BE Radio®

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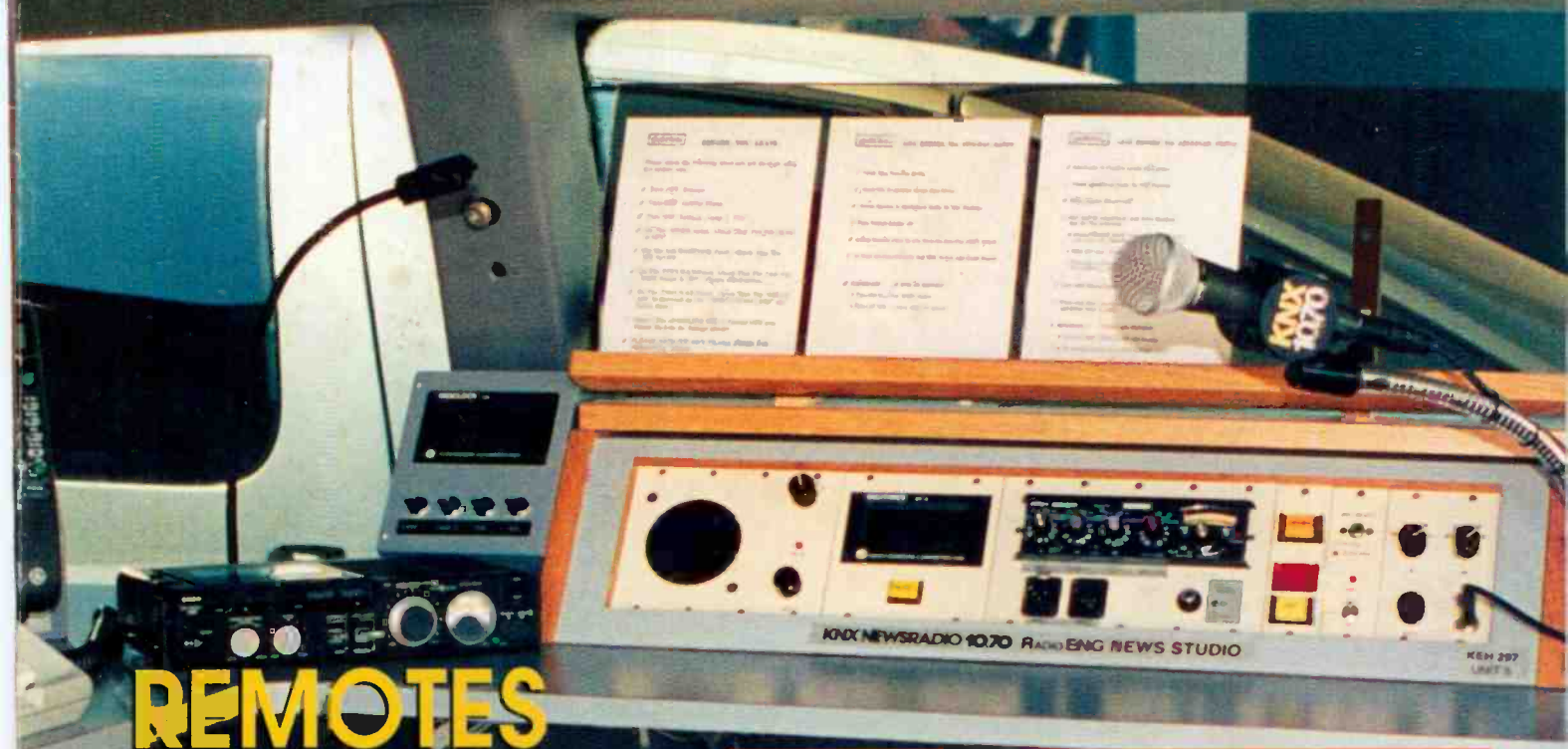
...from the Editors of BROADCAST ENGINEERING



REMOTES
Better, faster, cheaper . . .

STUDIO-to-TRANSMITTER LINKS
The impact of digital

UPDATING THE NEWSROOM
Audio and text on the same PC?

MAINTAINING MULTI-STATION FACILITIES
The pros and cons

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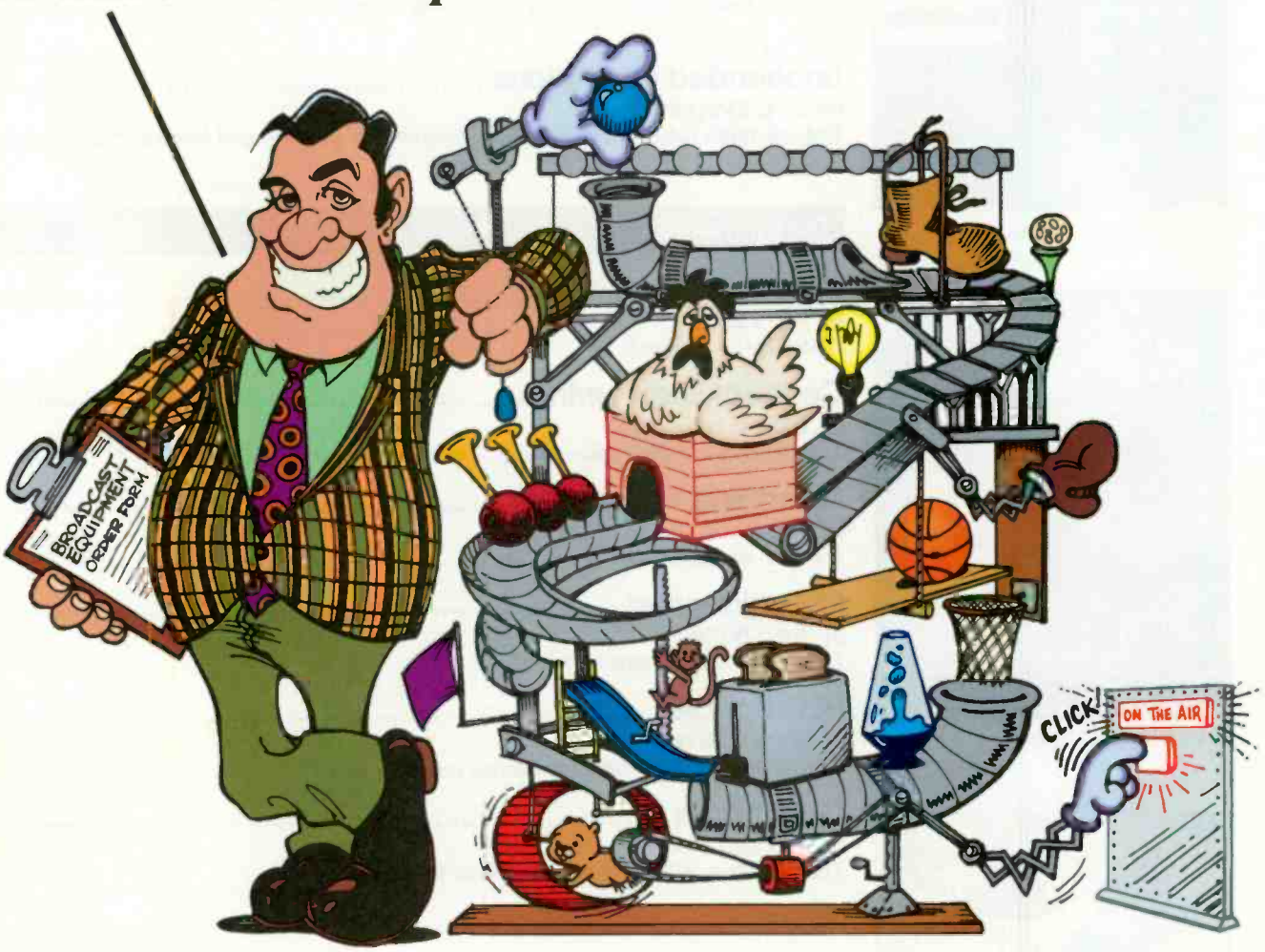

