiver output, and a composite-to-discrete decoder was used to provide left and right audio to the uplink's MUSICAM encoder.

This approach worked for a while—and was far superior to the off-air pickup—but the noise and separation figures still were not what they should be. We were also limited to feeding only program audio to the Rochester and Syracuse stations.

This last consideration became very important as the two new stations began to prosper and non-program

materials, i.e., spots, promos and voice tracks, needed to be fed on the satellite. TFT came to the rescue with its DMM92-100 digital STL modem and multiplexer.

The DMM92-100 is a spectrally efficient encoder/decoder that packs 15-level digital modulation into a bandwidth of approximately 1/6 the aggregate data rate.

Efficient gear

For our four 15 kHz and two 3 kHz audio channels in Buffalo, the aggregate data rate is somewhere around 590 kilobits per second (kbps), resulting in an STL bandwidth of just under 100 kHz.

Stations that do not need four channels of 15 kHz audio can use the DMM92-75, which provides two 15 kHz, two 7.5 kHz and two 3 kHz audio channels in a 75 kHz STL bandwidth. This narrower bandwidth system allows any FM subcarriers of 92 kHz or higher to remain on the STL; with the DMM92-100, subcarriers must be above 125 kHz.

Internal MUSICAM or apt-X encryption is integral in either DMM92, although use of an external codec is optional.

Easily installed

Assuming that a composite STL system was originally used at the studio, installing the DMM92 involves little more than rearranging the audio chain so that the stereo generator is located at the transmitter site. It is advisable to use some light gain-riding audio processing ahead of the DMM92 encoder to protect the codec from excessive levels. The "digital composite" output of the DMM92 is fed into the composite input of the STL transmitter.

At the other end of the link, the composite output of the receiver is fed to the DMM92 decoder input. It was necessary to change the IF filter in our 7700 receiver to accommodate the wider bandwidth

of the DMM92-100.

Now we can feed the satellite uplink transmitter for our other New York operations independently from the programming on the Buffalo station. Side benefits for us, but perhaps the most important advantage for most others considering a digital STL are dramatically improved signal-to-noise ratios on all channels, improved separation and greater fade margin on the STL.

There is one caveat: Although I have not experienced a problem with any of our 15 radio stations, there have been documented cases of conflicting compression

algorithms. It pays to check for compatibility between any algorithms used at your station (hard drive, digital cart, satellite, etc.) and the MUSICAM and apt-X algorithms used by the DMM92. If there is a conflict, keep in mind that TFT allows you to use an external codec employing the algorithm of your choice.

The DMM92 is a flexible, easily installed bridge between analog and digital technologies. For us, it provides the means to deliver multiple channels of noise-free high-fidelity audio over an otherwise noisy radio link.

□ □ □

For information from TFT, contact Paul Black in California at 408-727-7272; fax: 408-727-5942; or circle Reader Service 4.

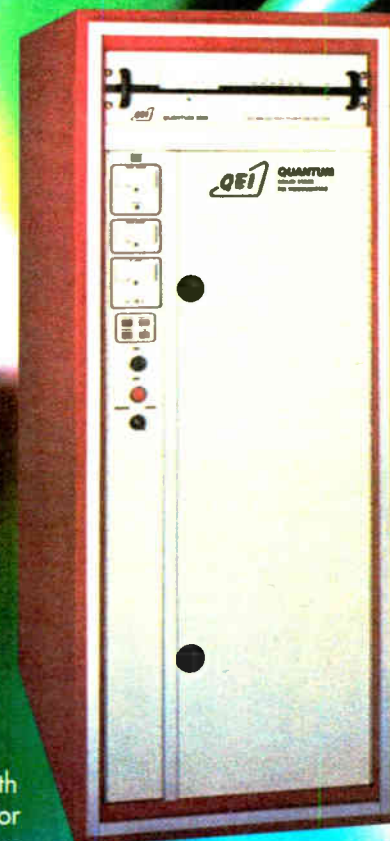
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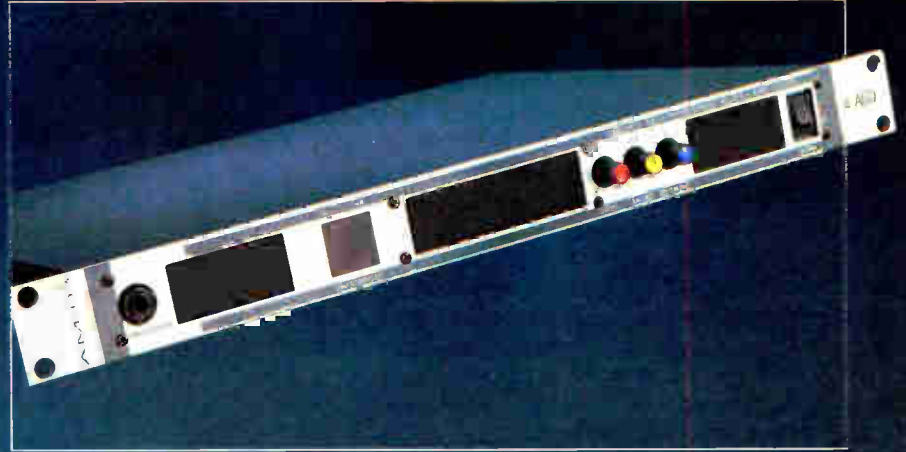
The AEQ Portable Mixer MP-10

- ▶ Ideal for remote event transmission.
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- ▶ Carrying case included.

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- ▶ Transformer balanced outputs.
- ▶ Internal Ni-Cd rechargeable batteries provides 4 hour autonomy.
- ▶ Automatic switch to battery if power fails.
- ▶ Dialing keypad, dual mode Tone / Pulse.
- ▶ Three headphone output jacks.

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AEQ Mixing Console BC-500

- ▶ The AEQ Mixing Console BC-500 is designed for those radio stations seeking great audio quality at a competitive price. Its designers paid great attention to the control layout; the logical control design ensures a quick learning period as well as a trouble free operation.
- ▶ Advanced true modular design allows total flexibility. The module chassis has built-in meters and speakers and comes in a standard configuration with the following capabilities:
- ▶ Six dual stereo inputs.
- ▶ Four mono inputs Mic / Line selectable.
- ▶ One Telephone Hybrid interface.
- ▶ Studio control intercom monitor.
- ▶ One main stereo output plus mono sum output.
- ▶ Power supply for On Air signaling.
- ▶ The AEQ BC-500 comes with 4 blank modules to enhance this configuration.



AEQ AMERICA, Inc.: 2211 South 48th Street, Suite H - Tempe, AZ USA 85282
Phone: 1 (602) 431 0334 - Fax: 1 (602) 431 0497

INDUSTRY ROUNDUP

Radio Primed for ISDN Use

by T. Carter Ross

WASHINGTON ISDN burst into the American consciousness at the end of last year with the release of Frank Sinatra's *Duets* album, much of which was recorded via ISDN. The Chairman of the Board stayed on one coast while his duet partner was often in a studio far away.

In Europe, where a changing political landscape has led to the widespread installation of state-of-the-art telecommunications technology, ISDN is in common use by broadcasters, professional audio facilities and even businesses.

Rapid growth in use

In the United States, ISDN use has grown dramatically over the past year. A number of audio professionals now regularly use digital telephone technology to transmit everything from voiceovers to commercials to sporting events in real time. But despite its widespread growth here, ISDN remains an infant technology in the U.S.

"I see ISDN exploding."

—Lynn Distler
Comrex Corp.

