

RadioWorld®



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October 4, 1995

AT&T Demos IBAC DAB In Big Easy

by Alan Carter

NEW ORLEANS Even before the inaugural ride of the AT&T Digital Audio Broadcasting (DAB) mobile demonstration came to a halt, developers had proven themselves to some of their potentially harshest critics: key proponents of rival in-band, on-channel USA Digital Radio.

No doubt

But while AT&T left no doubt during World Media Expo, held here Sept. 6-9, that the in-band, adjacent-channel (IBAC) system works, the success was being termed as a slam against the European-developed Eureka-147 system that transmits at L-band.

Not only was this the first time AT&T allowed radio broadcasters in general to hear one of its systems, this was the first time for a demonstration of an adjacent-channel system.

Members of the USA Digital Radio consortium, however, maintained their IBOC system best meets the needs of broadcasting in the United States because it does not require any reallocation, as does Eureka, nor the fitting in of new transmissions into a crowded band, as does AT&T.

"If I were Eureka, I'd be worried," said Tony Masiello, head of CBS Radio engineering. "Ask the Eureka gang to do the same thing here: They can't do it."

Glynn Walden, who heads engineering for Group W, said the Eureka proponents would have to use five transmitters to cover the same area as AT&T.

Bad news for L-band

The AT&T mobile demonstration was broadcast at 96.5 MHz at 1 kW ERP. The transmission was roughly calculated out to a 60 dBu contour, with the antenna at 436 feet actual height. The signal held up for at least 16 miles from the transmitter and antenna located downtown.

"This is very damaging to Eureka because this is a replacement for their L-band system," Walden said. "It's an 'any-band' system."

Masiello said AT&T showed that a digital system can operate at 200

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Radio Rocks with Cleveland Museum

by Charles Taylor

CLEVELAND Radio made rock 'n' roll.

And long before visitors to Cleveland were close to the waterfront location of the city's new Rock and Roll Hall of Fame to physically see it, they were made acutely aware of the long-awaited museum's presence.

In the airport and along roadsides, signs proclaimed, "Cleveland: America's Rock 'n' Roll Capital." The city celebrated with parades, speeches, celebrity appearances and, of course, the seven-hour stadium concert event that drew the likes of Chuck Berry, Bruce Springsteen and Melissa Etheridge.

On the radio, even stations whose mainstays are Mariah Carey and Michael Bolton joined in with the region's moniker as the home of rock 'n' roll.

In fact, the event was a media mainstay nationwide, both for television and radio. But in many ways, there was the innate understanding that rock 'n' roll and radio had traveled through time together, ably chaperoning each other through the genre's formidable evolution.

Over Labor Day weekend here, more than 40 radio stations acknowledged

their relationship with rock, broadcasting live from "Radio Row," set up alongside the 150,000-square-foot museum. Stations came from Toronto, New York, Chicago, St. Louis, Philadelphia and the like, while network

by-play of the events and relevance of the \$92 million museum's opening.

"Hey, if it wasn't for radio, there wouldn't be a Rock and Roll Hall of Fame," acknowledged Gary Bennett,

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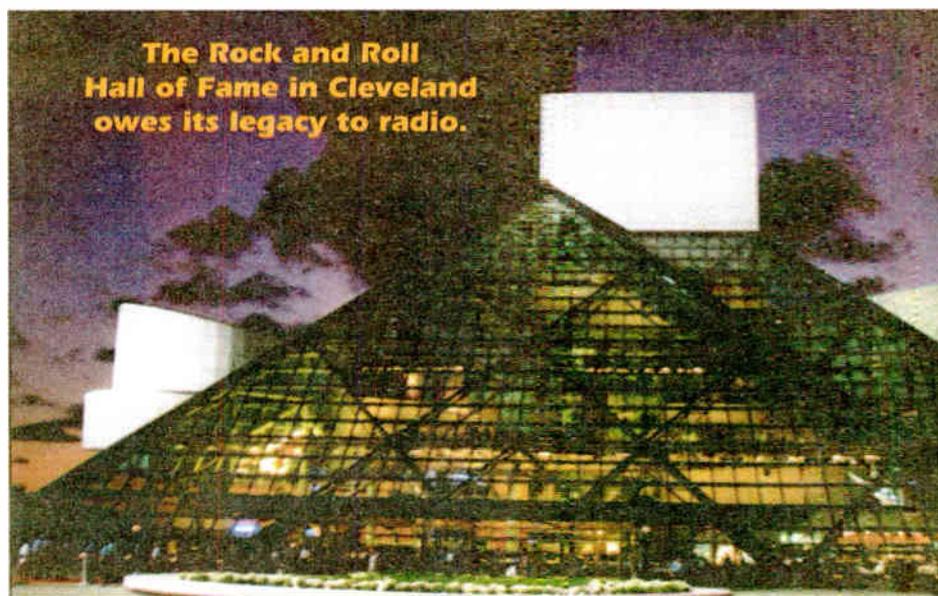


photo Charles Taylor

entities like ABC, Westwood One and Voice of America spread the word around the world.

Many sponsored call-in shows from the remote site, while others offered a play-

WME Draws Fewer to New Orleans

NEW ORLEANS In spite of an upturn of attendance for the NAB, SBE and RTNDA conferences, overall attendance figures for the World Media Expo in New Orleans were down from the 1994 show, according to the official count.

The four-day convention, which includ-



New Orleans Convention Center hosted World Media Expo

ed the NAB Radio Show, the Society of Broadcast Engineers, the Radio-Television News Directors Association and the Society of Motion Picture and Television Engineers, had a total attendance of 14,533.

The 1994 World Media Expo in Los

continued on page 21 ▶

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NEWSWATCH

DAB Lab Tests

ARLINGTON, Va. Although the lab portion of the tests are finished for Digital Audio Broadcasting, the bickering is just beginning.

At press time, the Electronic Industries Association (EIA) was drafting a letter to respond to charges from USA Digital Radio that certain multipath tests were performed incorrectly.

Sources at the EIA said the association was also considering allowing DAB proponents to inspect the lab testing facility again.

As for rumors of repeating any of the lab tests, one EIA source said that that would be a matter for the National Radio

Systems Committee (NRSC) to decide.

Field tests are expected to begin this month in San Francisco pending a decision on Eureka-147's request to add two transmitters to its system.

Growth Continues

NEW YORK July marked the 35th consecutive month of revenue growth for the radio industry according to the Radio Advertising Bureau (RAB).

The 6 percent increase comprised a 7 percent increase in local spot advertising revenue with no gain or loss in national spot revenue over July 1994.

RAB President and CEO Gary Fries

said "All indicators point to an overall improvement as we move into the fourth quarter."

Spring RADAR

NEW YORK ABC Radio Networks had the highest share of network listeners according to an ABC Radio Network report on the RADAR 51 Spring survey. The report said the network had 45.6 percent share of the 12+ audience followed by Westwood One with a 39.2 percent share. CBS trailed with a 14.8 percent audience share.

According to the report, the ABC Excel Network posted the highest audience gain of all the networks with a 24.4 percent increase. ABC's four other radio networks lost audience percentage points as did five of the six Westwood networks.

The report also showed Paul Harvey was the dominant news personality in Network Radio. His 8:30 a.m. broadcast reaches 5.1 million listeners each week.

EIA Signs National Group

NEW YORK It adds only five stations to their RDS campaign, but the Electronic Industries Association (EIA) was excited when the Noble Broadcast Group signed agreements to commit its stations in top markets to the Radio Data System program.

The EIA said Noble is the first broadcast group to make a nationwide commitment to allow all of its stations in the top 25 markets to take part in the program.

The new stations that will soon be sending RDS text messages are: KBCO-FM and KHIH-FM in Denver; KNJZ-FM and KMJM-FM in St. Louis, and XTRA-FM in San Diego.

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.

The PHANTOM

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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.

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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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AM Expanded Band Open to Comment

by Lynn Meadows

WASHINGTON Database errors helped bring down the AM expanded band proposed allotment plan issued by the Federal Communications

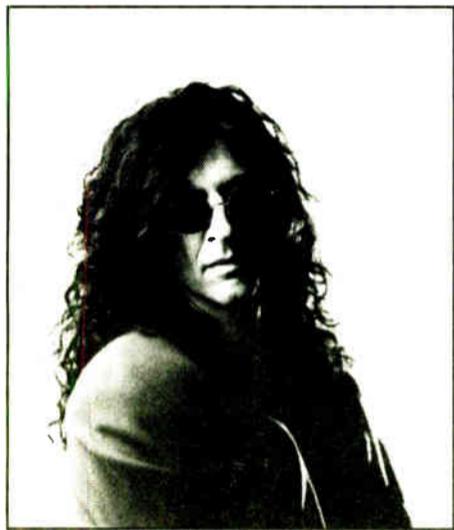
Commission (FCC) last October.

The FCC is currently in the middle of a 30-day comment period asking people to submit any fixes necessary to the database it used to generate the first proposed allotment plan.

New Twist on Howard Stern Indecency Saga

by Alan Haber

NEW ORLEANS Say you saw it coming or say you were surprised: Either way, the record \$1.715 million settlement agreement reached between the Infinity Broadcasting Corporation and the Federal Communications Commission (FCC) puts



Howard Stern

the most famous, prolonged indecency tussle in radio history, involving radio's reigning "bad boy" Howard Stern, to rest.

Or does it?

The settlement agreement, announced on Sept. 1 by the FCC, "resolves several pending indecency enforcement proceedings involving broadcast stations licensed to Infinity and its subsidiaries," according to an FCC press release. The \$1.715 million amount is actually a bit higher than the amount of the fines, which stood at \$1.706 million.

Opinions about the settlement agreement were flying fast and furious on the alt.fan.howard-stern Internet news group not long after it was announced.

One person, in answer to the question posed by a contributor to the newsgroup, "Why did Howard and Infinity back down?" made mention of Stern's stated plans to start the Howard Stern Network (Stern has been talking on the air about doing this when his contract with Infinity is up this fall).

Rumor

A rumor mentioned on the World Wide Web site, "The Interactive King of All Media Newsletter," suggested that Stern may be signing with SW Networks. In answer to this rumor, SW's Manager of Media Relations, John McKay, told *RW* that SW had "No comment."

McKay added that SW President and CEO Susan Solomon said she thinks Stern is a tremendous talent and admires him a great deal.

The settlement agreement between Infinity and the FCC involves broadcasts that were aired between 1988 and 1994

on the popular Stern Show on Infinity licensed stations in New York (WXRK-FM), Philadelphia (WYSP-FM), and Manassas, Va. (WJFK-FM).

According to Bill Kennard, the FCC's General Counsel, the settlement agreement essentially gives Infinity a fresh start, but doesn't actually wipe the slate clean. He said that "It is kind of a qualified immunity. If there is something out there that we don't know about that involved conduct between July 1993 and the current date ... we're still going to look at those (complaints), and, of course, anything that Infinity does from here on out — they're going to be treated as though they're any other licensee."

The July 1993 date is when Infinity represented to the FCC that they had a new control system in place, including a delay, that would guard against potentially offensive language.

The King speaks

The self-proclaimed King of All Media railed loudly on Monday, Sept. 11, his first day back from a week-long vacation, against the latest chapter in Infinity's seven year tussle with the FCC.

Stern said that Infinity "is very brave. They put up a struggle that you wouldn't believe, but you think that they can take on the United States government? You're kidding yourself."

Stern said he was sad about what happened.

"If I was faced with \$1.7 million in fines," he said, "the government not letting me go to court, the government shaking me down every time I was up for license renewal, the government not allowing me to buy radio stations without delays and costing millions of dollars, I really don't know how I would react."

Stern's comments did not stop there. He said he was "sickened over the fact that I cost the company that I work for \$1.7 million, that the whole thing was a total joke. Nothing is solved. There was never anything indecent or obscene said."

Opposing view

The FCC's Kennard said the commission takes issue with Stern's claim that nothing he has said has been indecent.

"The FCC found that Infinity should be liable for a million seven hundred and six thousand dollars in fines for repeated violations of our indecency statute," he said.

"And the Court of Appeals for the D.C. (District of Columbia) circuit found that our indecency standard was not vague, and that broadcasters had sufficient notice of what the standards are, and in Mr. Stern's case, they stepped over the line."

Stern "may not believe that he's done anything indecent," Kennard added, "but the FCC believes that he has."

continued on page 11 ►

Nineteen Petitions for Reconsideration followed the announcement last year that about 80 AM stations would be permitted to move to the expanded band.

Some of the petitioners said that errors in the database could have caused improper calculations of improvement factors. Petitioners also pointed out that database information which protected federal travellers information stations was in error.

The "improvement factor" is the ratio of the total area of domestic interference caused by an AM station over the station's interference-free area.

The procedures followed last year will be repeated once the database corrections received during the comment period are manually researched and entered into the computer. Stations that made the cut last year may find themselves off the list next time.

Improvement factors will be calculated for the 688 stations who requested to migrate to the new frequencies. It takes a month of computer toil to calculate and rank the improvement factors.

Once the improvement factors are settled, another computer program running continuously for two weeks will plug them into the new frequencies systematically making sure they do not create interference.

Jim Burtle, head of the AM facilities group at the FCC, said the new proposed allotment plan will not be ready until after the end of the calendar year. That new plan will also have to undergo a

WDJM(AM) in Elizabeth, N.J., is the only station in the country guaranteed an expanded band frequency.

"reconsideration period" said Burtle, before it is finalized and licenses are actually issued.

WDJM(AM) in Elizabeth, N.J., is preparing to start broadcasting at 1660 kHz thanks to a Special Temporary Authority granted by the FCC in the spring.

The daytime station has first priority to move to the expanded band; it is the only station in the country that is guaranteed an expanded band frequency. What is not guaranteed, however, is that WJDM(AM) will remain at 1660 kHz once the allotment plan is finalized. ☺

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AT&T Further Proves In-Band Can Be Done

NEW ORLEANS Kudos undoubtedly must go to the engineers at AT&T Bell Labs. Their mobile demonstration of the AT&T in-band, adjacent channel system in New Orleans once again proves that it can be done.

Digital quality radio can be broadcast within the existing spectrum allocation for U.S. radio.

Of course I took the ride. Picture a sunny 93 degrees Fahrenheit with a good helping of that New Orleans humidity. The dark blue Dodge van was comfortable and cool.

The driver proceeded down Convention Center Drive and took a left on to Julia, headed toward downtown. Right on Tchoupitoulas and into the

hear one of its systems, this was the first public demo of an adjacent-channel system.

Stats: The AT&T mobile demonstration was broadcast at 96.5 MHz at 1 kW ERP. The transmission roughly calculated out to a 60 dBu contour, with the antenna at 436 feet actual height. The signal held up for at least 16 miles from the transmitter and antenna located downtown.

AT&T was out to prove two main points: 1) the adjacent-channel system works, and 2) it does not cause interference.

They proved it admirably, although my tour did experience two dropouts. One dropout occurred around a group of large towers, the other at an intersection a block or two away from a highway overpass.



Berlin's IFA trade show featured these DAB receivers.

shadows of the Sheraton, Marriott and Westin Canal Place Hotels ... But how did it sound, you ask? Great! The music selection included the pristine voices of Celine Dion, Mariah Carey and Vanessa Williams, among others.

Not only was this the first time AT&T allowed radio broadcasters in general to

The van was equipped with Sennheiser HD250 headphones and, truly, the only thing missing from the experience was the A/B comparison with analog. Maybe next time.

But not everything at the show was digital and work-oriented. Our most heartfelt

congratulations to WireReady President Dave Gerstmann and Mona Lonberger, who tied the knot in New Orleans.



The Gerstmanns

Wedding cake and coffee were served at the company booth at noon, on Friday, Sept. 8. Best of luck to both of them.

And as DAB progresses here, so, too does it abroad. Michael Lawton reports from Germany with the following tidbit.

Given the rapid-fire beginnings of pilot and test DAB systems across Europe during the last quarter of 1995, perhaps the last hurdle Digital Audio Broadcasting (DAB) faces is the receiver question.

The biennial consumer electronics trade fair, Internationale Funkausstellung (IFA), in Berlin marked the first introduction of DAB receivers for consumers, with several manufacturers showing DAB receiver units, mostly for cars.

All the receivers consisted of a control panel that mounts in the dashboard, and a receiver, about as large as a CD changer, that fits in the car's trunk.

The Grundig DAB receiver uses a PC

card designed by the Fraunhofer Institute for Integrated Services. At this stage, the card must plug into a car radio to work.

For receiving PAD ancillary data information services, Deutsche Telekom showed a prototype mini-screen for use in automobiles.

As Gert Siegle of Bosch-Blaupunkt, which is delivering the eventual 1,000 receivers for the Berlin pilot DAB project, said, development of DAB receivers will be the same as with mobile phones: the first were heavy and needed a lot of power, so that they had to be carried in cars. Only later did power-saving and weight-saving developments make the handheld phone possible. The DAB portable will come (see photos).

On a more personal note, big changes are happening right here in Falls Church. Long-time RW friend, former USAirplay columnist, Buyer's Guide Editor, News Reporter, Radio World International Managing Editor, and most recently, The Radio World Magazine Editor Chuck Taylor (whew!) is leaving the fold. Chuck is headed to the Big Apple to oversee the radio section for Billboard magazine.

We all wish him the very best of luck — I know he'll be great. He also will be sorely missed.

I'll be more involved in the day-to-day operations of The Radio World Magazine for awhile. As Editor-in-Chief, my role to-date has been more of an advisory one. RW Buyer's Guide Editor Whitney Pinion becomes, with the next issue, Managing Editor of the two Radio World's, and she and I will be working on both.

Kudos go to WNNK-FM Harrisburg, Pa. It won the Marconi Award for CHR station of the year (beating out the likes of KIIS-FM in Los Angeles). WINK 104, you will recall, is Al Peterson's former place of employment — and he too shares in their success this past year. Congrats to WINK 104 and to Al!

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Avoiding Lightning Strikes

Dear RW.

I want to share my unusual success with avoiding lightning strikes. It may be secret or, maybe I'm the only one that didn't know this!

During the last two years, I've installed two FM transmitters at our two sites. One site is in New Jersey and is our standby transmitter and the other is in Pennsylvania, the location of our main transmitter. At our auxiliary site we rent space to Bell Atlantic for its cell system.

Both sites use retired steel shipping containers. They are usually sturdy and give great security. These boxes are 8x8x20 and cost us about one thousand dollars. We've studded, walled and carpeted these boxes.

During a recent violent lightning storm, we survived without a scratch. The Bell Atlantic system was demolished! In fact I didn't even know there was a hit until a neighbor told me Bell literally had to replace everything in its building.

At our Pennsylvania site, the FM down the road is constantly "wiped out" and we survive without a scratch. Both of our sites use high quality surge protectors on the primary lines. Our boxes are tied to the ground systems and the tower.

It is my guess that lightning subscribes to the skin effect theory and this causes the strike to pass over the box, and not enter the steel container. Wooden and concrete structures don't seem to isolate their contents.

Even if money were no object, I don't think you could build a more secure and maintenance free facility than the used freight containers provide. They seal when the doors are closed and become rodent proof. Air handling is a "breeze." Air can be brought in through floor gates

and discharged through ceiling or wall exit ducts. Only your imagination limits the usefulness of these containers.

*Lawrence J. Tighe, Jr., President
WRNJ-FM, Hackettstown, NJ*

AM Expanded Band

Dear RW.

It is refreshing to see proposals for creative use of the broadcast spectrum (Edward S. Welch, RW, June 14). However, as an unlicensed low power broadcaster who has a significant stake in seeing a fair and equitable allocation of the alleged "limited and crowded airspace," I cannot agree with the proposal to take LPFM and convert it into the waste land of the "new and improved" expanded AM broadcast band.

The FM spectrum would not be overcrowded if the FCC would abide by its own rules and license stations in the public interest and not in the name of profit or under pressure by special interest groups. In the Phoenix market there are numerous translators used by commercial Class A and B stations to compensate for their limited signals. There are also several stations from outlying communities (up to 100 miles away) using translators to "tap in" to the profitable Phoenix radio market.

Then there are the nine fundamentalist Christian radio stations, five of which have crowded out any possibility of community stations, licensed or otherwise, from operating in the 88-92 MHz region. One of these stations is an out-of-state satellite translator which rebroadcasts the same programming at two locations in the non-commercial FM spectrum.

An interesting argument could be made that the FCC has violated the Establishment Clause of the First Amendment by the exclusive licensing of so many "local" radio services which program only one narrow sectarian viewpoint. No doubt the very powerful NRB lobby would take issue with this assertion. Nevertheless, here is a counter proposal: eliminate all the translators in major markets. This would alleviate a lot of the so-called congestion. If a licensed Class A or B operation cannot operate profitably with its limited signal, then it will go dark and thereby free up more frequency space. There is no caveat in the FCC rules that all stations (in any market) are created with equal coverage areas.

Further relief could be granted by moving the non-commercial religious stations into the expanded AM band. Because religious stations constantly have a ratings share soaring to around 0.0, the move to the expanded AM band would not be financially detrimental.

Finally, Mr. Welch should remember that access to the broadcast spectrum is not contingent upon "competency in radio theory" and compliance with "FCC rules and regulations." Technology makes LPFM viable without an extensive engineering background. The current FCC rules are not applicable to LPFM. The

Radio Loves Rock 'n' Roll

The legacy of rock 'n' roll radio extends far beyond the confines of Cleveland's Hall of Fame Museum. The glass and concrete structure belies the undisciplined, free-form underground nature of the genre it reveres.

For the early rockers — the ones that shaped both radio and music as we know it today — were fly-by-the-seat-of-your-pants musicians that instilled fear in the hearts of mainstream America and joyous adoration in the hearts and minds of the world's youth. And it was radio's risk-takers who introduced them.

Underground radio is as intrinsic a part of that history as Jimi Hendrix or the Velvet Underground. Today's Alternative musicians and stations are throwbacks to those early pioneers of free-form music radio.

But the chords that link musician to radio station to audience can be found in other formats, such as Country radio, and are being discovered by the new commercial broadcasters in Europe and other parts of the world.

Radio is the most ubiquitous and varied of media — 11,000 U.S. stations beam out a signal to more receivers than there are listeners. The wealth of format niches ensures that there is practically a station for every listener out there.

The listener who complains that there is not is not searching hard enough.

For 75 years, radio has played a natural role in the cultural life of this country. Its reach is broad and important — beyond just rock 'n' roll.

It is the strength of the people you hire to run your radio stations and the quality of the programming you choose to air that will propel radio beyond the next 75 years. Whether you deliver your programming via fiber optic or over the air using digital signals, what matters is radio's continued ability to tap into the heart and soul of its listeners, and continue playing that vital role in their everyday life.

—RW

FCC would have to write rules and regulations that would adequately but not excessively regulate this new type of service.

Like it or not, LPFM is here and it is not going away. Commercial broadcasters do not have an exclusive right to the radio spectrum. The notion that LPFM poses any competitive financial or technical threat to established operations is nonsense. If the commission will not accommodate this new class of service, then that final order will ultimately come from a Federal Court.

*Bill Dougan, Community Broadcaster
KAFR Phoenix, AZ*

Radio Hall of Fame

Dear RW.

It is not often that I will go to bat for someone who is a star on one of my competitors, but I think that the nomination of Bruce Williams to the Radio Hall of Fame is one of those rare exceptions.

You see, Bruce made me — actually, all of us in the talk business — profitable.

I've been involved in talk radio since the early 1980s and I believe that I've proven you can take any small, off-the-air daytimer and make it successful. But I could not have done that before Bruce made talk radio popular enough to stop my investors from laughing too hard to make that investment. In fact, when I bought KTRT, it was with the understanding of my lender that I would program the station with programs "like Bruce Williams' show on Talknet."

In short, to many people Bruce is talk radio. Yes, there are newer hosts with bigger egos (also on my competitor, because I quaintly insist on being live and local) who are more issue-driven.

But I'll tell you this: I listen to KRMG when I'm in the car from 7 p.m. to 10 p.m. and then flip over to my station to find out how the Royals did. The mark of good talk radio is when you get to where you are going and leave the engine running a few more minutes because you are too interested in the program to get out of the car. Believe me, I've wasted a lot of gas listening to Bruce.

If Bruce had not have been so successful in 1981, I might not be where I am today. And neither might you. Remember that when you cast your vote or make a recommendation to those who do.

*Fred M. Weinberg, President
KTRT(AM) Tulsa, OK*

Clarification

The Aug. 23 issue of RW incorrectly states that National Public Radio will switch to a new satellite in January. NPR is actually completing its conversion from an analog distribution system to a digital system in January but has no plans to switch to a new satellite.

Radio World

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**Next Issue of
Radio World
October 18, 1995**

DARS Service Inching Closer to Reality

by Dee McVicker

PHOENIX It looks like digital radio is poised to enter the space age as planned. In January, the FCC approved allocating a portion of the S-band to companies requesting to set up satellite-based digital audio radio services.

Rules for the S-band spectrum have



A Prototype DARS Car Receiver

been proposed and the first round of comments were due at the Federal Communications Commission (FCC) Sept. 1. It could be as soon as October or November that licensing will be granted to applicants wanting to use 12.5 MHz each at the lower end of the S-band spectrum, between 2,310 MHz and 2,360 MHz.

Currently, there are four applicants pending the FCC's assessment, each with a different plan to utilize the S-band spectrum. Still up for consideration is whether or not others will be allowed to apply, according to the commission.

In early September, the FCC granted a waiver to Satellite CD Radio which authorizes the company to spend up to \$10 million towards construction of its satellite system. The FCC stated that the company will build "solely at its own risk" since the waiver does not necessarily mean that CD Radio will be awarded a license. Recently, the company contacted aerospace company Loral to build two satellites, plus an earthbound spare, that will beam as many as 50 channels of music and talk to car listeners tuning in with special dishes and radios.

Thirty channels will beam commercial-free, CD-quality music formats — ranging

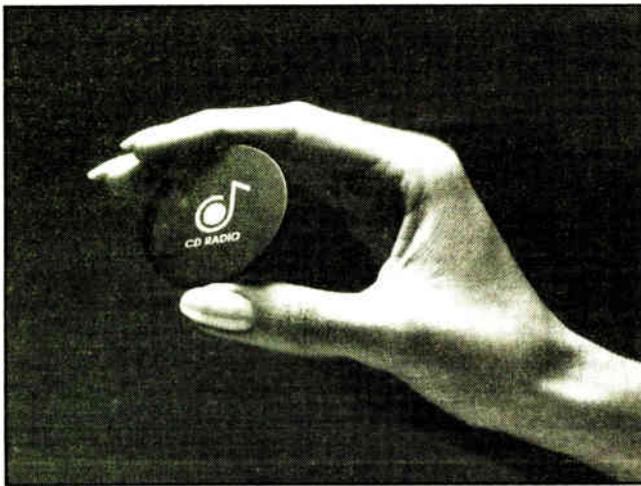
from children's songs and Latin rhythms to opera and classic rock — to automobile listeners subscribing to the service. Twenty channels will be dedicated to news, sports, and talk-type formats.

Mobile listeners

To bring CD Radio to subscribers, programming will be sent to two geosynchronous satellites, and the signals will make the return trip back to earth simultaneously using a time division multiplexing scheme. The system uses "spatial diversity" reception technology in order for the radio to seamlessly switch from one satellite to the other should listeners need to change satellites as they are driving across the continental United States.

The receiver coordinates the two incoming satellite signals, that can reach the receiver as far as 3.8 milliseconds apart, by delaying one of the signals proportionally. The system was tested last year using two NASA satellites.

For receiving the signal, CD Radio



CD Radio's Satellite Dish Antenna for the Car

developed a small satellite dish antenna, approximately 1/8-inch thick and 2-inches in diameter, to be mounted on or in a car. Subscribers will also need an AM/FM/S-band receiver; S-band proponents are hopeful that receiver manufacturers will build the three-band receivers in place of AM/FM receivers now in automobiles.

CD Radio is currently working with receiver manufacturers on such a radio, and has a three-band radio that includes a digital display showing the CD Radio channel number, music format, song title, recording

artist album title and record label.

American Mobile Radio, Digital Satellite Broadcasting Corporation (DSBC) and Primosphere, the three other companies getting on the S-band wagon, also are planning and developing satellite technologies.

DSBC, for example, is planning to beam 16 channels nationwide and 31 spot beams from one satellite network, with supplemental terrestrial repeaters for those areas not within line of sight of the satellite signal.

Narrowcasting

The concept behind the new digital service is to deliver CD-quality audio nationwide, with some "narrowcasting" to spot markets for niche programming. Mobile listeners subscribing to CD Radio's commercial-free service, for example, will be able to pick up a digital-

quality signal in San Francisco and listen to it all the way to Rhode Island, static-free and commercial-free.

This kind of reach could also "re-localize" programming, making it easier for motorists to get gospel in Idaho, bluegrass in New York, and New York symphonies in Arizona. Moreover, CD Radio subscribers, who will be charged roughly \$10 monthly above the cost of equipment, will be able to hear programming in different languages.

CD Radio is targeting initially for a 0.16 percent market penetration of 350,000 subscribers, the number it needs to break even financially. So far, it has raised almost \$20 million to launch the service, but will need several million more to carry out its plan.

CD Radio has tentatively reserved the launch date of its satellites by Ariane-space to take place sometime between Dec. 1, 1997 and July 1, 1998.

CPB Funding Options Considered by House

by Lynn Meadows

WASHINGTON A 2 percent fee on station sales was one of the ideas proposed in a hearing exploring the possibility of making public broadcasting self-sufficient.

The House Subcommittee on Telecommunications and Finance heard from eight public radio proponents last month who had brainstormed ideas for the long-term financial stability of public broadcasting.

Ideas included creating a trust fund, using spectrum fees, cutting costs, using advertising and enhanced underwriting, and creating a new class of license.

Delano Lewis, president and CEO of National Public Radio, said he opposes using advertising or frequency swapping to help finance public broadcasting, but does favor allowing producers "more latitude" in their underwriting efforts.

Representing the Association of America's Public Television Stations, the Public Broadcasting Service, Public Radio International, and NPR, Lewis suggested developing a new private corporation which would help move public broadcasting away from an annual federal appropriation.

According to Lewis, the corporation could be responsible for administering a non-governmental investment portfolio. After initial funding by Congress, Lewis said the interest income from the portfolio would be

used to offer the current programming now provided by public broadcasting.

Lewis proposed three sources for funding the portfolio: FCC spectrum auctions; lease income on unused noncommercial spectrum; and a two percent fee on transfers of commercial licenses.

"Our legislation imposes a fee of 2 percent of the amount paid for a station on the person selling the station," said Lewis citing the proposed ownership changes and consolidation that will make the local service component of the broadcast medium more critical.

The subcommittee also heard testimony from CPB President and CEO Richard Carlson. Carlson told the congressman that a report done by The Lehman Brothers indicated that no combination of cost savings and new sources of revenue could fully replace the current Federal appropriation.

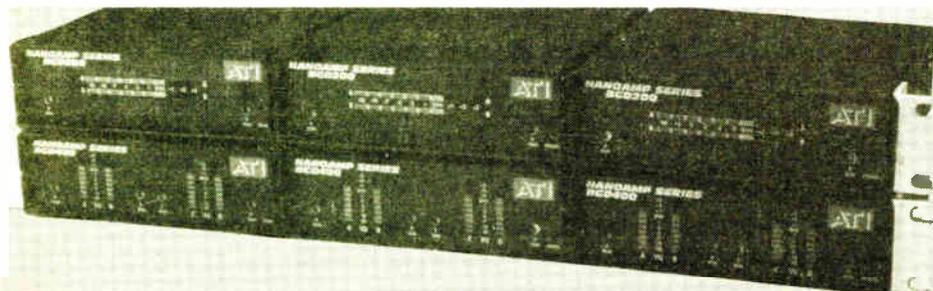
The history of the budget process for CPB this year is enough to give even the calmest accountant heartburn. In FY-1995, Congress appropriated \$285 million for CPB.

This spring, the senate voted to freeze the corporation's budget for the next two years at the 1995 level of \$285 million. The House voted to reduce the funds to \$265 million in 1996 and \$221 million in 1997.

At one point, there was skepticism as to whether or not the CPB would receive any funding at all in 1998. On Aug. 4, however, the House passed a bill recommending funding CPB at \$240 million for 1998.

The CPB is not the only agency to experience the budget cutting zeal of the current Congress. During the week of the hearing, Chairman Reed Hundt responded bitterly to a senate appropriations subcommittee vote that would cut the budget of the Federal Communications Commission by 20 percent.