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BE Radio

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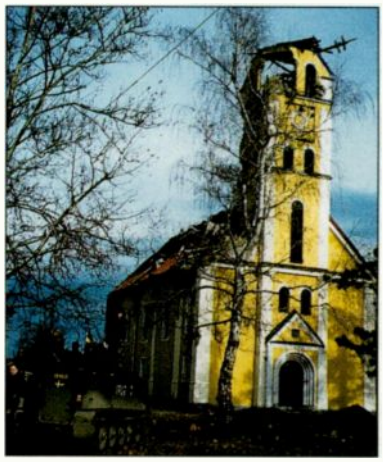
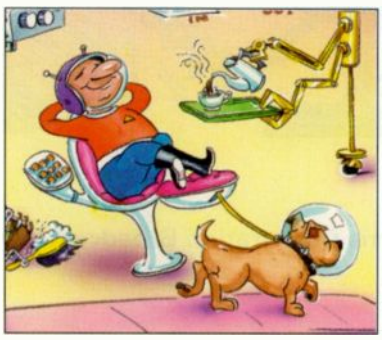
10 *Managing Technology*



24 *(Not So) Remotes*



36 *Unattended Operations*

This month...

Departments...

ON THE COVER: Nowhere are the cost, size and weight advantages of new technologies having greater impact than on radio remote systems. This mobile news studio is one of three such minivans used by KNX 1070 Newsradio, Los Angeles. *Inset*: Portability and ruggedness are essential for wartime coverage. (Photo by Peter Breslow, NPR.)

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Circle (5) on Action Card

Editorial:

Watching radio

The 19th century statesman Otto von Bismarck was the first to observe that "Laws are like sausages. It's better not to see them being made."

Apparently this rule doesn't apply to radio. If current trends are any indication, there seems to be no shortage of interest in watching radio being made – on TV, the movies and in real life.

For example, among current TV series based on radio operations are NBC's "Frasier" and "NewsRadio," two certified prime-time hits. "Remember WENN" is a refreshingly new, original cable series on AMC set in radio's Golden Age. Produced by pop-star-turned-Broadway-composer Rupert Holmes, the show is receiving widespread critical acclaim. And still in syndication nearly 20 years after its premiere is "WKRP in Cincinnati," one of the most popular shows in TV history. (Of course, a radio-station setting is no guarantor of success, as proved by the rapid demise of last year's "The George Wendt Show.")

Meanwhile, movies have also had some success with the radio-station setting. A few years back, Eric Bogosian electrified audiences in "Talk Radio," and this year, "The Truth About Cats and Dogs" enjoyed a long and fruitful run. Unlike the license taken by some presentations, "The Truth. . ." showed a pretty realistic major-market radio station talk-show operation. (So truthful, in fact, that the January/February 1995 issue of *BE Radio* appeared as a prop in the film!) A number of other successful movies have also been set in the Golden Age, including the much lauded "My Favorite Year," in which an aging movie star (Peter O'Toole) discovers just how different the live radio broadcast is from the process of film making.

Remember how radio was used as a central and unifying motif in George Lucas' breakthrough hit, "American Graffiti," with Wolfman Jack in a semi-autobiographical role? And serious radio-movie buffs may recall "FM," probably more memorable for its soundtrack album (with the Steely Dan tune of the same name) than for the film itself – although it did serve as the inspiration for the above-mentioned "WKRP" series.

Several major, recent theater works have made radio a key element of their setting or story line, as well. Among these are the "Greater Tuna" series, "Buddy. . .The Buddy Holly Story" and "The 1940's Radio Hour," all of which have enjoyed successful runs around the United States and abroad.

Crossing the line from the other direction, live studio or theater audiences pack the house to watch actual radio broadcasts of national comedy, music and variety shows, ranging from the "Grand Ole Opry" to "A Prairie Home Companion." In some cities, local radio broadcasts draw similar crowds.

All of this proves that radio still captivates the American public, both in its product and its process. There is also something distinctly "American" about the heritage of radio broadcasting and its various styles. Of course, part of radio's mystique lies in the invisibility of its creation, but this makes the occasional opportunity to watch some radio-making all the more captivating. Playing to today's passions, watching a live radio broadcast also involves some elements of interactivity and multimedia.

The easiest way for most stations to capitalize on this intrinsic interest is by doing radio remotes – and they're becoming easier to do all the time. (See this issue's cover story, p. 24.) Any time you take your program origination outside of the studio, you give your listeners a chance to watch radio composition. It's OK to let them see the man behind the curtain once in a while; if you're doing a good job, it won't detract from their respect for the great and powerful Oz of the ether. So get out there and make some radio for your audience on location. Unlike legislation or breakfast meats, the exposure will do your station as much good as the sponsor or event you're covering.

By Skip Pizzi,
radio editor

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Contract Engineering:

Maintaining multistation facilities

By William Fawcett

Years ago it was common practice for a radio station to have a full-time staff engineer — or perhaps even an engineering department. Broadcast deregulation of the 1980s (and the concurrent increase in broadcast equipment's reliability) brought an end to that. Engineers who could adapt took on the role of "contract engineer." This business approach was further fueled by the establishment of Docket 80-90 stations shortly thereafter. By the late 1980s, it was not unusual for a contract engineer to have a dozen or more such stations on his or her roster.

But having a string of Class A FMs and daytime AMs for clients has its drawbacks, most of them monetary. Many of these stations hardly had enough money for good maintenance, much less capital expenditures.

Now consider the present day, where the trend is toward consolidation and formation of the "superduopoly," in many cases, this implies a multistation facility.

Even before recent changes in the law, stations were experimenting with consolidation through LMAs and earlier levels of duopoly. Now the prospect exists for outright ownership of up to eight stations in a market by one firm. This provides the potential (perhaps the requirement) for multistation owners to direct increased funds into technical capitalization and operations.