Despite the roadblocks that remain to complete ISDN integration, ISDN availability is spotty in some parts of the U.S. and some regional Bell companies are resisting the introduction of ISDN service, but most manufacturers see ISDN use continuing to grow rapidly.

"I see ISDN exploding," said **Lynn Distler**, vice president of sales and marketing at **Comrex Corp.** "It's going a lot faster than I thought it would."

David Lin, product manager for **Corporate Computer Systems (CCS)**, also see continued interest in ISDN.

"ISDN is growing substantially. In the last six to eight months, I would say it has become 50 percent of the business," he said. "There is no question that ISDN will become the standard."

For potential ISDN users, the most frequent problems and stumbling blocks lie not with the technology itself, but with regional telephone companies' understanding and implementation of it.

"One of the mysteries with this technology is the telco networks. That's where the learning curve is," said **Andy Bosworth** of **RE America**.

Distler also said that telephone companies need to better understand ISDN before it becomes easier for broadcasters to use.

"You cannot treat an ISDN line like a normal phone line. There usually will be problems if you order an ISDN line, but it always eventually works," she said. "It's a telco problem, at the installer level."

In fact, just as in Europe, where customer requirements have spurred both advances in applications and in the widespread use of ISDN, U.S. broadcasters' needs are implicated in

the growth of ISDN here.

"Some of these new technologies and new applications of ISDN are all pretty much the result of customers that have applications with broad bandwidth requirements," said **Mike Lordi**, media relations manager for AT&T.

Customer demands

And ISDN is sure to receive more use as more people ask for it.

"All that needs to be done is get ISDN from the central office to the users," said **Tony Thimit**, technical engineer for **Telos Systems**, if a lot of users ask for it, then that might speed the telcos up and ISDN will be everywhere."

"Clearly the deployment of ISDN needs to accelerate," said **Jack Kelly**, vice president of marketing for **Intraplex**. "It is the most cost-effective to use: Switched 56 is still expensive for broadcasters."

"I think that the deployment impediment, if it were corrected, it would spur more use of switched technology by broad-

casters, which would spur even more use. ISDN would then grow on itself," Kelly said.

While it maybe a few years before ISDN filters down to common use in medium and small markets, manufacturers are planning ahead and looking to develop products that will meet future needs.

"The digital world is quickly taking over the telecommunications market and eventually everyone will have to connect up to it digitally," said **Brooks Gibbs**, **Gentner's** director of business development for broadcast products.

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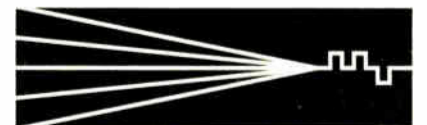
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World Radio History

SPECIAL REPORT

ISDN Gear Rises to Meet User Needs

by Jeffrey Cohen

LONDON Across Europe, where ISDN is in widespread use, manufacturers of audio codecs and other ISDN equipment now market their products by focusing more on applications than hardware.

Also, ISDN equipment is evolving to include more user-requested features, allowing it to better suit user needs for a better price.

These trends reflect the fact that ISDN

TelTech, a Canadian manufacturer, comes the Digital Courier International marketed as a system for point-to-multipoint transmission, such as sending out radio commercials from an ad agency to stations or program syndication. Similar applications are catered to by the ISDN Multipoint from **Dialog4** of Germany.

The majority of recently released products have ISDN terminal adaptors (TA) integrated into the equipment. This allows

nalling functions—such as the indication of an incoming call—with the audio functions.

Until the development of a common European standard for ISDN, known as Euro-ISDN, which allows equipment to be used throughout the continent, vendors were reluctant to make equipment that connected directly to ISDN lines. There were concerns about different standards and approvals in each nation in which the equipment was sold and/or used.

Complete solution

Many new products are marketed as complete solutions to audio communication requirements. There has been an explosion in the development of units for news reporting and sports commentaries.

The latest fashion is integrated units containing a codec, a terminal adaptor and all the audio facilities a reporter needs, i.e., mixer and headphone feeds. Some manufacturers also include recorders and battery packs to further increase the utility of the units. Making

• **Dialog4** — contact Berthold Burkhardtmaier in Germany at 49-7141-22660; fax: 49-7141-22667; or circle **Reader Service 73**.

• **Glensound** — contact the company in England at 44-622-753-662; fax: 44-622-762-330; or circle **Reader Service 47**.

• **Maycom** — contact Miranda van de Pol in the Netherlands at 31-8819-77525; fax: 31-8819-77380; or circle **Reader Service 167**.

• **MPR TelTech** — contact Remy Kozak in British Columbia at 604-293-6184; fax: 604-293-5787; or circle **Reader Service 91**.

ISDN equipment is being sold to users who are fairly conversant with the technology.

equipment is being sold to users who are fairly conversant with the technology and know where, when and how it can be used.

Focus on use

Manufacturers also see a large, secondary market of potential users who know nothing of the technology but need to transmit audio from place to place. These potential users are in the market for complete systems.

Much of the new equipment on the market typifies this trend. From MPR

greater functionality than was previously available when users had to purchase a separate TA and connect it to an audio codec.

By being combined in a single unit, these products fully integrate the various sig-

SPECIAL REPORT

APT Codec Opens Doors

by Brian Heimerl

CULVER CITY, Calif. When Whitney Houston sings the praises of AT&T True Voice service, her voice sounds fine on television. But what about when it comes through the telephone? How will she sound once her voice leaves AT&T and goes through your local tail circuits?

You cannot capture the full range of Houston's voice with standard 3 kHz dial circuits or even 10 kHz equalized analogue circuits. Given 20 Hz to 20 kHz of bandwidth, Houston will probably fill it up, but how is that sent down a phone line in real time?

The answer is simple: Combine an **Audio Processing Technology 3D2** codec with ISDN or Switched 56 telephone circuits. Instantly your radio station is in direct-dial digital communication with the fastest growing network of audio production, broadcast professionals and voice talent throughout the world. Two-way stereo, 20 Hz to 20 kHz, pumping through a combination of six telephone lines, that's true voice.

We are all eager to hear what AT&T is marketing, but this solution is not what was in mind when the True Voice advertising campaign was developed. In fact, if you ask an AT&T representative where you can get a 3D2 codec, he or she will either have no idea or refer you to **IDB Communications'** Digital Services Group.

AT&T certainly wants to sell access to its incredible digital network, and local telephone companies are eager to sell you access to AT&T, if they have invested in digital switched technology. Meanwhile IDB, under exclusive license from Audio Processing Technology (APT), is shipping 3D2 codecs as fast as they arrive from Belfast, Northern Ireland.

What sets the 3D2 system apart from others is its apt-X100 compression algorithm. With more than 100,000 apt-X audio coding ICs in use today in profes-

sional audio applications, this 4:1 data compression system has a proven track record of being transparent to the effects of multiple coding.

Incorporated into the 3D2 digital audio transceiver, the apt-X100 system offers a combination of professional quality coding, extremely low transmission delay and high bit error immunity.

Since 1992, the 3D2 (marketed as the DSM100 outside of the U.S. and Canada) has provided uncompromising, rugged performance highly suited to the most demanding professional audio applications, ranging from full duplex live remote broadcasts to point-to-multipoint program distribution, studio-to-studio links, STLs

continued on next page ▶

the units applicable for portable operation meant redesigning the codecs to greatly reduce power consumption.

British manufacturer **Glensound** managed to reduce power to the point that its GSGC4 units run for 10 hours off of three regular D cells. The unit's features and its price have generated a number of orders for Glensound recently.

The Vamos system from Dutch manufacturer **Maycom** includes a solid state recorder in its Digicorder, which can directly send audio files via ISDN as well as support live transmission.