Hundt said the appropriation would "cause not cuts, but amputations." By the end of the week, Hundt was thanking the full Senate Appropriations Committee for increasing the subcommittee's appropriation by \$18 million. CPB may not have such luck.



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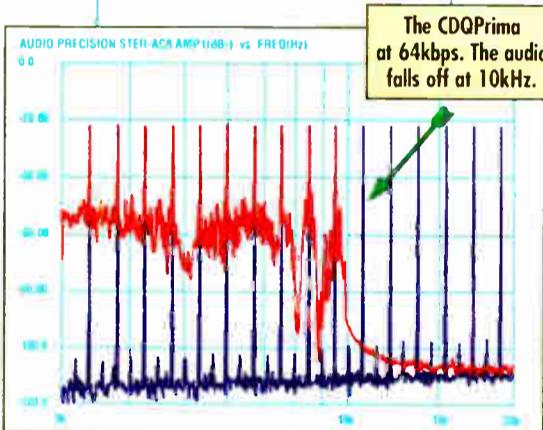
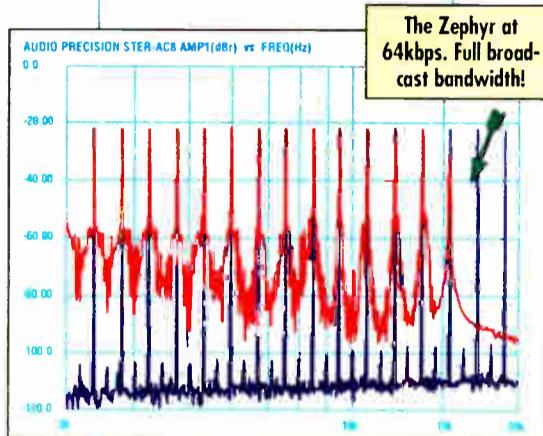
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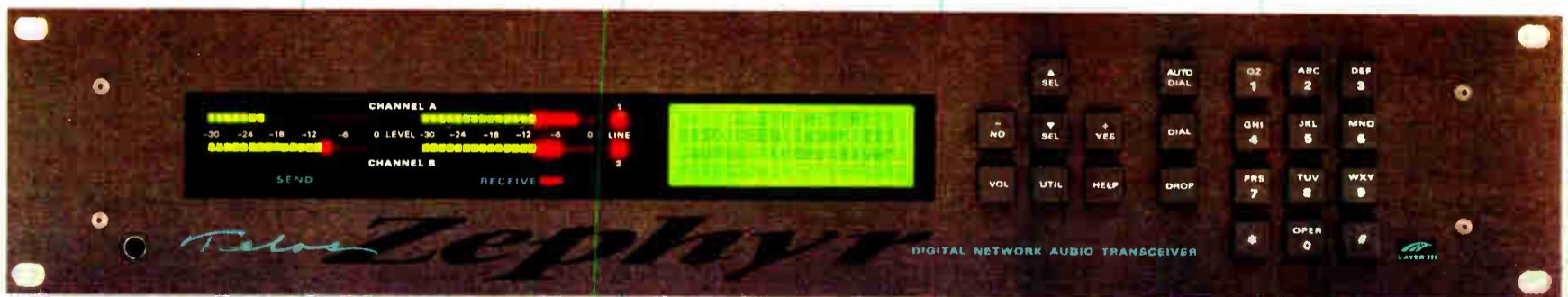
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World Radio History

Radio Rocks Cleveland

► continued from page 1

chief engineer for St. Louis' KSHE-FM, who started as a DJ at the station in 1968. "If people hadn't heard the records on their \$5 transistor radios or tube radios, they wouldn't know who Chuck Berry or Little Richard are. So really, radio made rock'n'roll."

Added Ron Foster, an afternoon announcer with ABC Radio's Pure Gold format, "There was Elvis, there were

The Beatles, then there was Woodstock. Now, there's the Rock and Roll Hall of Fame. It's a big major event in rock'n'roll history."

The majority of the out-of-town stations got the message home via ISDN lines: the Hall of Fame stated that no uplink or downlink satellite dishes were allowed on-premises. A number of stations took advantage of Cleveland-based audio equipment manufacturers Cutting Edge and Telos Systems, which offered its Zephyr digital transceiver on the house to stations in need of a connection to their studios.

"It's certainly not the first time a multi-radio station remote has been accomplished, but it was a first for Cleveland.

We wanted it to be as easy as possible," said Cutting Edge President Frank Foti, who also had a hand in designing a state-of-the-art radio studio in the Hall of Fame.

"On a personal level, I'm a Clevelander and I grew up on rock'n'roll: The Who, The Kinks, Bruce Springsteen," he said.

"I wanted to thrash everything that's been said in a non-positive manner about my hometown and show visitors that this is a pretty cool place." ☺



Cutting Edge President Frank Foti lends a hand in a studio he helped design.

61 Years Ago

Reprinted from Radio World October 6, 1934. 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.

ACE ADVISES ON HOW TO GET IN AS ANNOUNCER

William H. Andrews, chief announcer of NBC's San Francisco studios, epitomizes the requirements of an announcer:

Age: twenty to twenty-five years. Education: college preferred, but not necessary, though basic knowledge of at least two languages is necessary. Voice: trained in both music and drama but NOT theatrical in tone. Experience: artistic and technical, in radio. And—most important of all—ability to sell.

Andrews said:

"The announcer is the salesman of every program he presents, particularly on commercials—is this true, for on sponsored programs the announcer not only has to present the entertainment itself but often discuss the product being advertised."

Must Work the Buttons

On a high table in each studio is a box containing channel switches operated by buttons. By pressing the various buttons the announcer standing by connects and disconnects the other stations on a network as the schedule requires. He must do this at exactly the right second, many times a day, with mechanical perfection.

Astonishingly small is the number of applicants who can meet the pronunciation test devised for announcers' auditions. The list includes such words as inimitable, oceanography, cacophony, jugular, sacrificable, inquiry, carburetor, and isolate—all taken out of actual continuities. Not one candidate out of ten pronounces them correctly, Andrews reports. In a recent audition at which twenty men were tried out, eighteen failed on the announcing test and two were barely fair. The final arbiter so far as NBC pronunciation is concerned is Webster's International Dictionary.

Tells How to Start

Auditions for announcers are held only when a prospective vacancy on the staff develops. Applications are then sifted down to those of persons who, inexperience and general qualifications, might do. The position, frequently is awarded to some announcer from a smaller station who already has proven his ability on the air or to somebody employed in another department at NBC.

"This seems hard on young chaps who want to enter radio and have no experience", says Andrews. "But at a big broadcasting station nobody has time to teach a beginner. The wisest action for the inexperienced boy who wants to be an announcer is to get a job at the first small station which will employ him. The all-around work he will do at such a station is the best possible preparation for a specialized job at a big station, later."

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Any digital audio system is expected to provide immediate operating efficiencies and improve the bottom line. But systems are often selected without giving proper credit to the role as a platform for future capabilities and expansion.

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WORKBENCH

Choice New Items to Stock in Shop

by John Bisset

SPRINGFIELD, Va. John Rohwer in Sterling, Ill., just finished converting WZZT to the ABC distributed Z-Rock format. John bought the new Scientific Atlanta Encore DSR-3610 digital satellite receiver to decode the signal. He encountered some interesting installation foibles, and wanted to pass them on to *Workbench* readers who may be making similar conversions.

John reports the SA Encore to be a robust piece of broadcast equipment. Unfortunately, it comes with a robust interior cooling fan which is, frankly, quite noisy. Anyone with intentions of locating the receiver in a studio where microphones will be used, may want to reconsider. The unit runs uncomfortably warm to the touch — even with the fan — so don't consider disconnecting it. In

fact, in tight spots, SA recommends installing a second fan to keep the unit cool.

Those who are doing the typical conversion, such as is done with Rush, using the California Microwave splitter and down converter as per ABC network instruction sheets will want to check out the diagrams that come with the receiver. Your existing receiver will power the LNB, but not the down converter "after" the splitter.

In John's installation, power from the SA receiver LNB terminals (TB12-a jumper) was required to get the receiver operating properly. This is not immediately clear, and John reports the ABC techs told him not to do this. But, in fact, the down converter does need power to operate, and your existing receiver, as per the documentation, will not supply it. Again, look at the pictures and you will

see what they are up to.

Finally, those who have been operating with Wegener receivers, using the convenient 10-turn output adjustment pots will be saddened to know that the Encore has no output level adjust. It blows a sporty plus eight into your hard drive. This level will completely bury your liners and sounders.

Despite all the adjustable parameters on the Encore, level is not one of them. ABC recommended the installation of a distribution amp at the receiver's output. John chose a pair of 5.6K resistors to attenuate the receiver and match levels. John used the DA to boost the hard drive output to feed the processing.

John hopes *Workbench* readers heading down this path will have an easier time. The time constraints to "get the format on" did not help, but the folks at Harris Allied in Richmond, Ind., did. John reported great assistance in specifying exactly what he would need. John Rohwer can be reached at WSDR, 815-625-3400.

called a Basic Stamp Module. It is actually a small computer that is mounted on a small stamp-sized board. The modules run BASIC programs, have eight or 16 general I/O lines, program space for either 100 or 600 instructions, and will run either 2400 or 9600 baud.

The stamp computers are less than \$50, and a Stamp Programming Package is available for \$99. Contact Parallax at 916-624-8333 or circle **Reader Service 150**.

★ ★ ★

Owners of Comrex DXR Codecs can reap the rewards of research engineers who have perfected a technique to double the audio bandwidth of this popular G.722 codec. Even after the factory mod, the codec remains completely compatible with the older G.722 models. The upgrade permits full 15 kHz audio transmission, and costs just \$200. For a limited time, if your check is included with the unit, the modification will cost \$175. Call Marsha Shamel at 800-237-1776, or circle **Reader Service 66**.

★ ★ ★

RW Editor in Chief Lucia Cobo passed on a really neat catalog from the C. Crane Company. In addition to a variety of shortwave receivers, scanners, and satellite equipment, the company sells a variety of AM antennas, many in the \$50-

continued on page 13 ▶

New Twist on Stern Saga

▶ continued from page 1

If Kennard believes that Stern crossed the line of indecency, then why did the FCC makes a settlement with Infinity that basically presents a scenario in which Infinity is not guilty of any wrongdoing?

"We believe (Infinity is) guilty of wrongdoing," said Kennard. "They disagree, and rather than litigate that issue any further, the parties have decided that it's in both of their interests to settle the case."

Public interest

Kennard noted that there are around 150 indecency complaints pending at the commission — not all involving Infinity, of course, but other licensees.

"We need to resolve those and we need to collect the forfeiture amounts for those fines," he said. "This settlement allowed us to collect actually more money than was actually due from Infinity in an expeditious manner, so we feel that certainly the public interest was served."

That may indeed be Kennard's feeling, but most of the people who responded to a *RW* poll posted on the alt.fan.howardstern newsgroup felt otherwise.

Sweeps week

One person pointed out that a lot of what's on television "is more obscene than the Stern show. Check out Oprah, Jerry Springer, et al, during a sweeps week."

Another person said he thought that the \$1.7 million was "chump change to Infinity but amounts to extortion by the U.S. government." This same person went on to say that he listens to Howard frequently, "but sometimes when he dwells on his bowel movements a little too long, I simply turn to something else."

A couple, responding together, had a different point of view. "It's simple," they wrote. "Infinity caved in. Howard NEVER would have."

At the 1995 NAB Radio Show, Mel Karmazin, president and CEO of Infinity, responded to a question about the settlement agreement that was asked at a highly-anticipated workshop pairing him with L.

Lowry Mays, president and CEO of Clear Channel Communications, which carries the Stern show on two of its stations.

Karmazin said that Infinity had been having conversations with the FCC "for a number of years in trying to settle our differences." He noted that "Infinity has always believed that the material that was broadcast by Howard was definitely well within the guidelines that the courts have provided on indecency."

The FCC, said Karmazin, "gave Infinity what Infinity wanted, which was clearly Howard's show is a show that has not violated any rules whatsoever. Our record is totally spotless, and I gave the government what they wanted, which was economics."

Karmazin told the packed house at the New Orleans Convention Center that he thought "there will be many, many more broadcasters interested in taking Howard's show into many more markets than he has been in up until now."

The FCC's Kennard said the commission is "satisfied that the procedures that Infinity put in place to moderate the tone of the (Stern) show since July of 1993 appear to have worked. That is, the level of complaints has dropped fairly dramatically."

Broadcasters who think the Infinity settlement agreement doesn't touch them might do well to think again: Kennard said the commission is sending out a message to other broadcasters.

"We're going to enforce the law," he noted.

Stern, of course, may have had the last word on the subject of the settlement agreement, and the entire indecency struggle, to boot. He stressed on the air on Sept. 11 that Infinity put up a good fight, and that they deserve applause.

"It's like when you go up against Mike Tyson and you're in the ring and you last 12 rounds — even though you lose, you applaud," he told his audience. "(Infinity) got jerked around plenty, and I feel bad for them. I feel bad for me, and I feel bad for the American public."

★ ★ ★

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Audio Processing Like the Pros

by Jim Somich

CLEVELAND Last month I discussed the ABCs of audio processing. Becoming accustomed to your processing chain and educating your ears are vital pre-requisites to becoming a processing guru. This month, let's get serious and talk about some real trade secrets of competitive audio processing.

A good analogy of broadcast audio processing is a big funnel. Wide dynamic range program material is fed into the wide end and a fully processed, narrow range signal exits the narrow end. A funnel narrows down gradually and you must also gradually narrow down your raw audio.

The narrowing-down process is performed by devices that become progressively more aggressive. An aggressive processing element requires that input program be tightly controlled else too much processing can result. In order of aggressiveness starting with the most gentle are: leveling, compression, peak limiting, and clipping.

If you fed your program audio directly into a clipper the sound would be grossly distorted. Only small amounts of aggressive clipping can be used. Therefore, prepare the audio by packing it tightly before subjecting it to more aggressive processing.

Nothing is more frustrating to the fledgling engineer than being confronted with

a competing station that is cleaning your clock. This is almost always a loudness game. Few stations have a passion for quality, but many demand loudness at almost any cost.

After hours of fiddling you become convinced that the equipment you have to work with is at fault. Although this may be true, often it is a lack of understanding of the equipment you have that prevents you from achieving your goals.

Let's go back to the basic processing building blocks.

Levelers: Leveling or pre-processing is used to slightly narrow a wide range input signal. Leveling functions are usually handled by your compressor — the first unit in most processing chains. In some cases, pre-processing is stand alone, as when stations use Prisms in front of their Optimod.

Pre-processing keeps a very wide range audio signal from overworking the compressor. Most compressors have a relatively narrow range where they can deliver great performance. Take away the pre-processing and they are all over the place in quality.

Compressors: Compressors are the next step down the funnel. They take the out-

put of the leveler and narrow the range a little more. While levelers operate with very slow time constants (attack and release), compressors are slightly faster. Compression ratios (output level change for a change in input level) are also steeper than levelers.

Peak Limiters: The output of a well-adjusted compressor is usually tightly controlled, but because of the slow action of the levelers and compressors, their output contains too much peak energy for broadcast. The threshold of the peak limiter is set to operate only on the peaks of the compressed signal. Attack and release times are much faster than in leveling or compression.

Clippers: Clippers are used to build density. Density is a major contributing factor to loudness. In any competitive audio processing situation, it is almost impossible to achieve competitive loudness without clipping. Clipping is the most aggressive form of audio processing.

Misused, it can be a disaster. A well designed clipper fed tightly controlled audio from a good chain can be your secret weapon in the loudness wars.

Figure 1 is a circuit diagram of a clipper that I have had good success with. Many audio processors contain good clipping circuits, but in many cases you might

input voltage crosses the reference voltages, because of the slow rates of the op-amps.

Great audio processing is about details. You must optimize each stage of the funneling of your audio. If you present audio to a processing stage that is uncontrolled for that stage, you are inviting serious distortion.

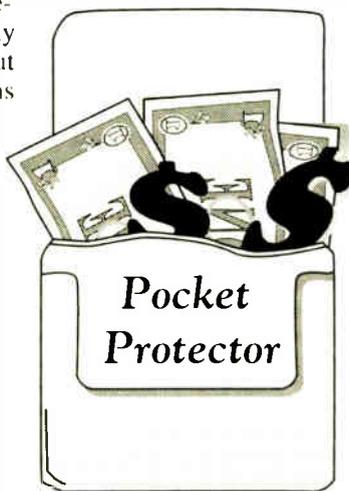
Clipping creates loudness. It has earned a bad name over the years because of its misuse. A little clipping goes a long way. It can give you that extra dB or two you need to stand out on the dial. Nothing builds audio density like clipping.

FM stations often clip their stereo composite signal as well as their audio. Clipping the composite can often create even greater loudness, especially if there are overshoots in a composite STL system or in a stereo generator. These overshoots can hold down modulation by keeping the overmod light lit.

Because composite clipping takes place after the 75 microsecond pre-emphasis, the distortion products it creates are reduced by the complementary de-emphasis in the receiver.

Indiscriminate clipping of the stereo composite without regard for the pilot will cause severe pilot modulation and loss of stereo FCC rules require that the pilot injection be held between 8-10 percent (73.322). For this reason, the clipper described in this column is not suitable for composite clipping.

It is common practice to hot rod audio processors. A circuit designer sets certain limits for each control in a processor. In many cases, the limits are conservatively set to prevent the user from getting into trouble. It is a relatively simple matter to adjust component values to speed up a processing function or change some other parameter.



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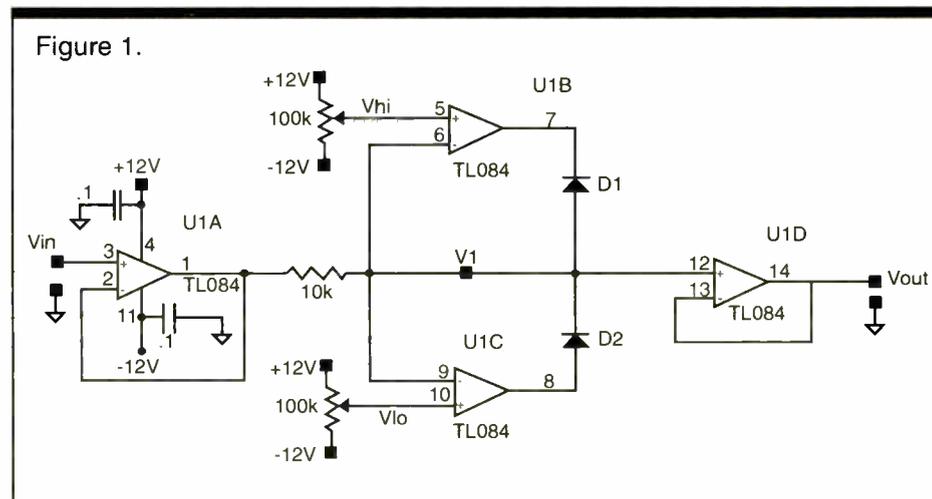
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Op-amps A and D form unity-gain buffer amplifiers. Op-amps B and C compare the input voltage V_{in} with the reference voltages V_{hi} and V_{lo} . These references set the high and low clipping levels of the circuit. When the input voltage lies in the range $(V_{hi}-V_{lo})$, the outputs of the comparators make both diodes D_1 and D_2 reverse biased. As a result, the circuit's output V_{out} follows the input voltage.

When the input voltage exceeds the value V_{hi} , op-amp B's output goes negative, forward biasing D_1 and thus, reducing V_1 \pm the voltage at the inverting input of op-amp B. The circuit reaches an equilibrium condition at which $V_{out} = V_1 = V_{hi}$.

Similarly, when the input voltage goes below the value V_{lo} , op-amp C's output goes positive, forward biasing D_2 . This increases the voltage at V_1 . At the equilibrium condition, $V_{out} = V_1 = V_{lo}$.

The circuit's output continues to follow the input for about $2\mu s$, even after the

DSP (digital) processors are very difficult to hot rod because the processing algorithm is stored in a programming chip (EEPROM). You are usually limited to the control range provided by the software writer.

If you feel that you are now ready to tackle the competition, slow down a bit. Start by making small adjustments and listening to the result. Do not change too many things at the same time or you will have no idea of what you have done or how you accomplished it.

When you achieve something you like, sleep on it. Come back the next day with fresh ears and continue to make small tweaks.

I hope I have given you some insight into the complex subject of competitive audio processing.

□ □ □

Jim Somich is a radio broadcast engineering consultant and president of MicroCon Systems Ltd., a manufacturer of broadcast equipment. He can be reached at 216-546-0967.

COLE'S LAW

Watch Your DJ's Mouth on the Radio

by Harry Cole

WASHINGTON If you like to talk dirty on the radio, you'd better start doing it after 10 at night and before six in the morning. Otherwise, you may find yourself looking down the wrong end of an indecency forfeiture before you know it, thanks to a decision this past summer from the U.S. Court of Appeals for the D.C. Circuit.

The issue of "indecency" has long been a difficult one, mainly because the Federal Communications Commission (FCC) has declined to provide any meaningful definition of what might be deemed "indecent." Oh sure, the commission will tell you that indecency is "language or material that, in context, depicts or describes, in terms patently offensive as measured by contemporary community standards for the

broadcast medium, sexual or excretory activities or organs." But hey, what does that mean, in real life terms?

(For example, if you wanted to promote the he-man image of your station in order to attract an 18-25, heavy metal, male audience, you might want to say: "We're the station with balls." But the FCC has already preliminarily held that such a reference to balls is indecent under the standard quoted in the preceding paragraph. But I digress from the topic.)

Basic conundrum

Unfortunately, this basic definitional conundrum is only the most obvious

problem in the field of indecency. Other, somewhat more subtle problems abound.

This is largely because, unlike obscenity — which enjoys no First Amendment protection at all, and which therefore may be absolutely banned from the airwaves — indecency enjoys some, but not complete, protection under the First Amendment. That means that once something is deemed to be indecent, the government can regulate it to some degree. Of course, as soon as you introduce this element of degree into the debate, all the issues cloud up real fast.

The June 1995 Court of Appeals decision arose from one such cloudy issue.

Congress had, back in 1988, taken a bold and daring (and plainly unconstitutional) political stand by trying to ban all indecency from the airwaves at all times. The Court of Appeals swatted that notion down without much difficulty. Back to the drawing boards went Congress, and in 1992 out came a new law ordering the FCC to prohibit the broadcast of indecency between 6 a.m. and 10 p.m. on non-commercial stations and between 6 a.m. and 12 midnight on commercial stations. The FCC duly adopted such rules, which were promptly appealed. The recent decision is the latest milestone in that process.

Safe harbor

Unfortunately, the Court of Appeals has upheld the 6 a.m. to 10 p.m. safe harbor notion for all broadcasters. (The court

continued on page 19 ▶

WORKBENCH

▶ continued from page 11

\$75 price range. For a copy of the catalog, call 800-522-TUNE, or circle Reader Service 88.

★ ★ ★

Digital Generation Systems has provided more than 2,000 of its DG System commercial receive playback terminals across the country. The system can be configured to support a remote start interface on a production console. Schematics and full documentation can be obtained by calling Jeannie Batinovich at 415-546-6600, or by circling Reader Service 202.

★ ★ ★

Kathleen Karas at Crouse-Kimzey of Annapolis, Md., reported the ALCATEL solderless XLR connectors is selling briskly. Prices are the same or slightly less than the soldered XLR. Female connectors are pink, and the male connector is blue. For a sample, mail your business card to Kathleen Karas, Crouse-Kimzey, Box 6300, Annapolis, MD 21401.

If you do remotes, you need a couple of each sex in your emergency kit. They are life savers!

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□ □ □

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

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SURPRISE!

Circle (77) On Reader Service Card

Satellite, ISDN Compete for Radio

by Alan Haber

NEW ORLEANS Moving spots, liners and programming from their origination points to your station in the most efficient and effective manner possible is getting easier, thanks to the proliferation of Integrated Services Digital Network, or ISDN, lines, Switched 56 lines, and the introduction of satellite delivery into the distribution picture.

But the jury is still out on the clear choice in the battle for market share: No two delivery or receive situations are alike — stations receive advertising from agencies, and programming from networks and other providers, for example — and money and timeliness are at issue.

arrakis
SYSTEMS INC.

Which is the best choice for your station? That depends on a lot of factors, and who you talk to. Long-time console and hard-disk systems manufacturer, Arrakis Systems Inc., teamed up last year with Wegener Communications and SW Networks in a joint venture that has resulted in the company's AVCR,



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record, forward and store product.

In use by SW Networks for its 24-hour networks, the satellite-based technology is designed to deliver "the benefits of

satellite radio to the power of local programming," said Jon Young, Arrakis Systems vice president of sales.

The A-VCR is a simplified black box approach to satellite affiliate systems that is file control compatible with the Arrakis Digi-Link and DISC systems. The A-VCR products can receive and store ISO/MPEG Layer II digital audio, control, schedules, text, graphics and e-mail from a Wegener digital receiver.



Ready for delivery fourth quarter this year, the technology is being rolled out by SW Networks to key affiliates in key markets.

Another one of the distribution players showing its wares at the 1995 NAB Radio Show was Comrex, which manufactures digital audio codecs such as the DXP/DXR G.722 units that automatically detect and adapt to either 56 or 64 kilobits per second (kbps) networks like Switched 56 and ISDN.

Vice President Lynn E. Distler said that ISDN or Switched 56 lines are being used more these days. Stations would go with ISDN over satellite, she offered, because of satellite's higher cost.

"You have to broker for the satellite time in advance," she noted. "You can have (an ISDN line) whenever you want it, and I don't think you can pay more than 20 cents a minute coast-to-coast. You could never buy satellite time for that."

For small programmers distributing materials to five or 10 sites, ISDN might be a choice, said International Datacasting's Director of Sales and Marketing, Virginia Lee Williams (the

company works solely in satellite). But, she suggested, "It is not the only choice."

International Datacasting's products include satellite digital audio and data broadcast receivers, such as the SR121 MPEG PRO Satellite Digital Audio Receiver for radio networks, and the FlexRoute Satellite Digital Audio Receiver for reception of high-quality digital audio and data. Both units support ISO/MPEG Layer II/IIa MUSICAM digital audio compression.

Getting things done in the here and right now will always be important to radio stations. Telos Systems manufactures codecs that provide real-time non-proprietary open interconnection; their main function, said President Steve Church, "is to do right now broadcasting."

Telos's Zephyr codec handles popular compression standards, and can transmit two-way, 20 kHz stereo audio and ancillary data anywhere in the world; the ZephyrNet provides terrestrial transmission of high quality audio to multiple locations over ISDN.



A lot of Telos customers, said Church, are using the Zephyr for "the kinds of things that the store and forward (products) are intended for." He mentioned that around two dozen voice talent types are using the Zephyr to make deliveries to stations.

Satellite, said Church, "is really one-to-many, and the economics for satellite make sense if you are sort of an old style network ... you've got a guy doing a show for the world in New York and everyone gets the show."

With codecs, he added, "It is possible to start a syndicated program economically with only one affiliate." But if, at some point, a show with one affiliate graduates to wide distribution, Church said that economics may favor satellite.

Church said it seems to him "that if you're distributing something from a fixed site to a fixed site, that terrestrial in the long run is the way to go."

Dolby Laboratories is working exclu-



sively in ISDN with its Dolby AC-3 on ISDN product, which provides real time audio distribution. Kevinn Tam, director of Dolby's marketing and sales communications product group, said the company chose to go with ISDN because that is where the movement is.

Dolby's products include the DP523 Digital Audio Encoder and the DP524 Digital Audio Decoder, which can handle both AC-2 and some of the new AC-3 algorithms.

ISDN represents about 50 percent of the volume at DG Systems, according to Ann Marie J. McGee, director of marketing;

continued on page 16 ►

IBAC Demo'd

► continued from page 1

kHz spacing and that the 6 MHz Eureka-147 requires is not necessary.

But while praising the technology behind the AT&T system, Masiello questioned how the system will fit into the existing allocation scheme in the United States.

Looking ahead

AT&T officials admitted the situation in New Orleans was unique because they had to worry only about a third-adjacent station.

"It's not as straightforward as IBOC," said Nikil Jayant, head of advanced audio technology at AT&T Bell Laboratories. The upcoming official mobile tests in San Francisco "will be a challenge," Jayant said.

But he was optimistic that the value of the system will be a driving force.

"What I want to do is just demonstrate the technology to people," said Edward Y. Chen, technical manager at AT&T Bell Laboratories. "The only system left that people have not had a chance to hear is in-band adjacent."

Chen said there were two key points he wants to prove with the New Orleans demo: the adjacent-channel system works and that it does not cause interference.

"To me, in-band adjacent-channel is another way for broadcasters to have DAB," Chen said.

Clean signal, mostly

Throughout the mobile demonstration that took about 30 minutes there were few transmission dropouts. Some tours were clean, while others experienced one or two dropouts.

Some present at the initial demo, however, questioned whether the vocals on one cut were as clear as they should have been. The audio is a live CD feed of a mix of pop, folk, jazz and classical music.

Not only do USA Digital Radio and the AT&T systems differ in their transmission paths, they do not use the same algorithms.

AT&T uses its own PAC scheme, while USA Digital Radio uses the enhanced MUSICAM MPEG/Layer II from MUSICAM USA (formerly CCS).

"The PAC algorithm takes advantage of the characteristics of the human auditory system to compress CD-quality stereo signals about 10:1, a factor of two greater than current commercial digital systems," said Jayant.

A robust modem and a three-layer method of error protection ensure that audio quality is maintained in the presence of transmission imperfections at various vehicle speeds and locations, according to AT&T. ◀

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Competition for Radio

► continued from page 15

straight modem delivery is done the rest of the time. The company is starting to



integrate satellite into its product mix.

DG Systems announced at the 1995 NAB Radio Show its teaming with Hughes Network Systems to create solutions that integrate satellite and terrestrial communications, and its first national distribution of music — Reba McEntire's latest single, "On My Own" — simultaneously and dig-

itally to more than 600 radio stations.

Getting a spot to a station in 15 minutes, for example, means nothing unless the traffic instructions get there, too.

"There has to be support behind it," said McGee, "such as customer service, where there is a need for somebody to physically talk to someone."

In order to do things faster and better, she added, "you have to make sure that everything's moving simultaneously."

If a station goes with satellite, it might be a good idea to have an ISDN line for backup purposes. Two-way communication is important, said McGee.

In other words, don't put all your eggs in one basket.

"I think that is a critical business message to stations," she offered. "It's too risky for anybody to do that."

MUSICAM USA's Vice President of Sales and Marketing, Art Constantine, said that it is good for a station that uses satellite to have ISDN waiting in the wings as a backup (MUSICAM USA, the new name for Corporate Computer Systems, is a subsidiary of VirteX).

Constantine said that MUSICAM USA's CDQ Prima series of codecs are able to



detect audio levels at the inputs and outputs, and can take automated action if those levels change beyond reasonable points.

When thinking about whether to go with ISDN or satellite, Constantine said that one important concern is the kinds of feeds a broadcaster is looking to receive.

Constantine said that stations should investigate their options. But, he added, they should "Make a decision based on the ability of the hardware to metamorphose — to improve, to change, to grow."

Stations should make decisions based "on the years of experience a manufacturer has in business," he said.

"And make your decision based not on a fear of the future, but ... looking forward to new opportunities and to growth with product that has the ability to grow as you grow." That, he added, could be ISDN.

VirteX has announced that Infinity Broadcasting will be equipping its affiliates and the affiliates of Westwood One and Unistar with MUSICAM Express compressed audio (MUSICAM Express is a joint venture between VirteX and Infinity).

ISDN and Switched 56 are used by Digital Courier International for its common platform that allows the sending of audio and text in any direction, point-to-point or point-to-multipoint. Stations are provided with a 486 personal computer and a dedicated network connection.

As to why stations would want to go with ISDN or Switched 56 instead of satellite, Director of Sales Mark Burns mentioned satellite's "ongoing expense." ISDN, on the other hand, involves "very little capitalization." Burns also pointed out that "Some radio stations ... will not accept spots via satellite. They said, 'Enough. We missed too many, they're separated from the traffic instructions.'"



When thinking about which way to go, stations should consider the quality of audio they desire. Pete Lowenstein, vice president in the distribution division of NPR Satellite Services, which uses Comstream digital audio receivers and digital satellite modems for both its public radio and commercial services, said choosing between ISDN and satellite as far as audio quality is concerned is complicated, because comparing one label with another "doesn't really tell you very much."