Will the circle be unbroken?

It is possible that this may signal the return of the staff engineer. The technical demands of a consolidated facility are great and may require a full-time presence. If we've learned anything from the last 20 years, it is this: The engineer who adapts is the engineer who survives.

Being a staff engineer (i.e., a station employee) may be advantageous. Larger companies may be able to offer various perks unavailable to the small business. On the other hand, the clever contract engineer who can structure his/her work within the IRS independent-contractor guidelines may also reap the benefits of consolidation.

Think of it this way: less travel, more money. Contract engineering firms might take a cue from other industries and assign individual technicians responsibility for certain major accounts. Under that scenario one person has working, day-to-day knowledge of the facility, but other (perhaps more senior) persons are available for major projects or disasters. This is where the field service firm, as opposed to either a single contract engineer or staff engineer, has a marked advantage: when lightning strikes three transmitters and two studios at once, there is only so much a single person can do.

A newly consolidated station group will typically require a lot of immediate engineering work, and it may need much more shortly thereafter. The design work and capital improvements involved will likely present plenty of challenges. Your client has probably paid millions for this group of stations, so try not to think small.

Start with planning (where else?)

Naturally, you should not proceed in a haphazard way. The client also must be convinced of the requirement for detailed planning — and the need to pay for such work. This is no longer a stand-alone radio station. The physical-facility infrastructure, audio distribution, studios and transmission facilities will all be stretched to their limits and interdependent on one another like never before. When five stations go down at once, redundancy ceases to be a luxury.

Besides extensive planning, the level of documentation must also be increased. Wiring tables, maintenance logs, even the location of buried cables all become critical issues. Contractors might consider an investment in a laptop computer if they don't already have one.

> The engineer who adapts is the engineer who survives.

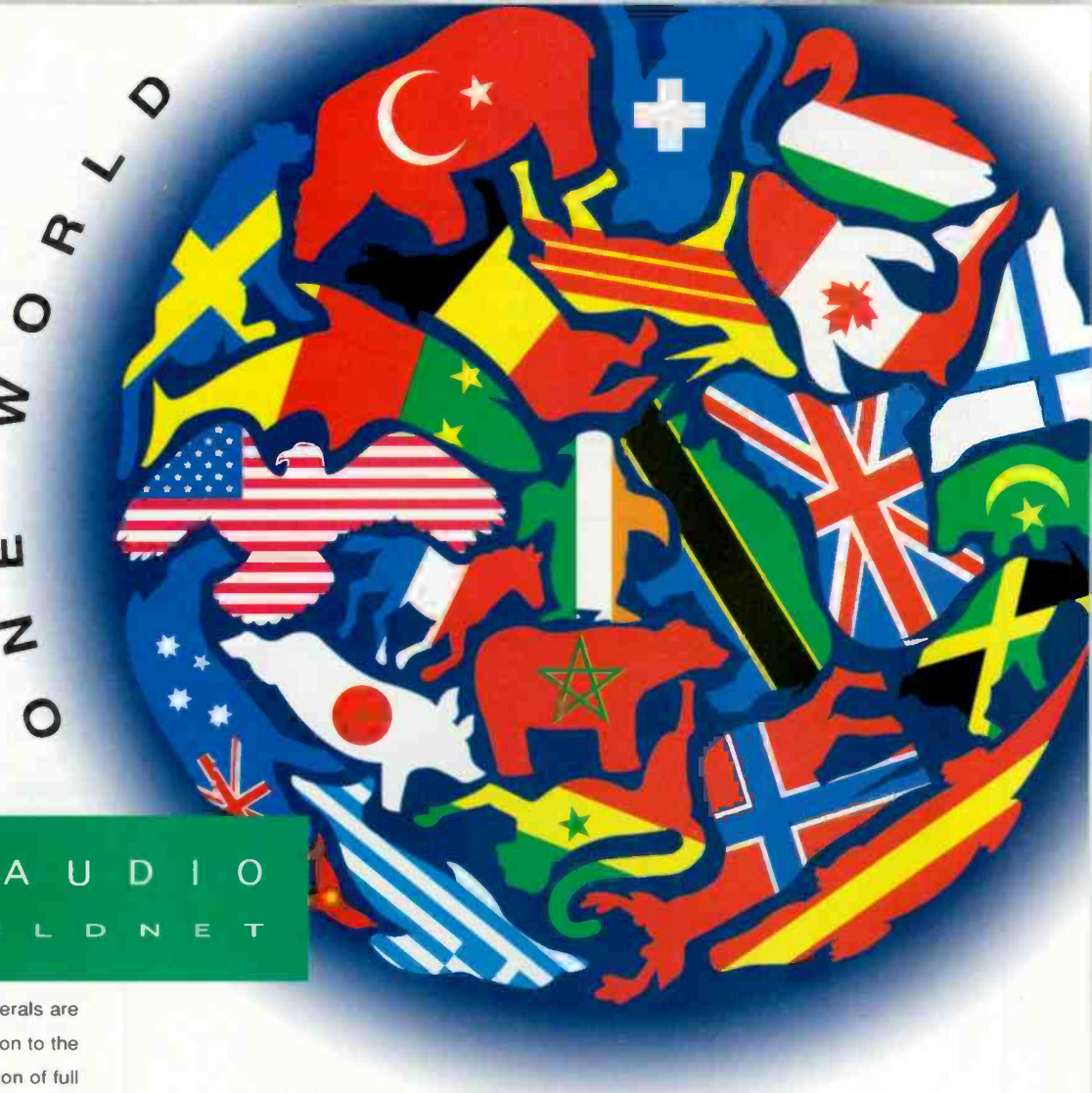
Speaking of computers, have you noticed the number of computers in some of these larger multistation facilities? Besides the expected office computers and LANs, there are computers in studios, automation systems, music playlist computers, traffic, billing and perhaps remote machine/transmitter-site control. Because of the specialized nature of many of these systems, the installation, maintenance and repair often fall upon the broadcast engineer. Here again, adapting and surviving will be key components of the successful engineer.

An engineer's dream

Consider the example of one typical superduopoly, which is faced with consolidating a three-tower AM array with another nondirectional AM, plus two (possibly three) FMs — including auxiliary antennas. This implies combiners, isocouplers, directional proofs and lots of detuning. With several full-power backup transmitters, this could amount to a facility rivaling that of a major short-wave broadcaster. Add to that the need for computer control and monitoring, sophisticated electrical distribution and generating systems, dummy loads and antenna switching, HVAC systems and Halon fire-suppression.

Clearly, a "seat-of-the-pants" approach will just not work here. This is a great challenge for the truly professional broadcast engineer.

William Fawcett is president of Mountain Valley Broadcast Service, Inc., a broadcast engineering firm in Harrisonburg, VA.