Apart from the functionality of having a single box, rather than separate items of equipment, the price tag of these units tends to be significantly lower than what the users previously paid for ISDN services and equipment.

Advances in equipment, plus the lower cost and widespread availability of ISDN lines, pushes this method of audio transmission from something a few enthusiasts were doing to the first choice for all non-permanent audio circuit requirements.

□ □ □

Jeffrey Cohen is a communications analyst for BBC News & Current Affairs.

AT&T Links NBA Radio

▶ continued from page 51

and other NBA Entertainment bits. We have found multiple uses for ISDN technology and it has worked out very well.

When we have a potential problem, it usually clears itself up. A computer tests the lines throughout the week. Starting at 7 or 7:30 in the morning, it runs remote loopback tests. When I get to the office later in the morning, I might see a potential problem in, for example, Cleveland. I check the number myself and I see the same problem. I call the AT&T 800 number and repairs are made quickly and efficiently.

At first, when I found a line I thought might be in trouble in the morning, I would get nervous. Now, I barely bat an eye. AT&T and the local phone companies really understand the system and what's going on.

How frequently do we use ISDN technology? Last year 25 teams used it. Each team plays 41 home games during the regular season. Factor in the playoff games, and we have done approximately 2,500 games in the past two years. We are entering our third season and everything is great: The entire system has worked even better than we had hoped it would.

□ □ □

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If you had Pavarotti here,



USER REPORT

Dolby DSTL Connects Four FM's

by Harvey Klann
Chief Engineer
Ives Broadcasting

ALPENA, Mich. "Stop right there!" I told the general manager when he wanted to run a third station from our main studios. Ives Broadcasting was adding stations faster than our STL network could handle. Before we bought any more equipment, I wanted to consider all of our STL options.

Since then, we have installed four four-channel Dolby Digital Studio

Tawas City, Mich., (formerly WDBI-FM)—we installed a conventional dual mono STL to carry its signal. But the STL had fade problems, and we were running out of spectrum space. When we began to consider feeding a third station from our studio, I insisted we review all of our options before buying any more STL equipment.

At the NAB convention we looked at all the STLs on the market, both analog and digital, and soon realized that the number of signals we wanted to carry demanded a digital STL. Digital STLs can put twice

DSTL® was designed as a completely digital system from the start. But we did not fully appreciate its cutting edge technology until we put it on the air.

We purchased three DSTLs to carry three FM signals (WHSB, WHST and WBMI(FM) in West Branch, Mich.) from our studio in Alpena. The DSTLs are used on path lengths of 12, 27 and 35 miles.

More fade margin

Although our old analog STLs had a higher output power, the DSTL makes the long shots with a lot more fade margin. The DSTL receiver is so sensitive, down to 2 μ V. Some of our paths used to be marginal, but with the DSTL we have 20 dB more fade margin than before—even when carrying twice as many channels in our 500 kHz spacing. The four-channel DSTL carries four 15 kHz channels and two data channels in 400 kHz of spectrum. What station would not want to double the capacity of its STL while making it more reliable?

With a name like Dolby behind it, we expected phenomenal audio quality from the DSTL, and it delivered. The Dolby AC-2 audio coding used in the DSTL is very transparent. We use it along with a compression-based automation system and it sounds great. For our repeater hop,

We send four stereo pairs from our studio via DSTL systems.

we use Dolby's repeater system with digital I/O, so the signal stays in the digital domain.

As for audio quality, it is like the studio is at the transmitter. We also use Dolby's digital stereo generators. Like the rest of the system, it is a completely digital design. The signal stays digital through the generation of the composite signal. It has amazing specs: Separation is greater than 60 dB. We can keep the processors at the studio and stay loud.

With the success of our operation, we installed a fourth DSTL to serve WELG(FM) in Rogers City, Mich. In total, we send four stereo pairs from our studio via DSTL systems. With the extra channel capacity of the four-channel DSTL, we enjoy a considerable cost savings by keeping all our operations in one building. We use a digital automation system to simulcast WHSB and WHST, but insert separate spots for each station. The other two stations are programmed independently by computers with digital audio storage.

We sound better and from the day the equipment first came out of the box, I have been 100 percent satisfied. Some engineers might think that four FM stations at one studio is taking duopolies to the extreme. But with some help from the folks at Dolby, it has become quite normal.

For information from Dolby, contact Tom Daily in California at 415-558-0200; fax: 415-863-1373; or circle Reader Service 149.

APT Codecs Ease Access

► continued from previous page

and remote voiceover applications.

The 3D2 permits a wide range of audio transmission modes, depending on your application and available telephone capacity. These include options to transmit and receive one audio signal (mono mode) or two simultaneous audio signals (stereo mode), with selectable guaranteed bandwidths between 6.2 kHz and 22.5 kHz and the ability to transmit and receive to multiple destinations with a single codec.

Audio is input or output using either the balanced audio line I/O interface or, when operating at the appropriate frequency, the AES/EBU-SPDIF digital audio interfaces.

In addition to the audio data, auxiliary data can be transmitted or received simultaneously with audio using the asynchronous RS-232 interface on the 3D2. This facilitates transmission and reception of industry-standard time code without further data overheads.

The codecs include an RS449/RS422/X.21 compatible interface that connects directly to ISDN primary rate terminal adaptors (TA), single or multiplexed ISDN basic rate TAs, T1 fractional TAs, synchronous modems, Switched 56 CSU/DSUs and many other NTUs which offer contiguous transmission capacity in multiples of 56 kbps.

The 3D2 codec is not a "plug-and-play" technology. APT does not sell the pieces needed to extend your studios beyond the radio station. Even the best technicians will need help programming TAs, troubleshooting the equipment and interfacing with telco. The actual cost of the equipment is so expensive that most stations could not reasonably consider the capital outlay. APT knew going in that customers were going to require hands-on support to make every-thing work properly.

The IDB Audio Control Center, with a room full of codecs and a knowledgeable staff on duty 24 hours a day, can make hybrid connections easily with equipment normally incompatible with the 3D2.

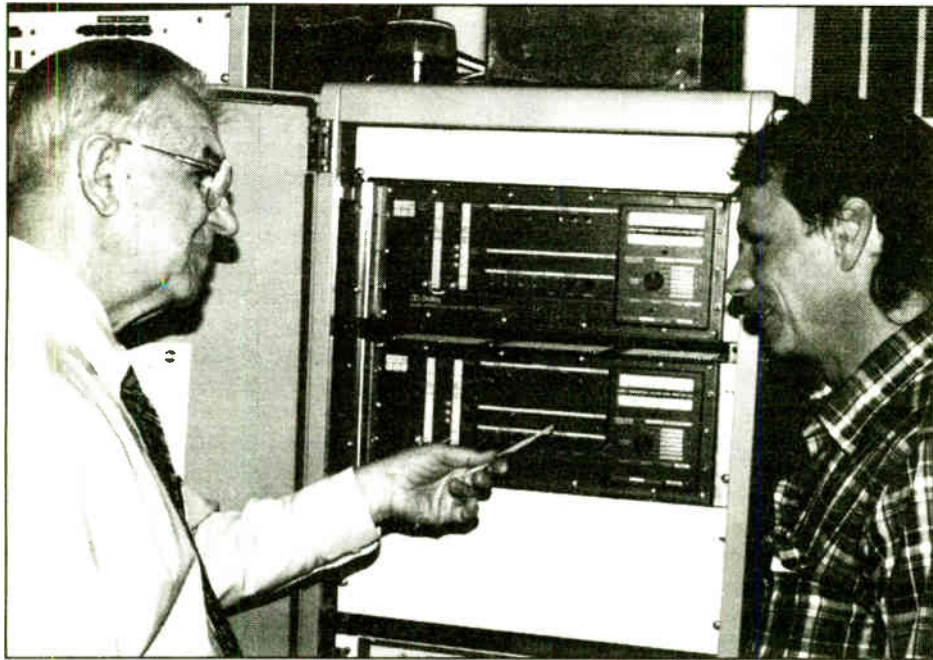
3D2 codecs are provided to qualifying subscribers on a rental basis, guaranteeing access to the latest developments in this emerging technology. IDB orders all circuits and provides replacement equipment overnight.