"There are low bandwidth, low power satellite channels that would probably sound worse than a good quality ISDN circuit," he noted. "On the other hand, a high quality, well-engineered satellite circuit should be able to run rings around some of the other non-satellite technologies."

How does a station choose between ISDN and satellite? If a station has the option of going one way or the other, for example, Lowenstein said, "it really would get down to questions of economics, reliability and ... quality."

So, ISDN or satellite? Both delivery methods have a place in the world of radio, said Lowenstein, who added that there is not "one dominant thing that is the perfect way to do everything. It is those people who know how to take the pieces and make them complement each other that are probably able to get the best results."



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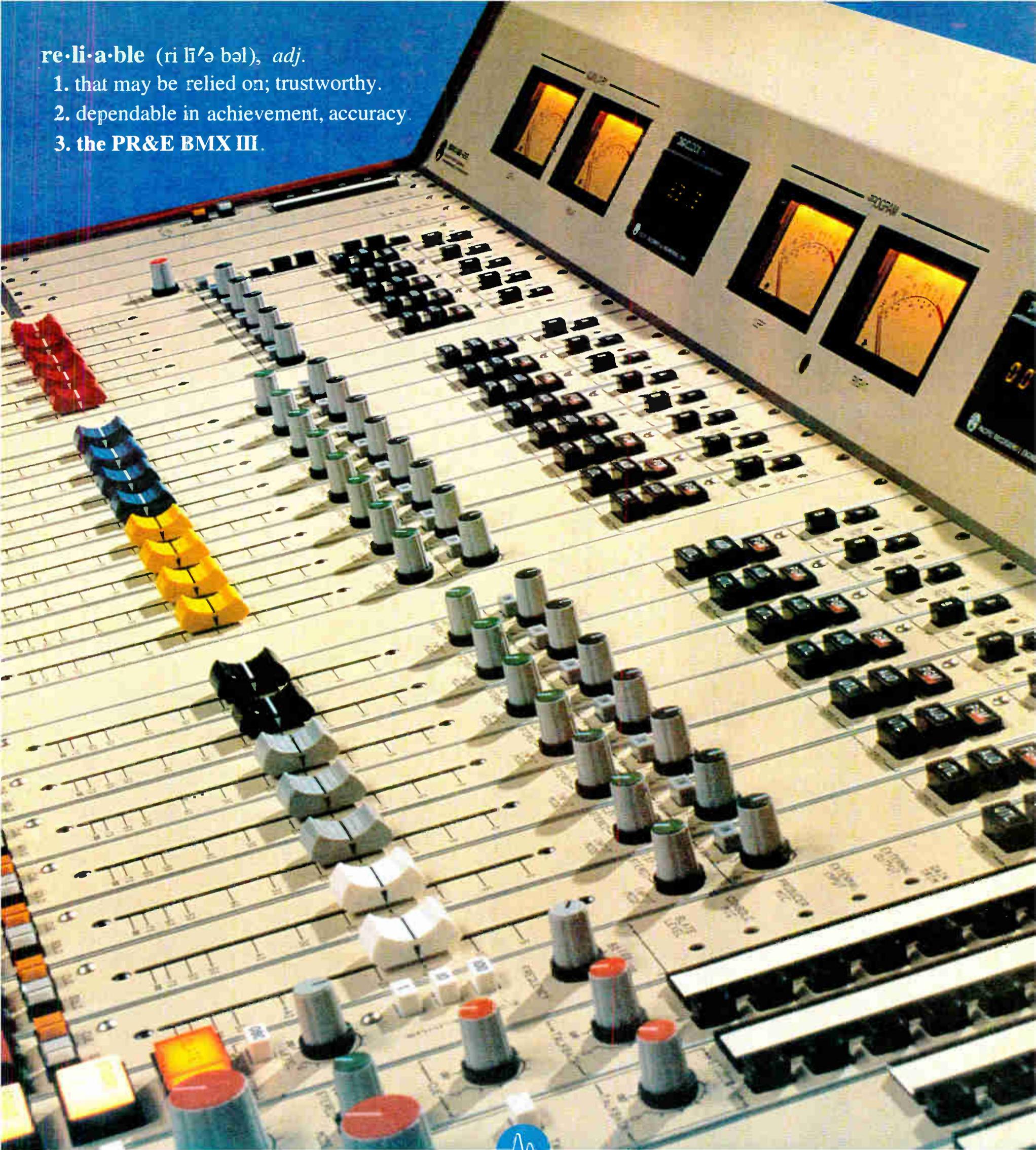


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Circle (17) On Reader Service Card

High Speed Data Service Unveiled

by Lucia Cobo

NEW ORLEANS Addressable radio is a business reality for broadcasters wishing to partner with SEIKO Communications' FM Superhighway. Announced press conference during World Media Expo, the technology multiplexes a variety of information like traffic reports, financial updates, emergency notification, personal messaging and paging into the subcarrier spectrum of FM radio stations.

FM Superhighway Inc. President and CEO Gorgon Hastings said the company is looking for partners in the broadcast business.

"The FM subcarrier is a business opportunity," he said. What the FM subcarrier

offers is two additional radio stations or "communications channels you already own," said Hastings.

Among the new possibilities the technology provides are the transmission of the station logo, news, weather, sports, stocks, traffic, client logos, promotions and any other services stations can dream up.

Hastings said future applications would be possible with the coming integration of the cellular phone and the car radio receiver.

One of the components of the SEIKO system is the ACTT chipset, a device already incorporated into the SEIKO Message Watch, the first consumer product to integrate the technology for personal messaging and

information services.

Stations can conduct surveys, send information or implement a variety of

birthday messages and the like based on information about the listener from its database.

The Seattle market has a prototype program in place, the Seattle Wide-area Information for Travelers (S.W.I.F.T.). The program is a joint effort of SEIKO (technology), Delco



SEIKO's prototype FM Superhighway Car Display with Receiver

Keeping It Clean

► continued from page 13

concluded that there was no rational basis for distinguishing between commercial and noncommercial stations and, because Congress apparently thought it was okay to air indecency on noncommercial stations as early as 10 p.m., it should be all right to do so on commercial stations, too. "NYPD Blue" fans everywhere are pleased with this part of the decision.)

This means that the FCC can bar — and, indeed, already has barred — the broadcast of indecent programming on all stations except after 10 p.m. and before 6 a.m. Because the primary justification for regulating broadcast indecency is the protection of children, the rationale for this "channelling" approach is that, at those late night hours, there are likely to be fewer children in the audience.

This court decision is a set-back for broadcasters, as it reflects the court's approval of a number of FCC assumptions which are, to say the least, a little soft. For example, the court buys into the notion that the protected class of children encompasses everyone under the age of 18. That means that the Court seems to be treating the perceived need to protect a 17-year-old as equivalent to the perceived need to protect a 10-year-old.

Nevertheless, unless the Supreme Court agrees to hear an appeal of the decision of the Court of Appeals, the 10 p.m. to 6 a.m. safe harbor for broadcast indecency (and the corresponding absolute ban on broadcast indecency at all other times) is the law of the land. That means that, while you would appear to be able now to broadcast all the indecent stuff you might want between 10 p.m. and 6 a.m., you had better be sure not to broadcast any at other times of the day.

Bright side

On the bright side, though, is the fact that the recent decision involved only the procedural channelling aspect of the commission's rules. What is still left to be litigated, case-by-case, is the definition of indecency as it applies to each particular allegedly indecent broadcast. Before the FCC can collect a fine or forfeiture, it must (if the target licensee insists) demonstrate to a trial court (including, possibly, a jury) that the FCC's rules have been broken. In the case of an indecency forfeiture, such a trial would theoretically require the FCC to convince a trial judge or jury that which the licensee broadcast

was, in fact, indecent.

That means that, for instance, in the case of one of the Infinity Broadcasting/Howard Stern fines, the commission might find itself trying to convince a jury in a particular community that the most popular morning radio show in that community is indecent. If such a case does go to trial, it will be interesting to see how a jury reacts to the argument that the government should be permitted to fine someone for the broadcast of programming which is — at least according to audience numbers — wildly popular.

There are a number of pending cases involving specific fines for specific broadcasts. They have been in a holding pattern for the last year or two, presumably while the FCC waited to see how the Court of Appeals would come down on the issue of channelling. Now that the Court has given that aspect of indecency regulation the green light, the commission will probably now press forward with its individual cases involving individual licensees (the Infinity/Stern fines being among the most notable of those).

Vindication

The availability of trials to permit broadcasters the opportunity to vindicate their conduct before a jury of their peers is, on the one hand, encouraging. It represents a kind of safety net which will, ideally, protect individual broadcasters from a censorious federal bureaucracy which may or may not have any idea of what the broadcaster's audience believes is acceptable programming.

But on the other hand, it is sad that any broadcaster would have to be put to the time, expense and anxiety associated with such a trial. Indeed, the mere threat of such a trial is likely to discourage many broadcasters from venturing into any area of programming which might, after the fact, be deemed indecent. Such a chilling effect, although perhaps unavoidable in a regulated industry such as broadcasting, is to be deplored, because it represents a subtle, clearly undesirable, encroachment on well-established First Amendment freedoms.

If you have any questions about any of these issues, you should be sure to consult with your communications counsel.

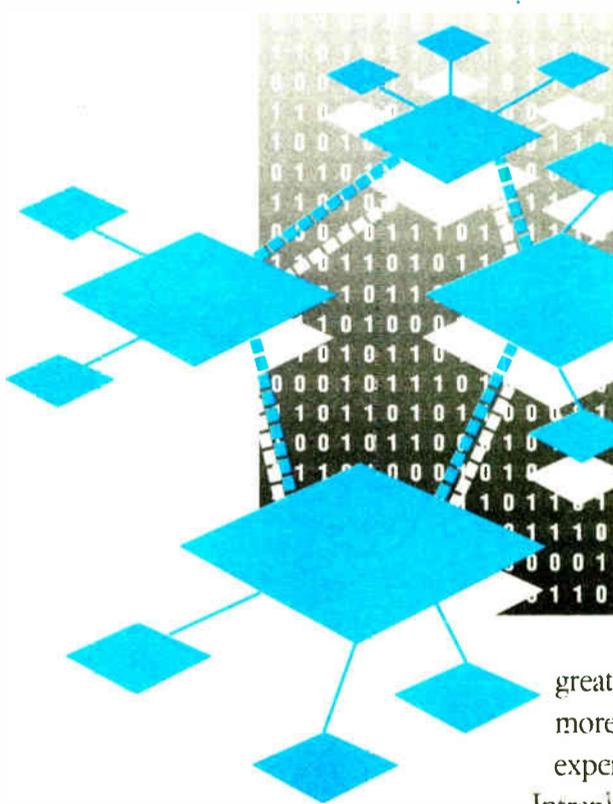
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Harry Cole is a principal in the Washington-based law firm of Bechtel & Cole, Chartered. He can be reached at 202-833-4190.

other two-way applications. For example, stations can send customized ACTT chipsets to loyal listeners. Once the chips are in the listeners' receivers, the station can send customized happy

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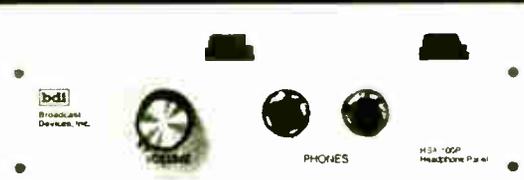
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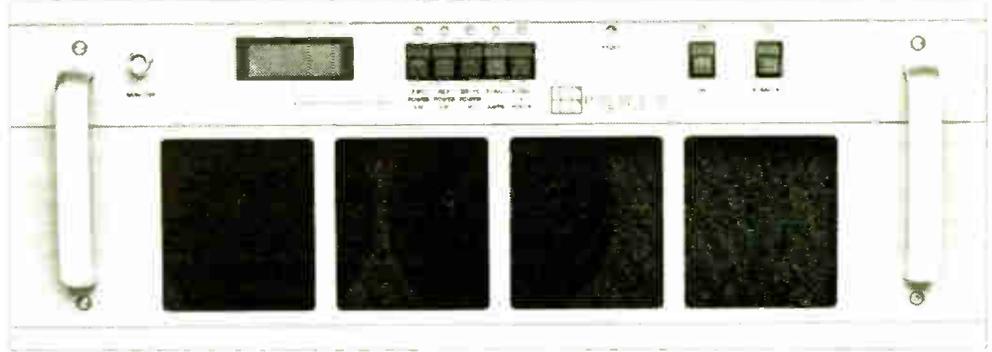
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INTERNATIONAL UPDATE

Europeans Move Ahead with Eureka

by Alan Carter

NEW ORLEANS As broadcasters here are in the midst of testing in-band DAB systems and hearing them publicly for the first time, Europeans are putting the first services on the air.

Why are the Europeans so far ahead? Broadcasters there use the Eureka-147 L-band system, which was soundly rejected by U.S. radio.

BBC on air

The British Broadcasting Corp. (BBC) claimed it would be the first to offer a full-time commercial service

with five channels scheduled to begin Sept. 27.

Five transmitters will provide coverage to the greater London area or about 20 percent of the United Kingdom. That is some 12 million people. By 1998 the BBC plans to have an additional 22 transmitters providing service to about 60 percent of the population.

In Berlin, the first pilot project went on the air Aug. 26 during the IFA International Radio Show. Eighteen temporary licenses were awarded by the regional broadcasting licensing authority.

Sweden wants approval for DAB services

in three major cities including Stockholm, and the Dutch are expanding their experiments throughout the Netherlands in Amsterdam, Rotterdam, The Hague and Utrecht.

On the pan-European front, the BBC World Service, the German Deutsche Welle, Radio France International and Radio Netherlands World Service formed the European Digital Radio service in preparation for the next step past short-wave.

Even in North America, the Canadians have experimental Eureka-147 broadcasts on the air in Toronto and Montreal and plan full-time operations in 1996. Canada

took an uncharacteristic vocal stance to support Eureka-147 as a worldwide standard for DAB.

Who's listening?

The number of listeners the services will have is a different story.

Receivers are hard to come by — even for broadcasters to conduct test operations — and those on the market in Europe cost between \$6,000 to \$7,000.

Philips showed an early generation model last year, and Grundig recently released sketchy details on another. Other receiver manufacturers such as Pioneer and Sony are unusually quiet on the subject with suspicions high that they are about to launch introductions.

European broadcasters are ready to blame receiver manufacturers if the introduction of DAB is slowed at all. Some also toss a few jabs at the United States, knowing the consumer market in the states is so large when compared to elsewhere in the world, that success is almost a given.

Ancillary services

The ancillary services possible with DAB almost seem to be more important for some broadcasters than the CD-quality, multipath-free audio Eureka-147 DAB offers.

Canada launched an in-car navigation and traffic monitoring system via Eureka-147 on L-band.

In Sweden, Severiges Radio and Swedish Telecom are looking to multimedia opportunities with DAB. Not only would a radio receiver of the future have a tuner, dial and speakers, as the Swedes foresee, the unit will include a graphic screen, a loudspeaker processor and a more sophisticated user interface.

Some of Germany's leading broadcasters — Radio NRW, a major network supplier, Antena Bayern, one of the country's oldest private stations, and Radio Hamburg, a market leader in the city for which it is named — teamed with the German industry to develop DAB data services. 

'Day of Mario' Kicks off NAB Radio Show

by Alan Haber

NEW ORLEANS Sept. 6, will surely be remembered as "The Day of Mario" — Cuomo, that is — the 52nd governor of New York and the keynote speaker at the opening ceremony of the 1995 NAB Radio Show.

It was the day the former governor descended upon the New Orleans Convention Center and contributed a lasting impression on those radio people who chose to make Sept. 6 part of their show experience.

Listeners of the cleverly named "The Mario Cuomo Show" from SW Networks are presented every Saturday morning with three hours of stimulating

dialogue from someone who may be one of the great political orators of our times.

Three terms

Mario Cuomo served three consecutive terms as governor of New York: 1982, 1986 and 1990. "The Mario Cuomo Show" is not his first radio gig: He was co-host of the "Ask the Governor" pro-

gram on WCBS(AM) in New York City and he fulfilled co-host duties for a show on WAMC(FM) in Albany, N.Y., during his 12-year term.

Not surprisingly, he brought up everybody's favorite controversial radio personality, Howard Stern. Regarding the self-proclaimed "King of All Media," Cuomo said he gets asked about him "all the time, because I have won a series of awards for being very near to absolute on the First Amendment." People want to



Former New York Governor Mario Cuomo delivered keynote address to radio broadcasters.

know what Cuomo thinks "about Howard Stern being fined for so-called indecency. Well, first of all ... nobody can tell you what indecency is."

Just prior to delivering the keynote address for the 1995 NAB Radio Show, Cuomo spoke briefly with members of the press high atop the La Maison restaurant in the New Orleans Convention Center.

Need thinkers
Cuomo said his radio show is about dealing with issues. "What we need most in this country right now is not passion — there is plenty of passion in all directions, and it's not strength," he said. "There's all kinds of strength. Some of it is misdirected, some of it is too harsh. What we need is thought, and what we need is thought by the people."

People need to make "the best possible judgements," he said. How do you help the people do that? You talk to them." But how? On television? "Well, that's one way," he pointed out, "unless

Repulsive but free

Cuomo said he thought Howard Stern's antics were "very repulsive. I don't like it. I wish he would stop it, but the last thing in the world I would do is make a law to try to stop it, or fine him for doing it. I simply don't think that's the way to approach it."

Asked to what extent people are influenced by what they hear on radio talk shows, and whether that can be good or bad, Cuomo said, "Nobody knows to what extent you're influenced by radio or television or the newspapers or a speech. How would you know? You can't poll it, there's no evidence that discloses it, so we deal here in the world of good guesses."

When he hears "the same thing I'm saying being said on radio, apparently with at least a quiet approval, I feel more confident

continued on page 23 ►

WME Draws Fewer

► continued from page 1

Angeles drew 17,637 attendees; a figure partially attributed to walk-in registration and the significant number of SMPTE members present in the Los Angeles area.

Patty McNeill of the National Association of Broadcasters explains attendance was higher this year for the three other organizations; for example, NAB member presence was up six percent from last year's convention.

"RTNDA and SBE attendance was up 29 percent too, and we were ahead of last year in pre-registration of attendees," McNeill went on to say.

Nearly half of the manufacturers, services and syndicators exhibiting their products at the World Media Expo were attentive to the specific needs of radio broadcasters and audio engineers.

According to McNeill, 367 exhibitors were present on the floor of the New Orleans Convention Center. Of those exhibitors, 173 were devoted to radio and audio.

While down from the number of radio/audio exhibitors in 1994, McNeill reports those that were present came in with bigger booths and displays.

Actual floor space occupied by exhibitors in the Center was approximately 117,000 square feet.

"The equivalent of 2.5 football fields worth of show space," said McNeill. 

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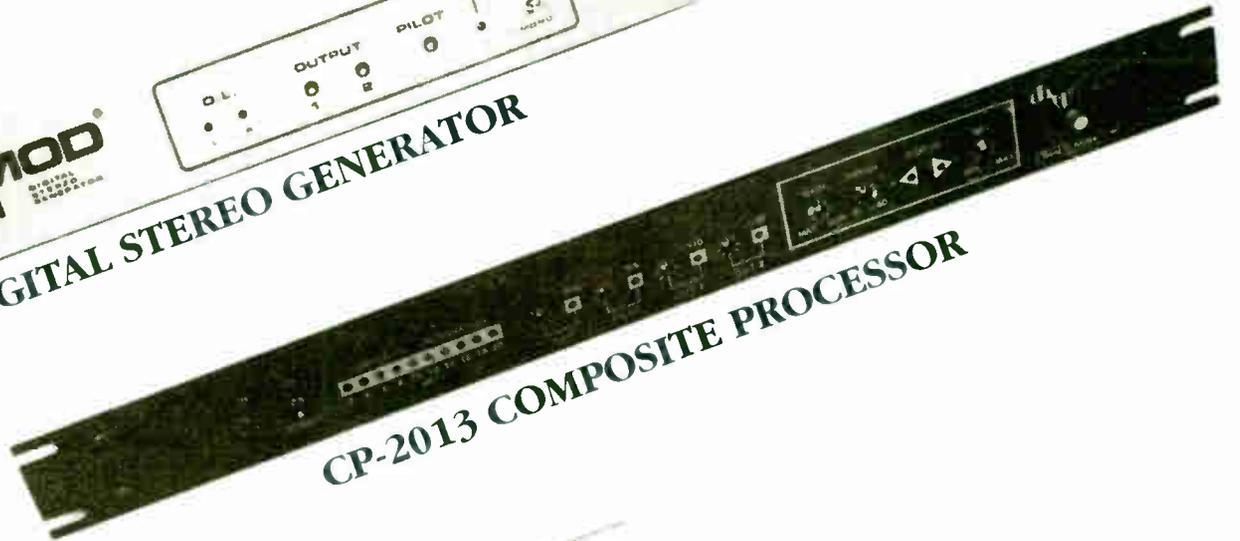
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Legislation Will Redefine Face of Radio

by Charles Taylor

NEW ORLEANS Passage of impending telecommunications deregulation legislation would likely redefine the variables of station ownership for radio broadcasters.

Implications of the bill on license renewal, LMAs and attribution were the focus of an NAB Radio Show session, "Duopolies, LMAs & Station Acquisitions: Opportunities in the '90s."

Currently, drafts of House and Senate versions of the proposal, which would eliminate caps on radio station ownership, are headed for a Hill conference committee to iron out compromises.

Among the more dramatic moments of the legalese-laden session was an appeal from Roy Stewart, head of the FCC's Mass Media Bureau. Imploring the audience to consider the weight of the potential legislation, he said, "Think for a minute. What does this mean? Don't let these words flow over your head. This is something that has a direct impact on whether you're going to be here next year."

When pressed by an audience member for his opinion of the bill, Stewart said, "I'm not sure if it's going to be adverse. I can make an argument on both sides."

Panelist Sally Buckman, with Washington communications law firm Leventhal, Senter & Lerman, explained that in addition to elimination of ownership caps, the bill would include a two-

step renewal process: simply, the FCC would be required to determine whether a station had served the public interest in its past term and whether it violated rules; and commission renewal without the traditional invitation for outside challenges.

LMA rules would remain intact, though it was noted that many such program-brokered situations came about in anticipation of more liberal ownership caps.

"Even with deregulation, you'd still be expected to maintain control. It will still

be your responsibility even if someone else is controlling the programming and selling the time," said John Fiorini, of

line. You've still got to pay attention."

Matthew Leibowitz, an attorney with Leibowitz & Associates in Washington, rounded out the session with an optimistic forecast for station sales. "There's ample money coming into the industry. It also goes rather deep; there's money for medium and small markets," he said.

"The number of transactions is amazing. It's a seller's market. Prices are going up in medium and major markets and going through the roof in some cases. Large groups are gobbling up other groups in preparation for new legislation."

It's a sellers market. Large groups are gobbling up other groups in preparation for new legislation.

D.C. communications law firm Gardner, Carton and Douglas. "

Added Stewart, "There's no reason to lose your station at renewal time. Don't fall into a trap and put your license on the

Mario's Day

► continued from page 21

in my point of view and more willing to express it," he said.

The thing that the multitude assembled in the La Nouvelle Orleans Ballroom had in common, Cuomo said, was "a commitment to radio." He said he has always been "an unabashed admirer, even a lover, of radio. There's probably a very good reason for that. After all, radio was born only about a decade and a half before I was, and we grew up together, literally."

He said he misses being governor, but he loves radio. "There are differences between being governor and being on the radio and having a show," he offered. "In government, you get to move the great stone. You can put your shoulder to it, and actually move it. In radio, all you can do is shout at the people who are trying to move the stone. But that can be an awesome power, that ability to shout or to speak softly to the people in command."

"Radio, like its gaudy sister television, can affect people in high places and everywhere, for better or for worse. And that's something that we have to keep in mind. I know I do. I take very seriously my own responsibility in my modest role as a talk show host. I know that radio has the ability to uplift, because I was uplifted by it."

During his wide-ranging keynote address, Cuomo touched on a variety of issues. The address was made available to Internet World Wide Web surfers with either the Real Audio or Xing players installed on their PCS through SW Network's Web site.

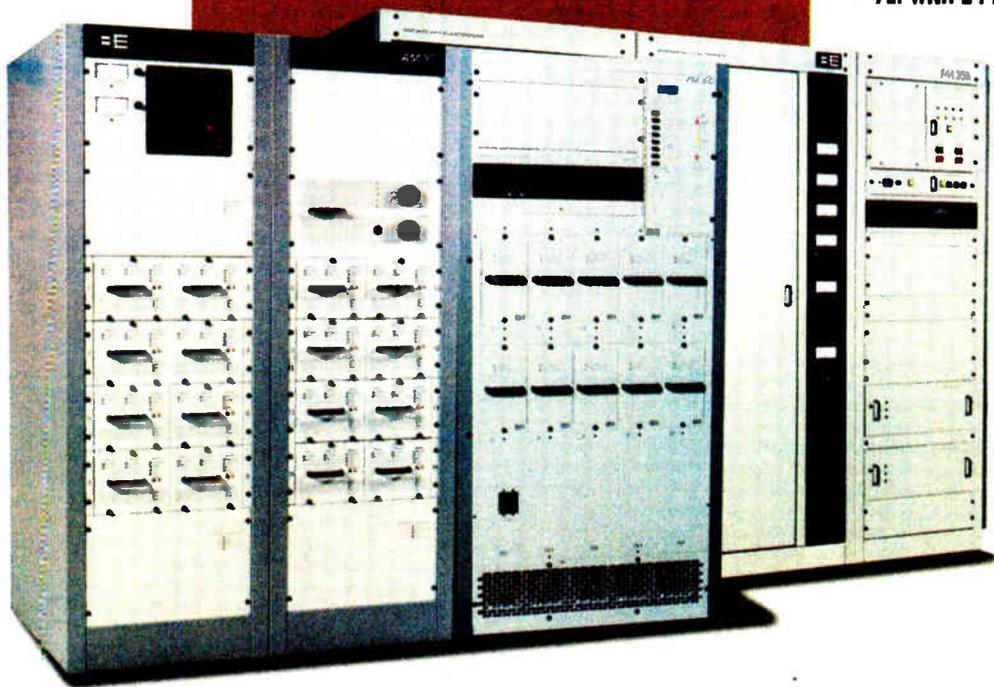
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John C. David, senior vice president, radio, National Association of Broadcasters (NAB), said this is the association's

plan. "We're looking forward to the next 75 years," he said, "with technology that I think is going to revolutionize this whole business from a competitive standpoint, from a quality standpoint to the consumer." The underlying word here, he added, is "digital."

David said the NAB is excited about "the prospects of digital, DAB, using digital in the production studios and the newsrooms around the country — the whole operation of radio stations. It is going to make them more efficient, and it's going to provide new revenue streams for stations that we haven't even scratched the surface on yet."

Radio stations around the country (and the world, for that matter) are discovering the seemingly limitless opportunities the Internet's World Wide Web has to offer, from allowing stations to reach out to their local listening areas to providing new revenue streams.

Three sessions at the NAB Radio Show were geared toward helping stations understand the Internet a little better: "Profiting from Technology in the '90s," "The Internet: Are You Ready to Cybercast?" and "Internet Boot Camp."

David said he thinks the Internet is an exciting arena. The first step in the process

of understanding it, he said, is to figure out what the Internet is, how it works, and how to get on it. "Now the problem is, 'How can I make some money with it?' I think those answers will be given here at this show."

If your station is thinking about getting into the Web business, it is probably not alone. Why has interest among stations in the Web grown so far and so fast? "Curiosity, first," said David, who added that the questions being asked now are along the lines of "Is this something that is beneficial to my radio station? Is it another way for me to promote my radio station other than over the air?"

In addition to reaching out to local listeners with information about stations and taking advantage of new revenue streams offered through Web sites, stations may want to set themselves up as being "expert" on a particular topic, such as their format. In other words, a country station might want to include on its site transcripts or audio excerpts of interviews station personnel have conducted with country stars, and links to other country music sites on the Web.

By doing this, and by simply being on the Web, a station is not only reaching its local listeners but also radio-hungry Web surfers throughout the world. It's certainly cutting edge to be pulling in a worldwide audience, but is it beneficial?

"The Internet's great," said David, "but I don't want people to lose sight of serving their audiences. If we get to the point of concentrating more on the Internet worldwide than on our local communities, I think we've got a problem, because localism in this business has made us what we

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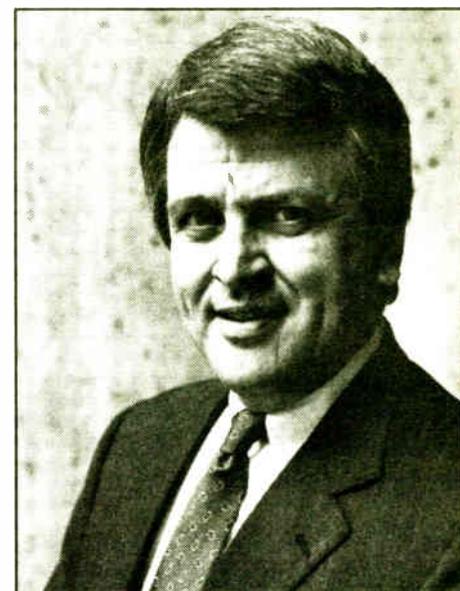
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John C. David

are today. We shouldn't take our eye off that ball."

At the NAB Radio Show, said David, "we're going to talk a lot about formats. We have some of the top programmers in the country. I don't want to lose sight of our basic business, because I think that will not serve us well, and it will not serve our customers well."

Way back when, 75 years ago, Marconi and others were inventing radio. With three-quarters of a century already recorded, and the next 75 already in gear, what do stations need to keep in focus as they forge on riding the airwaves?

Their audience, said David — "people and advertisers who have been loyal to them, and whom they have helped progress in their business," he said. "It's still a one-on-one medium, and we shouldn't lose sight of that. The technology will help us do that job better." ☺

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World Radio History

Equipment and Applications for Radio Production and Recording

DIGITAL DOMAIN

Dali Easy Two-Track Digital Editor

by Mel Lambert

LOS ANGELES Anyone that has been following these columns for a while will appreciate my predilection for simple-to-use interfaces. The way I see it, the microprocessor revolution brought us a great deal of speed and power but a greater deal of confusion.

Digital audio workstations, in particular, were blessed with enhanced sound quality and creative potential, but many lacked a simple way to perform repetitive tasks. Point-and-click mouse functions and pull-downs are well and fine for word processors, spread sheets and other chores where sequential tasks require a

list of possible options.

Hard-disk editors and workstations are another animal altogether. For most of us in the radio business, two-track editing and sound assembly is just about all we need for many day-to-day tasks.

Keep it simple

Multitrack certainly is useful, but only if you have to replay multiple elements simultaneously. Most, if not all, of these types of productions can be achieved with more modest systems. We are, however, often faced with a number of confusing menus and system options to record a short sequence into the workstation, edit them into sequence, perform a

couple of crossfades, perhaps some equalization or compression, and then off-load the digitized data to another location for storage and playback.

Should be easy, yes? On many Mac- and PC-based systems, you seem to spend more time navigating around various windows and pull-downs than you do performing the edits.

One stereo editor that is going opposite the prevailing paradigm is about to be unveiled by Fairlight, the well-known Australian maker of powerful MFX Series workstations for the video and film post-production industry.

As I have been finding out, the new Dali-2T has been designed from the ground up to provide two-track editing. It features a very easy-to-use controller and, as far as I can determine, delivers everything it promises. What else could

you ask for; aside, that is, from an explanation for the rather whimsical name? (As I discovered, it refers to the surrealist painter Salvador Dali, who utilized distorted clock motifs in many of his works.)

Hello, Dali

Basically, the Dali-2T consists of a rack-mounted box that houses the various processing cards, I/O ports and a 400MB

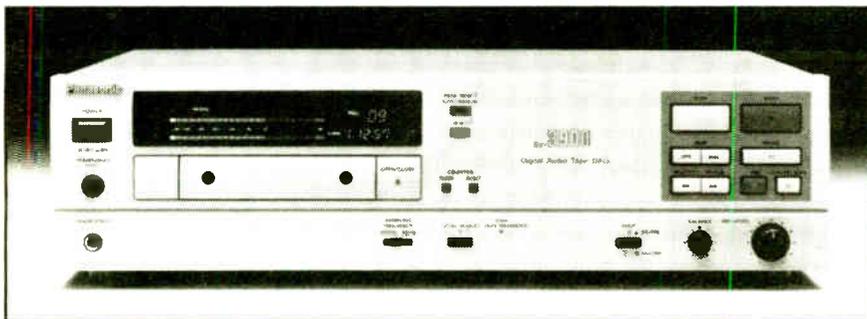
The new Dali-2T has been designed from the ground up to provide two-track editing.

hard drive, connecting to a controller. The supplied hard drive holds up to 60 minutes of mono sound files; stereo record/replay capacity is around a half-hour. Additional SCSI-compatible drives can be added if necessary.