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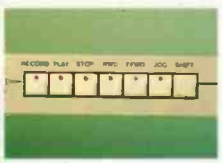

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Skyport 2000

Here's another affected area to think about: An increasing number of individual stations now receive signals from multiple satellites. Adding more stations and a minor regional network or two, and before you know it, you've got six or 10 dishes out on the lawn, each feeding multiple users. (Even if all the stations need to look at the same satellite, you can only split the signal to so many receivers.) It is, therefore, worth thinking about bigger and better dishes to feed those splits, and to build patchable redundancy into the system. Low-noise block converters (LNBs) complicate the situation even more. A possible solution is the global use of low-noise amplifiers (LNAs) instead, placing block converters downstream (inside) after the patch panel.

Another reason for upgrading the dishes has to do with increasing levels of terrestrial interference, as well as a fully populated 2° spacing plan. Only a quality dish will yield the desired signal-to-noise ratio. Digital satellite receivers are not handling this problem as well as expected; pops and clicks are more noticeable than soft analog failures.

Audio distribution

Gone forever are the days when you could twist a few resistors together and split an audio feed to a few studios. A multistation facility might involve five or 10 studios, and may also include a high level of RF. This requires many distribution amps (perhaps even routing switchers), miles of cable, and most important, planning and documentation.

Make sure your plans are flexible; anticipate satellite network changes on a regular basis. Look also at your RPUs, ISDN and telephone interfaces. It is not uncommon for the sales staff of a multistation facility to bundle a remote package, often with the same announcer doing the remotes on one station after another. After all the stations have had a feed from the site, the cycle repeats.

For studio design, think generic. A uniform studio design is a real plus. Formats change and equipment breaks. A fully patchable facility can really take off the pressure. If you are not fully automated, at least put all your commercials on hard disk, and have your system networked to all of the studios. Where studios must be of a specific design, have at least one other studio capable of running that format.

That was then, this is now

These are just some of the factors that will be important in supporting a multistation facility. Consolidation is driven by capital investment, and the increased demands placed on a facility will drive that infusion of funds even more. It remains to be seen if this is just another short-lived, upward trend in a cyclical economic pattern, but it certainly is preferable to the lean times seen in the early 1990s.

For the capable contract engineer, it is important not to get hung up on labels. Changing conditions may precipitate a new business paradigm. Go with the flow; the prospect for high-quality employment opportunities with commensurate pay is good.

When the FCC dropped the first-class license and eliminated the requirement for most stations to have full-time engineers, the industry saw an influx of "jack-leg" engineers. The CB-radio installer who handles a station or two on the side may soon be looking for supplemental work flipping hamburgers. (Luckily, the minimum wage is going up.) Conversely, the professional broadcast engineer should strongly embrace this new era. There is work, there is money, and with a little talent plus some good business sense, it can be a positive time for you.

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Managing Technology:

Updating the newsroom

By Bob Reed

"Another cart just jumped its cue!" For the third time in four days, that cry, preceded and followed by a series of expletives, came from the news announce booth. It was time to replace our cart machines – and probably the whole concept of using carts for news operations, as well.

Three years previously, we had successfully converted our commercial delivery and traffic systems from tape cartridge to digital, using a file server and multiple PCs on a local area network (LAN). At that time, our four-person news department, sports director and two-person agribusiness department inherited the carts from the production and control rooms, to use in their news operations.

Our old reliable cart machines were into their third decade of use, and even the best of equipment can't be expected to last forever. The triple-decker playback machines had already undergone at least two rebuilds, so it was certainly time to consider replacement. Oxide on the cartridge tapes was becoming almost nonexistent.

Because of our positive experience with digital storage of our commercials and the successful integration of our traffic and digital audio system, we decided to check out the options available for our news operation. We had already converted our wire collection system to computer, using the AP Newsdesk. This allowed us to collect AP News, our network data wire and state newswire into a single computer and print only what we wanted, using a single printer. Previously, we had three printers cranking out paper 24-hours day --- most of it ending up in the trash.

Our first question was, "If commercial audio and traffic can be integrated into a single system, how about wire copy and audio?" As we soon found out, several systems are available that can do this today, and they cover a wide range of capabilities among them.

The best news was that we could replace the cartridge system with digital audio for little more than the cost of replacing the triple-deckers and cart recorders. The advantages were numerous: better quality and reliability, fewer mechanical parts to wear out, increased flexibility and other benefits that we hadn't even considered until we began investigating the systems available.

Planning the transition

Of course, abject fear gripped the news staff when word leaked out that the station was considering "computerizing the newsroom." Many announcers and news people don't like change. They are accustomed to taking a stack of news copy and carts into the announce booth, with each in the order they are to be used in a newscast. So we needed a digital system that would mimic a cart system, but still provide the advantages of computerization.

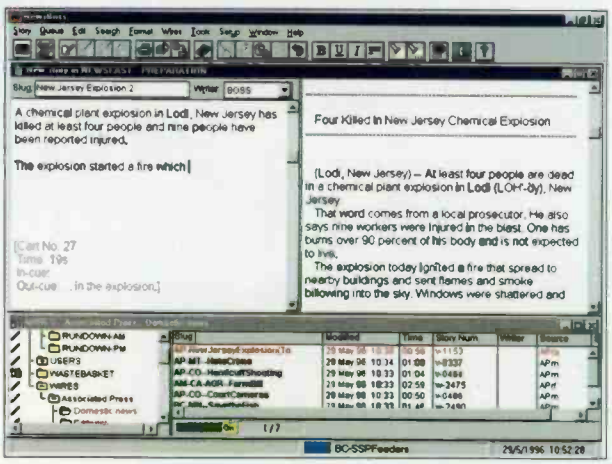
This implied that we should look for a system that would let the news reader organize the order of the stories, but switch the order on the fly as time constraints dictated. For example, what if a late-breaking story threw off the planned newscast sequence or the newscaster approached the end of a newscast intending to close with a 45-second story, but only 30 seconds remained?

Central storage of text *and* audio was also considered critical. Our commercial system stores the commercials *locally* at each of the terminals where they are used. That means transferring the audio from the production room to the control rooms, which takes time. A newscaster can't wait for transfer. If a story breaks with audio, it has to get on the air immediately. Therefore, central storage of the audio (i.e., stored on a file server and instantly available to all terminals) is a must.

The flexibility to run any audio cut either in a predetermined sequence *or* on-demand at any time is also necessary. In addition, all audio, wire copy and locally originated copy must be accessible from all editing terminals, as well as for use on the air at either of two stations that share the facility. This includes news announce booths, the newsroom, the agribusiness department office and both stations' control rooms. Again, central storage on a file server with distribution through a LAN is necessary.

Selection and implementation

What we found was a system that could collect as many wire services as we wanted into a single computer terminal, with the wire text accessible to all other terminals on the LAN. Audio could likewise be uploaded into a single terminal on the LAN, with original audio, as well as any edited cuts available at



A text-editing screen from the Windows-based *NewsBoss* system from Broadcast Electronics, which integrates wire copy or original scripts with audio clips stored on the company's *AudioVAULT* system.