Once the 3D2 is up and tested, the only thing you have to do is dial the phone to turn your radio station into a global studio.

□ □ □

For information from IDB Communications, contact Steve Jordan in California at 213-240-3730; fax: 213-240-3904; or circle Reader Service 120.

Brian Heimerl is working with IDB's Digital Services Group in the development of systems for both 3D2 and TeleSPOT. Contact him at 213-240-3976.



Harvey Klann (I) shows Staff Engineer T.J. Michels one of the Northern Radio Network's Dolby DSTL units.

Transmitter Links (DSTL), and run four stations from one studio. The network could not operate any more smoothly.

Consider all options

Ives Broadcasting started with WHSB(FM) in Alpena, Mich. When we added a second station—WHST(FM),

as many signals in the same spectrum space. In this part of Michigan, you cannot find any unoccupied space in the 950 MHz spectrum.

There were several different design approaches to choose from, but I was disturbed by the digital add-on option. We did find, however, one company building a state-of-the-art digital STL. The Dolby

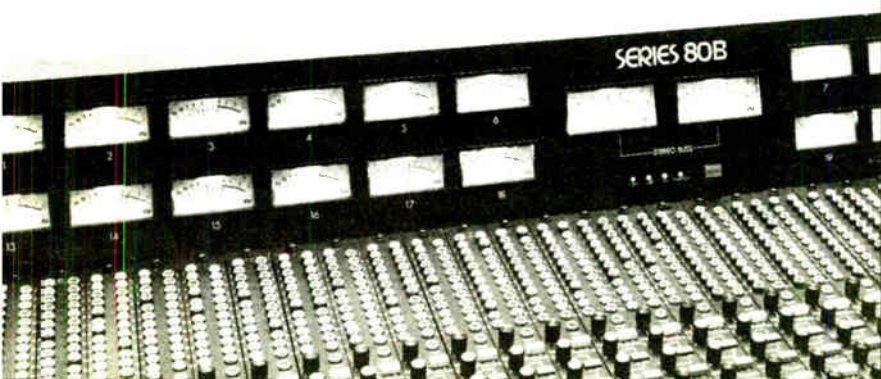
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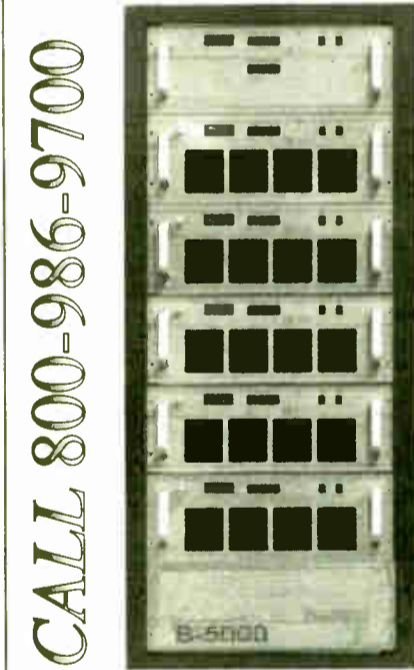
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READER SERVICE NO. 48

USER REPORT

Burk Offers More than Control

by Steve Fluker
Chief Engineer
WMFE-FM

ORLANDO, Fla. WMFE-FM, a public radio station serving Central Florida with classical music and NPR news, is currently in the final stages of completely overhauling its studio and transmitter sites. When we began the overhaul, we wanted to add capabilities for unassisted overnight operations.

After extensive research and testing, I decided the best remote control system for our needs was the ARC16 from Burk Technologies. Although I had read, seen,

The system starts with a basic chassis housed at the transmitter site. The chassis can be outfitted with one or two control modules allowing either eight or 16 channels of Raise and Lower commands and Analog and Status inputs. The back of the unit contains D connectors for direct open collector connections or for an optional interface panel to buffer the circuitry with relays. All connections are on large, easily accessible terminal strips.

Display and alarms

The ARC16 display is alpha-numeric and has programmable text for each metering channel. Upper and Lower limit and status alarms are included and can trigger any external alarm device or even initiate a telephone calling sequence through an optional speech telephone/computer interface card. This card, with its clear and easy-to-understand voice, announces transmitter conditions and alarms. An external audio jack feeds an air monitor or any other audio source to the caller.

Control at the studio is via either a chassis identical to the one on the transmitter end or a PC and modem. The chassis option works like traditional remote control systems, providing full-time monitoring and control capability. Unlike traditional systems, however, this chassis can be outfitted with up to 16 complete Control, Analog and Status channels too.

The PC option uses dial-up telephone lines and calls the transmitter at regular intervals, recording vital parameters and any status changes that occurred since the previous call.

The most versatile studio configuration is connecting the studio chassis to a PC. This facilitates on-screen viewing of all parameters at all times and allows automatic logging to either disk or printer. This option also provides redundancy in case the link between the two chassis fail.

Connections between the chassis are via any conventional method. Burk configures the system to meet individual stations' needs, including digital cards to interface with digital STL data ports.

Strongest feature

Perhaps the strongest feature of the ARC16 is the Auto Pilot option, which requires a PC and the computer interface card. Auto Pilot gives the user up to 60 programmable subroutines to control anything connected to the remote control. Each subroutine can contain up to 19 steps. Programming is extremely easy with all available options on-screen. This could, for example, automate power and antenna pattern changes at an AM station.

There is one caveat about unattended operation: Be sure you request Burk's

pamphlet outlining the requirements for unassisted operation. I also recommend calling the local FCC field office to inform them of your intentions. It is better to be safe than sorry.

As the Auto Pilot controls both the transmitter and studio ends, I decided to automate our overnight operation. The operators turn on the BBC network before they leave, and Auto Pilot takes over from there. At 1 a.m., the system switches from the BBC network to an overnight classical music network.

It also turns on a cue detector system for station IDs. AutoPilot monitors the station and logs IDs as they run. In the event of a network failure, the system starts a DAT tape and alerts the remote site operator of a problem. The system even checks our subcarriers every 10 minutes, taking any necessary corrective actions immediately. This eliminates downtime on the channels, keeping the station from losing revenue.

Operates smoothly

Our audio reading service operates much more smoothly now that control of the equipment is out of our volunteer readers' hands. The system starts tape recordings, switches between live readings and network feeds and signs the

service off at night.

My next task is programming the system to test the backup transmitter, putting it on-air once each week if it works properly. If the parameters are not perfect, the main transmitter will stay on-air and the system prints a log indicating what is wrong.

While my overall experience with the ARC16 has been extremely good, there are a few quirks I have discovered. When using the computer interface and printer, the system locks up if the printer fails or runs out of paper. This includes all AutoPilot functions.