Rear-panel connectors include AES/EBU ports for direct digital interface, stereo analog inputs and outputs,

continued on page 29 ▶

Fool Your DAT Machine: Readers Tell You How on p. 45.



LINE OUT

The Ups and Downs of Converting to Digital

by Bruce Bartlett with Jenny Bartlett

Part II

ELKHART, Ind. For years, radio production people have put radio spots together on tape. But now that the trend is to digital workstations, some people find it hard to make the change; others welcome it.

In the latter group is Dave Miller, owner and chief engineer of Absolute Recording in Elkhart, Indiana. He switched from analog production to digital several weeks ago.

We interviewed Dave in last month's Line Out column. He spoke of the way he used to do things in the analog world and discussed his decision to go digital, describing his current production methods.

In the past, Dave used a big Tascam 20 x 8 mixing console. Now he uses a Power Mac 7100 with Digidesign Pro Tools eight-track recording software.

What does Dave like about digital? "I've

come to appreciate digital very much," he says. "It's a completely different mindset. You have to get out of the linear mode of analog. When you get into digital, you've got clips of audio, like the old film days where you have clips of film hanging on a wire. You can grab them and stick them in anywhere you want...like cut and paste."

Opening the mind

He has to remind himself not to be limited to the analog way of thinking. "Digital expands your horizons so much. I'm making the transition, but I'm still drawn into what we grew up with. It's hard to shake it.

"I don't miss the old razor blade! I got pretty quick with a blade. In twenty years, I've done over 50,000 physical edits. But I can see that I'll probably break my record with digital."

Dave is a big fan of Pro Tools' automated mixing as well. No more hands, feet, toes and noses on the faders, and asking the client to "reach over and turn that down for me, would you?"

continued on page 43 ▶

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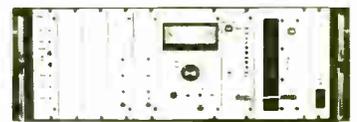
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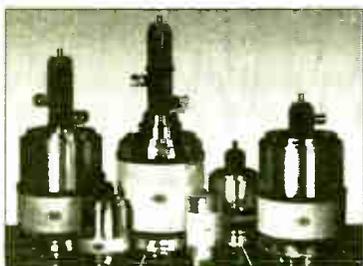
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READER SERVICE NO. 114

PRODUCT EVALUATION

Buyout CDs from Energetic Music

by Chris O'Brien

WASHINGTON Over the last 10 months, I have been on an intensive search for a production library to fit our Rockin' Country format. I recently got the chance to hear portions of the buyout production package from Energetic Music of Seattle.

While the Energetic Music library is royalty-free and relatively inexpensive, it does present the production person with a challenge when hunting for the perfect bed for a spot.

I sampled three volumes from the Energetic Themes broadcast library and one of their new Recurring Themes CDs, which features 50 variations on the same basic song, presented in styles from

"Funk" to "Romantic Orchestra."

The advantages to purchasing a buyout production package are obvious: no long-term lease to factor into a budget, and a low one-time-only cost. The disadvantage in this and many buyout scenarios is, you get what you pay for.

The Energetic Music catalog features a wide assortment of production music and sound effects to "buy outright." The \$99.95 price tag is reasonable for the Sound Effects Library, but after having listened to just three music CDs offered by Energetic Music, it was difficult to accept the nearly \$100-per-disc price they were asking.

In the studio

I used Energetic Music discs BC-3,

BC-4, BC-5 and RT-1 in the production studio for two weeks. I will say the library does contain some really fantastic and imaginative cuts, but it also includes some rather predictable and, frankly, tired-sounding cuts.

Let me focus on the positive: specifically, volumes BC-3, 4 and 5. The imaginative cuts I referred to a moment ago really stand out. The writers at Energetic Music excel in the creation of unique-sounding New Age, Tropical and Industrial category music. This is a tribute to the imagination of writers Monty Smith, Mark Bittler and Jimmy Free.

In spite of the strengths of these music forms, there is a huge shift when it comes to Classical, Blues and Country.

As a contemporary Country music programmer, I always look for production packages that include Modern Country. To my ear, Energetic Music's interpretation of this genre is considerably behind the times.

Classical cuts come across stiff and electronic, and more often resemble a Sound Blaster soundtrack for a computer game than a professional quality production bed. As for Rhythm and Blues ... let me just say that those who listen to Muddy Waters or Robert Johnson would not be impressed.

Recurring themes

I was also concerned with the Recurring Themes CD. The collection makes sense as an image package, unifying the elements of, say, a Full-Service station. For commercial music, it has limited appeal.

RT-1 contained a total of nine different music styles with varying fadeout times, for a grand sum of 50 cuts; all variations of the same song. For my money, I'm looking for *different* songs with diverse styles; in radio production, appropriate

music needs to be distinctly different from commercial to commercial.

Changes in instrument balance or arrangement would have been more desirable than different cut timings. When even the skimpiest digital workstation on the market today can trim and re-time music cuts, it seems unnecessary for a CD to be produced this way.

In my search for a production library to complement WRCY-FM's Rockin' Country format, I have found that combining elements of several libraries is the solution to making the perfect fit to our format. I am currently using production music designed for Urban, Rock and Country formats.

Libraries such as the Energetic Music collection have something to offer, but you

Two-Track Digital Editor

► continued from page 27

MIDI, video sync and time code. Projected list price for Dali-2T, complete with 400MB hard drive, is \$9,990.

The controller features a variety of dedicated keys for major system functions: an LCD screen with programmable softkeys (whose function change dependent upon what you are doing) and a bank of familiar transport controls; a large scrub/jog wheel, level meters and a numeric keypad that enables direct entry of timecode or cue point locations. A shift key modifies some of the buttons to provide double functions. All in all, the controller is well laid out and extremely easy to navigate around.

Easy display

The LCD is key to the unit's functionality. An upper area contains various timecode locations that label Marker In/Out pointers, plus the Current Play location. A thin line below this shows the entire project, and where the Now line currently resides. The lower section shows audio files in an easy to comprehend graphic form, represented as pieces of tape. Finally, the LCD displays the percentage of remaining hard disk capacity, plus labels for the softkeys.

of the crossfade envelope. It is surprising how quickly one can produce the required result, and be ready to off-load the file to the final medium.

Bells and whistles

In addition, Dali-2T provides some powerful DSP functions. Time correction — or "TimeFx" in Fairlight parlance — is available in three modes: Pitch Change, in semitones; Stretch/Relax, in percentage duration; and Varispeed (-25 to +400 percent).

A choice of six time-dilation settings are available, that have been set up to provide the optimal results with certain types of audio including male/female voices, pop or classical music. Final lengths can be matched to a percentage of the original timings, or defined as a specific extended/reduced duration.

Also provided is a powerful four-band fully parametric equalizer, with choice of highpass, lowpass or bell-response for each band, plus a real-time dynamics section. The latter provides selection of Compression Ratio (gentle to steep/limiting), Threshold Level, Gating Threshold, and Attack and Release settings for each of the selected audio elements.

The Dali-2T offers just about everything you might look for in a workstation designed for broadcast production.

Loading audio is simplicity. Connect an analog or digital source, and press Record. Audio is digitized to hard disk, and tagged with a timecode label from the internal generator or an external source. User selectable sample rates for analog sources range from 32 to 48 kHz, with the normal user choices.

Once the sound cues have been loaded, they can be edited into position by simply moving them to a marker, with crossfade overlaps or butt edits. The overall level of individual cues can also be adjusted.

Providing such basic functions on dedicated keys dramatically speeds up the editing and trimming process. Scrub editing enables the precise edit points to be located, the markers used to define the start of the next segment, and/or the start

Although the new Fairlight Dali-2T might not set the world afire in terms of flash and sizzle, it has great deal going for it as a basic two-track random-access recorder/editor and can be mastered in a couple of minutes. It features an extremely simple user interface, with easy to understand commands. In many ways, the Dali-2T offers just about everything you might look for in a workstation designed for broadcast production.

Mel Lambert has been involved with the production and broadcast industries for 20 years. Now principal of Media&Marketing, a Los Angeles-based consulting service for the professional audio industry, he can be reached at mediapr@aol.com, or 818-753-9510.

Product Capsule: Energetic Music Library

 Thumbs Up	 Thumbs Down
<ul style="list-style-type: none"> ✓ good island/tropical beds ✓ new age music ✓ industrial beds ✓ inexpensive SFX library available 	<ul style="list-style-type: none"> ✓ expensive for music buyout discs ✓ weak in some categories

For more information, contact Energetic Music at 1-206-467-7101; or circle **Reader Service 7**

must be savvy when investing in any buyout-type agreement to ensure that you are paying the right price for the level of quality you require. If your CHR or Hot AC station needs to freshen up the production library, several discs from Energetic Music might help, while sparing the expense of leasing another huge library.

Chris O'Brien is the program director for WRCY-FM, Washington's Thunder 107.7 and a contributing writer to RW. Chris can be reached at 703-631-2577.

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PRODUCT EVALUATION

Inexpensive Reverb Goes Zoom

by Alan R. Peterson

WASHINGTON Inexpensive digital reverbs are frequently reviewed in *Studio Sessions* for the benefit of broadcasters interested in less costly products. With prices mostly in the \$200-\$400 range, reverb for the masses is possible.

But most budget boxes are strictly reverb only. What if other effects are desired? Pitch shifting is hardly ever packaged in budget units. The same can be said for serial and parallel effects.

It is a fact of life that corners will be cut on budget gear and the frugal production director assumes she/he will just have to

come to some sort of compromise. This is why the Zoom 1202 Studio is so attractive.

A few years ago, the Zoom corporation made a big ripple with a little box: the model 9002 16-bit digital echo/reverb/distortion processor. This full-featured device was small enough to fit onto the belt or instrument strap of the user. That experience came in handy when it came time for Zoom to release the 1202 — a remarkably small rackmount processor capable of numerous reverb, delay, echo and pitch shift effects. All are true stereo and sampled at 44.1 kHz for full sonic quality. The Zoom 1202 is packed

with the kinds of programs creative minds love to mess with.

Budget-conscious managers and production directors will especially appreciate the \$250 list price. Shop around a little and you should land one for around \$200.

Understand this is a musical-type processor better suited for -10 dB project studios than broadcast production rooms: level correction and compatibility will be an issue. But then again, the classic Yamaha SPX-90 started out life the same way.

First, the quibbles ...

The front panel legend is nothing more than a blue adhesive-backed vinyl sticker which will gradually get razored and peeled off by fidgety DJs. Don't think your station is "different"; it will happen.

Preset configurations are determined at the factory. There are no memory locations to store your favorite programs. The VU indicator is a two-color LED, green during zero and normal levels, red during hot levels. When it goes red, you have just clipped your signal.

The 1202 lacks a display and bypass switch, and pots have a light duty feel compared to most production room devices.

Wall wart. Live with it.

Finally, forget MIDI. Zoom left it off the 1202. This is not a major concern if your studio is not MIDI-capable to begin with.

Versatility

All that aside, the 1202 is a fun little box. There is no shortage of reverbs, ranging from concert halls to acoustically dead rehearsal rooms (I've never understood why "dead room" is considered a reverb program). Two data controls are

applied to input, the 1202 stayed politely silent.

Zoom delivers a good performance with serial and parallel effects. While configurations are not selectable (as on the pricier Ensoniq DP/4), the patterns Zoom created are meaty and useful. PIT+REV (pitch shift and reverb) gives you instant "voice of God" and FLA+REV (a flanger) is great for sweeping the cold

Product Capsule:
Zoom 1202 Studio

 Thumbs Up <ul style="list-style-type: none"> ✓ serial/parallel effects ✓ noise gate ✓ lots of reverbs ✓ price 	 Thumbs Down <ul style="list-style-type: none"> ✓ see 'Quibbles'
--	---

For more information, contact Zoom at 1-516-364-2244; or circle **Reader Service 125**

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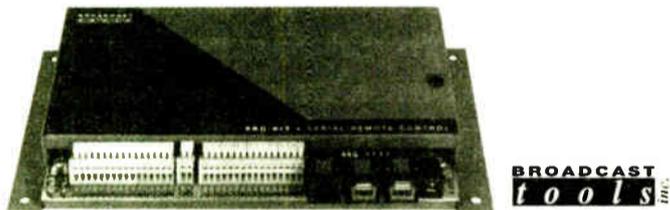
Parallel effects allow different processing on each channel. One side of the stereo image can be flanged while the other gets reverb or echo. Very handy if your console has assignable Aux outs and you wish to use the 1202 as a "second effects box" to sweeten two tracks at once.

I found delay and echo difficult to tame. Here is where a display would have been handy to match tempos, beats-per-minute or delay in milliseconds. Frankly, there is little call for echo in radio spots these days, but both sound good and beat cart machine echo hands down.

My performance test shows the Zoom 1202 to have decent RF rejection. I live less than a half mile from a combined TV/FM tower in Virginia which sprays RF into everything I own. With no signal

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Zoom Studio 1202 Processor

included on the front panel to dial in diffusion — in this case, stereo spread — high-frequency damping, density, pre-delay and other variables, depending on the chosen effect.

Within each effect are 16 patterns, or variations on the original effect, selectable from another rotary switch on the front panel. This alters decay time. There are ten reverb programs, which means the pattern control gives you 160 basic reverbs even before you touch the data dials.

Two EQ controls adjust the high and low frequency content of the effect signal, leaving the dry side of the mix intact.

There's more

An A/B button selects different effects banks, moving between the reverbs and series/parallel effects. This button keeps front panel switching simple, allowing you to select effects without scrolling through several hundred programs.

The 1202 has especially nice flanging and chorusing effects, editable via the data knobs. An audible delay exists in the pitch shift program, but the sound is surprisingly clean. I tested this feature by shifting a guitar track up and down one

applied to input, the 1202 stayed politely silent.

Speaking of silence, the 1202 has a program called ZNR, for Zoom Noise Reduction. This is a noise gate with selectable thresholds and variable depths. If your studio lacks a downward expander or gate for the mic channel, the ZNR can tame room noise during basic voice sessions, but needs careful adjustment for optimum performance.

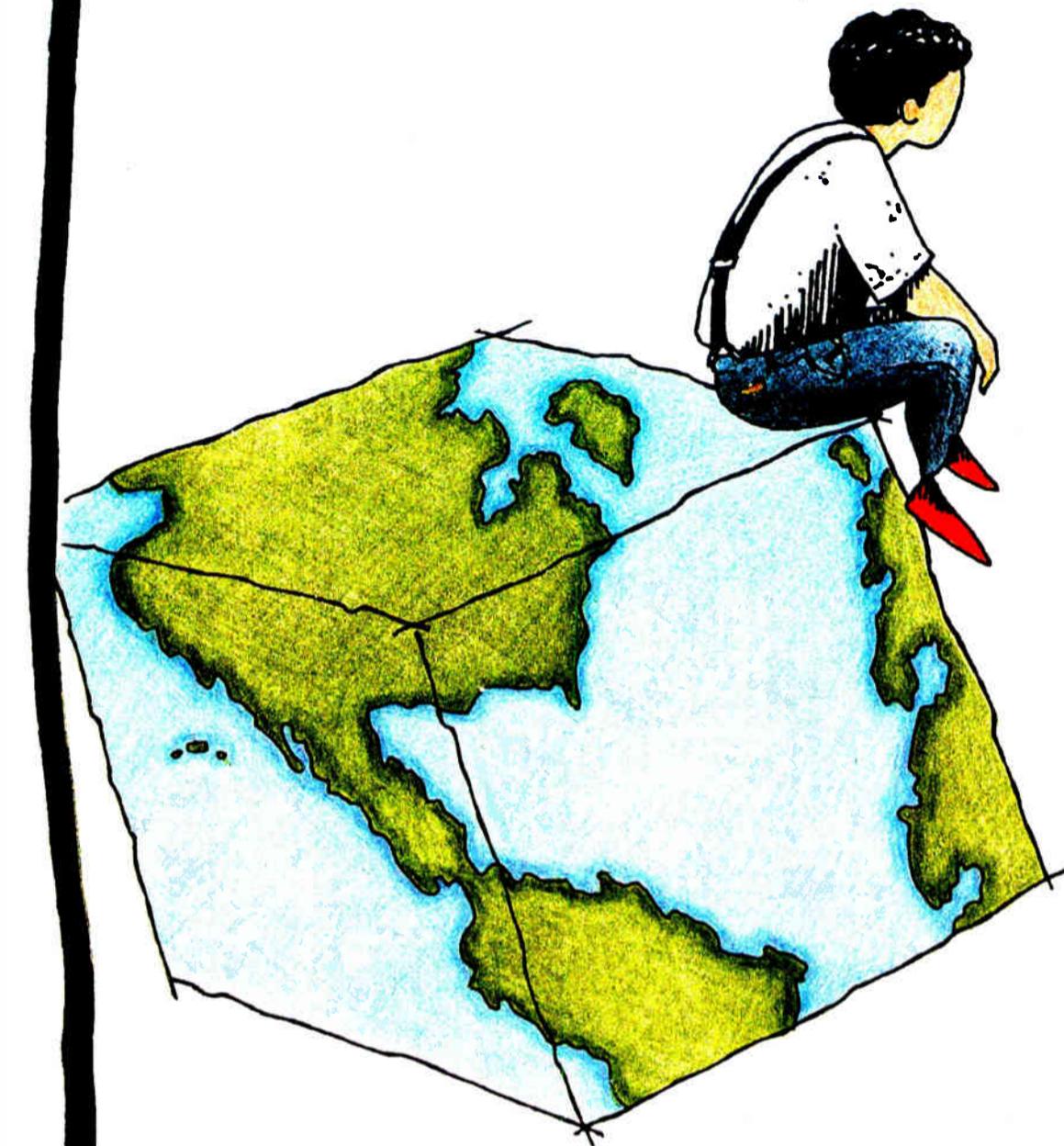
Conclusion

The budget reverb arena is already quite crowded. The Zoom 1202 is a standout for its clean stereo reverb, pitch changer, noise suppression, combined effects and tweakability, and all at a killer price. Because it is a low-priced unit, you will have to deal with the compromises listed earlier.

Frankly, the biggest problem your staff may run into is writing down all the settings necessary to recreate a favorite sound.

If your station is on a tight budget but needs an effects processor offering more than basic reverb, test out the Zoom 1202.

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PRODUCER'S FILE

Is Neumann Clone Rode-Worthy?

by Ty Ford

BALTIMORE It is more than a little scary how similar the shapes of the Neumann U87 and the Rode NT2TL (\$600) are. The fact that their assemblies are almost identical is even scarier. Although I didn't drop the dime to call the company in Sydney, Australia, I am sure the resemblance is no accident. A close look by anyone with more than casual knowledge of the Neumann U87, however, will reveal the differences.

The specs that came with the pair of NT2TL mics I tested indicate 20 Hz to 20 kHz response (with no graph provided), a noise figure of 17 dB-A SPL, sensitivity of 16mV/pa and a maximum SPL of 135 dB; 145 dB with the pad. Output impedance is 200 ohms. The output connectors and internal head pins are gold-plated.

Windscreen

The first, and most obvious difference is, the NT2TL's capsule windscreen is less substantial than the U87's. So much less that it can be dented without much effort. The Rode NT2TL offers only two patterns,



Rode NT2TL microphone

omni and cardioid. The patterns are easily switchable via a two-position switch mounted on the body. On the other side of the body, a three-way switch allows either the 10 dB pad or the high-pass filter to be engaged, but not both at the same time.

When switched to the pad position, both NT2TL's sounded fine. However, when the high-pass filter was engaged, both mics generated a lot of unexpected high frequency noise. This noise was less noticeable with the omni pattern than with the cardioid pattern, but still made the high-pass filter unusable.

The results were the same on both mics, whether I used the Mackie 1604 mic preamps or the Amek/Neve 9098.

The NT2TL uses dual pressure gradient transducers and has a transformerless output. No individual frequency response graphs are included, but according to the accompanying booklet, "We have designed the NT-2 to exhibit a rising response centered around 12 kHz."

In a nutshell, the NT2TL sounds like a Neumann U87, with just a touch of top end that one might hear from an AKG 414.

The first tests took place at Flite Three, a video and audio-for-video facility in Baltimore. The NT2TL and a U87, using API mic preamps, were set up in the car-

dioid pattern for a male narrator. The mics sounded extremely similar. At a distance of 6", the NT2TL was slightly fuller on the bottom than the newly cleaned Neumann U87. The NT2TL also had a little more sizzle on top; something like one might expect to hear from an AKG 414. As the talent moved in to about 1" from the mics, the Neumann became a little edgy but the bottoms remained very similar.

Omni-presence

The NT2TL sounds equally good in the omni mode. High-frequency response drops off at about 40 degrees either side of dead center, but this is nominal for a mic in its price range. You usually have to pay a lot more for great polar response in the omni mode.

The NT2TL was three or four dB hotter than the U87 (it should be noted that the U87Ai, which took the place of the U87 after 1986, is also about three dB hotter than the original U87 design we were using).

The Rode was not without problems. When first plugged in to Flite Three's mic cables, the Rode picked up video sync noise and an AM or FM radio station. When the same cable was plugged into the studio's U87, there were no problems. I can only guess that the mics were tested in an area where the RF environment is a lot more friendly.

Some of the Gefell mics from East Germany had the same sorts of problems when they first hit the US several years ago. As a result, Gefell beefed up the RF filter circuitry and solved the problem. Hopefully, Rode will do the same.

If you really like the sound of the NT2TL, and are concerned about noise, try using Gotham GAC-3 cable, or EMT

Product Capsule: **Rode NT2TL Microphone**

 Thumbs Up ✓ affordable ✓ good sound	 Thumbs Down ✓ RF and moisture prone
---	--

For more information, contact Harris Allied at 1-800-622-0022; or circle **Reader Service 181**.

2022 if you can find it. Use XLR connectors with all-metal shells — not the plastic-backed Neutriks — and connect the cable shields to both shells. In our test, the EMT 2022 cable stopped the RF completely. There were no noise or RF problems at my own studio with the NT2TL plugged into an Amek/Neve 9890 or Mackie 1604 mixer.

High Humidity

Another weak spot in the Rode design is the capsule's sensitivity to humidity. The instruction guide suggests putting the mic back in its zippered pouch with its packet of dehydrant crystals after each use. It even gives instructions on drying out the crystals so they may be used again.

Our tests confirmed the NT2TL's sensitivity to humidity. Exhaling into the NT2TL at a distance of 4"-6," without a foam windscreen or pop filter, freaked out the capsule, so much so that it was still fritzing and popping an hour later. As

the guide indicates, foam pop filters can be used, but they filter out some of the high frequencies too. Rode suggests using one of the panty-hose pop screens. They work, but may not be enough to handle a heavy breather at three inches or less from the mic. If you've got people who **MUST** eat the mic, you have no choice but the foam-style filters.

Incidentally, we tried the exhale test on both the Neumann U87 and an unsuspecting Gefell M71. Neither mic exhibited any symptoms.

Suspension mount

The Rode SM-1 suspension mount, which is included with the mic, is well designed and allows much easier and more precise positioning of the mic than the standard Neumann suspension mount. In our tests, it was also more effective at reducing bumps and thumps than the Neumann. Neumann will likely lose some sales to this mount because it fits the U87 very well, and it's a lot less expensive. The suspension mounts I received each included an extra set of rubber bands. A good thing, too; one of the bands was broken on one of the mounts. I suspect the reason was a mounting flange that had been closed just a bit too tightly to accept the rubber band. A pair of needle-nose pliers was used to open the fitting slightly to allow proper placement of one of the spare bands.

In conclusion, the Rode NT2TL — regardless of its limitations — is an exceptionally transparent and open-sounding mic. I would expect it to do well in a variety of applications including drum overheads, vocals, piano, guitar and



Internal view of the Rode mic

(from a safe distance in a dry environment) voice-overs or regular on-air radio use.

The Rode NT2TL is not the "Neumann Killer" some expected it to be, but is a great sounding mic for the price.

□ □ □

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Make the Right Choices with Furnishings

by Alan Peterson

WASHINGTON Man, what an NAB show! Just looking around at all the amazing things available to the radio professional proves the future ain't what it used to be.

Inspired by the Aug. 9, *RW's Buyer's Guide*, I spent an inordinate amount of time scoping out consoles, components and studio furniture. Assuming you, too, were swayed enough to commit to a future studio upgrade, may I bring to your attention something that could influence your purchasing decision. I call it the Oops-Bam Syndrome.

"Oops-Bam" is the sound you hear when jocks; 1) drop stacks of carts on the console, 2) miss the telephone cradle when hanging up the phone and strike a CD deck, 3) slam the studio chair into the rack and strip buttons off the transmitter remote control, 4) any variation on this theme. Oops-Bam is the sound that reveals just how much abuse your studio furnishings can take.

A radio studio is not Macy's display window and you and I both know DJs treat broadcast gear the way The Who used to treat guitars. Hear me now and believe me later, Hans: in fairly short order your sparkling new studio will

experience Oops-Bam. Do your shopping with that in mind.

Console-ation

Consoles catch Oops-Bam a lot. Watch when jocks pot down faders on linear consoles: in one agonizing move, the fader is slammed completely down with the momentum of the jock's hand continuing downward, glancing across the OFF button at a low angle. You will never see it demoted at the shows that way, but in the studio that is standard Oops-Bam procedure.

Faders must be able to bottom out without damage. Button caps have to withstand hits from any direction without springing off. Bulbs must ignore vibrations caused by impacts. If panels flex or

Bamproof.

Consider construction. Whether metal racks or wood boxes with metal rails, think about the potential for ground looping. Bolt in just one defective piece of gear, and your airchain will hum like a hornet. Ask about nylon-insulating hardware.

Are wood racks made of plywood or particle board? While the former may be expensive, the latter is more prone to crushing and damage. Think it won't happen at your station? Wanna buy a marsh?

Will you be racking up any tube gear? Extensive tube and transformer heat can soften glue and detach the rack's laminated surface, then look out!

A lesson learned in Pennsylvania:

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You and I both know DJs treat broadcast gear the way The Who used to treat guitars. Do your shopping with that in mind.

wobble from a jock's enthusiasm, keep looking.

Same for rotary consoles. In the heat of battle, mic keys are slapped into the ON position, pots get zeroed with violent thuds, input buttons take it on the nose ... broken key contacts, popped button caps and free-spinning knobs aren't far behind. Look for solid switches and pots with double-set screws.

How's that silk screening? Telco feed modules on \$20,000 consoles can lose face after one year of button-punching. How serviceable are the modules? Are there over-the-counter op amps and logic chips on board or unmarked Factory-Only components? Can you easily remove monitor and headphone pots when — not if, but when — they start to get scratchy? Oops-Bam will force the issue every time.

Fine furniture

When studio furniture and components get shortchanged during upgrades, the Oops-Bam syndrome is dramatically revealed.

One station I worked for hired a local cabinet builder to make new studio furniture. Once the lumber became acclimated to our studio, the laminated plastic surface began to crack.

A low-budget makeover at another station forced reuse of wobbly furniture that once augmented our automation system. We met budget, but at the cost of skippy turntables and CDs. I won't even mention microwave oven carts and lumber store screw-together furniture I've seen used as 19" equipment racks!

The case for well-built studio furnishings is clear. They are designed to be

Measure twice, buy once. A control room cabinet wasn't deep enough to accommodate CD machines *and* their XLRs. Having to stop and buy right-angle XLR connectors to fit a shallow cabinet was a rude surprise.

Consider location. Sure, that corner turret cabinet mounted inaccessibly against the wall looks great. When that cola spills down inside the cabinet — and it will — have a good time getting to the electronics inside. Especially if "old school" engineers wire it up with military-dress cabling, leaving out service loops.

Have a seat

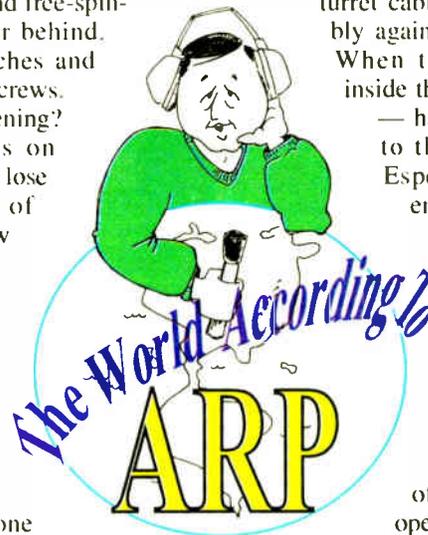
Finally, studio chairs. Pneumatic steno chairs for standup studios or office chairs for sitdown operations; either way, forget the \$59 specials. The tall one will blow a seal and collapse. The office chair will squeak louder than the one it replaced. Mystery screws will drop out of chair bottoms and height knobs will strip threads, all in the first month.

If you buy studio chairs from a local supplier, look for one offering warranties. And buy good ones, don't trade them out. Traded merchandise always seems to be crud.

Keep in mind the environment this furniture must exist in; we are talking demolition derby, not quilting bee.

Many broadcasters look for value in *RW's Buyers Guide* pages. Many more looked for it at the NAB show. For the benefit of your bottom line and keeping your studios Oops-Bamproof, take a long look at the people who will be using the very gear you need to buy.

Make the right decision, then shop til you drop.



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Most importantly, both the DN-961FA Drawer Loading model and the DN-951FA are from Denon, who for 83 years has been serving the needs of audio professionals and for 21 years has been advancing the art of digital audio.



DN 951FA CD CART PLAYER



DN 961FA DRAWER LOADING CD PLAYER

On Air
Screen

Navigator (KDLT)

00:04:14 intro: 109
00:00:00 intro: 100

All Around The World

11:00:00 -> 11:49:10 00:49'02

A	04'28	All Around The World - Lisa Stansfield	19"
M	04'10	I Wish - Stevie Wonder	T 18"
M	04'29	Set Them Free - Sting	35"
C		START DAT2	
	01'19	[Bottom of the Hour]	
M	00'03	R-r-r-r-Radio.. -	
M	00'45	Casual Furniture -	
M	00'30	Harley Davidson -	
M	00'35	News Call 1 -	
T	00'34	Cancer	
T	00'34	Japan	

"Hot Keys"

Carts

ON

1
Applause

2
Window Crash

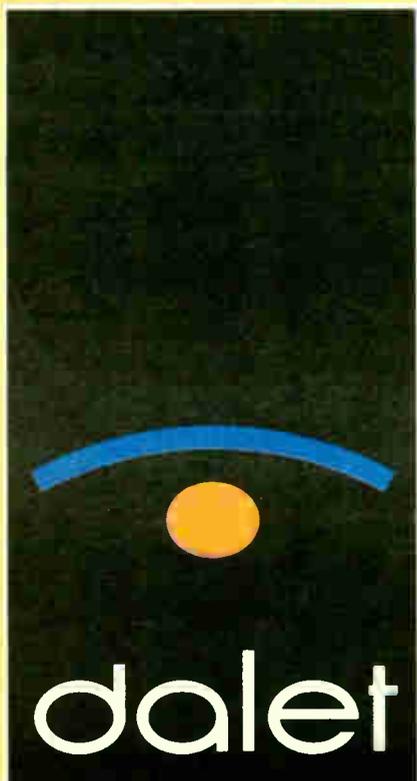
3
Roar !!