Bob Reed is operations manager at KGNC-AM/FM, Amarillo, TX.

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Managing Technology: Updating the newsroom

all other terminals. At any terminal a reporter/newscaster could rewrite the copy, embed audio cuts into the copy and put a story on the air. Likewise, locally originated copy could be created on a word processor by the newswriter and instantly be made available at the other terminals.

Digital editing of the audio is possible at all terminals, even though the raw audio is recorded into the system at only one terminal. This applies to network audio feeds, telephone interviews and even announcer-recorded voicer/actuality stories. It is also faster than dubbing to cart. The newsperson just points the mouse at the beginning and ending points of the audio segment, clicks the button, gives the audio cut a name or number and designates it "ready for air play." No reel-to-reel machines, no cart machines and no real-time dubbing steps are required.

Central storage of wire copy also gives control room announcers immediate access to weather bulletins, sports scores and other information delivered by the wire services. No more rushing down the hallway after the alarm sounds, tearing off the copy and rushing back to the control room. (Oh, don't forget to make a photocopy for the other station.)

The audio upload/editor screen from *NewsRoom*, an integrated, PC-based digital news system from Computer Concepts. A "virtual VU meter" helps users make the transition from traditional systems.

A *paperless* system is the ultimate goal. This won't happen immediately, however, because news people tend to need the comfort of holding a script in their hands, and the ability to shuffle papers and rearrange the order of the stories "the way they've always done it." Yet after a short time, you'll find them holding the scripts in their hands, but reading the story directly from the computer terminal screen in the announce booth. Soon, they'll not bother carrying the copy into the news booth and you can turn off the printer.

One precautionary note: When you make the decision to go digital in the newsroom, don't make price your predominant criterion of choice. The pace of technological change is so rapid that if you invest in "just enough to get by," after a year or two you'll find yourself facing the need to upgrade the software and your hardware may not be able to handle it. Get a system with enough memory, speed and hard-disk space to accommodate future expansion. It might cost a few hundred dollars more today, but will save thousands later when it's upgrade time.

For more information on digital newsroom systems, circle (100) on Action Card.

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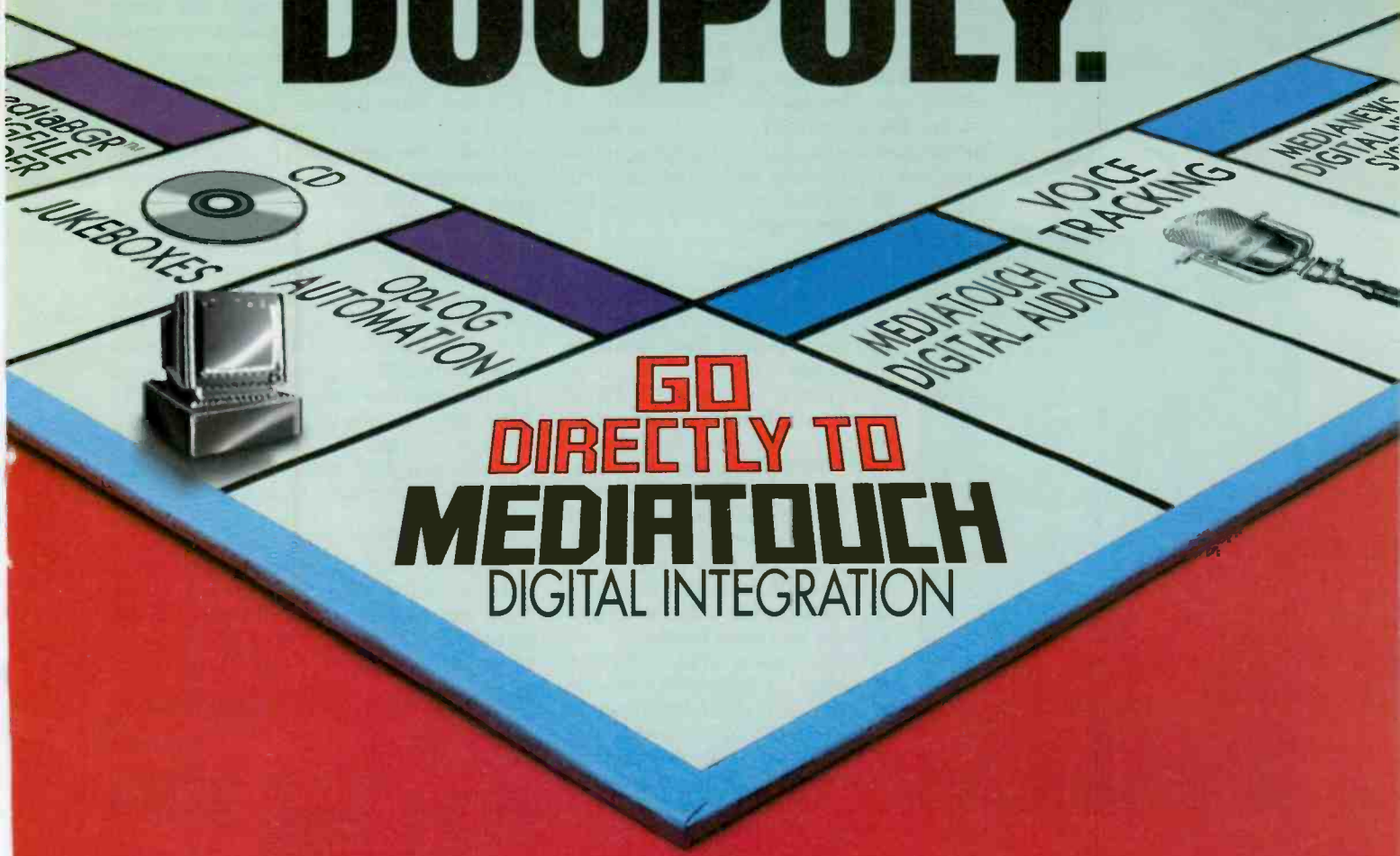

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Circle (24) on Action Card

RF Engineering:

STL update

By John Battison, P.E.

Now that digital AM transmitters and digital FM exciters are being installed, it seems inappropriate to feed them with analog studio-to-transmitter links (STLs), especially when so much of the equipment at the studio is also of the digital variety. But it's not just for such technical congruity that broadcasters use digital STLs. They can provide a literally transparent link between facilities, even those that are separated by significant distances.

Admittedly, if you have a first-class analog STL system that is working properly and has not yet been amortized, it may be difficult to persuade management of the need to convert to an all-digital path to the transmitter – especially if the transmitter is also a new, fully analog unit. Nevertheless, if you are in the market for a new STL, consider a digital system, both for its performance today and its readiness for interface with future elements of your increasingly digitized transmission chain.