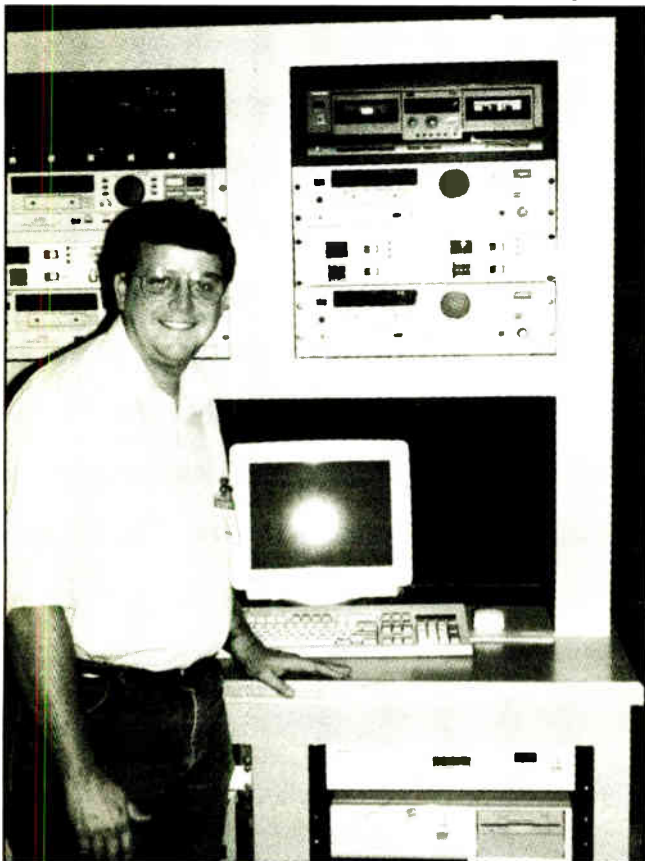
Also, there is no indication or alarm for telemetry loss at the studio end. I use a status light at the transmitter site and an Auto Pilot routine to check for this failure, which is a workable solution.

Although not a problem of the system itself, any automation functions programmed into the ARC16 are only as accurate as the clock in the PC, which typically is not good. To correct this, I combined the Burk software with a program that calls the Naval Observatory Master Clock daily to keep the PC clock accurate.

The ARC16 Remote Control System from Burk Technologies is by far the best remote control system I have come across in my 14 years in broadcasting.

□□□

For information from Burk Technologies, contact Dan Rau in Pennsylvania at 800-255-8090 or 508-433-8877; fax: 508-433-8981; or circle Reader Service 15.



Steve Fluker expected to use the Burk ARC16 only for transmitter remote control, but it automates overnights too.

experimented and questioned Burk extensively about the system, I was not prepared for what I discovered once it was installed.

More than remote control

The ARC16 became much more than just a transmitter remote control: It became an automation system. Between the system's computer interface and AutoPilot software, I found that the system's only limitation was my imagination.

As I installed it, I thought of functions I wanted to do and quickly discovered that the ARC16 could perform it very easily. Before too long, I automated both the radio station and an audio reading service for print-impaired Floridians that originates at WMFE-FM.

Over the past year, the ARC16 has proven vital in keeping our operation running smoothly, and it has saved the company a considerable amount of money. It is competitively priced and, given its many features, is actually a better deal.

The ARC16 remote control system is a modular system, configurable from basic operations to complete control of multiple sites from anywhere. All that is needed to control a site is a PC and a modem or just a Touch-Tone (DTMF) phone line.

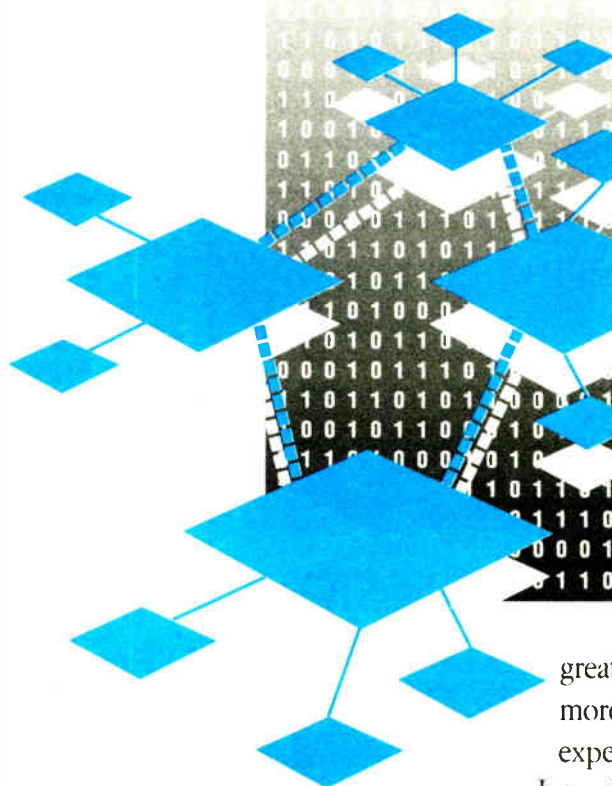
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Circle (152) On Reader Service Card

USER REPORT

Phone Byte Takes Calls to Air

by Tom Bohannon
Chief Engineer
WCFB(FM)

ORLANDO, Fla. In September 1992, when WCFB(FM), B94.5, went on-air as Orlando's first "young country" station, one of our prime goals was to make the station fun for the listeners. One of the "fun" elements we wanted to incorporate was listeners' telephone calls. Airing calls is hardly a new concept, but using them as an integral part of the format posed some challenges.

Most phone calls need editing to eliminate bits that drag, pause, stumble, etc. Conventional tape editing of a few calls is not a problem, but 20 or so calls per hour becomes a real challenge for the announcer. It takes time, and it becomes difficult to catalog them all. The result is a lot of tape on the floor, pieces of paper scattered about the control room, and occasionally the wrong call gets aired or a great call gets lost.

Digital technology

By mid-1993, we were planning to build a new, state-of-the-art studio for B94.5, making full use of digital technology. The aim was to make everything as easy and efficient as possible for the announcers. Although analog cart machines are still in use, we wanted to eliminate reel-to-reel machines and other analog devices. All recording was to DAT or a PC.

Phone calls were to be recorded and edited on a PC, because we thought the DAT machine's editing functions would not meet our requirements. Several popu-

lar digital PC editors were tested and evaluated. But I was not satisfied by them; they required too many mouse clicks, keystrokes or screen changes to make simple two-track edits. They were geared to production room use, not to fast-paced on-air use.

Phone Byte did all he said it would and more.

About this time, Ben Umberger of the Blue Group called offering to demonstrate his latest digital editor, the Phone Byte. He explained that the Phone Byte was designed specifically to do what I was looking for: easily record, edit and playback telephone calls. On top of that it is user-friendly enough for even the most computer-illiterate announcer.

A few days later, Umberger brought in the Phone Byte. It did all he said it would and more.

The main screen is logically laid out, with the major functions easy to find. It lists all the calls recorded by an individual announcer (each announcer has her or his own directory). Calls are indexed by number; a text description lists the date recorded and the length of the cut.

Edit screen

Umberger then demonstrated the edit screen, which is accessed with a single keystroke or trackball click. It allows the announcer to edit calls as either a bar or waveform graphic. Using the keys on the number pad, the

beginning or end of the call can be trimmed in 1, 0.1 or 0.01 second intervals in real time, making for extremely precise edits.

In addition to trimming the beginning and end of calls, a virtually unlimited number of edits can be made. The announcer can eliminate pauses, stammers or profanity, making calls concise and a lot more fun. Also, each of the edits can be trimmed with the number pad.

Our midday announcer was most impressed by the stacking screen. B94.5's midday show, "The Beestro," is all requests from 11:00 a.m. to 1:00 p.m. This screen lets the announcer organize calls in any order and to play them back as a group or sequentially. It makes playing back multiple requests for the same song a snap. Our evening announcer also

uses it to playback votes for the "Battle of the Buzz-cuts."