4
Plane & Car Crash

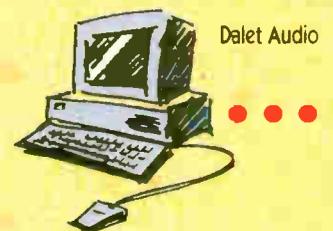
Inflight M

All Around The World	I Wish
fade out... > 00:04:108	fade in.... > 00:00:000
xfade..... > 00:03:459	begin off... > 00:00:000
end off... > 04:23:280	att. (dB): 1: 0

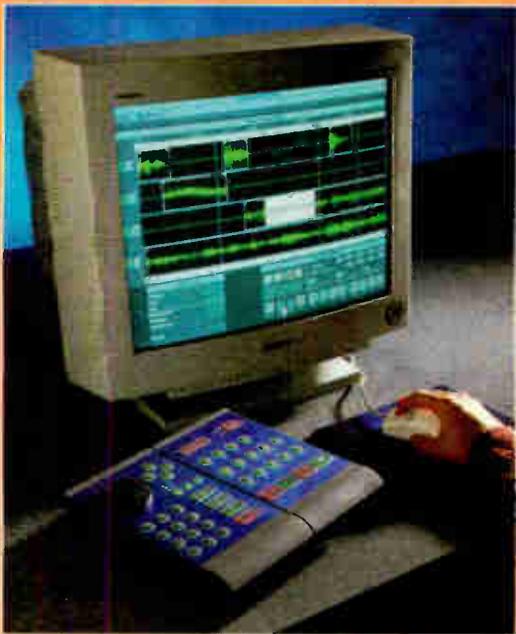
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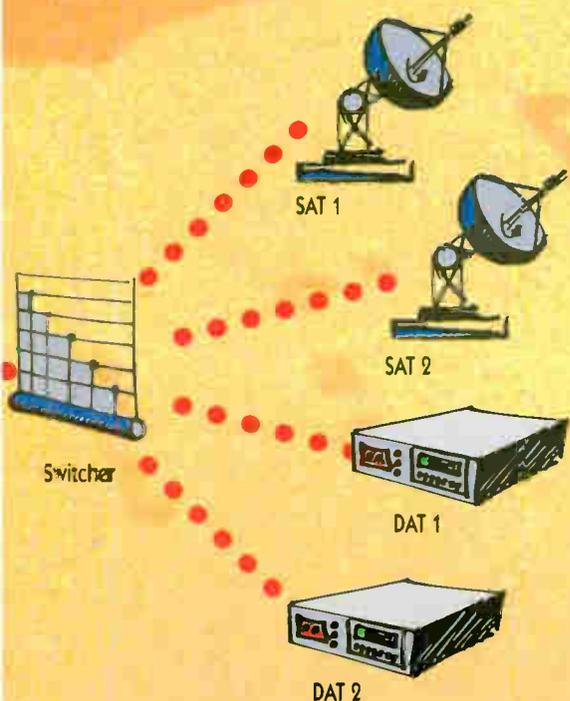
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Bake the Flakes Back into the Tape

by Rich Rarey

WASHINGTON Recently, a record producer called in a fit of mild panic. He had a dozen two-inch reels of multitrack tape, priceless in content, and unplayable in their present form.

I inquired as to the noise the reels made as he attempted to play them. "Squeeeek!" he said. Did his tape leave dusty, rusty particles on the guides and heads? He said yes. No doubt remained: his tapes had the dreaded Sticky Shedding Syndrome.

I reminded him that before he start a national telethon to raise money for research, a cure had already been found. When he realized that his precious master

tapes were in no immediate danger and could temporarily be restored to usefulness, he calmed down and rang off.

The producer's call piqued my interest. What would you do if your ancient, valuable tapes started sticking and shedding? What are the manufacturer's current recommendations?

The panic button

William Lund, senior technical service engineer at 3M's Maplewood, Minn., headquarters said the first and foremost thing is "Don't panic." In fact, it is so foremost that he repeated: "*Do ... Not ... Panic!*"

According to Lund, the only 3M brand of tape stocks affected are 226, 227, and

to a lesser extent 806 and 807, manufactured from 1978 through the early 1980s.

Tom Neuman, senior staff engineer in charge of the Recording Technology Group at Ampex Corporation's Redwood City, Calif., headquarters, had a similar response to those asking about tape shedding: "Don't panic!"

Neuman says that various Ampex tape stock from the early 1970s to early/mid 1980s has been afflicted with the syndrome: including two-inch Quad video tape, half-inch EIAJ video tape (the industrial/educa-

tional Sony "Rover" format) and the ubiquitous Ampex 406 quarter-inch analog mastering tape. Because the 406 stock was a big seller, with about one million reels leaving the Ampex factory every year, this is the stock that affected the most users.

To understand how these tapes wound up with Sticky



PUBLIC DOMAIN

Shedding Syndrome, it is important to view the manufacturing process from a historical perspective.

Originally, the magnetic oxide was deposited on a paper backing. Paper had serious drawbacks. Moisture could cause the backing to grow and shrink. As the noise level of recording tape is dependent on the smoothness of its oxide surface, paper's microscopically rough surface made it impossible to make a smooth oxide layer over such a rough backing.

Acetate, according to Bill Lund, made a smoother backing material, but was water-based. Ultimately, DuPont's Mylar (polyester) made an excellent backing material: owing to its tough, smooth and stable qualities.

Exotic soup

Attaching an oxide coating to polyester is harder than just painting it on. The raw oxide has to be ground to a fine evenness without clumps or oddly sized particles, as the nature of high quality magnetic recording dictates that the particles must be regular and small. The oxide is mixed in vats with a binding agent that Lund describes as an "exotic, organic soup."

The binder is a complex polymer chain of organic chemicals and lubricants that will (hopefully) cause the oxide to attach permanently to the backing, while permitting the easy sliding of tape across the heads.

The binder's chemical recipe is unique to each manufacturer, and is closely-held information. Interestingly, it appears every tape manufacturer has had a sample of its competitor's products rigorously analyzed for composition, so the tape users are really the only ones who don't know (or care) what makes up the binding agent.

Volatile chemicals are added to the production vats that act as "carriers" to permit the binder/oxide slurry — now properly known as a dispersion — to be sprayed (or "coated") onto the plastic backing. The resultant raw product is heated to evaporate the volatile carrier. These vapors are captured and recycled.

The real problem

How is it, then, that certain tape stocks became sticky and begin to shed?

According to Tom Neuman, no two chemists agree as to why it is happening, but the effect is this: the binder's long, complex polymer chain breaks down into smaller polymer chains in a process that might be likened to microscopic Tinker-Toys. It is these unbonded parts of the chain that appear to cause the stickiness. It is believed that

continued on page 40 ►



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Reel Home Cooking

► continued from page 38

the particular combination of a certain oxide with a particular binder will, over time, cause the binder to break down.

Moisture in one's archive storage area will exacerbate the breakdown. Neuman says the analytical tools of the 1970s were not sharp enough to reveal binder limitations at the onset. Tape deterioration was finally recognized in the early 1980s when a major remastering phase for the emerging compact disc technology occurred. Users found their irreplaceable tapes sticky and unplayable.

Ampex chemists then started analyzing the problem as frustrated users tried their own home-brew solutions: from talcum

powder (don't even consider this — it will rip the oxide off the backing and ruin your heads) to alcohol washes which merely swab the oxide off the backing, ruining the tape.

The solution

Chemists discovered the only answer was to reure the tape through careful heating. During heating, the binder's stubby chains rebonded into the proper longer chain, and made the tape almost as good as new.

Here is the recipe for restoring your tapes, as patented by Ampex (don't worry, anyone can use it!).

First, get a reliable, even heat source

that can maintain 50 degrees Celsius (about 121 degrees Fahrenheit), plus or minus a few degrees. Many people use a convection oven, which is an oven with an internal fan to ensure even heating during the process.

Bill Lund reports some are using a food

tory oven for its research: a unit costing in the hundreds of dollars.

The key is *reliable* heat temperature. A candy thermometer in the oven will help you monitor the desired temperature. Neuman says that regular cooking ovens should be avoided: their thermostats may

Apparently tape will remain playable for a period of weeks to months, depending on the severity of the shedding.

dehydrator oven as an inexpensive heat source. Tom Neuman says one record company constructed its oven from a cardboard box, a hair dryer and a candy thermometer.

Ampex uses a Blue M industrial labora-

not have high enough "resolution" to deliver consistent heat at these relatively low temperatures.

The recipe

- Do not preheat. Put your tapes in when the oven is cold. Tape does not like temperature shock any more than humans.

- Do not fill the oven more than 50 percent full. It will make even heat distribution difficult. An oven with a two cubic foot interior can bake about eight 10-inch reels at a time.

- Leave the tape on the reel. At these tepid temperatures, plastic reels will not be harmed. Tom Neuman says after baking, the tape will have a loose "pack" and if the tape is not on a reel, annoying tape spillage can occur.

- Bake for hours and hours. Bill Lund at 3M recommends baking eight to 10 hours and allow the reel to cool down slowly. Tom Neuman at Ampex recommends baking for 24 to 48 hours with the same gradual cooling-down period. Severely shedding tape can be repeatedly baked until it is playable. Does the difference in hours matter? Probably not. The tepid temperatures won't damage the plastic tape or reels, or demagnetize the tape. Both Lund and Neuman reports complete success by baking any tape that has Sticky Shed Syndrome.

How long will the binder remain intact? Apparently tape will remain playable for a period of weeks to months, depending on the severity of the shedding. When the tape begins to exhibit signs of shedding, they can be rebaked again and again without damage.

- Allow the reels to cool slowly. You can allow them to cool within the oven when the baking cycle is finished. The tape will naturally have a loose pack on the reel, and should carefully be playwound for proper pack and stored tails-out.

- Do not throw away your master reels. Both Neuman and Lund stress reels may be rebaked as needed, so there's no reason to discard them.

Tom Neuman says that he has seen tape from every manufacturer exhibiting Sticky Shedding Syndrome. This is because every tape manufacturer has to turn to a small handful of companies for the raw materials that compose recording tape: petroleum companies for plastic materials and pigment companies for the oxide. It is not the ingredients that make a recording tape unique, Neuman says, but rather the unique way the raw materials are processed into the complex material called recording tape.

Good luck with the recipe!

Until next month, I remain, your ob'd't baking eng'r.

□ □ □

Rich Rarey is the technical director of National Public Radio's "All Things Considered." He can be reached at rrarey@npr.org.

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Circle (26) On Reader Service Card World Radio History

WHAT TO TELL YOUR GM WHEN YOU WANT A NEW PRODUCTION MIXER WITH MORE THAN FOUR FADERS.

First and foremost, tell them that you can get a studio-quality 16x8x2 console for just \$3199*. \$3199 won't buy an extra hard disk for that digital cart doofrulator that keeps going south during morning drive. Heck, go whole hog and request a superb 24-channel Mackie Designs 8•Bus console — they're just \$3999*.

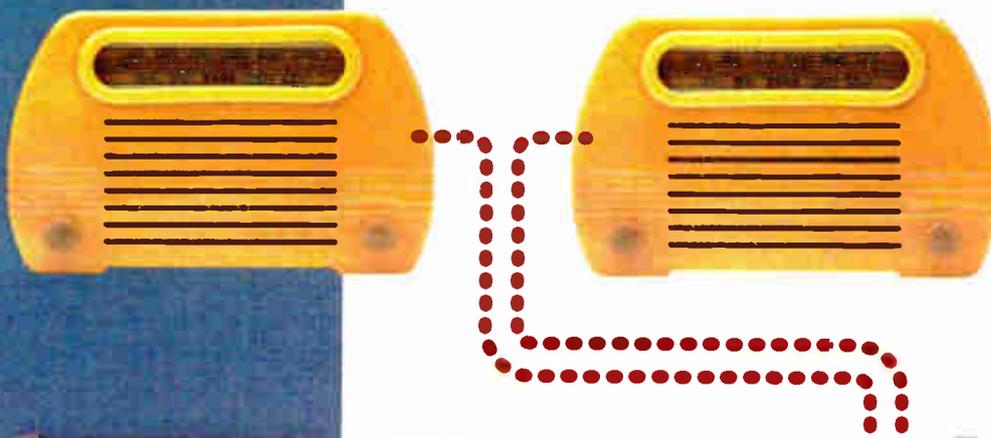
Second, tell 'em that Mackie 8•Bus consoles are built like tanks.

All three models feature solid steel chassis, sealed rotary controls, double-sided thru-hole plated fiberglass circuit boards and special impact-resistant design. Many 8•Bus consoles have been in continuous, 24-hours-a-day, hands-on use for years in high-pressure production facilities. Some have actually survived on-air jocks for prolonged periods of time.

Third, tell 'em the station's probably already playing music recorded on an 8•Bus.

That's how good our consoles sound. Tons of headroom. Low noise. And no coloration. It's no wonder that the list of platinum and gold albums tracked and mixed on 8•Bus boards grows daily. Sure, arguing sound quality rarely sways a GM, but it's worth a try.

If necessary, call your broadcast supply house (BSW & Harris-Allied come to mind), or Mackie direct and request our 48-page 8•Bus console brochure. It has a lot more arguments as to why our consoles are the best value around. Finally, if all else fails, consider begging.



Selected highlights of the Mackie Designs 8•Bus console...

1 Studio-grade mic preamps on every channel. Discrete circuitry with conjugate-pair, large-emitter-geometry transistors contribute to specs like -129.6 dBm E.I.N., 0.005% distortion and 10Hz-300kHz bandwidth. Phantom power for condenser mics switchable in banks of 8 channels.

2 Monitor section with separate Control Room and Studio stereo level controls. Select any combination of L/R mix, Mix-B, 2-Track or External feeds. Mono summing switch included at no extra charge.

3 Double headphone section lets you create two different headphone feeds with any combination of Monitor, Mix-B, Aux 3 & 4 or Aux 5 & 6.

4 Separate Talkback section with built-in mic. Selector switches let you address any combination of Aux 1, Aux 2 or Tape/Submasters.

5 Six pre/post-switchable aux sends per channel. Four available at any one time.

6 Big-console equalization: 12kHz Hi shelving, 80Hz Lo shelving, swept Lo Mid (45Hz-3kHz) and true parametric Hi Mid EQ. Band center is sweepable from 500Hz to 18kHz; bandwidth is variable from 1/2-octave to 3 octaves. ±15dB boost/cut throughout. PLUS an 18dB/octave Lo Cut filter that cuts room rumble and mic thumps.

7 100mm faders with true, logarithmic taper. Gain is smooth throughout the fader's travel instead of erratic and unpredictable like it is with cheap D-taper faders.

8 In-line console design with separate Mix-B/Monitor section. Doubles inputs during mixdown or create two different stereo feeds at the same time.

9 Internal goodies such as double-sided, thru-hole-plated fiberglass circuit boards, gold-plated interconnects, sealed rotary control, ultra-high duty cycle switches and exceptionally-high RFI rejection.

No shown: The massively over-engineered, triple-regulated 200-watt, 2-rack-space external power supply.

The 16•8 shown above is part of a complete mixing system. Optional meter bridges and stands are available for all 8•Bus consoles. There's also a matching 11-rack-space "SideCar" for outboard gear. Add a 24-channel expander to the larger 24•8 and 32•8 models.

Circle (28) On Reader Service Card

*Suggested U.S. retail prices 16•8, \$3199; 24•8, \$3999; 32•8, \$4999. Slightly higher in Canada. Contact your broadcast supply house for exact pricing.

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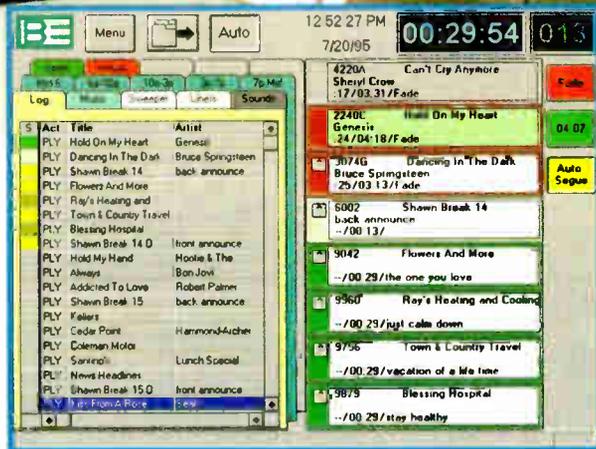
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Alesis Monitor a Good Loud Value

**Bruce Bartlett
with Jenny Bartlett**

ELKHART, Ind. In the May 18, 1994, issue of *RW*, we called the Alesis Monitor One speaker a best buy. Its big brother, the new Monitor Two, looks and sounds a lot like the Monitor One. But the Two is much larger, has deeper bass, and plays louder.

The Alesis Monitor Two is a large, three-way ported speaker priced at \$599/pair. It can be used nearfield or mid field. The look is modern, clean and sleek. The cabinet is rubber-coated to avoid slippage on a console.

The Monitor Two uses three drivers: a 10" woofer, 5-1/4" midrange and 1" tweeter. The woofer and midrange cones are made of mineral-filled polypropylene, said to reduce breakup. Large voice coils help the drivers handle lots of power. The 1" silk-dome tweeter is ferrofluid cooled.

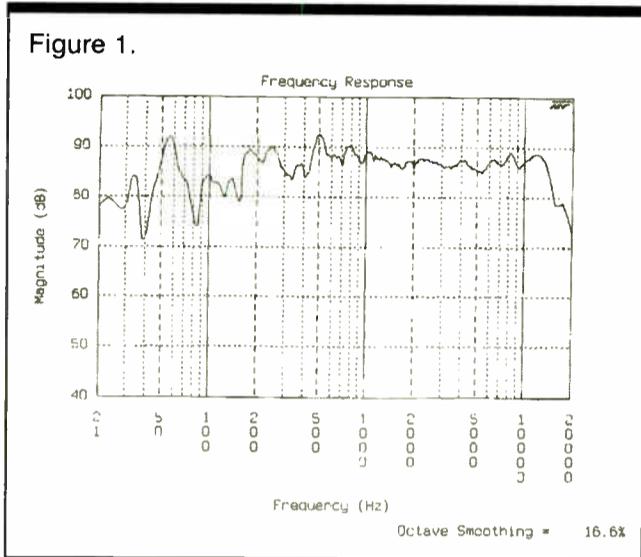
Power handling is 150 watts continuous program and 200 watts peak. Alesis

suggests that you use a power amp of 100-250 watts per channel into 4 ohms.

On back of the cabinet is the "SuperPort." It is big to prevent turbulence; the claimed result is tighter, deeper bass. Each speaker weighs 34 pounds and

measures 14" W x 20" H x 14" D. Binding posts on the back accept large speaker cables or a dual banana plug.

As for specs, rated sensitivity is high at 90 dB SPL/W/m. Claimed response is 35 Hz-18 kHz, ± 3 dB, and impedance is 4 ohms.



Listening tests

The clearly written owner's manual was a help in setting up the speakers. It stated that the speaker should be mounted several feet from any wall, or else the bass will be excessive. Allow several feet of spacing.

In my listening tests, I put the Monitor Twos just behind my mixer, three feet apart and three feet from me. I had to toe in the speakers to hear enough

highs. The speaker fronts were about 2-1/2 feet from an absorbent wall behind them. Here are my impressions of the sound:

Plenty of deep bass, but not very tight. Kick drum has weight and power. Lots of impact. A terrific, big sound when turned up loud. Super for rock 'n' roll. Electric guitars are mellowed out a little.

The sound is not harsh, so you can listen to it all day long as an air monitor.

Violins, cymbals and percussion lack air (extreme highs). Sometimes the instruments mush together a bit. Acoustic guitar plucks are delicate. Vocals are full and smooth but not muddy. A non-harsh, listenable system.

Measurements

Using a Techron TEF analyzer, I tested the Alesis Monitor Two. The mic was one meter away at tweeter height. I saw a

mostly flat frequency response, ± 2 dB from 150 Hz to 12 kHz. There's a steep rolloff above 12 kHz and a gradual rolloff below 150 Hz. This is the anechoic response in "full space." When you put the speakers just behind a console, in half space, the bass response would rise about 6 dB. Then you'd get a flat response down to about 40 Hz. The graph shown is the combined room/speaker response, 1/6-octave smoothed. The peaks and dips in the bass are room effects.

The woofer is mostly flat from 50 to 800 Hz, and the rear port resonates at 35 Hz. As the Energy Time Curve indicates,

Product Capsule:
Alesis Monitor Two

 Thumbs Up <ul style="list-style-type: none"> ✓ powerful, deep bass ✓ smooth and neutral sound ✓ good looking ✓ great dynamics, plenty loud 	 Thumbs Down <ul style="list-style-type: none"> ✓ bass very slightly muddy ✓ highs not extended ✓ transients slightly smeared
--	---

For more information, contact Alesis at 1-800-5-ALESIS; or circle **Reader Service 41**.

Absolutely Digital

► continued from page 27

On the down side, Pro Tools does not have as many physical ins and outs as Dave wants. There are not as many points to tap in, and send signals to. Although all the inputs and outputs are assignable, only one physical XLR can be assigned to each track.

On the level

Setting levels takes more time with digital. "My old analog system was calibrated to points on the faders. I could set up the board before the session based on how it was calibrated. With a digital system, analog source levels are touchy. I'm always setting them. But when you feed in a digital signal, there's no level adjustment. I like that."

How about the sound? "I can't say that I've noticed a big difference in sound quality between analog and digital. My analog stuff sounded pretty good because it was dbx encoded. But I am more sensitive to room noise now with digital, so it must be cleaner."

Is Dave working any faster with digital? After two weeks, he became as fast producing digitally as he could with analog. At first, the learning curve slowed him down. Fortunately, his clients understood he was learning a new system (thanks to a good working relationship with them). He also charged them less per hour because he worked slower initially.

As Dave puts it, "I will be charging more for digital because I'll be more efficient. I'll be darned if I'm going to invest this kind of money just to do something faster and make less money from it. The overall cost to have a spot done will remain the same. I spend less time, but I charge more to make up for it. My clients are getting better quality and increased capabilities for the same price."

The future

"I haven't tapped all the power of this system yet," he says. "I still have yet to learn all the features and shortcuts. I'm getting there, but I probably won't use the whole thing. I wish I had more time to study this and play with it."

Dave is also looking into digital linking with other studios, for example, an announcer in Nashville that needs to be recorded in Elkhart.

"I could receive the announcer's voice signal through modem, and record it here. Or I could provide voice talent for studios in other cities without having to FedEx tapes to them overnight. Distributors could download radio programs through modem."

Considering his bright future, Dave is happy that he switched to digital production. "At first, I was reluctant to let go of that analog security blanket. Now that I've changed over, I have no regrets. Many others are doing it. When you make the switch, there's no looking back!"

□ □ □

Bruce Bartlett is a microphone engineer and technical writer, and the author of Practical Recording Techniques published by Howard Sams. Jenny Bartlett is a technical writer. Bruce can be reached at 219-294-8388.

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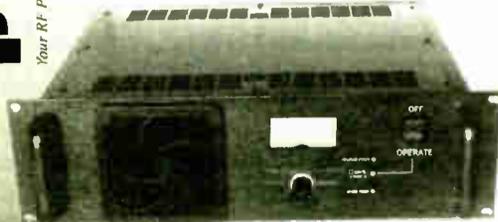
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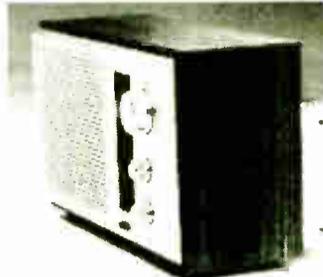
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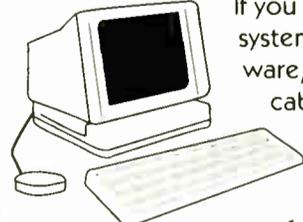
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Fool That DAT: Readers Tell You How

WASHINGTON In our review of the Tascam DA-30 MKII DAT recorder (*Studio Sessions*, RW Aug. 9, 1995), a sidebar addressed the 99 cut limitation of all DAT machines — not just the Tascam.

At the conclusion, we asked readers to submit methods they have discovered to trick DAT decks into believing a hypothetical "cut 100" on a 120 tape is a new Zero location. This way, an entire DAT can be recorded and properly indexed with ID numbers.

Several workable suggestions and methods are explained in this follow-up article to the original sidebar.

Low tech

The first method was tested on the DA-30 at WNNK-FM, Harrisburg, PA. It did not get implemented as production room policy, but does work.

A fifteen-second tone is recorded as cut 1. The tape is left to run, recording silence for 108 minutes. Another tone is recorded which the DA-30 identifies as cut 2. The tape is then rewound to cut 1 and used normally.

The bogus cut 2 ID should occur around the time cut 99 goes by (factoring in a short consistent length of leader between cuts). The recorder reads the marker and writes subsequent IDs from that position. The added benefit is the stripping of

Absolute Time code on the DAT tape.

Problems: accidentally recording over the bogus ID renders the method ineffective. The DAT machine is tied up for an hour and forty minutes during this operation. The method also presupposes only



Sony DTC-1000 (with RS add-on): fools them every time

60-second spots will go to tape: a mix of :10 and :30 second spots leaves an equally unidentifiable amount of tape between cut 99 and the new cut 2.

Hollywood DATs

As head of Jeff Davis Productions in Hollywood, Jeff Davis provides voice-work and production to a number of radio stations. He uses a Fostex D10 DAT machine which allows him to record up to 799 Program Numbers (PNOs) on one DAT.

Why 799? According to Jeff, "If you divide a 120-minute tape into ten-second segments and allow for proper separation, 799 would be the maximum number."

On DAT machines that limit displayed

cuts to 99, Jeff suggests rolling 30 seconds of non-recorded tape after the 99th cut, then begin recording again. The machine might see this region as "zero" and generate a new Program Number 1.

While Davis claims this works on a Panasonic SV-3700, many machines will simply write an ID with no index number.

Old Sonys

Hal Jackson — mastering engineer and technical advisor for production music company FirstCom Music — uses an old Sony DTC-1000 to fool DAT recorders into writing new ID codes.

When he hits the "Start ID, Manual" button on the DTC-1000, the machine drops into a recursive audition mode and loops a portion of tape repeatedly. After homing in on the best place to write an ID code, a "0" and "1" are entered on the keypad.

When the Manual button is pressed again, the machine obligingly rolls the tape back before that point and prints a brand new Program Number 1 ID at that location.

Using the DTC-1000, any number can be written anywhere, after which the DAT can be loaded into any other recorder. The latter machine needs to see the new program number to begin generating cuts 2, 3 and beyond when subsequent material is recorded.

Jackson explained: "We document new numbers onto studio logs as '+2,' '+3' and so on to signify these cuts are 'plus 99.' This numbering scheme has worked

like a charm since the days when we mastered everything to DAT first. Thankfully CD-Rs (recordable compact discs) are now the norm in the FirstCom production department today."

Jackson said that he has three Tascam DA-30s, two Panasonic SV-3700s and other portable DAT players laying about at FirstCom, "but there is one Sony DTC-1000 whose sole existence is to make that crazy +1 track code whenever we need it."

It may be possible to adapt one or more of these methods to work on DAT recorders at your station.

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PRODUCT GUIDE

Companies with new product announcements for Studio Sessions Product Guide should send them to Radio World, c/o Studio Sessions Editor, 5827 Columbia Pike, 3rd floor, Falls Church, Va. 22041



Sennheiser HD414 Reissue

Sennheiser Electronic Corporation, Old Lyme, Conn., is releasing a limited edition of the classic HD414 stereo headphones in celebration of the company's 50th anniversary. The open-air transducers have been updated from the original 1967 design to incorporate modern Sennheiser driver

technology. The HD414 reissue comes with a two-year parts and labor warranty, has field-replaceable parts and features Dr. Sennheiser's signature on the headband. Suggested retail price is \$99.

For information, contact Sennheiser at 203-434-9190 or circle Reader Service 168.

DigiTech Digital I/O Card

DigiTech has introduced the SV-I/O: an optional digital I/O plug-in card for the Studio Vocalist harmony processor. Radio jingle producers who now use the Studio Vocalist to generate vocal harmony can interface the processor with a digital console and keep all signals in the digital domain until final playback. The SV-I/O supports standard sampling rates and has both AES/EBU and S/PDIF inputs and outputs.

For more information, contact DigiTech at 616-695-5948 or circle Reader Service 132.

RDL Rack-Up Interface

Radio Design Labs added to its Rack-

Up line with the RU-LA2D balanced/unbalanced converter.

This is a bidirectional converter for interfacing consumer-quality CD and tape machines to and from balanced, line-level console wiring. Connections are made to XLR and phono jacks, or to a terminal block on the back of the unit. Frequency response is 10 Hz - 40 kHz, ±0.5 dB, with better than 0.005 percent THD.

For information, contact Radio Design Labs at 805-684-5415 or circle Reader Service 138.

Tempo Works Componder

Tensor Tech Labs of Lenexa, Kan., makes Tempo Works — The Componder: a time compression scheme for digital audio. Tempo Works changes the play time of an uncompressed digital audio file up to 50 percent without distortion or artifacts. This is useful for broadcasters who use PC-based DAW programs lacking built-in time compression algorithms. Tempo Works is available for both DOS and Windows.

For more information, contact Tensor Tech Labs at 913-383-3997 or circle Reader Service 103.

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USER REPORT

Telos Keeps WPR on Cutting Edge

by Allen Rieland
Director of Facilities
and Engineering
Wisconsin Public Radio

MADISON, Wis. Wisconsin Public Radio (WPR) has always been on the cutting edge of radio technology even when many people didn't know what radio was. This philosophy has guided

Mitchell, who once worked at the BBC and later was the first producer of NPR's "All Things Considered," always had a dream of having dual service everywhere in Wisconsin.

Boosted ratings

This strategy of providing NPR news and classical music on our first service and original talk programming (which we call "The Ideas Network") on our second service boosted ratings far beyond the single format we once used.

Another conscious decision was to decentralize both our news gathering and morning drivetime news and weather reports. By 1988, we had created regional news bureaus in Milwaukee, Green Bay, Appleton, Eau Claire, Superior and Stevens Point (which has since moved to Wausau).

One obstacle immediately encountered was the need to send locally produced

news pieces of statewide interest back to Madison for inclusion in the state portion of the hourly newscasts which originated there.

In the late 1970s, we experimented with early single-line telephone extenders from McCurdy Radio, which traded some high frequency response for a very extended low frequency response. We quickly decided that the quality wasn't high enough especially since many of our reporters were women and their voices sounded dull due to the frequency limitation.

After using standard telco line couplers and Comrex two-line systems, we began looking at Switched Digital Audio (SDA), which I had been hearing about at the Public Radio Conference seminars and at the National Society of Broadcast Engineers (SBE) conferences since 1991. By the end of 1992, WPR's Madison Bureau became the first Switched Digital site in the 608 area code.

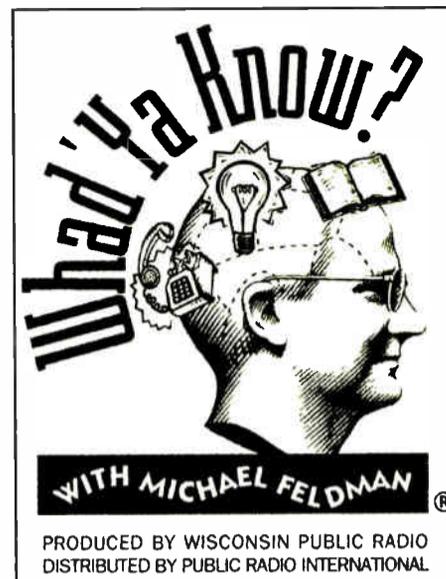
Clear audio

SW56 worked well for us. The audio was clearer and, while the signal-to-noise

We opted for the Telos Zephyr because of its simplicity of operation, sound quality and single-box design.

the station from the use of frequency extenders all the way to our use of Telos ISDN codecs

Before 1986, WPR was almost completely centralized with all programming originating from the University of Wisconsin. Director of Radio Jack



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"Whad'Ya Know" will be broadcast live in December using a new Zephyr.

ratio was no better than our Comrex two-line systems, the frequency response now extended out beyond 7 kHz and the distortion often dropped to below 1 percent. Unfortunately, we still ran into problems connecting with other sites.

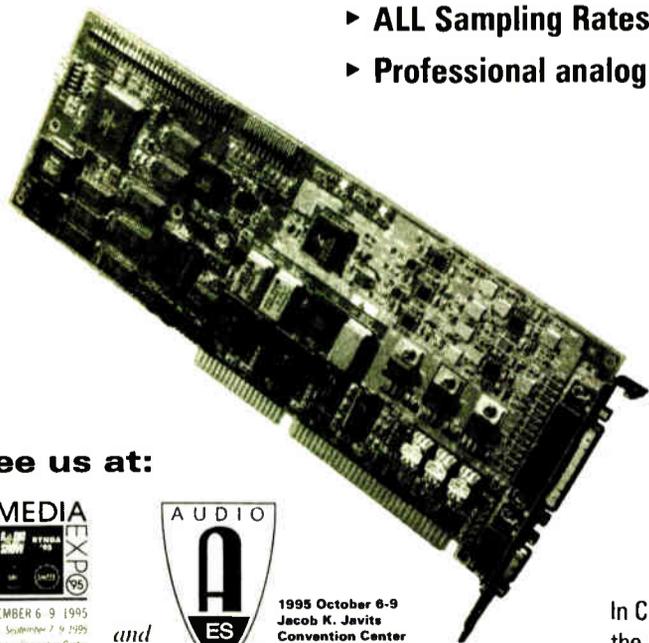
In 1993, the areas of Wisconsin served by Ameritech began to have
continued on page 51 ▶

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USER REPORT

TFT Boosts CKEY over Niagara Falls

Reciter Booster FM System Helps Canadian Stations Reach Shielded Listening Areas ... and Save Money

by Keith Dancy
President
CJRN(AM)-CKEY(FM)

NIAGARA FALLS, Ontario Niagara Falls, the honeymoon spot of North America, is the latest application of on-channel synchronous FM booster technology to overcome the obstacles of terrain to provide coverage to shielded population centers.