Advantages of digital STLs

In practical terms, a digital STL provides freedom from distortion and clipping problems that sometimes plague an analog STL. Digital STLs also will operate with a much lower received signal than that required for analog operation – as low as 5μV at the receiver terminals. The fact that the typical digital STL also has a built-in 20dB fade margin adds to its attractiveness. This feature often makes it possible to use smaller dishes, thereby reducing cost and tower loading.

Unlike analog STLs, audio performance on digital STLs remains identical as received signal strength varies throughout the usable range. This eliminates the inconsistency of the noise floor on many analog STLs, caused by seasonal or other variations along the path. And in this age of consolidation, digital STLs can even add to the capacity of a given link by allowing additional signals to be included in the bitstream.

Implementing digital STLs

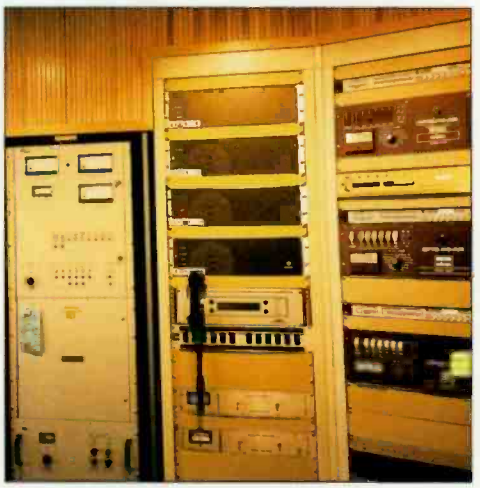
First, a general caveat on STLs: Given today's proliferation of radio signals, it is essential to work with your local SBE frequency coordinator. If you don't know who that is, call the SBE headquarters at 317-253-1640 and ask. When working with a coordinator, it is important to keep him or her informed in a timely manner. If you select a frequency, and then end up not using it, be sure to tell the frequency coordinator. Otherwise it will be listed as occupied, and other legitimate users may not have access to a vacant channel.

The second item to watch carefully is a change in your area's topography. An example: Several years ago, one of Columbus' major FM stations suddenly lost its STL signal in the middle of the afternoon. As it turned out, a new building was being erected, and unknown to the station's chief engineer, it was directly between the studio and the transmitter. This kind of situation cannot always be anticipated years in advance, but before installing a new system make a survey to be sure that there are at least no *existing* blockages. If you have to locate downtown, it is a good idea to check out the buildings along the line of fire to see if they are soon to be expanded or torn down. Also, don't forget that Fresnel zone clearance should be checked where rural STL paths are planned. Occasionally, knife-edge propagation can be used, although usually its characteristics seem to apply more to higher-frequency links than the typical 950MHz aural STL.

Most of the major STL suppliers are now offering digital STLs. Increasingly, these systems offer AES/EBU connectivity. This allows digital audio devices preceding and following the STL in the chain to be interconnected without leaving the digital domain. It also permits two channels of digital audio to be serially conveyed over as much as 300 feet of shielded, twisted-pair cable and interfaced at the STL transmitter. No additional synchronization is required because the AES/EBU signal is self-clocking. The AES/EBU input accepts the start of each 32-bit block of audio as a clock pulse and thereby maintains synchronization inherently.

Spectral efficiency

As usual in these days of increasing emasculation of broadcaster's frequency bands, STLs are feeling the spectrum pinch. Almost daily, the FCC either generates itself, or publishes requests from RF users, for



At WWRC in Washington, DC, four T-1 circuits (top of center rack) are multiplexed onto a bidirectional 18GHz path for an uncompressed digital STL and a 20-channel TSL. The latter is used to return satellite downlinks from the transmitter site's dish to the studio. Bidirectional data and telephone circuits also share the links. An analog 950MHz STL (bottom of center rack) serves as backup, with analog telco program circuits used as a tertiary link. (Photo by Kevin McNamara, courtesy of Intraplex.)

John Battison, *BE Radio's* consultant on antennas and radiation, owns John H. Battison and Associates, a consulting engineering company in Loudonville, OH.

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more slices off the broadcast auxiliary bands.

Digital STLs offer a good way to cope with these attacks on broadcasters' frequency domain. In some cases, a narrower-bandwidth channel than that required by the analog STL can be used for the digital path, with better audio quality at the same time. In other cases, a digital STL can allow two full-fidelity stereo audio feeds (or several lower-quality mono feeds for subcarrier services and the like) to be placed on the same channel that previously supported only one analog stereo link.

Of course, what enables this efficiency in the crowded 950MHz aural STL band is the use of data compression. Across the current crop of digital STLs, numerous algorithms are offered, including apt-x, Dolby AC-2 and ISO/MPEG Layer 2.

Not all of today's STLs use the narrow channels of the 950MHz band, however, and other types of digital STLs are available for these purposes. These systems use T-1 links from telco or microwave STLs in the 18GHz and 23GHz bands, which offer sufficient bandwidth to support *uncompressed* stereo audio. In the case of T-1 circuits, a transmitter-to-studio link (TSL) return path is intrinsically included, providing increased cost-effectiveness.

At present, there is no such thing as a "digital composite" 950MHz STL. All these systems operate like discrete analog STLs, requiring the FM baseband to be assembled at the transmitter site. Yet with the AES/EBU connectivity now offered on STLs, processors and exciters, there are many more options for high-quality air-chain configurations than existed in the analog STL world. It is possible to deliver a composite digital FM signal via T1 or 18/23GHz STLs, however. Consult with STL manufacturers and dealers for details. Some digital STL manufacturers also offer clever backup systems that allow quick, automatic switchover from digital primary to analog backup links.

The regulatory front

Remember that the Private Radio Bureau of the FCC took over the processing of all STL applications on Oct. 1, 1992. This may seem like old news, but if you've not had an occasion to file a Form 313 for some time, this change may have gone unnoticed. Applications that require a filing fee should go to FCC, Mass Media Services, PO Box 358700, Pittsburgh, PA 15251-5700.

If you have questions, call Ms. K. Garland at the FCC's Gettysburg office: 717-337-1212 or 800-322-1117. Form 313 has had several changes in recent years, and it is advisable to get the latest edition before filing. The fee-payment forms and requirements also seem to change from year to year. It's a good idea to request a supply of new Forms 313 and fee-paying instructions from the FCC. The latest number for ordering FCC Forms is 800-418-3676. (Delivery of forms can take about three weeks or more.)

Like everything else, the STL is going digital. With this change comes improved audio quality, increased reliability, uniform performance over time and greater spectral efficiency – not a bad bargain overall.

Acknowledgment: The author wishes to thank Geoffrey Mendenhall of Harris Corporation for his assistance in preparing this article.

For more information on digital STLs, circle (101) on Action Card.