By the end of the demonstration, both the morning and evening announcers were threatening to take the Phone Byte hostage. The program director, Steve Kelly, was convinced that the Phone Byte would be an essential part of the new studio.

Technically, the Phone Byte uses an IBM-compatible PC and operates under DOS. I purchased a 486DX-33 with a 1.2GB SCSI hard drive from a local vendor. The Blue Group supplied the software and an Antex soundcard. Audio sample and compression rates are user selectable: We use the 32 kHz sample with no compression.

Soundcard

The Antex card can be set to record mono or stereo. We record the caller on one track and the announcer on the other. All functions are easily accessed via a keyboard, trackball or mouse; we use a trackball. I purchased the large SCSI for both speed

and capacity, but I could get by with a smaller drive, probably in the 500 to 750MB range.

We have had the Phone Byte in service for about eight months. It performs well, and any problems we had were handled by the Blue Group.

The announcers really love it. One announcer was very computer illiterate and quite concerned about learning a new technology. His fears were not borne out: It took only a few days for him to familiarize himself with the Phone Byte, and, after about a week, it became second nature.

It is great to find a piece of equipment that meets both technical and programming requirements and is easy for announcers to use. I plan to purchase two more for our sister stations, WDBO(AM) and WWKA(FM), in the near future.

□ □ □

For information from the Blue Group, contact Ben Umberger in Florida at 813-531-4487; fax: 813-531-4897; or circle Reader Service 211.

USER REPORT

MSI Wired STL Goes Digital

by Mike Callaghan
Chief Engineer
KIIS-AM-FM

LOS ANGELES When I first learned it would take 350 feet of cable to get from KIIS' new studios in Burbank to the roof, I almost fell over. Who could afford the 350 feet of Heliac it would take to hook up the STL dish, much less tolerate the signal degradation it would create on the way to the antenna?

We were only running from the eighth floor to the 13th, but it sounded as if the cable would be routed around the perimeter of the building instead of up its center. Additional measurements confirmed the length and that I had a serious problem on my hands.

Only solution

The only solution I could see was to mount the STL and RPU equipment up just beneath the roof and feed the signals up and down with twisted pairs instead of coax.

The building's landlord agreed to lease us a penthouse closet large enough to hold a small rack. It would hold the two Moseley PCL-606/C transmitters we needed. All I had to do was get composite signal to the room from the stereo generator, which would remain in the shop where we could keep an eye on it.

I was concerned about running the composite signal through 350 feet of coax, so I called Vince Mercadante at Moseley. He got a good laugh out of my predicament. Moseley did not intend for the PCL-606 transmitters to be driven through a cable of that length.

I remembered that Modulation Sciences Inc. (MSI) made a "composite line driver." So I called Eric Small, and he verified that the CLD-2500 Wired STL would do the job.

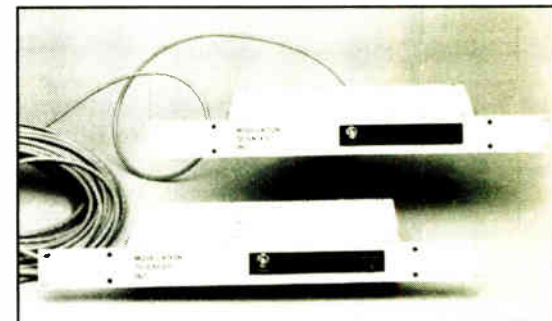
The unit consists of two different 1.75-inch rack-mount chassis. These are interconnected through Twinax cable—two balanced cables with a separate shield around them both. When the drivers are ordered, you specify what type of cable you will use and the units are configured accordingly. KIIS used Belden 9463, which has an impedance of 78 ohms. The studio unit is set to drive two outputs.

Once the cable is run, installation is simple: You mount the transmitter in the rack next to the stereo generator and connect the two with a short BNC

to BNC pigtail. Then an XLR connector is soldered to the end of the Twinax.

Running cables

The other end of the Twinax, upstairs in the KIIS penthouse closet, is also connected to an XLR plug. This runs to the CLD-2500 receiver. Considering the difficulty of running the cables, and as I would probably not be able to install any more wires after the first run, I ordered twice as much cable as I needed and included a spare Twinax in the bundle.



CLD-2500 wired STL

The receiver mounts next to the STL transmitters and feeds them both in parallel. It has just one BNC output, so a "T" is needed to split the output. The driver system has a low enough output impedance that disconnecting one of the two transmitters does not change the modulation level appreciably.

The front panel has a gain trim to adjust variations in signal level through the driver system. Another trimmer is included to compensate for "tilt," or the loss at high frequencies. This is adjusted when the system is first installed and will not have to be changed thereafter.

Considering that the studio end uses a different ground reference than the transmitter end of the composite driver, I was impressed that noise and hum were virtually undetectable.

Modulation Sciences has done a good job of solving a problem I never would have thought of, but which would have been a serious obstacle if I was forced to address it without MSI's help.

□ □ □

For information from Modulation Sciences, contact Art Constantine in New Jersey at 800-826-2603; fax: 908-302-0206; or circle Reader Service 31.

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FEATURES: It's got what's needed! It's **DUAL FUNCTION:** the 8400 can be used as an eight output stereo DA or easily configured as four 1x4 DAs (using simple rear panel jumpers) — sixteen outputs total, each with its own front panel gain trim. It also has **separate connectors** for every input and output. This allows for easy wire changes in the field, rapid troubleshooting, and further avoids the conductor pinching that plagues screw terminals.

The 8400 has the componentry, performance specifications and interconnect system that make it the obvious choice for your facility. At AUDIOARTS we've got the engineering know-how; **benefit from our experience!**



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World Radio History

TECHNOLOGY UPDATES

QEI

QUICK-LINK Combines Spread Spectrum And Digital Signal Processing Technologies

WILLIAMSTOWN, N.J. The QUICK-LINK from QEI Corp. combines real-time, linear digital signal processing with state-of-the-art military Spread Spectrum RF technology. The result is a digital stereo microwave system for broadcasters to use for RPU, backup STL/TSL or any other application requiring a high-fidelity, quick-and-

easy, digital stereo transmission.

The convenience of license-free digital radio transmission in stereo, without interference, allows Spread Spectrum technology to unleash the possibility of inexpensive remote broadcasts.

Interference in the RPU spectrum dictates that the solution arise from advanced technology. Spread Spectrum

communications, in conjunction with real-time linear encoding and decoding, answer this need, creating a low-cost alternative to Switched 56 digital telco circuits, analog program lines and interference-prone RPU systems.

The QUICK-LINK accepts stereo or monaural audio from any audio mixer; XLR audio connectors



simplify set up of the unit. Two LED bar graphs display audio level at a glance. It can be powered from AC or DC.

It provides two user signals to the receiver to control or flag equipment at the studio. Ten unique coding channels can be selected from the front panel for total remote broadcast security. An optional kit allows QUICK-LINK to be rack mounted.

The QUICK-LINK receiver displays coding channel in use and signal lock status. The receiver's channel code may be selected remotely. Audio output and antenna connectors are located on the receiver's back panel.

For information, contact Jeff Detweiler in New Jersey at 800-334-9154; fax: 609-629-1751; or circle Reader Service 203.

J.N.S.

Fully Linear Multiplexer System From J.N.S. Electronics

SAN JOSE, Calif. In 1992, J.N.S. Electronics Inc. released the first truly fully linear digital multiplexer system to the broadcast industry, the D-Mux 500. With D-Mux, the signal is true A/D and D/A, CD-quality transmission.