Now the cities of Niagara Falls on the U.S. side and Welland, Port Colborne and Niagara-on-the-Lake on the Canadian side of the river all receive CJRN(AM) from the Skylon Tower, high above the falls.

The markets

CJRN was an old line 10 kW AM station at 710 kHz, also operating a 250 W AM station in Fort Erie, Ontario. Canadian FM rules allowed us to take one of the stations and, in effect, trade its AM license for an FM. The problem was that the new FM would be next to the American border, and the only possibilities left were a couple of Class A stations. We felt that a Class A would not serve the 1 million-plus



STL antenna atop Skylon Tower.

Buffalo metropolitan area listeners, as well as the 450,000 to 500,000 in the Niagara region.

The Niagara metro area includes the Canadian cities of St. Catharines, Niagara-on-the-Lake, Niagara Falls, Welland, Port Colborne, Fort Erie and the area in between. In other words, almost 1.5 million people could be served if a good FM frequency could be found. The problems included not intruding into the U.S. space beyond allowable limits while still managing the terrain factors.

Another desirable design objective was to use only the existing dual AM transmitter site. Both CJRN and

CKEY(AM) were on a single site at Fort Erie, and now both CJRN and CKEY(FM) have their main transmitters on that site.

We decided to use one of the AM transmitter sites near Fort Erie, which featured



Keith Dancy stands proudly in front of his station.

12 towers on only 92.5 acres of land. The 26,000 W ERP that was finally decided upon required a directional array, but the escarpment toward desired population centers would present significant propagation difficulties.

In short, we predicted that the escarpment would cause some problems because of the relatively low height of the antenna and the dramatic 350-foot drop of the escarpment at Niagara Falls.

The problem

The shadow created by the escarpment would include a large portion of Lake Ontario and leave 120,000 potential listeners in St. Catharines with a marginal signal and a lot of chopping.

I had read about the TFT Reciter Booster FM system and contacted Terry Ambrose of MSC, TFT's Canadian agent. Dancy then met with Imagineering Ltd. President Ed Bogdanowicz to determine the feasibility of the system.

Tests done from the Skylon Tower in Niagara showed that serving Buffalo, N.Y., from that location with a single transmitter was virtually out of the question, not to mention a potential capital investment of more than \$1 million.

If CKEY could keep its main transmitter at Fort Erie and engineer an on-channel booster at St. Catharines, it would save the expense of the extensive Skylon installation, not to mention the fact that the Skylon site did not reach all the markets that CKEY wanted to reach.

Deliver the market

A low-power transmitter on-frequency at St. Catharines would deliver to the entire market's population, provided there was little interference from the main lobe transmitter at Fort Erie. The synchronized system was exactly what was required: The system would work much like a cellular telephone, with the escarpment providing the isolation and the TFT Reciter system providing the synchronization of modulation and frequency.

With the permission of Canadian authorities, the system was tested and installed. The Skylon Tower proved to be ideal as an STL repeater site to reach

both the FM booster location and the main transmitter at Fort Erie.

It did point out one additional problem with on-channel boosters: sometimes you cannot tell when you are off the air. I called CJRN engineer Bill McDougall one morning to say that the station was off the air, but McDougall argued that the station was indeed on air because he could hear it from his house. Actually, he was receiving the synchronous booster and could not tell the difference between it and the main transmitter. McDougall's home is in one of the areas expected to receive the poorest coverage.

I believe that the synchronous booster system makes CKEY the most competitive radio station, along with two other FMs in the market who were grandfathered in and have higher towers. Not having to move the CKEY main transmitter from Fort Erie allows CKEY to maintain its excellent coverage of Buffalo, which, in my opinion, is superior to a lot of existing home-based Buffalo stations.

The bottom line is that CKEY is worth much more now with the TFT FM synchronous booster than it was before. A potential CN\$1 million investment for a risky solution was circumvented because a system that cost about one-tenth that amount proved to be the best solution.

For information, contact Paul Black in California at 800-347-3383; fax: 408-727-5942; or circle Reader Service 161.

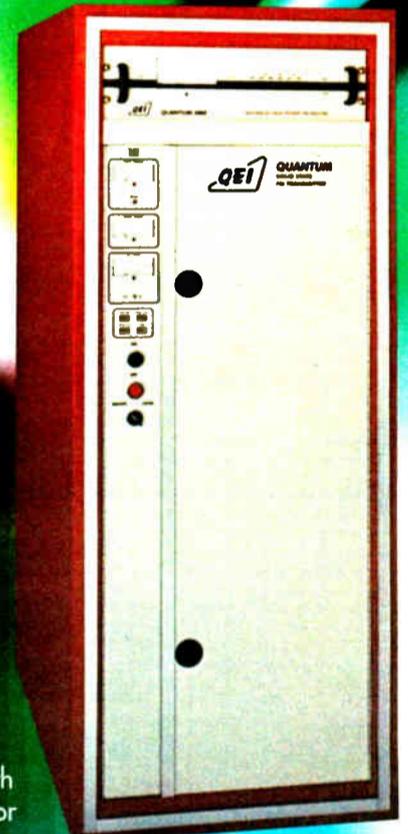
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USER REPORT

Logical RE 660, 661 Give Good Audio

by **Chuck Leavens**
Director of Engineering
WDUQ(FM) and
President
Leavens Engineering Associates

PITTSBURGH, Pa. When I was selecting codecs to use for sharing programming in high-quality stereo with other stations and for shipping 20 kHz stereo programs for network distribution around the world, I almost missed the RE 660/661.

Manufactured by **RE**, a large Danish instrumentation company, and distributed by its U.S. division **RE America**, these units have an impressive worldwide installation base.

660 and 661 are the model numbers for the separate encoder and decoder. These units are used separately on each end of a connection, providing a single-direction stereo audio path, or they can be used together on the studio end to provide half of a 20 kHz stereo bidirectional dial-up link.

Upon looking the units over, I discovered that every possible parameter I could possibly want to set up was on the front panel. There are no dip switches, and no special computer software is necessary to get at certain functions. RE laid everything out in a logical, direct way.

Looking at the encoder panel from left to right, the display shows analog or digital input, sample rate, mode, transmission

speed and data subchannel speed. The adjusting controls are all next to the display with an extremely logical and clear layout.

In addition, the decoder has the most powerful autodetect function I have seen on any unit. It does an excellent job of detecting the incoming data-stream and making the unit comply with whatever the data wants. It provides incredible audio without setting up a bunch of switches.

This was important to me because at **WDUQ** any member of the staff may need to use the unit to go live on the network in case of an emergency, as we did last year in the aftermath of a major airplane crash in Pittsburgh.

Just when I thought I was familiar with the unit, a diskette arrived in the mail with a software update. I downloaded the update into the unit from a portable PC and within six minutes had six sample rates. These are provided on 3.5-inch diskettes in DOS format.

This was not the last time I received an update. Later I received a diskette that added a whole new operating protocol to the unit. I have been very impressed with the fact that RE was one of the first to use PC-downloadable software.

RE's experience as an instrumentation company really pays off here. They have sent disk updates to ensure compatibility with other units that do not follow standards, while still adhering to the world standard.

They seem to be committed to making the unit meet the needs of users now and in the future by adding features with free software upgrades. I need to be sure that the technology and the equipment I buy doesn't abandon me as the years pass. I feel very comfortable with these units from this aspect.

A friend of mine was concerned because the units do not use an audio clipper to protect the headroom. I discovered in my own testing that a clipper is not provided because it would seem the gain structure of the unit is such that it's next to impossible to hit the digital ceiling. At least I haven't been able to get the units to distort.

Any time I've tried, the 5532 on the active balanced output was producing enough current to start lighting lamps. And still only extremely clean sound appeared at the output. The unit has active balanced ins and outs, as well as AES/EBU digital ins and outs.

Sonically, I prefer RE coders to other units. With the array of sampling frequencies, you can adjust for best audio response within the MPEG Layer II structure. For example, Layer II at 56 kbps data speed going with a 24 kHz sample rate gives better response and better sonic ability than a 48 kHz sample rate. This is a normal function of Layer II, and as such it is provided for the maximum flexibility and sonic response.

Of course, these units are capable of speeds up to 384 kbps with all MPEG modes supported, one channel, two channels, stereo, joint stereo along with the full implementation of G.722.

I use these units regularly for communication with the BBC London, CBC Toronto, National Public Radio and even for super-high quality stereo remotes with live music around Pittsburgh. Making sure I can connect to units from other manufacturers is always a concern with some out there not being with the world standard for ISO/MPEG Layer II.

I have successfully communicated on numerous occasions with every major brand of codec out there. It makes sense to me to buy a unit that is certified as being with the standard by the ISO, the people who set the standard.

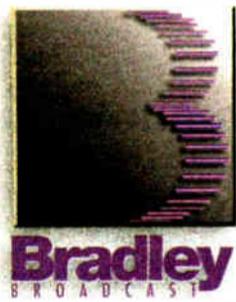
The RE 660/661 are certified. I bought a second full set a year later and they too have been great. I guess if I had to sum up these units I would say that they are extremely well-crafted and designed and, sonically, are the best of a variety of units I have tried. Plus, RE America is committed to customer support.

For information from RE, contact the company in Ohio at 216-871-7617; fax: 216-871-4303; or circle Reader Service 80.

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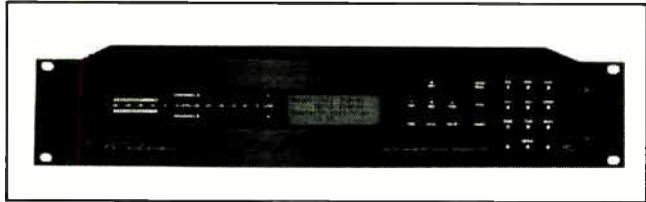
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 **HARRIS
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WPR on Cutting Edge

► continued from page 42

access to Integrated Services Digital Network (ISDN) lines. Because our SW56 system was being so heavily



Zephyr digital network audio transceiver.

used, we decided that we needed a second system.

After considering the Layer II and Layer III systems available, we opted for the Telos Zephyr because of its simplicity of operation, sound quality and single-box design.

We use the Zephyr in its Layer III mode, but it is also compatible with G.722 and with Layer II units. Layer III provides us with a signal-to-noise ratio better than 75 dB, low distortion and frequency response out to 15 kHz.

We also liked the Zephyr's versatility. We can use Channel A to link up with a bureau for a news feed and still have Channel B free to link up with a guest in some far-flung studio for an interview. In addition, we hope to use it to bring in live stereo remotes as we add other Zephyrs at our bureaus.

Zephyrs were in our Madison and Eau Claire bureaus by 1994.

Backup feed

In October 1994, I received a call from the technical director of "Prairie Home Companion" to arrange for a backup feed during the show's visit to the Madison Civic Center on November 5. Apparently a piece of equipment in backup chain of their uplink was out for repairs and wasn't expected to be available in time.

Although we are an uplink site for National Public Radio, running lines installed from the civic center to us would have been very costly. I suggested they install an ISDN line and I'd lend them our Zephyr for the evening. They could then dial up the NPR satellite center in Washington which also had one.

The Ameritech technicians struggled for two days to install and provision the line properly, but it worked and the folks from Minnesota were impressed by the quality and simplicity.

Just days before the show, we learned that the arrangements for a satellite backhaul of our "Whad'ya Know? with Michael Feldman" program for January 28 in Columbia, Mo., had collapsed. "Whad'ya Know?" is carried by over 150 public radio stations.

We remembered the success that "Prairie Home Companion" had using the Zephyr for a stereo two-hour program, so we checked if there was ISDN available. The answer was no, but the Columbia site could get SW56.

Ultimately successful

Telos shipped us the V.35 cable necessary to use the Zephyr as a SW56 codec and we located the correct CSU/DSU at NPR in Washington. Tom Blain, technical director of "Whad'ya

Know?," hand-carried the Zephyr on the flight to Missouri.

As usual, getting the line to function properly took too long, but it was ultimately successful. Since that show in January, we have used ISDN and the Telos Zephyr for "Whad'ya Know?" backhauls from New York City on April 1 and from Toledo, Ohio, on May 20.

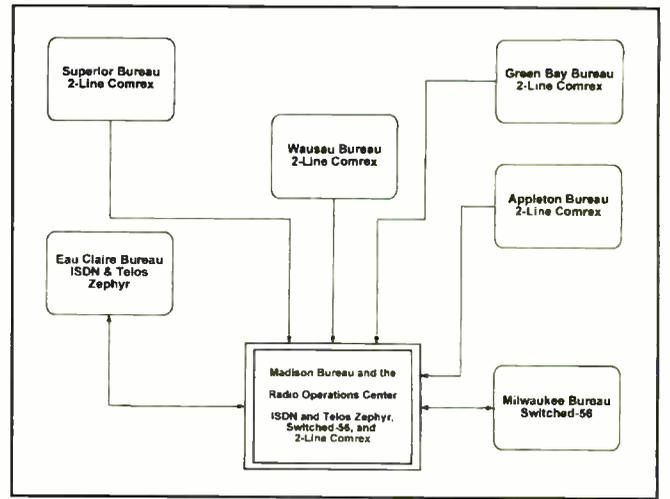
In December 1995, one of the first uses of ISDN at our Green Bay Bureau will also be a "Whad'ya Know?" broadcast from the new Weidner Center for the Performing Arts at the University of

Wisconsin. It will be live, using a new Zephyr.

We are sold on this technology. Although there are caveats about the availability, installation time and audio delay of switched digital services, WPR will continue to purchase more units for our news bureaus and for remote use to get the programs where they need to go, as cheaply and simply as possible with greater sound quality than ever before.

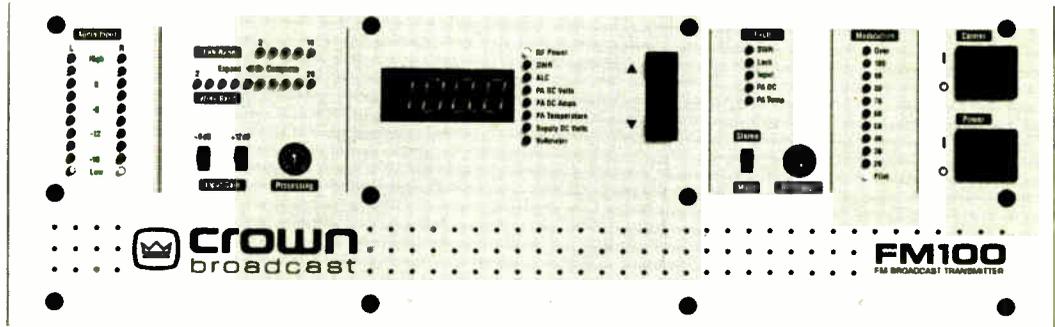
For information from Telos, contact Danielle Kreinbrink in

Ohio at 216-241-3343; fax: 216-241-4103; or circle Reader Service 35.



Wisconsin Public Radio switched links with regional bureaus as of August 1995.

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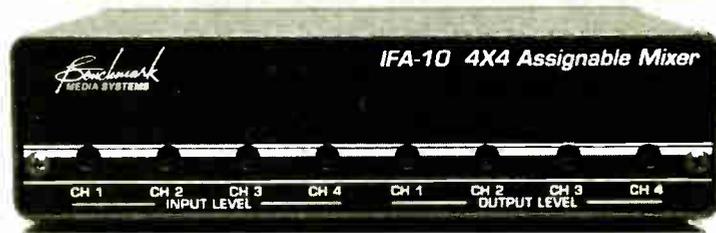
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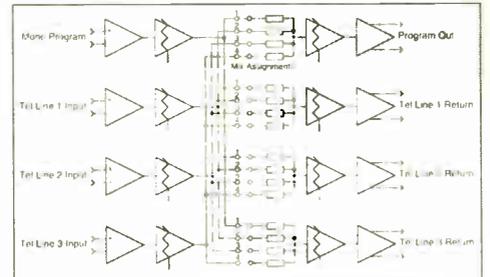
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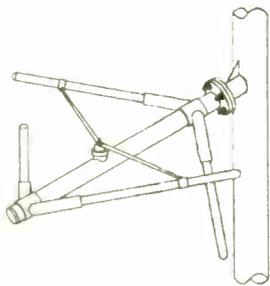
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USER REPORT

TAC Tackles Audio In and Out Problems

by Harry M. Bingaman
Chief Engineer
Sunbury Broadcasting
Milton Lewisburg Broadcasting
Sunair Communications

MILTON, Pa. It seems that 1995 has been the year of the telephone in the engineering department. Three of the six stations I service decided to upgrade to digital phone systems.

Normally, this would not be a problem. But it seems that when you work with the local telco, it is hard to convince them that you need to move audio other than the spoken word in and out of its system.

Sound America has come up with an excellent way of solving audio in and out problems on almost any phone system, be it single line, key or digital — the Tac Telephone Coupler System.

Head scratching

During the planning stages of the first installation, we had informed the telco rep that we needed in certain station departments a way of getting audio from our sources to the phone lines.

With a little head scratching on their part, they came up with a solution, but it

Installation was a snap — just plug between handset and phone.

was costly and outside our budget.

The next day I was paging through the latest Broadcast Supply Worldwide (BSW) flyer and found the Sound America Tac Plus listed in the new products preview. It looked like exactly what I needed, so we bought two units.

The first unit was installed in the newsroom, where the phone is used the most. Installation was a snap — just plug between handset and phone.

The unit features a three-position handset muting switch. In the up position, it is momentary muting; the middle position, normal; and the down position, continuously muted. Included is a TMPEdance and attenuator selector switch, which makes it compatible with almost all phone systems. But do not plan on using the Tac or Tac Plus with any phone system that incorporates its dialer or brains in the handset.

Routing audio

Routing audio in and out is a simple task. It has two 1/8-inch (3.5 mm) mono female jacks. One is audio in, and its level requirements range anywhere from +4 dBm to +16 dBm for -10 dBm to phone line, depending on whether you have a standard or an electronic phone.

The other jack is for audio out from the phone system. Its level is set for -55 dBm. It obviously was intended to be used for mic input.

Last, this unit comes RF bypassed, which is a good thing. Most of my units were used at a 10 kW AM station with antennas outside the window.

We have bought a total of five units for

use in the newsroom. The news department carries one in their jump bag for field reporting. We also use the Tac Plus in the copy department. We have one connected to a cart machine for playback of spec spots to clients.

If you need to get audio in and out of a phone system, this product is ideal. But there is always room for improvement. The units we used in the newsrooms were modified.

We eliminated the resistive attenuator on the audio out line. We needed a line

level out, rather than mic level. It would be nice to have the impedance attenuator selector switch mounted inside a tamper-resistant cover. We did have problems with it accidentally being turned to the wrong setting, resulting in improper send level. We eliminated the problem by removing the knob after installation.

We have been more than pleased with the Sound America Tac Plus unit. It not only saved us time but, more importantly, money.

For information, contact Fred Himes in



TAC Telephone Coupler System.

Georgia at 912-238-1771; fax: 912-238-1750; or circle Reader Service 10.

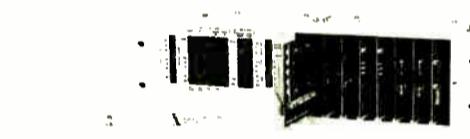
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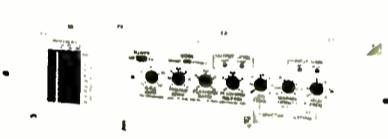
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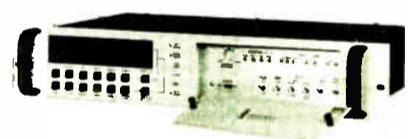
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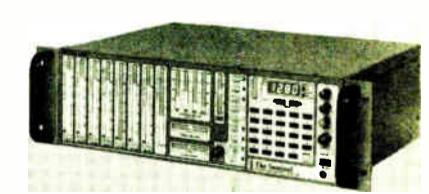
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USER REPORT

AT&T Helps Revive Health NewsFeed

by Jack Sheehan
Assistant Director of
Public Affairs
Director of Health NewsFeed
Johns Hopkins Medical
Institutions

BALTIMORE When the Johns Hopkins Medical Institutions decided to revive "Health NewsFeed" — a 60-second syndicated report on medicine, including interviews with Hopkins experts — high-quality audio and a technologically diverse delivery system were at the top of its priority list.

When the program began in 1985,

audio tapes were shipped to an uplink point for distribution. The quality was good, but the distribution process lacked flexibility. Subscribers had only one opportunity each day to receive the satellite transmission.

Budget pressures ended the program in 1993, but after an 18-month hiatus, Hopkins' Office of Communications and Public Affairs decided to start from scratch with a new, all-digital system.

With a broadcast background as an Associated Press Broadcast Services radio network anchor and reporter, I was hired to rebuild the program and develop an innovative and cost-effective

system for delivering the daily 60-second reports to subscribers.

Multifaceted system

A primary objective was to create a multifaceted delivery system to meet the needs of radio stations with varying levels of technological capabilities. After two months of investigation, we settled on four distribution routes that would provide a viable choice for every radio station.

The primary route is via Satcom C5 using ABC Satellite Services' SEDAT system. There is also an automated phone feed for stations without satellite receivers. Those stations equipped with multimedia computers can download the audio from a computer bulletin board, using a toll-free access number, and play it back through any Windows-equipped multimedia PC with a soundcard.

The fourth and most innovative route for receiving Health NewsFeed utilizes AT&T's ISDN (Integrated Services Digital Network) service to provide CD-quality sound over ordinary phone lines that are accessible via toll-free service.

Early on, we decided that our program would be sent to the satellite uplink by

ISDN because of the high-quality digital audio that the service can carry and because Johns Hopkins is already wired for it. But we needed an alternative for many stations, especially the smaller ones, that found a once-a-week satellite feed inconvenient. They needed a capability for dialing into an on-demand, high-quality feed and then receiving the program automatically when it suited them best.

AT&T's solution was to add its new WorldWorx 800 service to our ISDN BRI (Basic Rate Interface) line, linking the advantages of digital service with the convenience and cost-effectiveness of toll-free service. The combination gives Hopkins a toll-free vanity number for both voice and data calls. Software in the local telephone company switch determines which call is which and routes it to either the ISDN lines or the phone set. 1-800-MED-RADIO was selected as the toll-free number, and the service was set up on one of the hospital's T1 lines.

Stations equipped with Switched 56 (SW56) ISDN equipment can dial the 800 number and connect automatically to our distribution system, which plays back a full week's worth of programs.

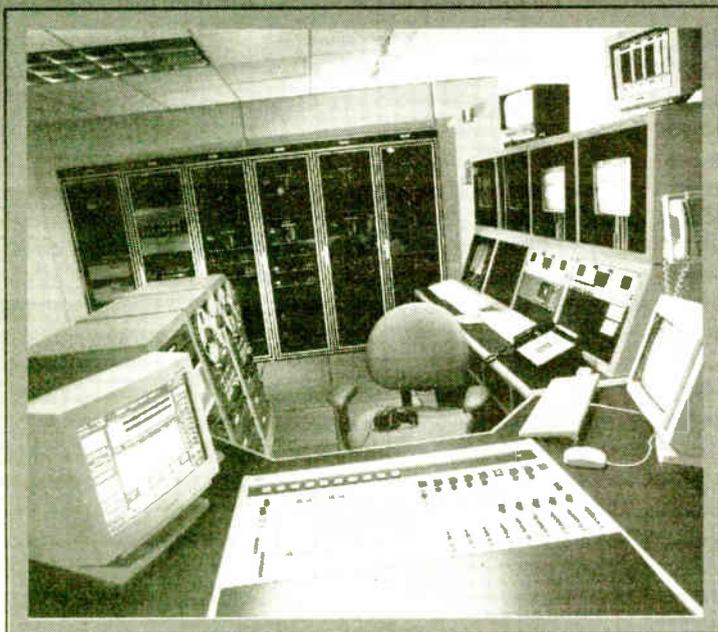
The process

Inside the Health NewsFeed studio, the ISDN line is brought into an ADTRAN ISU

continued on page 56 ►

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USER REPORT

CDQPrima Alleviates That Sinking Feeling

by Richard Rudman
Engineering Manager
KFWB(AM)/KTWV(FM)

LOS ANGELES As L.A. proceeded with its construction of a metrorail into Hollywood, the city began to encounter problems that ultimately affected all of us, especially businesses situated near Hollywood Boulevard.

The biggest problem is called subsidence — a nice way of saying the ground is literally sinking. Some of the buildings have even been cabled so they don't topple as the ground near the tunnel sinks. At the moment, construction on the tunnel has stopped.

My biggest concerns about all of this were KFWB's phone lines, including one from our studio to the transmitter. There is only one telephone company cable that crosses from our side of Hollywood Boulevard to the other.

Even before the subsidence problem, there was always the danger that construction crews would inadvertently cut through the cable and put us off the air. I do not have a line-of-sight path to the transmitter and so have never been able to use a microwave STL for KFWB.

Fiber network

Fortunately, just a few months before Hollywood Boulevard began sinking, Pacific Bell had offered us free fiber installation in anticipation of the rise in fiber network use in the future. It was especially attractive because of a protective feature PacBell calls "Sonet," which is basically a ring of fiber that

would have to be severed in two places to fail.

To make full use of these fiber capabilities, I decided to go with fractional T1. I bought six slots for a total of 384KB capacity. When I heard about the new CDQPrima codec from MUSICAM USA (formerly CCS), I did some research and found that I could use T1 to ease my fears of having our main phone lines cut.

The Prima uses MUSICAM, which not only sounds good but allows two full-fidelity channels in each direction plus a data channel. Group W has been heavily involved in the development of DAB, and a quality signal is very important to us. Anything that goes into our transmitter has got to be capable of what the company feels is the highest quality digital audio. I certainly wanted to squeeze every bit of quality audio we could out of this backup system.

Peace of mind

We had previously worked with MUSICAM as an experiment with a digital Moseley STL for our FM station and we were extremely pleased with the way it sounds, better than most of the algorithms available today.

CDQPrima, along with fractional T1, has given me peace of mind for our back-up problem. From the start, the Prima did everything we asked of it. Since the Prima is field-upgradable, we are better prepared for the future. Older codecs are stuck at what they are built for today.

continued on page 56 ►

USER REPORT

Comrex Improves Remotes, Byte by Byte

by **Ralph Norman Beaty, CPBE**
Chief Engineer
WIBC(AM)

INDIANAPOLIS WIBC's move to digital remotes on ISDN brought us some dramatic improvements in program quality and flexibility and also lowered costs.

Prior to the acquisition of WIBC in 1994 by Emmis Broadcasting Corp., our remote broadcasts were done mainly over UHF radio links and analog broadcast circuits. With the limited range of radio links and the astronomical expense of equalized broadcast loops, ISDN is quickly replacing these options as the major vehicle for our remote broadcasts.

Equipment list

WIBC uses Comrex DXR.1 and DXP.1 digital audio codecs for converting the analog audio from the remote equipment to the required digital format. The Comrex units use the widely deployed G.722 standard for 7.5 kHz monaural bidirectional audio, which is great for AM broadcast stations.

For FM broadcasts, these codecs are also capable of 15 kHz monaural bidirectional audio, using both ISDN B channels. Emphasis is placed here on bidirectional capability in that the station can return program, operational

information or cuing to remote site without a second line.

The DXR.1 is a rack-mount unit that we use at the studio. The DXP.1 is a much smaller unit and it is ideal for the remote pack-size constraints. We use an Adtran ISU 128 ISDN terminal adaptor (TA) with

Our complete remote kit consists of headset and stick microphones, headset amplifiers, audio mixer, codec/TA, a laptop computer for call screen coordination and the all-important clock. No matter what time zone you are in, the talent needs to see what time it is at home.

In central Indiana, Ameritech country, ISDN is widely available. Specific site availability depends on having an appropriate switch type (usually an AT&T 5ESS or Northern Telecom DMS100) at the local central office and on the distance between the remote site and the

are the same as voice calls and do not incur a measured per-minute charge. Long distance, with a choice of the major players, does incur an additional per minute rate. We have found local Ameritech service employees excellent in installation, service and support.

Digital audio codecs take some time to do their job, and transmission paths can add to that delay. Depending on the distance and the algorithm utilized, the effect of program returning to the remote site can range from paging at the airport to déjà vu.

Talkback system

Because of this, a mix-minus scheme is needed so that the talent won't hear him- or herself on the return path. The audition channel of the air console can be used to generate the mix-minus, provided that each source can be independently selected.

Lacking this versatility on your audio board, an auxiliary mixer can also be employed to send all of the sources, except for the remote location, down the return path of the ISDN line. WIBC uses a modified talkback system, with a mix-minus and a switched feed so that the studio producer may talk to the talent on location.

Coding delay can vary tremendously, depending on the algorithm, and some codecs produce a delay of up to a half second. Even with a mix-minus, this can be a

continued on page 61 ▶



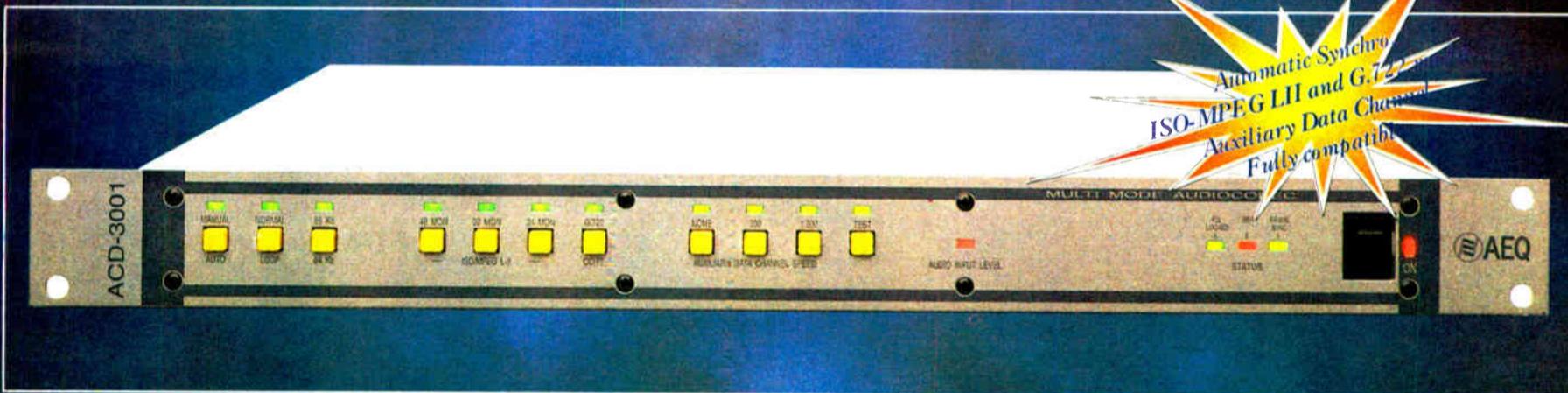
Mario Andretti (center) talks with host Big John Gillis (right) at the Indianapolis Fan Fest. The Comrex DXP.1 ISDN codec (see blowup) is under the supervision of WIBC technician Eddie McCelland (left).



a built-in NT-1, eliminating an additional piece of equipment from the remote pack. The codec and TA together cost about \$2,200 (a codec/TA pair is needed at both the remote site and the station).

nearest ISDN-provisioned central office. Installation costs for a standard basic rate interface (BRI) channel (2B+D) is \$190.00. The monthly usage charge is \$40.00. Local calls on the ISDN network

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- ▶ The equipment uses CCITT G.722 and ISO/MPEG Layer II compression algorithms in a wide range of operating modes and combinations.

Operating modes:

- ▶ The ACD-3001 offers the flexibility of user-defined operating modes. Selection is made on the front panel keyboard and is fully indicated by LEDs as well as the communication status and alarms.
- ▶ ISO/MPEG LII 48, 32 and 24 KHz MONO and G.722 modes are available.