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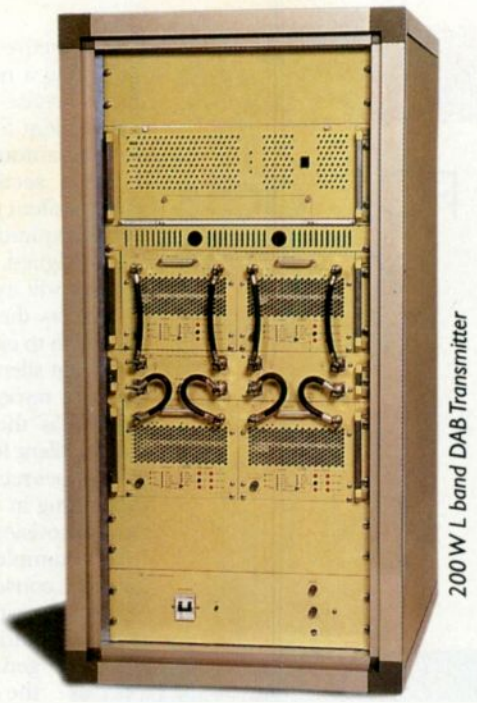

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Circle (40) on Action Card

FCC Update:

FCC acts on silent stations

By Harry C. Martin

Effective immediately, the FCC is enforcing a new rule that specifies that the license of a broadcast station that remains silent for a consecutive 12-month period will automatically expire. The rule implements a section of the Telecom Act. For stations silent prior to Feb. 8, 1996, their 12-month expiration clock begins on the date the act was signed, Feb. 8. Therefore, the first set of licenses will expire on Feb. 9, 1997.

Prior to the act, the commission had the discretion to either grant a station the authority to remain silent for a specified period or commence a revocation proceeding. The FCC no longer has the power to grant extensions to remain silent for more than 12 months. However, it does retain the right to begin a revocation proceeding in cases where the automatic expiration provision is not applicable.

For example, a station could be off the air for eight consecutive months, resume broadcasting for one day, and go silent for another five months without triggering the automatic expiration. But, the commission will still be able to initiate the revocation process in such a case. There have been no changes in the requirement that broadcasters must notify the commission and request consent for shorter periods of silence.

The commission warns licensees that the existence of pending applications by silent stations will not postpone the automatic expiration date. Thus, silent stations wishing to assign or modify their licenses should allow ample time for such applications to be processed.

Applications for facilities needed to return a silent station to the air should be accompanied with a transmittal letter with the label "*Request to expedite application of silent station.*" An explanation also must be given why the action is necessary to return the station to the air and the date that the license will expire if it remains off the air.

New regulatory fee schedule proposed

The FCC has released its proposed fee schedule. (See Table 1.) Because Congress mandated the same total amount of revenues to be collected as in 1995, most of the adjustments made to fee amounts were minor.

In general, the proposed fees have increased by slightly more than 1%. The commission had considered eliminating separate fees for construction permits (CPs) and auxiliary stations. It concluded, however, that it would be fairer to retain these separate fee categories. In the case of CPs, eliminating the fee would require existing stations to subsidize the start-up operations of competitors in the market. With regard to auxiliaries, the substantial differences in numbers of auxiliaries licensed to different stations would likely result in stations in smaller markets paying a greater proportional share of the total costs of auxiliary regulation.

Accordingly, the fee schedule continues to categorize radio stations by station class.

FCC implements two-step renewal process

The Telecommunications Act is changing renewal rules and procedures for radio stations. The commission plans to adopt an eight-year license term for television, radio, FM and TV translator facilities, low-power TV stations and international broadcasting licenses. The FCC proposes to continue to issue licenses for experimental broadcast stations for a term of one year. The terms will run concurrently by state. The new uniform license terms should enable the commission to operate more efficiently. The commission suggests that broadcast renewal applications granted after the effective date of the new rules

	FY 1995	FY 1996
AM radio		
Class A	$1,120	$1,125
Class B	620	630
Class C	250	255
Class D	310	315
Unbuilt CP	125	125
FM radio		
Classes C, C1, C2, B	$1,120	$1,125
Classes A, B1, C3	745	755
Unbuilt CP	620	625

Table 1. FCC fee structures proposed for FY 96, compared to those of FY 95.

be given an eight-year term. As for renewals granted prior to the effective date, the commission proposes to extend the seven-year grants to eight years.

In addition to the changes in the license terms, the act has eliminated comparative renewal challenges by establishing a two-step procedure. The commission must first determine whether to grant an application by examining three criteria: 1) the station has served the public interest, convenience and necessity; 2) there have been no serious violations by the licensee of the act or the rules and regulations of the commission; and 3) there have been no other violations by the licensee of the act or the rules and regulations of the commission which, taken together, would constitute a pattern of abuse.

If a licensee does not meet all of these criteria, the commission can deny the application or renew the license on certain terms and conditions (e.g., the FCC may grant a renewal for a term of fewer than eight years). Only after the commission denies an application may it entertain competing applications.

The new rules are expected to be in place by the end of the year.

Dateline

Commercial stations in the following states must file their annual ownership reports or report certifications by Oct. 1, 1996: Florida, Puerto Rico, Virginia, Iowa, Missouri, Alaska, Oregon, Hawaii and Washington. Stations in Iowa and Missouri must file their license renewal applications by Oct. 1, 1996.

Harry C. Martin is an attorney with Fletcher, Heald & Hildreth, P.L.C., Rosslyn, VA.

[solutions]

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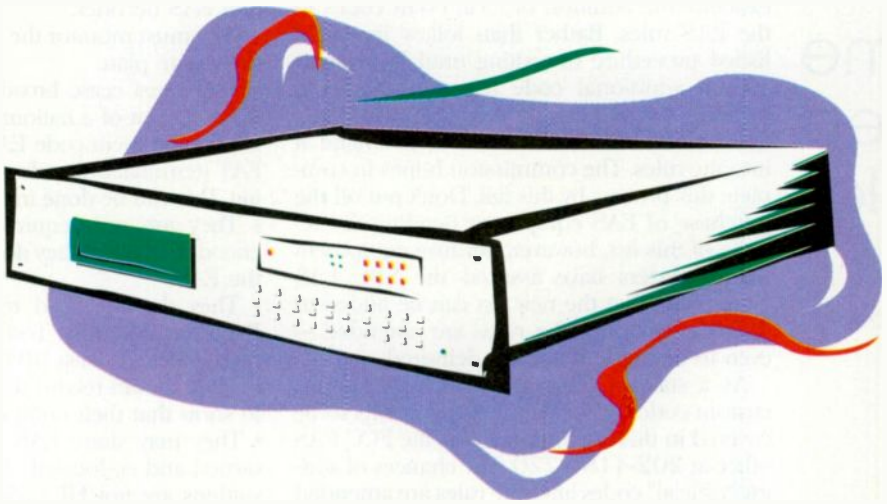

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Circle (41) on Action Card

EAS Update

Some refined rules

By Leonard Charles

Leonard Charles is an engineer at WISC-TV, Madison, WI, and chairman of the SBE EAS Committee.