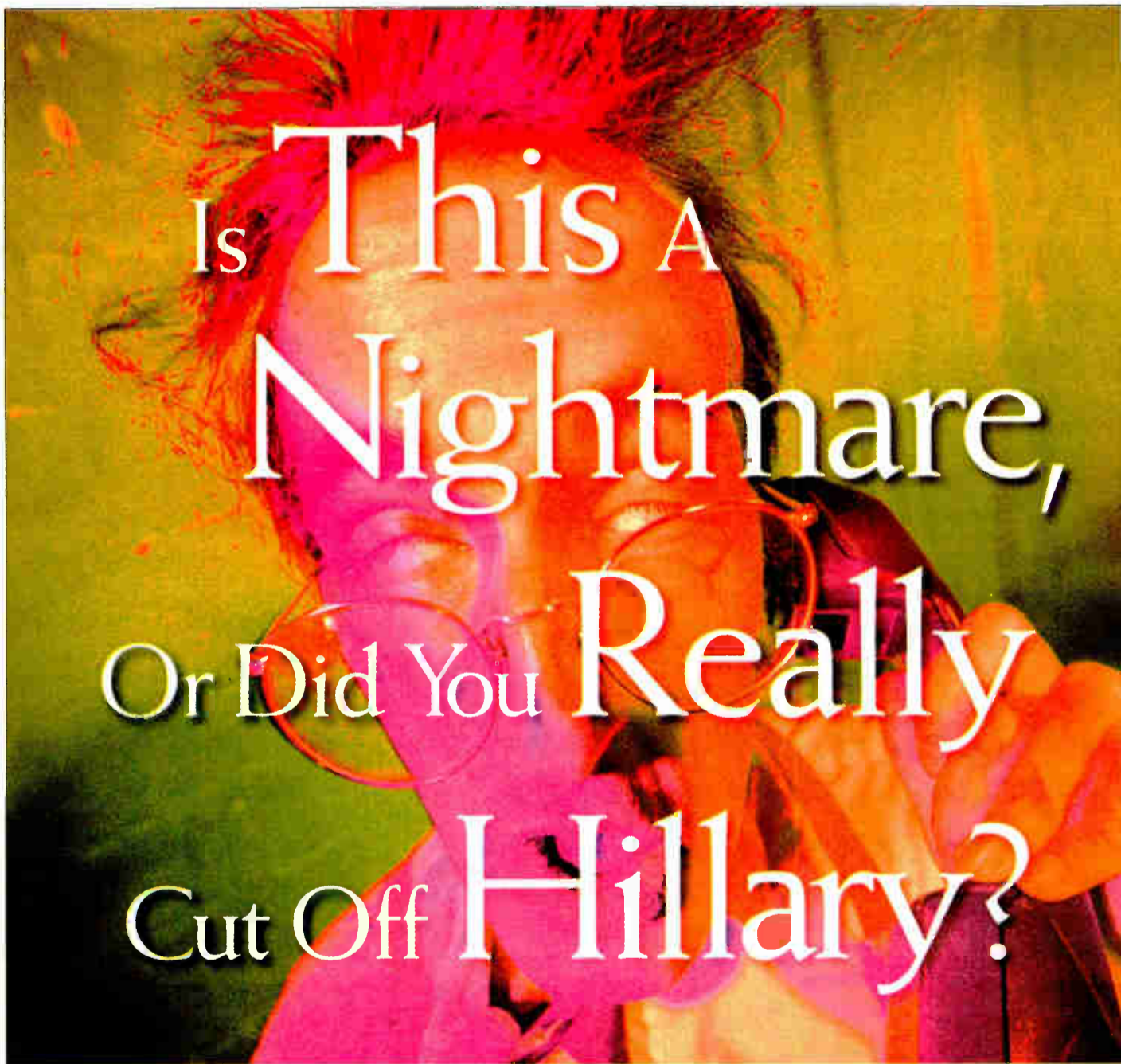
Radio stations spend vast sums of money to achieve the highest quality audio performance, but when that same audio is applied to a multiplexer and compressed, often signal quality is compromised.

Linear multiplexers offer very good performance parameters: Distortion less than 0.01 percent, typically 0.006 percent; noise less than -95 dB; crosstalk greater than -90 dB; phase performance typically less than 1 degree across the audio pass band of the signal; frequency response typically 0.05 dB; system delay of less than 250 microseconds, typically 124 microseconds; and a low bit error rate (BER) for digital path reliability.

The advent of true digital links will provide dramatically improved modulation techniques. In the J.N.S. DRFL 700 Series link 2Mbits is transmitted in 2 MHz of band width. This reduced band width negates the need to compress data and allows the broadcaster to deliver CD-quality audio to the transmitter or satellite system.

The D-Mux 500 system is highly flexible, with room for expansion modules within the system's frame structure. Also, it can adapt to ISDN or T1 systems to meet transmission uniformity.

For information, contact John Leonard in California at 408-729-3838; fax: 408-926-1003; or circle Reader Service 179.



The TS612 puts an end to unwanted talk show disconnections.

Your radio station has enough problems without your talk show hosts disconnecting important guests and callers. Put a Gentner TS612 in your studio and put an end to those problems.

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and keypad eliminate the need for a separate phone. Plus, the TS612 is so easy to use, your all-night weekend DJ can master it in minutes. Just imagine... no more lost guests, no more "Caller, hello caller? Are you there caller?"

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AudioVAULT! Now!

The screenshot shows the AudioVAULT software interface. At the top, there is a logo for Broadcast Electronics (BE) and a 'Menu' button. The time is 4:05:11 PM on 9/9/94, with a digital display showing 00:06:17 and a channel number of 11. Below this, there are several rows of broadcast items, each with a track icon, title, artist, and a 'Clear', 'Start', or 'Load' button. For example, '21 All She Can Do is Dance' by Don Henley is set to 'Clear', '631 You Might Think' by The Cars is set to 'Start' with a duration of 02:54, and '633 Kiss Him Goodbye' by Nylons is set to 'Start'. A 'Load' button is also visible. Below the broadcast items, there are tabs for 'Classic Rock', 'Liner's', 'News', 'Live', and 'Sound Effects', and another set of tabs for 'Wednesday', 'History', 'Thursday', 'Commercials', and 'Jingles'. At the bottom, there is a table with columns for 'Name', 'Title', 'Artist', and 'Length'. The table lists several tracks, including '347 More Music' (00:00:07), '1503 Turnpike Buick' (00:01:02), '1505 Crown Auto World' (00:01:01), '1507 Cimeron Bar and Grill' (00:01:00), '354 Mitch Jingle' (00:00:06), '605 What I Am' by Edie Brickell & New (00:03:36), '629 Mmm Mmm Mmm Mmm' by Crash Test Dummies (00:03:44), and '626 Found Out About You' by Gin Blossoms (00:03:46).

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AEQ

ACD-3.000 Coders Simultaneously Send And Receive Audio

TEMPE, Ariz. The ACD-3.000 audio codec from AEQ America is designed to simultaneously send and receive audio signals through ISDN or Switched 56 digital communication lines.

Both digital networks can be intercommunicated through the CCITT V.110 standard, allowing the codec to connect any point from the ISDN net with another point from Switched 56 by using converters that the carrier companies have installed in their main facilities.

The ACD-3.000 uses both the G.722 and MUSICAM ISO MPEG Layer II coding algorithms. G.722 operates with a 16 kHz sampling frequency, using 14-bit samples. It has an available bandwidth of 7.5 kHz and the delay generated by the coding/decoding process is quite low, about 3 milliseconds.