Features:

- ▶ Input / output bit rate selectable at 56 or 64 Kbits, with any of the operating modes.
- ▶ Manual and automatic synchronization. Last synchro. configuration, stored in memory, allows the fastest resynchronization in the event of a power failure.
- ▶ 300 or 1,200 bps selectable Auxiliary Data Channel available when working on ISO/MPEG Layer II mode.
- ▶ LOOP and TEST modes available. Error alarms included.

Specifications:

- ▶ Transformer coupled analog input and output.
- ▶ Digital interfaces V.35 and X.21 for Terminal Adaptor connection.
- ▶ RS-232 interface for Auxiliary Data Channel.
- ▶ 16 bits A/D and 18 bits D/A Sigma-Delta converters.



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AT&T Revives NewsFeed

► continued from page 54

2X64 modem connected to a MUSICAM USA (formerly CCS) CDQ1000 audio codec. The CDQ1000 has a relay closure output on the rear panel that latches after the codec frames up a data call.

When a station's ISDN modem calls for the feed, the modem connects and frames the codec. The relay output is taken to an Industrial Computer Source DIO16 interface card inside a ZEOS Pantera 486 computer. Custom software intercepts the interrupt generated by the DIO16 and triggers the computer's Turtle Beach Tropez soundcard to play back the Health NewsFeed reports, which are recorded and stored in Microsoft .WAV format at

16-bit resolution and a 22.05 kHz sampling rate. The software also counts the number of playbacks for record-keeping purposes.

All audio recording and editing is done on a ZEOS Pantera Pentium PC running at 90 MHz and using Turtle Beach's Wave SE editing program. The 486, in addition to serving as the playback machine, is a backup editing system.

The launch of this system was not trouble-free. Some local telephone companies had not installed switched software upgrades necessary to process the WorldWorx 800 number. That meant some stations never got a connection or

the data call was improperly routed onto the D, or voice channel, instead of the B channels for data. AT&T technicians in Atlanta and Chicago spent several nights and weekends tracking down the problem and making the fix.

A primary objective was to create a multifaceted delivery system ...

Late spring, a promotional campaign announced Health NewsFeed's return with four different distribution methods of varying technological sophistication. A mass fax to 5,000 radio stations, a brochure mailing describing the product and distribution systems, plus a media

campaign resulted in 200 calls to Hopkins during the first two weeks of the effort.

More than 100 stations were on-line when we went back on the air June 9. Bloomberg Business News, with 10 full-time stations and 50 affiliates, signed on and became the flagship station with our network. The current station roster has reached 110. Thus far, only Bloomberg and a few other stations are taking advantage of the ISDN/WorldWorx 800 delivery route; however, we receive a steady stream of inquiries about the service. So, we are engaged in an ongoing customer education process. As more local exchanges become able to process ISDN calls, we expect the number of stations choosing this delivery route to grow quickly.

Now that the WorldWorx 800 ISDN system is up and running, Health NewsFeed is preparing to extend overseas. The Voice of America is using the ISDN system to retrieve the reports and broadcast them in Europe and Asia. AT&T and Hopkins are working on international toll-free numbers for the automated ISDN feed, the voice line and the computer bulletin board service that offers medical news and information to stations. (That BBS is accessible at 1-800-JHH-0046 in the U.S.)

The combination of off-the-shelf technology and low-cost digital phone service enabled Johns Hopkins to bring Health NewsFeed back on-line under budget and with more flexibility than was available before. The increasing availability of ISDN service and lower equipment costs are making it an attractive and cost-saving alternative to the more traditional methods of program transmission.

For information from AT&T, contact the company's WorldWorx Customer Care Center at 800-828-WORX; fax: 908-221-4018; or circle Reader Service 71.

That Sinking Feeling

► continued from page 54

The technology in the Prima is advanced, and much of it is software-based. In an emergency, it can even "talk" to other devices based on Switched 56 or ISDN. I especially like the management and diagnostic software.

The Prima was straightforward when it came to setup and operation. One of the two Primas originally shipped had a faulty board but it was quickly replaced by the company. The system is now working and has not gone down in over a month of continuous use.

We are using the Prima and T1 setup as a backup line to the transmitter now, which is somewhat ironic as it far exceeds the quality of our regular studio line — a 15 kHz phone circuit, and that of our previous backup, which was an 8 kHz circuit.

Anybody in charge of engineering for a facility that has been through major disasters (such as the earthquakes of a couple of years ago) always wakes up at 3 a.m. worrying about the next thing he has not planned for. It used to be that the prospect of having our phone cable cut was my recurring nightmare. Now I have faith in the reliability of the fiber link and the superb performance of the Prima.

For information, contact Art Constantine in New Jersey at 908-739-5600; fax 908-739-1818; or circle Reader Service 53.



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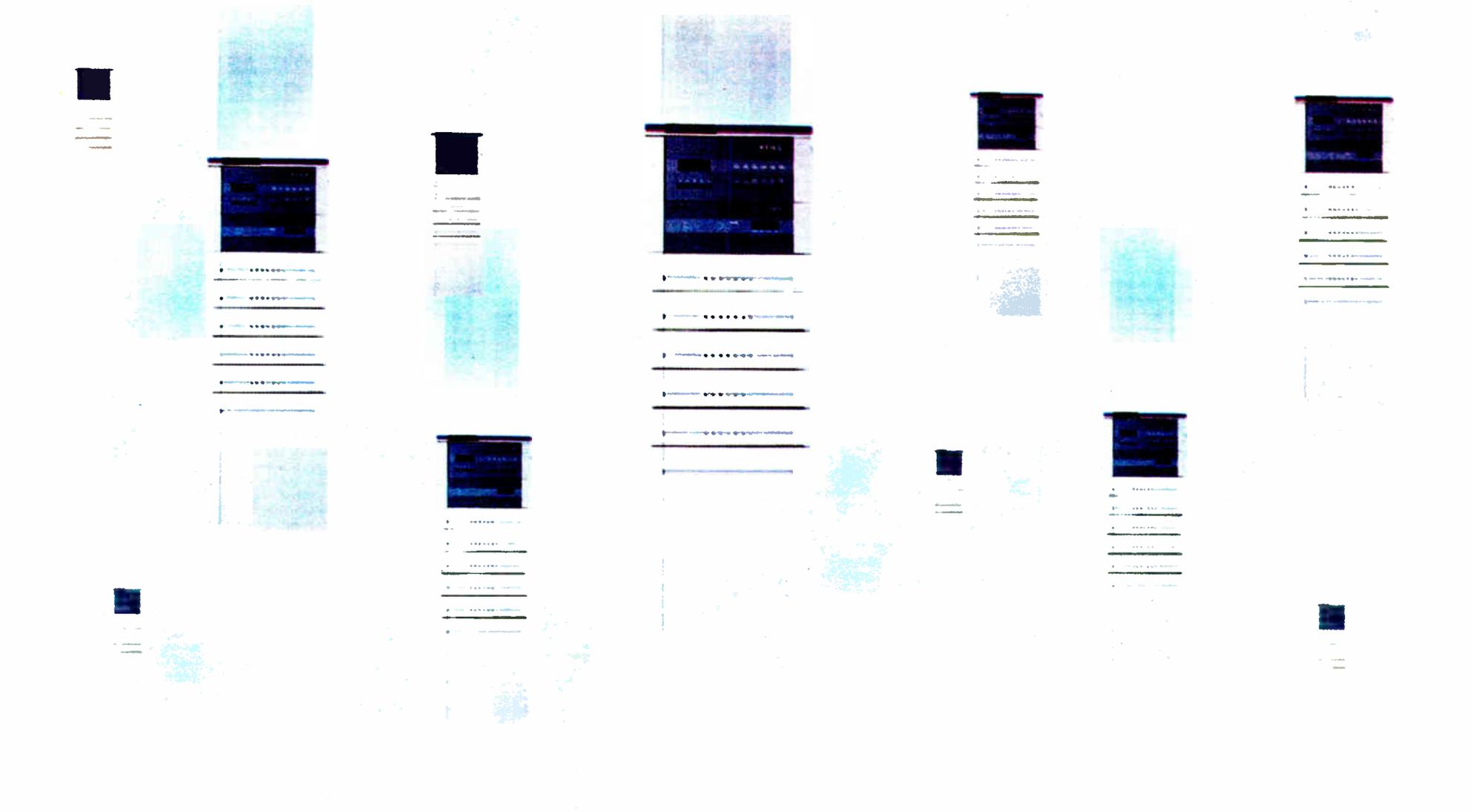
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Features

While the 12000 series console is available in 8, 18, & 28 input module mainframe sizes, the 18 channel mainframe with 12 input modules is by far the most popular configuration. The mainframe supports input modules, a variety of option modules such as input selectors and DA's, and even the 99 button Gemini control surface for Arrakis digital workstations. Input modules can be chosen as mic or stereo line input with three models of each to choose from. Also, the input modules may feature either 3 stereo output buses -or- 3 stereo output buses plus 3 mono output buses for a total of 6 assignable outputs. The six output version is perfect for talk studios with multiple telephone mix minus feeds. Input modules feature comprehensive logic control for sources and talk booth turrets. The monitor system supports a control room and two studios with complete talkback facilities. The mainframe even includes a 60 minute up timer standard. All of the features and capabilities are included in the 12000 to make it ideal for any size market.

Performance

Designed for the radio station of the digital '90's, the 12000 series high performance console has a dynamic range of over 100dB which makes it ideal for use with digital audio sources such as CD players and digital audio workstations. Use of Analog Devices monolithic mic preamps assures you of the lowest noise and distortion that current technology can provide. Active balanced in and out, the 12000 is the high performance, professional solution to your studio's needs.

Rugged Reliability

The 12000 series console is a rugged and reliable broadcast product. The modular mainframe simplifies service and provides for future expansion. The use of VCA's and DC channel On-Off switching increases fader life, reduces channel dropouts and noisy switches. The modules feature polycarbonate plastic overlays for scratch resistance. Penny and Giles faders, 5 million operation channel on-off switches, and ITT Schadow switches assure a long life. Use of heavy hardened aluminum panels, polycarbonate module overlays, and solid oak trim will provide a durable and attractive appearance through the years.



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USER REPORT

TS612 Works for Fast-paced AM Team

by Bobby Gray
Chief Engineer
WWKL(FM), WYMJ-FM,
WCMB(AM)

HARRISBURG, Pa. I have not been in radio professionally for 20 years, nor have I been the person solely responsible for deciding what equipment gets purchased and installed and ultimately used for more than maybe three years. Not until it was time to get a new phone system did I really have to study what equipment was available.

I would like to give credit to my mentors, Tom Ray and Duffy Eagan, for taking the time to show me what the major market morning shows have to work with and the train of thought behind the engineering departments that laid it all out for them.

High priority

After dealing with a jury-rigged office phone for on-air use for a long time, the morning show took it upon themselves to make purchasing a new phone system a high priority for everyone involved — namely, me. My problem was, which one? What capabilities do we want, and

that was fed dial tone via a modem data button on our office phone system. To put a call on air, you selected the line you wanted, hit the data button and then re-selected the same line, completing the process. You can imagine how desperate a quick-paced morning team would be for a new system.

I had promised the minute I saw the

Our setup makes for a completely console-free phone mix-minus system that sounds superb.

UPS man that I would clear my calendar until the system was on the air. The day it arrived I did not want to deal with a major phone system installation. After getting into it about waist deep, however, I realized that quite a bit of thought had gone into this system and that it was clearly going to do what I asked it to.

WWKL's setup

At WWKL, we use Symetrix 528E microphone processors, which allow

three places: into the left channel of the Otari MX5050BII, into the console so your morning person can air people live and into an amplified speaker so the announcer can hear the caller without having to put anything in cue. This setup makes for a completely console-free phone mix-minus system that sounds superb. No switches, no muss,

no fuss. A well-placed drop of Krazy Glue on the Otari announcer input pot makes for consistent announcer levels on tape.

Using the source select switch on the BMX, we can mix the Otari output into mono so jock and caller appear in both channels of the air chain. Not having the caller input pot glued allows the jocks to adjust for those calls that originate in trailer parks well beyond the 1 mV contour of the radio station.

The audition feed into the Shure mixer is probably one of our most used features. We send sound effects home to people as they play games in the morning and we send our Marti audio into it after turning down the microphone inputs so that remote audio can go into the phone system. Taking calls from a remote is now no effort at all for either the board operator or the morning show.

Out of the box

This system was on the air recording callers two hours out of the box. I was impressed with its abilities to adapt to my own outboard mix-minus system. There is a bank of hidden dip switches in the unit accessible through the front panel. You do not have to go to the same lengths I did for a mix-minus, as the TS612 does give you a nice, clean split between jock and caller.

The main difference between the TS612 and the SPH-3 can be summarized in one word: digital. The SPH-3 on its best day always had that "paper-towel-tube" equalization. The TS612 is so transparent in its ability to null out send audio that our air staff cannot even hear themselves when playing back the caller channel only on tape.

The TS612 bells and whistles are useful ones. The control surface, which includes a handset, is loaded with features. The unit is smart enough in record mode to start the Otari's recording by simply answering a line — and to stop the machine when it becomes apparent the caller is wasting our time.

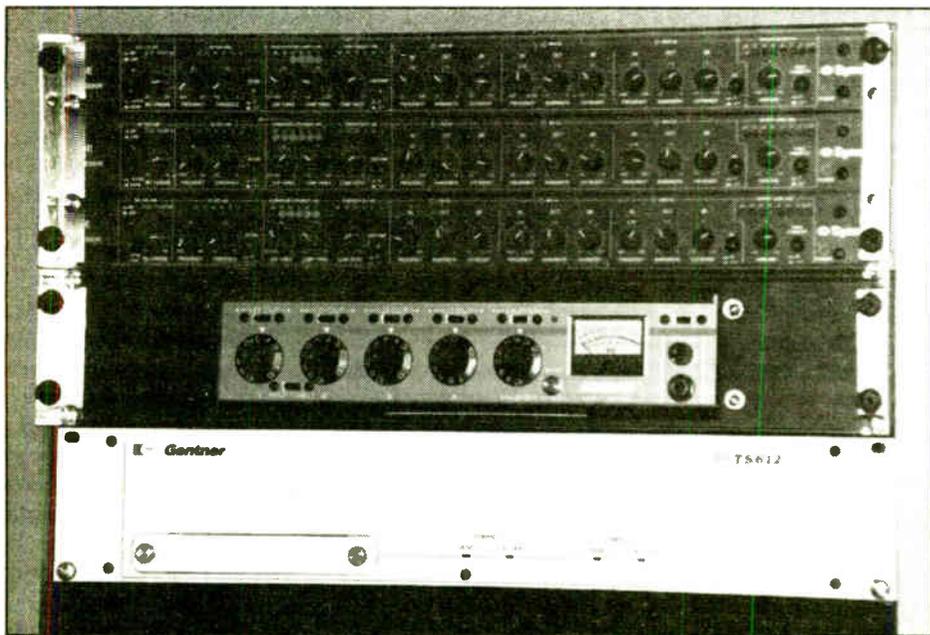
I made a very minor modification to the unit when I got it. There was some difficulty interfacing the TS612 directly to the Otari and the console logic simultaneously. Gentner was a big help in providing +5 VDC on the rear D-SUB connector to power a small reed relay interface I built.

We now have two of these systems in our

facility in our two on-air studios, and, most likely, I will order a full-blown, 12-line system for our production room, which is where our live talk shows originate. This system will also be configured with a screener location and control surface.

I am very pleased, and Gentner is to be commended for building a system that can be configured so many different ways.

For information from Gentner, contact the company in Utah at 800-945-7730; fax: 801-977-0087; or circle Reader Service 112.



The TS612 was up and running two hours out of the box.

how smart do you have to be to get a dial tone?

I thumbed through a couple of trade papers, found some phone system ads and made them available to our air staff, requesting their comments. The most common response was that they wanted to sound as good on tape with a caller as they sound on a live microphone. (We do a lot of "in-the-bag" request shows.) The air staff also wanted no part of an audition-oriented phone-to-tape system. "Too many buttons," they said.

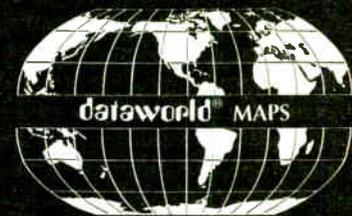
The Telos phone systems were tempting because of the in-console control panel for the Pacific Recorders BMX series. I had to tell myself more than once that aesthetics is not the only consideration when choosing a phone system. All this time I was being bombarded by those full-page Gentner TS612 ads. So I called them. I ordered a six-line version of the system without the available screener control surface.

We were replacing a Gentner SPH-3

you to choose how to run them. We run ours with mic level outputs directly out of the balanced output and into the BMX microphone input module. The 528E also gives you uninterrupted patch points to let you grab audio at various points throughout the processing stage.

We take the unbalanced output of the entire processor and run it mic level into a rack-mounted Shure M267 mixer. Our air studio has three mic positions, so this process is repeated for all three microphones. The Shure mixer now hears everything the BMX mic input modules do. Channel four on the M267 is selectable either line or mic. We run it in "line" and put a mono sum of the console audition bus into it. This allows us to put anything into the mixer via the console audition bus. The output of the M267 goes two places: into the Send of the TS612 and into the right channel of an Otari MX5050BH deck. Instant great-sounding disc jockey on tape.

The caller output of the TS612 goes



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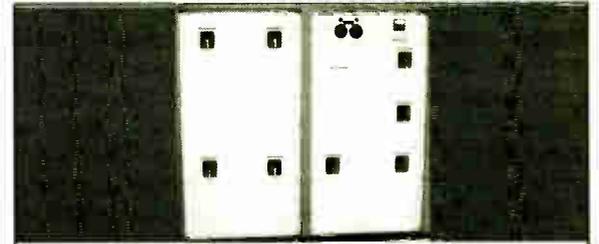
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USER REPORT

Burk ARC-16 Takes Heat off Tejano Station

Remote Control Unit Helps Keep Downtime at Multiple Stations to an Absolute Minimum

by **Bret Huggins**
Chief Engineer
KXTN-AM-FM/KCOR(AM)/
KROM(FM)

SAN ANTONIO Tichenor Media Systems owns and operates 16 radio stations, four of which are in San Antonio. One of these is KXTN-AM-FM, a Spanish-language station that programs Tejano music. KXTN also happens to be number one in the market.

With a number one station, in addition to other very active AM and FM stations in a market, you have a lot of pressure to keep downtime to an absolute minimum. The Burk Technology ARC-16 has been a real asset to the engineering staff.

Rely on the DJ

It's really frightening to have to rely on a jock to read and execute the carefully written "How to Turn On the Backup Transmitter" instructions. One would think that writing the instructions in one-inch high letters would do the trick. Unfortunately, it often doesn't.

See if this sounds familiar: The jock can't get the back up transmitter on by following the instructions posted in the studio, so you are on the phone telling him to go to channel one and press raise. The DJ then goes to the audio console, turns up the pot and hits the start button.

Don't laugh, it happened.

With the Burk ARC-16, I just tell the

jock to keep the music rolling and turn on the backup transmitter myself. The phone number for the ARC-16 unit is



Bret Huggins shows off the Burk ARC-16 in use at KXTN (AM)-FM.

programmed into speed dial. It answers after the first ring. Enter the code, select the channel and hit the pound key. Presto! Back on air.

Works by itself

Even better, with the Burk Autopilot software, it senses that the main transmitter is off, turned on the backup transmitter and then pages me with an alarm status.

The Burk ARC-16 works like a regular

remote with a studio unit and a transmitter unit.

You can also dial up any unit that has a speech interface. Only one speech interface is needed to talk to all the units in the chain. However you can have more than one speech interface for redundancy purposes.

On top of that, you can hook up with your laptop and check in on things even while on vacation.

Burk has a number of options for different applications. Give them a call and tell them about your station and needs. They will help you build the right configuration.

You can even get them to fax you a diagram of the proposed configuration to help you determine if it's right for your station.

For me, the ARC-16 relieves a great deal of the pressure that comes from a large or multistation operation. I know that Burk has definitely improved our on-air reliability.

For information, contact Dan Rau in Massachusetts at 508-486-0086; fax: 508-486-0081; e-mail: danrau@burk.com; or circle Reader Service 1.

Improving Remotes

▶ continued from page 55

real problem with live, interactive programs like our sports talk shows. One advantage of the Comrex G.722 units is that their delay is minimal, and two-way conversations can be held with a host back at the studio or with callers fed from the station, without people "stepping on each other."

Been there, done that

In the past year, ISDN has become a routine part of WIBC's operation. Our first involvement with ISDN was the media feeding frenzy surrounding the release of Mike Tyson from the Indiana Youth Correctional Center. The worldwide service of the British Broadcasting Corp. (BBC) used WIBC's studios and ISDN services for its coverage. The ISDN connection to London dialed up instantly (faster than an international voice call) and the per-minute charges for the bidirectional studio quality feed were around \$2.00. Try that with a satellite.

On the national and local front, WIBC has employed ISDN for remote broadcasts of the Derby Festival in Louisville, Ky.; Fan Fest at the Indianapolis Motor Speedway; the Indianapolis 500 Mile Race festivities; Disney World at Orlando, Fla.; the Indiana State Fair; sports talk shows; and daily commercial and promotional audio feeds.

With the use of Comrex codecs and ISDN, remote broadcast possibilities are worldwide. Life can be good at remote locations.

For information, contact Lynn Distler in Massachusetts at 800-237-1776 or 508-263-1800; fax: 508-635-0401; or circle Reader Service 84.

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USER REPORT

CLD-2500 Maintains Audio Integrity

by **Bill Stachowiak**
Owner and President
S&B Communications

BUFFALO, N.Y. S&B Communications is an engineering firm with 10 engineers serving the needs of 40 clients in western and central New York, Pennsylvania and wherever else our expertise is needed. I take pride in the personal attention we give to our customers.

Two stations in the Buffalo area that I deal with personally are WYRK(FM) and WJYE(FM). Originally, WYRK was situated on the fifth floor of its office building and WJYE was on the 17th. But when both stations were purchased by American Radio Systems this year, I was called upon to co-locate them on the 12th floor, which meant new studios and new

links to the transmitters.

Since the transmitter facility is on the 27th floor of the same building, I decided that a composite line driver would be the ideal link between the studios and transmitters. I bought the **Modulation Sciences** CLD-2500 to use as my wired STL.

Keep 'em separated

One of my primary reasons for using the CLD-2500 is my desire to keep the processing and other audio equipment separate from the transmitter environment. The CLD-2500 has turned out to be a good choice. The CLD-2500 does not degrade our stereo separation; separation for the stations exceeds 45 dB and we're enjoying extremely low distortion numbers, too.

The CLD-2500 was easy to set up — I just took it out of the box, plugged it in and it worked perfectly. I ran a twinax shielded, balanced twisted pair the 15 floors from the stereo generator to the exciter. Normally, it would not be possible to locate the generator that far from the exciter because of loss of separation and hum ground loops. With the CLD-2500 and twinax I could send a balanced signal up the line and keep the two far apart.

Enhanced performance

Overall, the stations' audio performance is enhanced by keeping the audio equipment

out of the high noise transmitter environment. By keeping the audio isolated, we maintain audio integrity throughout and ensure a quality signal.

I have had experience with MSI products before this, including the CP-803, and always with good results; I've never had one of its products fail.

We have just finished building the new studios and installing new transmitters and antennas for WYRK and WJYE. It was a major project that took months to complete and I'm happy to report that it turned out well. Finding an easy and reliable way to keep our audio clean and send it from our studios was, thankfully, a part of the job that didn't add to my worries.

For information, contact Eric Small in New Jersey at 800-826-2603, or circle Reader Service 207.

USER REPORT

Owners Consolidate With Moseley STLs

by **Jeffrey Lalumiere**
Director of Engineering
Tele-Media Broadcasting

EAST PROVIDENCE, R.I. Many modern (and not-so-modern) radio facilities across the United States are jumping on the bandwagon, converting their analog STLs to digital transmission.

Aside from the superior sound quality of digital audio provided by the **Moseley DSP 6000** series digital encoders/decoders, the increased spectrum efficiency is appealing to station group owners in that it enables four 15 kHz channels (along with other data) to be carried over one STL path.

Compared to conventional analog systems, up to 20 dB less signal is required at the destination point for full 90 dB signal-to-noise operation. Also, the DSP units interface nicely with T1 services provided by the phone company. The result is AES/EBU compatibility, high-quality digital audio and cost-saving efficiency.

Era of consolidation

In an era of LMAs, duopolies and consolidation, this high-quality, spectrum-saving technology offers a more efficient way of delivering program audio to transmitter sites without sacrificing quality.

We used the Moseley DSP 6000 series encoders/decoders to upgrade existing PCL-606 series STL transmitters and receivers to digital transmission in several markets. Along with the DSP 6000s, we included new Moseley 6010 transmitters and 6020 receivers to create digital STL systems in other markets. Tele-Media Broadcasting (which owns and operates duopolies in Providence; Quincy, Ill.; Johnstown, Pa.; State College, Pa.; and Harrisburg/York, Pa.) has introduced multiple-station, single-facility outlets in which up to four stations featuring different formats deliver programming to each associated transmitter site with

the Moseley digital STL systems.

The STL system at WPRO-FM and WWLI(FM) in Providence is unique in that the two FM stations' program audio is moved to each of two transmitter sites over a single STL path. This was made possible by upgrading an existing PCL-606 STL transmitter with a Moseley DSP 6000E4 digital encoder, and two PCL-606 receivers with Moseley DSP 6000D4 decoders, thus imposing the digitally encoded program audio from both stations on a single 951 MHz, 500 kHz wide RF channel.

More audio, lower cost

With one transmitter located at the studio and each of the two receivers located at their respective transmitter locations, program is delivered over an 8.5 mile path to each transmitter site, separated from each other by only 1,100 feet. Once received, each program (selectable) is decoded by the DSP 6000D4 units and fed to its respective transmitter. A complete analog backup system is in place for each site.

System two (WQWK(FM), WQKK(FM), WIKN-FM and WRSC(AM)) consists of four stations housed within one facility in State College, Pa. Utilizing the Moseley DSP6000 equipment, an existing STL and a T1 service provided by the local telephone company, the system came together quite easily. We were able to transport more audio to more places with less cost than conventional analog systems.

The Moseley DSP series encoders/decoders, along with their transmitter/receiver/T1 counterparts, have proven valuable and reliable in delivering high-quality audio program with many times the capability of analog systems.

So if you're in the market for digital, check 'em out.

For information, contact Dave Chancey in California at 805-968-9621; fax: 805-685-9638; or circle Reader Service 105.

USER REPORT

Prism Cuts Cost with T1

by **Craig Kopcho**
Station Engineer
Prism Radio Partners L.P.

JACKSONVILLE, Fla. Digital T1 transmission is the way to go. If you have a lot of dedicated circuits going from point A to point B, you'd be crazy to do it any other way.

For Prism Radio Partners, the impact on phone costs was dramatic — we've realized 75 percent savings in reduced rates. Program audio quality also improved dramatically, so much so that the microwave STL has been reduced to backup status.

Since September 1992, Prism has purchased 16 radio stations in key markets, including Jacksonville; Raleigh, N.C.; Louisville, Ky.; Wichita, Kan.; and Tucson, Ariz.

Lot of audio

In Jacksonville alone, Prism operates four stations — WOKV(AM), WKQL(FM), WPDQ(AM) and, a recent addition, WIVY-FM. We are also the NFL affiliate for the Jacksonville Jaguars. This means that there is lot of audio for us to cover.

To help us reduce costs and maintain flexibility, we use T1 lines for our main STL link at WKQL. Always in pursuit of better economies as well as audio quality, we switched from analog to the phone company's T1 Megalink digital service.

Interfacing with the Intraplex TDM 160 Series multiplexers, the service combines studio-to-transmitter program audio for our main music program, along with remote pickup and remote control, all through a single T1. We like the uncompressed discrete audio quality of the Intraplex program audio modules, and by carrying backhaul Jaguars programming, the T1 is full.

We selected Intraplex equipment because of its expansion capabilities and flexibility: We use the backhaul capability for Rush Limbaugh, and the T1 gives us redundancy for our other stations' STLs. We plan to add more 15 kHz channels in the future and will install another T1 to serve WIVY-FM.

The new WIVY-FM digital T1 system will be a complete audio transport network. The network is loaded: two stereo 15 kHz out to the transmitter (going uncompressed linear all the way), two stereo 15 kHz return feeds and a voice channel. The flexibility of the multiplexer is virtually limitless.

Because T1 is inherently bidirectional, not only do we get an STL circuit, but we effectively get return circuits for "free." The 15 kHz audio, using linear coding, provides CD-quality audio and maintains the characteristics of the audio processing. Stereo separation has improved and the noise is gone. I have yet to see a microwave STL that can surpass it.

The bottom line

The WKQL T1 service costs \$760 per month as opposed to our previous combined STL and RPU analog circuit costs of \$2,600 per month. The difference translates into a savings of \$1,840 per month. When we piggyback remote control as well, Prism saves another \$130 per month.

Moving from analog to digital T1 phone service significantly improved both audio quality and the bottom line. Analog lines have increased in cost while T1 lines have decreased; therefore, switching to T1 helped cut telephone charges. The savings continue into the future: the payback on the installation of this equipment will be less than 14 months.

For information from Intraplex, contact Christine Doyle in Massachusetts at 508-692-9000; fax: 508-692-2200; or circle Reader Service 204.

TECHNOLOGY UPDATE

D-MAX Module Set Expands Transport Capabilities Of CAT-LINK Digital STL

WILLIAMSTOWN, N.J. QEI offers the expanded capability of AES/EBU digital audio transport with the D-MAX module set for the CAT-LINK.

CAT-LINK can bidirectionally transport discrete audio, FM composite and BTSC composite over a single T1-compatible circuit. QEI invented the digital composite transportation technology and holds the U.S. patent on its use.

The philosophy behind the CAT-LINK is that of providing a transportation pipe. This means simply that what you put in is what you get out. No audio compression is ever required or utilized.

With the advent of digital FM exciters and upcoming DAB technologies, broadcasters

continued on page 64 ►

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TECHNOLOGY UPDATES

► CAT-LINK continued from page 62

need to transfer digital program material from the studio to one or more transmission sites. If you own one of the new-generation digital exciter, then you are already aware that any STL connected to the digital input of the exciter must be linear (i.e., uncompressed).

Until now, this required either that the AES/EBU digital source be located with the exciter or the conversion of the digital audio to the analog domain. Once in the analog domain, the audio was transmitted to the

transmitter site over analog STL and fed to the stereo generator and then into the digital exciter.

The D-MAX module set allows for the transport of the digital program material over the STL. At the transmitter site, the material is available in the AES/EBU discrete digital audio format, analog discrete audio and/or FM composite stereo simultaneously.

For information, contact Jeff Detweiler in New Jersey at 800-334-9154; fax: 609-629-1751; or circle Reader Service 171.

Portable Codec Delivers Reliable 7 kHz Audio over Plain Analog Phone Lines

MESA, Ariz. The Scoop Reporter from AETA is a portable codec that lets users send and receive 7.5 kHz quality audio over plain old switched telephone (POST) lines. It offers the convenience and low cost of the 3 kHz telephone with the quality professional broadcasters have come to expect from G.722-level ISDN or SW56 digital communication.

News reports, sportscasts and on-site promotional broadcasts can be done from

practically anywhere on a minute's notice, provided a telephone hookup can be found. The Scoop Reporter's low delay of 30 milliseconds makes it ideal for live broadcast situations.

The Scoop Reporter is packaged as a self-contained unit, with an XLR microphone input and an XLR auxiliary input. XLR output jacks are provided for local headset feedback and audio output. A keypad with an LCD display is provided for establishing and monitoring the communication. The unit may be powered from the main 110 V AC line or by four standard D batteries.

The Scoop Reporter uses the latest digital signal processing (DSP) technology to achieve a better than 10:1 compression ratio. The DSP device is capable of 60 million mathematical operations per second and uses a complex algorithm that duplicates the way that human vocal chords resonate and speech is formed. Based on this analysis, the codec communicates a simplified data string at 24 kbps using a built-in V.34 modem. The compression algorithm is not only fast, but also extremely resilient, operating at bit rates as low as 20 kbps with little degradation of quality.