In the MUSICAM mode, the sampling frequency can be either 32 or 48 kHz. With 16-bit samples and bit streams of 56 or 64 kbps, the ACD-3.000 can send audio with a bandwidth up to 12 or 13 kHz. The coding/decoding delay is high, about 200 milliseconds. This delay must be factored in before the equipment is used for talkshows.

The codec can be manually or automatically synchronized to the operation mode and the binary stream.

In the MUSICAM mode, the codec enables an auxiliary data channel with

AUDIX BROADCAST

Audix Digital Adaptive Hybrid Automatically Adjusts Itself

SAFFRON WALDON, England For external telephone interfacing, Audix Broadcast developed a pure hybrid that automatically adapts itself without voice switching, gating or masking. It provides a minimum of 30 dB rejection under all expanded line-termination conditions.

This digital adaptive telephone hybrid (DATH) is based on a 127-tap digital filter that continuously adapts itself on-line to provide ideal rejection characteristics. The digital technology enables the system to remove up to 16 milliseconds of reflected echoes from incoming signals.

The Audix Broadcast DTX system is a complete on-air phone-in system that uses the DATH to interface with the caller on-air and enables the operator to talk to up to five other callers through a communications system integrated in the console. To simplify operator tasks, it includes single-button operation, electronic call stacking and full integration into the studio system.

A microcomputer, interfaced to the studio system via static logic interfaces, helps minimize the chance of interference with other sensitive studio equipment. It also makes it simple to expand the system to two full control units and an assistant control panel, enabling smaller stations to share a central hybrid. Switching for program cueing, clean feeds, talkback and hybrid outputs is through internal relays.

For information, contact Ian Jennings in England at 44-799-542-220; fax: 44-799-541-248; or circle Reader Service 40.



selectable transmission speeds of 300 or 1,200 baud. For these applications, the ACD-3.000 includes an RS-232 interface to connect with a PC or other device.

For information, contact Gerardo Vargas in Arizona at 602-431-0334; fax: 602-431-0497; or circle Reader Service 97.

FIBER OPTIONS

Fiber-Optic Link Uses 18-Bit DSP Technology

BOHEMIA, N.Y. Fiber Options Inc. offers its 1240B Series fiber-optic link for transmitting video and stereo audio signals.

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For information, contact Fred Scott in New York state at 800-342-3748; fax: 516-567-8322; or circle Reader Service 143.

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EAST FARMINGDALE, N.Y. Global Digital Datacom Services Inc. (GDDS) specializes in the digital communications offerings of the Bell Operating Companies. GDDS provides "one-stop shopping" for nationwide service for Switched 56, BRI-ISDN, PRI-ISDN, T1 and T3 services.

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For information from GDDS, contact Angela DePascale in New York at 516-694-6806; fax: 516-694-6806; or circle Reader Service 165.

In the western U.S., contact Peter Burinskas in California at 619-729-0100; fax: 619-729-4040.

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A digital STL, for example, is configured by using two 3 RU mainframes—one with a transmitter module, a channel coder and a source coder, and the other with a receiver module, a channel decoder and a source decoder. Composite stereo, RDS and SCA are delivered with the RDS, stereo and SCA personality modules.

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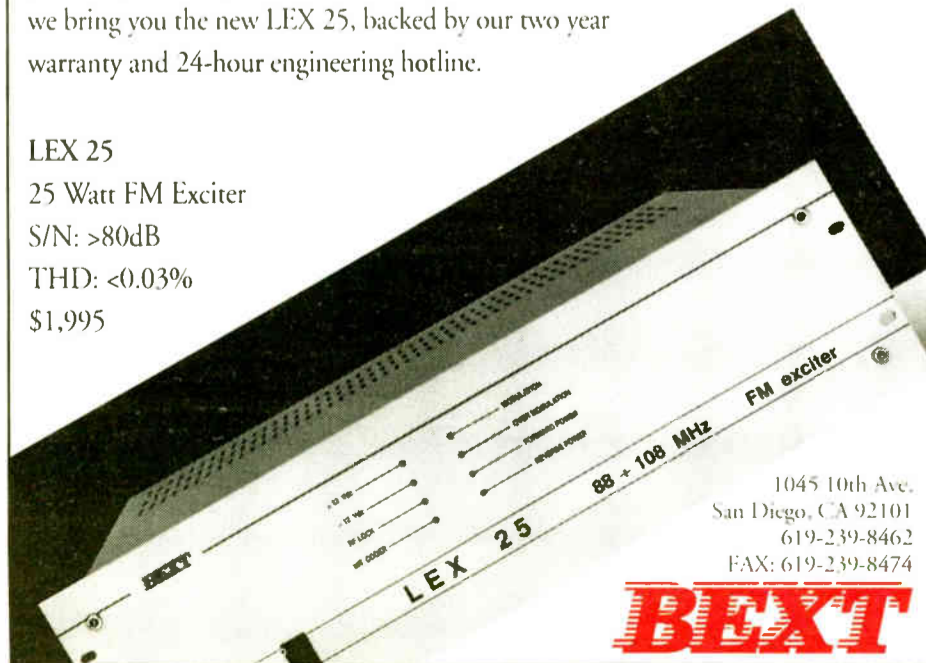
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For information, contact Dave Chancey in California at 805-968-9621; fax: 805-685-9638; or circle Reader Service 125.

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Newcomb 1960 portable radio transcription TT with PA, self contained with amp, 12" speaker in lid. R Myers, R Myers Productions, 222 Lakeview Ave, #216, W Palm Bch FL 33401. 407-832-4607.

RTS-405 stereo TT preamp (2), used 6 months, \$140/each + shipping. B Lord, Lord Broadcasting, 13313 SE 208th, Kent WA 98042. 206-631-2374.

Russco Studio Pro B with Micro-Trak tonearm, \$50 + shipping: Straight Wire Audio PH-2 preamp, \$125 + shipping J Cary, WLKX, 15226 W Freeway Dr, Forest Lake MN 55025. 612-464-6796.

Sparta remote unit with out mixer; Technic Quartz SP-25 (2) direct drive; Sparta 33 1/3/ 45 rpm. N Johnson, 92 Higgins Rd, Presque Isle ME 04769. 207-764-0605.

Technic SP-10 MK II with power supply, Audio-Technica arm, stereo cartridge, Fidelity Pro stereo preamp, \$175 + shipping. R Statham, WSTU, 1000 Alice Ave, Stuart FL 34994. 407-692-1000.

BE with microtrak tonearm and BE BETMS 100 TT preamp, \$100. J Coursolle, WPKR, 3891 Waukau Ave, Oshkosh WI 54903. 414-236-4224.

Gates Harris Intertype Corp (2), \$140/both. M Van Ouse, WTLR, 2020 Cato Ave, State College PA 16801. 814-237-9857.

Otarl MTR-10 " R-R, \$3500 + shipping/each; MCI JH-110 1" 8 track recorder, \$2500 + shipping. P Hogan, Regal Studios, 1349 Regal Row, Dallas TX 75247. 214-634-8511.

Newcomb self contained transcription TT with amp, \$295. R DeMars, 222 Lakeview Ave, W Palm Beach FL 33401. 407-832-4607.

Russco Studio Pro 2 speed (4) with tonearms, Micro-Trac, preamp, \$100/each. D Rogers, KXAX, POB 465, St James MN 56081. 507-375-3386.

Russco Cue-Master (2), \$120/Best Offer. M Van Ouse, WTLR, 2020 Cato Ave, State College PA 16801. 814-237-9857.

Russco FPSB Fidelity Pro, stereo preamp with individual gain, low-high filters, \$30. Kevin, Brown & Brown, POB 224, Portage MI 49081. 616-327-8352.

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