The Scoop Reporter was first introduced at the 1995 Spring AES show in Paris. It is already in use at radio stations in Europe and has been successfully evaluated by major U.S. radio networks. Two hundred units were sold to a pool of radio stations for their coverage of the 1996 Summer Olympics in Atlanta.

For information, contact Martina Semm in Arizona at 602-464-0085; fax: 602-964-0804; or circle Reader Service 189.

Frequency Agility Helps New STL Line Stand Apart From the Pack

HUDSON, N.Y. When Energy-Onix first explored the possibility of offering STL systems, it considered several factors. The company wanted to offer a quality product affordable to all broadcasters, regardless of their budget. Another consideration was features.

The STL-1 is a 10 W, frequency-agile, digitally controlled composite system, featuring a Precision LED modulation meter with peak indicator. It is remote control-ready and offers full metering of all system parameters. The STL-2 system has the same features as the STL-1 package with the addition of a 20 W amplifier.

Frequency agility provides duopoly owners the assurance of having a backup STL as an emergency standby system to cover several stations.

For instance, the company says that one customer ordered an Energy-Onix STL for a new station. The day the STL-1 arrived on site, a lightning strike wiped out the STL at his existing station. The station engineer unpacked the STL-1 system, entered the new frequency into the CPU and had the station back up in no time at all.

The remote control capability of these STL systems is another benefit. Personnel awakened by a call from their transmitter site will know if they have a transmitter or STL problem before engineers are dispatched. This information can save hours of downtime, allowing proper backup equipment or parts to be brought to the site on the first trip.

For information, contact Ernie Belanger in New York at 518-828-1690; fax: 518-828-8476; or circle Reader Service 157.

Looking for the ultimate affordable digital STL solution?



Look No Further!

Moseley

Moseley Associates Inc.
111 Castilian Drive
Santa Barbara, CA 93117
Voice (805) 968-9621
Fax (805) 685-9538

WHEN Moseley introduced the DSP 6000 in 1992 it was immediately acclaimed by the broadcast industry as THE digital STL solution. Here's why. The DSP 6000 virtually eliminates the problems associated with conventional analog transmission such as noise due to signal fades, birdies from intermod interference, and lack of spectrum for multiple audio feeds to LMA and Duopoly transmitter sites. Almost three years later, the DSP 6000 is the de-facto industry standard for sonic clarity and reliability with sales approaching 2,000 installations worldwide. But you probably already knew all of that stuff, right?

What you may not have known, is that the DSP 6000 also works in conjunction with your existing Moseley analog composite STLs! If you've invested in a Moseley PCL 505/C, 600, 606, 606/C or 6000, a few simple modifications convert your entire system to digital! And it won't cost a pot of gold (just under \$6,000). Call us for modification instructions, or better yet, ship us your STL and for a mere hundred bucks, we'll make the modifications and do the setup for you.

Isn't it time you stopped chasing rainbows and started enjoying the sonic clarity of digital? "Digitally clear. Clearly digital. Just the way we planned it." ▼

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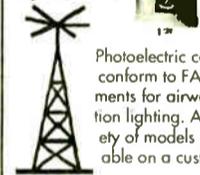
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AUDIO PRODUCTION

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Eventide 910, excellent condition, \$675. J Winters, 717-367-1119.

Pro Announcer 500 mic processor, as new w/manual, \$600. G Barnett, 619-328-1104.

360 Systems 16x16 router expansion unit only, \$295. G Watcher, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-817-1030.

CRL-4 SG 800A, SGC 800, SEC 800, SMP 850, good condition, with manuals, \$4000. Jack, KJKY, 1309 S Monroe St, Joplin MO 64801. 417-624-1025.

Tascam ES-50 & 51 combo sync, 2 slaves, \$2500. D Michaels, 916-926-1332.

Bulk eraser, \$49; Stewart 4 ch D-box, \$95; Cue command decoder, \$125; NEW Tascam midiizer MTS1000, \$450; Infonics 7" reel copier 1-3 copies, 2 @ \$125 ea; Furman elec crossovers, \$95; Peavey M2600 power amp, \$375; Crest FA800 PWR AMP, \$475. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

Good used studio tape 1/2" \$15, 1" \$30, 2" \$55. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

dbx-224x Type II NR, -10 dbm, \$90; (15) space Calzone mic locker, \$90; Symetrix T1-101, phone interface, \$175; Sony ECM-55B lavalier mic, \$150; all as new. Brian, 313-584-9201.

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Cooper Time Cube, MXR pitch xposer, MXR digital delay, Ensoniq DP-4, Roland SDE-3000 & unusual studio gear preferably 60s to late 70s era. 617-293-5671.

Ampex tube mixers, plug-in mic pre-amp modules for PF10's, Altec or other tube compressors, Mackie mixers. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

AUTOMATION EQUIPMENT

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SMC Model MSP automation system, works good, including 10-channel brain/switcher, SMC racks (3), 452 bi-directional Carousels (2), ARS 1000 reel PBs (3), single cart PBs (2), battery pack OP, Silence Sense, all manuals, 25 Hz/1000 Hz tone generator & some spare parts, you PU in VA, \$3250; 10" country tapes & set-up @ your loca available for reasonable extra charge. Howard, 615-452-8600.

Harris 9000 (5) ITC 750, Carousels, dual floppy drives, single cart deck, more, \$2000. Tom, 715-234-9059.

SMC Carousels (2), various mem cards, expansion card, audio & sensor cards, terminal, etc, BO; Xtel printer for automation syst, BO. C Tracy, WKNE, 603-352-9230.

CART MACHINES

Want To Sell

Audi-Cord DL-PS (4) stereo PB, excellent cond, \$650/ea; Delta stereo R/P, excellent cond, \$1500. E Stevens, 81 Lancaster Ave, Malvern PA 19355. 610-889-9676.

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Otari ARS-1000 PB only, good condition, with book, \$250 ea/BO. WMOP, PO Drawer 3930, Ocala FL 34478. 904-732-2010.

BE 3000A stereo R/P with tones, very good condition, \$850; BE 3000A mono PB/delay recorder, rack mount, new, \$500; BE 3000 mono R/PB with tones, good condition, \$650; BE 3000 (3) mono PB with tones, \$450/ea. D Kelly, 402-372-5423.

Mono Tapecaster 700RP & 700P (1 ea), good for parts or refurb, work, Best Offer. C Tracy, WKNE, 603-352-9230.

ITC stereo cart machines - 99B Rec/Play, \$1100; Delta Rec/Play, \$900; (5) Delta playbacks, \$600 each. Page J.B. @ 213-961-0100.

Want To Buy

ITC, BE, Fidelipac cart machines: single, triple, mono, stereo, play & record/play. Call M O'Drobinak @ 619-758-0888.

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Technics SL-P1200 \$695. M Guthrie, WFNS, 7201 E Hillsborough Ave, Tampa FL 33610. 813-620-9100.

Want To Buy

Century 21/Pioneer Autosegure units, players and sequencers, any condition. R Latimer, KXGJ, POB 2537, Bay City TX 77414. 409-244-4170.

COMPUTERS

Want To Sell

IBM PS/2 286 CPU, ISA BUS, IMET, 39 MB HDD, 1.44 floppy, \$150/trade toward mins. P Cibley, Studio C Music, POB 767 Murray Hill Station, NY NY 10156. 212-532-2980.

Want To Buy

Tandy 6000 HD with at least one floppy drive. Mel Crosby, 408-363-1646.

CONSOLES

Want To Sell

Tangent 1202A 12-channel mixing board, slide pots, reverb, pre- & post-FX, send & return, EQ, excellent condition, \$1000/BO. L Prezant, 718-548-1623.

Ampro AC10D (2) 10-chnl, each has 4 aux inputs, dual chnl mono out, self contained monitor amp, power supply & manual, very good condition, \$950. Dave or Harold, 517-686-9341.

BE BE-4M5DA, new, \$600. G Grassie, 505-734-5565.

Fostex 812 studio mixer, 2 yrs old, 12x8x2, original packing, manual incl, \$850. G Parmelee, Audio Tracks, POB 645, Middlebury VT 05753. 802-247-4208.

Harris M90, 19 chnl stereo, including PGM/AUD inputs and meters, 1-8 chnl remotes, 2 mic mods, good condition, needs power supply, BO; McCurdy SS4370, 8 chnl stereo board including 3 inputs/chnl, 1-5 chnl remote, 1 mic mod, excellent condition, BO. J LaBaum, 1423 W Norwich, Fresno CA 93705. 209-221-7510.

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McCurdy SS7500 stereo console system with furniture, Best Offer. M Guthrie, WFNS, 7201 E Hillsborough Ave, Tampa FL 33610. 813-620-9100.

UREI Mod One stereo consoles (2), Best Offer. R Stafford, 501-933-0403 FAX.

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McMartin B502 stereo console, \$300. Gary, 919-790-6315

Ramko DC5AR, 5 channel mono. J Parsons, Parsons Sound, 2781 Fayson Cr, Deltona FL 32738. 904-532-0192.

Tangent 1202-A stereo mixing console, 12 inputs, echo, send and receive, fold-back outputs, solo features, mono outputs, all inputs mic or line equipped. LED VU's, immaculate, \$800. S Lawson, KAK Productions, 928 Hyland Dr, Santa Rosa CA 95404. 707-528-4055.

Want To Buy

Any xfer panel for tape to disc late age of unit no concern. R York, 513-522-9336.

RCA tube bdct consoles. 512-371-7777.

Western Elect 23-C sloped front w/square boxes on ea end, grey, will trade for Pultec. Lang. EQs or WE 22-D. S Horner, 619-535-1210.

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Aphex Dominator II 720, excellent condition, with manuals, \$850. Jack, KJKY, 1309 S Monroe St, Joplin MO 64801. 417-624-1025.

CRL PMC 300A peak mod cntrlr, very little use, new, BO. M Ward, 508-875-6109.

DAP-310 Discriminate Audio Processor in working order with manual, \$275. B Hawkins, 950 N Meridan St #1297, Indianapolis IN 46204. 317-684-8411.

Orban Optimod FM 8100A, xint cond, incl spare Aphex #4 & #5 cards, orig box & manual, \$3500. G Barnett, 619-328-1104.

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Want To Buy

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Vanguard PK20 & SK150 mics & info. 617-293-5671.

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MISCELLANEOUS

Want To Sell

1/4" tip, rim, sleeve patch bays (6) w/X-Mas trees, misc broad cast carts, wire, connectors, etc. BO. L Prezant, 718-548-1623.

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Tangent 1202-A stereo mixing console, 12 inputs, echo send & receive, foldback outputs, solo features, mono outputs, all inputs mic or line equipped, LED VUs, immaculate condition, \$800. S Lawson, KAK Productions, 928 Hyland Dr, Santa Rosa CA 95404.

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Major market AT, experienced in AC/AOR/ALT, seeking FT in MD, D.C., PA or VA market. Have done Morn/ APD/PROD. Want longterm gig. Send replies to: Radio World, POB 1214, Falls Church VA 22041. Attn: Box #95-9-20-2RW.

Recently out of broadcasting school, hard worker, willing to travel, on-air, production, traffic. Joey, (405) 449-3683.

Chief Engineer, 25 year major market/large station pro, seeks stable NE station position, comprehensive experience, 50 kW AM directionals, FM applications, FCC regulations. 520-579-8473.

POSITIONS WANTED

HELP WANTED

ABOUT OUR EMPLOYMENT SECTION

HELP WANTED

Any company or station can run "Help Wanted" ads for \$1.50/word or buy a display box for \$60/column inch. Payment must accompany insert, use your MasterCard or VISA; **there will be no invoicing.** Blind box numbers will be provided at an extra charge of \$10. Responses will be forwarded to listee, unopened, upon receipt. Call 800-336-3045 for details.

POSITIONS WANTED

Any individual can run a "Position Wanted" ad, FREE of charge (25 words max), and it will appear in the following 2 issues of Radio World. Contact information will be provided, but if a blind box number is required, there is a \$10 fee which must be paid with the listing (**there will be no invoicing**). Responses will be forwarded to the listee, unopened.

Mail to:

BROADCAST EQUIPMENT EXCHANGE

PO Box 1214, Falls Church, VA 22041

Attn: Simone Mullins

SINE SYSTEMS

The Nashville-based company known for "Innovative Solutions" has an opening in its engineering department for a "utility infielder." This is a job for an energetic and talented individual who can wear many hats. Duties would include:

- Taking customer-service telephone calls
- Performing factory repair of Sine Systems equipment
- Creating production documentation and procedures for assembly, test and quality control
- Assist in defining and developing new products
- Assist in writing software and firmware
- Assist in writing product documentation
- Assist in sales/marketing
- Assist in purchasing

Experience and education is valuable, but energy, enthusiasm and willingness to learn are even more important. For complete information about this job opening, call our Fax-On-Demand line from your fax machine (615-227-2393). Listen to the voice instructions and request document 198.

RECORDERS...WTS

Otari 5050-SHD 8 trk 1/2" newly rebuilt, heads have full, life left, \$1800. W Gunn 619-320-0728.

Scully '100' recorders, record/play amplifiers, 8, 16, 24 track heads. Sequoia Electronics, 4646 Hounds-haven Way, San Jose CA 95111. 408-363-1646.

Tascam ATR 60 8 track with stand, remote, \$2250; Otari 5050-8 new heads, rebuilt, \$1595; Ampex 440B-8, \$1950; Tascam 25-2, \$495; Ampex ATR700, \$495; Scully 16 track 2", \$2950; Tascam 52 top of line, \$650; M79-24 fully rebuilt, \$9,500; Tascam locator for 85-16, \$375; Fostex E22 1/2" timecode deck, \$950; Fostex A80 8 track with 450 mixer, \$995. W Gunn, POB 2902, Palm Springs, CA 92263. 619-320-0728.

Want To Buy

Scully 250 for parts. B Young, WNUZ, 328 Brownview Dr, Chattanooga TN 37415. 615-877-1052.

REMOTE & MICROWAVE EQUIPMENT

Want To Sell

CCS Micro 56 pair of codecs with cables and modems for transmission of 715 kHz audio on 56 kb fixed data phone lines. \$2500/pr. R Cowell, KNTR, POB 308, Ferndale WA, 98248. 206-384-5117.

Burk Tech ARC 16 remote cntrl dial-up syst, like new, \$1950. Bill or Sharon, 603-672-9292.

Gentner SPH4 working condition, \$300. Jack, KJKY, 1309 S Monroe St. Joplin MO 64801. 417-624-1025.

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REMOTE AUDIO PACKAGES

SILVER LAKE AUDIO • 516-623-6114 • FAX: 516-377-4423

INC 4-wire switched 56 CSU/DSU, \$195. G Watcher, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-817-1030.

Moseley MRC-1600 system including studio & transmitter units monitor, keyboard T.I. printer and book set up for phone line, excellent condition, \$1000/BO. B Boyer, WMOP, PO Draw-er 3930, Ocala FL 34478. 904-732-2010.

WE RENT

TELOS ZEPHYR

CCS "Prima" Codecs
Stereo STU, NO License

Frank Grundstein
Audio/Video Consultants
610-642-0978

2-line encoder, perfect condition, less than 1 year old, works 200%, \$2500/BO. S Swartz, 407-686-2133.

Harris System 90 brains & audio switching equip. BO: McMartin TBM 1000A FM relay receiver. BO. T Stafford, 501-933-0403 FAX.

Moseley DRS-1 30-chnl digital/analogue remote cntrl, 2 compl systs w/status & limit alarms, \$650/ea. Gary, 919-790-6315.

Moseley MRC 1600 16-chnl, \$1000; TFT 7601 10-chnl, \$500. B Spitzer, KKLS/KKMK, 605-343-6161.

Want To Buy

Moseley PBR-30, 67 kHz demod card; 67 kHz filter board. B Caithamer, WMBI, 820 LaSalle Dr, Chicago IL 60610. 312-329-8066.

SATELLITE EQUIPMENT

Want To Sell

Prodelin 10' diameter 8 section fiber-glass dish & equip, high quality dish, gd cond, \$950/BO. C Rich, 317-268-2251.

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Mod Assoc 10 W solid-state HPA/Upcon, dual thread, no mods, for SCPC uplinking, \$7500/BO; Wegener 1806-24 satellite receiver for FM squared format, \$500; Zephyrus Model 304/392 satellite receiver, Moody, Jones, SMN formats, \$400. Gary, 919-790-6315.

Want To Buy

Mark 6' grid dish with N connector, 950 MHz, will pick up in St. Louis area, will trade for (2) 4' Mark antennas, also need Will-Burt Hurry-Up mast. B Hoffman, WKKX/WKBQ, 314-878-1040.

S/A 7300 wideband receiver, good condition & reasonable please. C Tracy, WKNE, 603-352-9230.

SOFTWARE/DATABASES

Want To Sell

Ron Balonis' Broadcast Engineer's COMPUTER TOOLBOX programs make the computer into a very smart technical assistant. For details, write COMPUTER TOOLBOXES, 118 Rice St., Trucksville, PA 18708.

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STATIONS

Want To Sell

Seeking a partner/investor to join our project in refitting our ship for use as an offshore shortwave broadcasting station that would be able to sail anywhere a radio voice is needed. If you are this individual or organization, please contact Lightwave Mission Bdctg, 718-853-4301.

3kW FM CP in small North Central Illinois community. Tom, 815-584-5186.

Springfield/Branson Market. Class C FM and Class A FM - Daytime AM combo. Cash or terms. 417-326-6445.

Want To Buy

Bdctr, not broker wants station(s), AM or FM, in S AL, W FL, E GA areas, prefer high pwr, but will consider all. Bdctr, 906 Northwood Cir, Nacogdoches TX 75961.

Cash for CP or distressed FM in CA or NV, must have potential to be viable, principals or brokers OK. Phone or FAX. 818-831-6787.

FM operating, dark or CP, exper broadcaster, will consider joint venture, prefer purchase or lease. J Powley, 910-342-1843.

Small radio station in NE Mid-Atlantic region. CP considered, \$60K or less. C Davis, 6802 Fox Meadow Rd, Baltimore MD 21207. 410-298-5958.

STEREO GENERATORS

Want To Sell

Optimod 8000A FM stereo generator & processor, re-chipped, BO: TM Century auto segue unit, handles up to 3 CD players, contains faders that respond to TM Century cue tones. BO. T Stafford, 501-933-0403 FAX.

TAPES/CARTS/REELS & CD's

Want To Sell

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STUDIOS

Digital studio equipment, Allen Heath GS3V mixing board, Alesis ADATs & BRW w/RMB, Panasonic SV3700 DAT, Neumann mic, Technics SP1300 Pro CD Player, Otari & Revov R-R, ADL 1000 Tube compressors, more. For list: K Kagalis, Sothern Sounds Productions, 111-C Coleman Ave, Waveland MS 39578. 601-466-0464.

TAPES/CARTS/REELS & CD's

Want To Sell

Over 5000 titles in country oldies library on analog tape, 10.5" reels, titles from 1945 thru current, light on '90s, reasonable; Vinyl library '40s thru '60s rock 'n roll 45s & 33s, also late '80s/'90s country 45s, country 33s from 1950 thru 1990; digital contemporary singles & albums, country singles. SASE to: American Music Formats, 4545 Nicholas Ct, Brookfield WI 53045.

Scotch, production facility deleting classic rock library from '60s, '70s on vinyl, cassettes, reels. \$250; empty 7", 10.5" reels, new and used, \$35 +shipping. D Pulwers, POB 9523, Alexandria VA 22304. 703-578-3014.

418 carts, Scotch carts, mostly music length, good to very good condition with AC music, \$500/all. Randy, 815-942-2839.

Aristocart A W 20 (110) cart racks, holds 20 carts ea, \$550; Dynamax ESD 10 eraser splice finder, good condition, \$400. D Kelly, 402-372-5423.

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T-120V 2.09	ST-120 6.99	SA-90 1.59	HI 8 120 5.99
L-750+G 3.99	DAT-124 7.99	SA-90 1.99	DENON
JVC T120 1.79	3M CDR 74 7.99	T 120 ERG 2.49	DAT-120 5.99
JVC ST-120 5.99	XE II 30 8.99	CDR-74 8.99	DAT-60 4.99

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Black Scotchcart IIs, 300 3.5 min, almost new condition, \$1.90/ea+shpg. B Lord, 206-932-4839.

Compl formats on 10 1/2" reels, with ques, AC Gold, Big Band, Country, also Beautiful Music background instrumental, many on metal reels, \$15/reel, sets only. Rt 2 Box 399, Harpers Ferry WV 25425. 304-725-9425.

Want To Buy

Fidelipac M-300, grey, will pay shipping + .50 ea. R Miller, KUAU, Box 575, Lahaina HI 96767. 808-572-5534.

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TEST EQUIPMENT...WTS

Allison Gain Brain/Kepex (6), 4 Kepex, 2 LX-100 power supplies, rack-mount with supply, Molex connectors, pins & crimp tool, Best Offer; Fairchild 659A older 3 spring reverb unit, 3 amps, sounds like old WABC AM, Best Offer; UREI 535 stereo EQ, like new in original box, \$350. L Prezant, 718-548-1623.

Potomac Instruments AT-51 audio test and measure set, excellent condition, all accessories, BO. J Seaman, PBS, 1320 Braddock Pl, Alexandria VA 22314. 703-739-5483.

Heath AG-8 audio oscillator, \$20/BO; Running time meter, 1 hr divisions, 115V, \$20+UPS. E Davison, 217-793-0400.

Potomac Instruments FIM-21 & Nems Clark 120E field strength meters, trade only-both for 1 FIM-41; Bird 8745-677 20 kW port dummy load, requires external water supply, \$750. Gary, 919-790-6315.

Tektronix 7613 storage mainframe, 7L12 spectrum analyzer, 7L5 spectrum analyzer with option 25, 7K11 CATV preamp & carrying case for extra plug in units, \$7500/BO. S Lockwood, 206-783-9151.

TRANSMITTERS

Want To Sell

Harris/Gates BC5H 5000 W, on 1080 AM, BO; 2 tower phaser; Potomac Instruments AM-19(204); other misc phasing equipment. Jack, WVKV, POB 1080, Hurricane WV 25526. 304-765-7373.

CONTACTORS BY "GELECO"

Ph: (416) 421-5631
Fax: (416) 421-3880

5 kW AM, \$5000; 5 kW Collins (2) 3 tower phasers, \$1500/ea, you pick up. KBAI, POB 1150, Morro Bay CA 93443. 805-772-2263.

JRC CM 30-50 tube type/rack mount AM, adjusts up to 36 W, type approved. J Cunningham, KHKC, RI2 Box 113B, Stonewall OK 74871. 405-265-4496.

BE-FM30 30 kW FM transmitter+FX30 exciter, only 40K hrs. in storage, BO; Gates FM-5C 5 kW FM transmitter, needs rebuild, PCB capacitors removed, no exciter, \$2000, you haul. Gary, 919-790-6315.

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Cetec-Sparta 602A 2.5 kW FM transmitter, tuned to 100.9 MHz with exciter manuals, new, \$6500. R Mason, 703-962-1133.

Collins 831 D-1 FM transmitter, operated @ 1700 W on 104.9 MHz from 1971 to 1994, good condition. Best Offer; Collins 310Z-1B FM exciter, operated on 104.9 MHz from 1971 to 1989, after 1989 used as backup, Best Offer. T Stafford, 501-933-0403 FAX.

Continental 315A-1 1984 5 kW on 1430 kHz, very good condition, \$17,500. T Love, WOBB/WMGR, 912-439-9704.

FM-Transmitters
Translators & Amplifiers
Solid State 15 watt to 6 Kw.
Jimmie Joynt
Factory Direct Sales
800/279-3326

RCA BTA-10U 10 kW AM xmtr. needs repairs, \$3500. B Barry, WAMB, 615-889-1960.

Wilkinson AM-1K 1 kW AM @ 840 kHz, 23 yrs old, \$1500; Harris FM 3.5 k 107.9 MHz 9-bay antenna & 300' of xmsn line, \$17,000. D Kelly, 402-372-5423.

QEI amplifiers, excitors and stereo generators. All are reconditioned and are tuned and tested on your frequency. 6 month warranty is included. If you want quality used equipment, call or fax 609-232-1625 and ask for Bob Brown.

New McMartin 20W, BIAE-5000 FM exciter, New McMartin IBM1005D FM relay rebroadcast exciter, also some used McMartin B919 exciter, 15W Goodrich Entec., 11435 Manderson, SE, Omaha, NE 68164. 402-493-1886 Fax 402-493-6821

Used equipment for sale: Belar SCM-1, Belar RFA-1, Belar FMS-1, Belar FMM-1, Moseley MRC 1600 system, TFT EBS receiver/generator, Gentner patch panel, and Harris racks. Call Transcom Corporation 800-441-8454 or 215-884-0888.

Transformers, chokes & other parts for Gates BC1-J & later series transmitters, including new, Peter Dahl mod reactor, all tested, Best Offer. Mike, 615-741-2277.

Want To Buy

Solid State AM 2.5 or 5 kW; also low power transmitter 30-500 W solid state. R Miller, KUAU, Box 575, Lahaina HI 96767. 808-572-5534.

Harris SX-1A 2.5 kW, good shape & reasonable. T Yarbrough, 615-967-2201.

RCA 5 kW AM, type BTA-5U & 10 kW AM, BTA-10U, any cond for parts. B Barry, WAMB, 615-889-1960.

McMartin AM/FM xmtr, any model, exciter or stereo modules. Goodrich Ent., 11435 Manderson, Omaha NE 68164. 402-493-1886.

TUBES

Want To Sell

4X150A, 4CX250B, 4-400, 4-1000, 807, 833, 8874, 8877, RCA, Amperex, EIMAC, etc. Westgate 800-213-4563.

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3CX3000A7	4CX250B/7203
3CX2500H3	4X150A/7034
3CX2500F3/8251	5CX1500B
3CX2500A3/8161	5CX1500A
4CX15.000A/8281	YC130/9019
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Want To Sell

Sparta 2-speed (2) TTs with "bag" of spare parts, tired but operational. Best Offer. C Tracy, WKNE, 603-352-9230

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1.5 kW FM 1975	Wilkinson 1500E	5 kW AM 1987	Continental 315R1
2.5 kW FM 1978	Harris FM2.5K	5 kW AM 1978	Harris MW5A/B
2.5 kW FM 1983	Harris FM2.5K	5 kW AM 1981	Harris MW5B
3 kW FM 1974	Harris FM3H	5 kW AM 1977	RCA BTA 5L
5 kW FM 1967	Gates FM5B	10 kW AM 1974	CSI T-10-A
10 kW FM 1971	Collins 830F1-B	10 kW AM 1981	Continental 316-F
10 kW FM 1968	RCA BTF 10D		
20 kW FM 1974	Collins/Cont 816R-2		
20 kW FM 1976	Harris FM20H/K		
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ACTION-GRAM

EQUIPMENT LISTINGS

Radio World's Broadcast Equipment Exchange provides a FREE listing service for radio stations and recording studios only. All other end users will be charged. Simply send your listings to us, following the example below. Please indicate in which category you would like your listing to appear. Mail your listings to the address below. Thank you.

Please print and include all information:

Contact Name _____
 Title _____
 Company/Station _____
 Address _____
 City/State _____
 Zip Code _____
 Telephone _____

I would like to receive or continue receiving Radio World FREE each month.

Yes No

Signature _____ Date _____

Please Circle only one entry for each category.

I. Type of Firm

- D. Combination AM/FM station
- A. Commercial AM station
- B. Commercial FM station
- C. Educational FM station
- E. Network/group owner
- F. Recording Studio
- K. Radio Station Services
- G. TV station/teleprod facility
- H. Consultant/ind engineer
- I. Mfg, distributor or dealer
- J. Other _____

II. Job Function

- A. Ownership
- B. General management
- C. Engineering
- D. Programming/production
- G. Sales Manager
- E. News operations
- F. Other (specify) _____

Brokers, dealers, manufacturers and other organizations who are not legitimate end users can participate in the Broadcast Equipment Exchange on a paid basis. Line ad listings & display advertising are available on a per word or per inch basis.

WTS WTB Category: _____
 Make: _____ Model: _____
 Brief Description: _____
 Price: _____

WTS WTB Category: _____
 Make: _____ Model: _____
 Brief Description: _____
 Price: _____

WTS WTB Category: _____
 Make: _____ Model: _____
 Brief Description: _____
 Price: _____

*Closing for listings is every other Friday. Please be aware that it does take approximately 1 month for your listings to appear. They will then appear for only 2 issues. If more time is needed, please re-submit your listings.

Broadcast Equipment Exchange

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Reader Service

October 4, 1995 Use until February 4, 1996

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Take note of these UPCOMING DEADLINES

-
- Deadline for November 1 issue: **October 10**
- Deadline for November 15 issue is: **October 20**
- Deadline for November 29 issue: **November 3**
- Deadline for December 13 issue is: **November 27**

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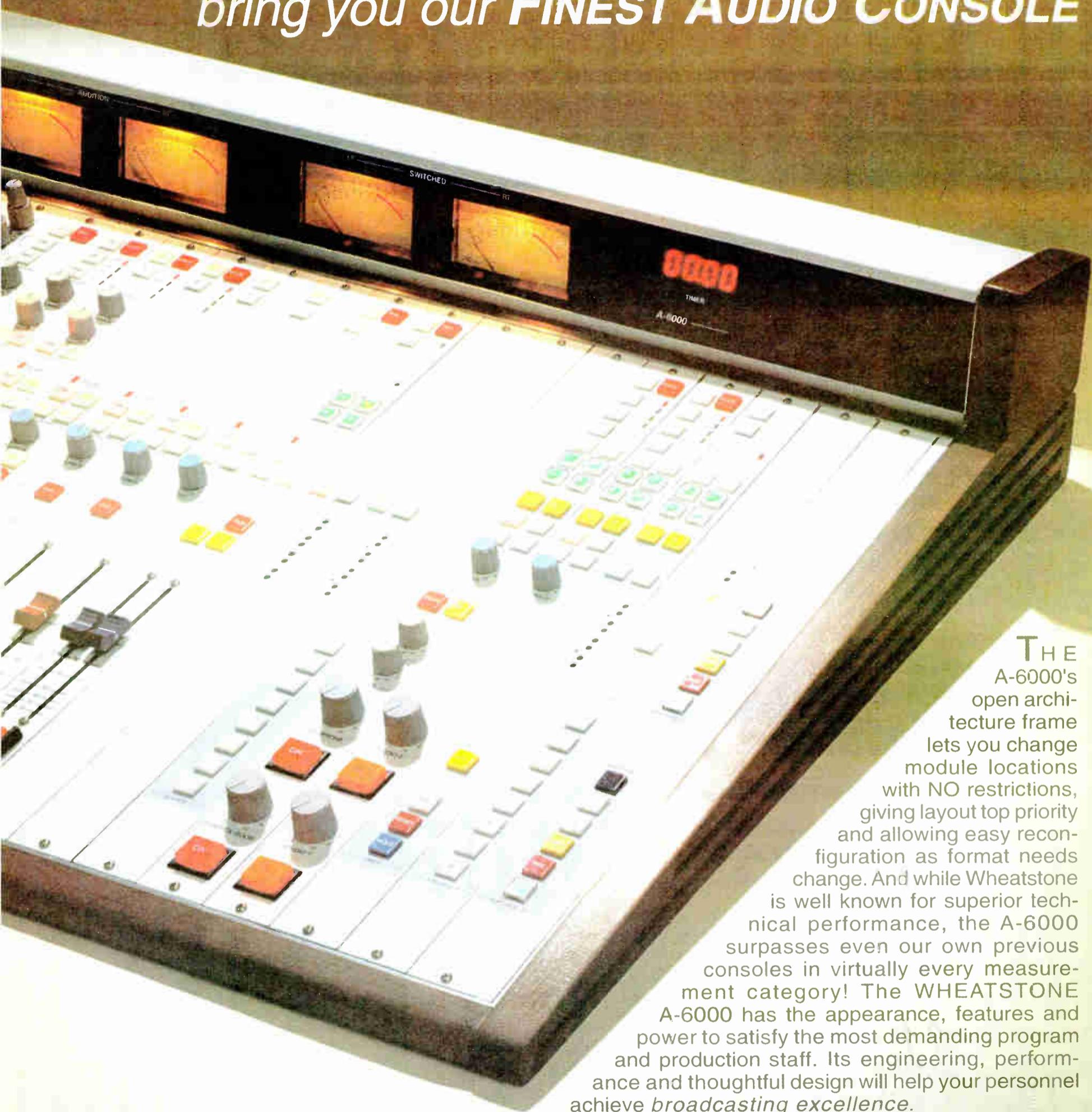
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