The clock ticks as the Jan. 1, 1997 EAS-implementation deadline nears. Feedback from manufacturers indicates that some broadcasters think this deadline will be pushed back once more. Another delay is unlikely, however.

Meanwhile, the FCC has decided that it will expedite the addition of local event codes to the EAS rules. Rather than follow its established procedure of waiting until local areas submit additional code requests, the FCC, working with FEMA and the NWS, will determine an all-inclusive list and then amend it into the rules. The commission hopes to complete this process by this fall. Don't put off the purchase of EAS equipment pending the release of this list, however, because equipment manufacturers have assured the SBE EAS Committee that the new list can be added to their devices once the rules are amended — even to equipment already delivered.

As a state or local area, you may suggest custom codes or local emergency events to be covered in this list by contacting the FCC EAS office at 202-418-1220. The chances of adding "official" codes after the rules are amended will be nearly impossible. The SBE suggests its list of local codes, which is published in its *EAS Primer*. This list is being reviewed by the three agencies for possible inclusion. You may find that an event unique to your local area is already covered in this list.

Another clarification that surfaced at NAB 96 involves the high-frequency (HF or shortwave) broadcasters in the United States and its territories. International broadcasters are mentioned only once in the new rules, in paragraph 11.54(b)(9). Many questions have been raised by HF broadcasters and the FCC has responded with the following clarifications:

- HF broadcasters must install an FCC-certified EAS decoder.
- They must monitor the two sources listed in their state plan.
- They must cease broadcasting immediately upon receipt of a national EAS message containing the event code EAN, then wait for the EAT (termination) code to resume broadcasting. This can be done in the automatic mode.
- They are not required to have an EAS encoder, because they do not need to activate the EAS.
- They do not need to participate in the Required Monthly Test (RMT) or the Required Weekly Test (RWT).
- They should record the receipt of any tests to show that their equipment is working.
- They may share EAS equipment with co-owned and co-located stations, even if those stations are not HF broadcasters.

The SBE EAS Committee will post new, updated or clarified EAS information as it becomes available on the SBE web site at sbe.org. You may also E-mail the committee chair if you have questions. The address is lcharles@wisctv.com or click on the chairman's name under the EAS heading on the SBE web site.

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Circle (42) on Action Card

Cover story:

(Not so) Remotes

Radio remotes are sounding better, costing less and getting easier to do than ever before.

By Flawn Williams

New technologies are making the radio remote not so "remote" anymore. The portability and reliability of today's audio equipment have combined with the growing availability of ISDN and other transmission systems to make the simple, high-quality and cost-effective remote a reality.

Long gone is the distant sensation of Edward R. Murrow's wartime reports from the rooftops of London or the big band broadcasts from hotel ballrooms or being able to tell by the sound whether your team was playing home or away.

Today you're more likely to treat your listeners to a full-fidelity remote from the Rock and Roll Hall of Fame in Cleveland, a stereo sportscast from the Super Bowl, a jazz brunch from a Singapore hotel or a riveting news report from Bosnia. The quality is *in your face*, no matter how distant the source.

Backhaul basics

Getting live audio back to the station so it can *be* a live broadcast is a large part of the challenge of radio remotes. For local originations, if you've got the gear and the available frequency clearance, RF pickups can work well. Where access to dial-up phone lines can be found, frequency extenders are still a useful alternative. But the maturing of Integrated Services Digital Network (ISDN) service across the country and around the world is making it the service of choice for moving audio in real-time from point to point.

At first, American rollout of ISDN lagged behind many other countries. Then, for a while, the terminal equipment was available but many regions couldn't get the necessary lines installed by their local telcos.

As of mid-1996, ISDN has progressed to being an accepted working tool. But when it comes to making audio connections with ISDN, you'd still be wise to take the advice of a certain U.S. president from the 1980s: "Trust, but verify."

Adventures in ISDN

For starters, there are many different options to select or reject when ordering an ISDN circuit. This is a predictable side effect of using a technology that is trying to be so many things to so many people. Voice telephony, computer data, high-quality audio and videoconferencing are just some of the tasks for which ISDN is used. But, for example, do you want your broadcast audio link interrupted by call-waiting beeps? Probably not. The manufacturers of ISDN audio codecs can give you good advice on what flavor of ISDN service their devices need. Work is also under way in the telco industry on codifying the service configurations required by different terminal equipment.

The dozens of different digital audio encoding algorithms available today can be intimidating, as well. In a few short years, the original 7.5kHz mono G.722 codecs have been joined by MPEG Layer

Photo courtesy of Sennheiser Electric Corporation.

II (in several variant forms), ISO/MPEG Layer III, apt-x, Dolby AC-2 and others, in mono and stereo implementations and at various data rates. Stereo systems are further split into two modes: those that encode each channel separately (*discrete* or *dual-mono*), and those that use *joint coding*, in which audio common to both channels is encoded only once and "copied" to both channels at the receive end. (Joint stereo can provide greater coding efficiency than a discrete two-channel approach, although stereo separation can suffer slightly in some cases.)

Compounding this variety are two different basic data rates. Although ISDN is theoretically built around 64kb/s channels, some long distance service (LDS) providers pass only 56kb/s of user data, reserving the other 8kb/s for network signaling. This problem is steadily becoming less prevalent, but it's still worth confirming full 64kb/s bandwidth with your service providers.

If you'll be purchasing or leasing the codec and terminal adapter equipment for your studio and remote sites, the safe course is to pick a single manufacturer and configuration for all of your ISDN gear. This will mean fewer variables when making connections and will give you a better chance of getting problems solved with a single phone call. Many service bureaus also exist that can rent you the required hardware and help you set up ISDN circuits, either one-time or long-term, local or long distance.

But if you're willing to delve into other algorithms to try connecting to existing ISDN sites, a whole world of ad hoc remote audio sources opens up. For a quick taste of what's out there, get a copy of the *Audiobahn* list (currently about 300 listings) distributed by Jay Rose of the Digital Playroom. You can E-mail Jay at jcrose@pop.tiac.net. The list notes which model of codec each site employs, so it's also helpful for contacting real users to get their opinions of different gear.

As the market matures, vendors are taking steps to improve their units' ability to talk to other brands. Compatibility is still far from automatic, though. It requires hands-on coordination for each call to a new location.

For those interested in feeding live stereo music from remote locations, *inverse multiplexing* (IMUX) systems are available that can combine up to three basic-rate interface (BRI) ISDN lines to obtain a data rate of up to 384kb/s. BRI is the standard flavor of ISDN service offered to most nonPBX terminations. It includes two "B" or *bearer* channels of 64kb/s each, plus a "D" or *data* channel of 16kb/s, used for call signaling – hence the nomenclature 2B+D is also used when describing ISDN-BRI. A 384 or 256kb/s link (on three or two ISDN-BRI lines, respectively) can transmit remarkably robust stereo. But even a 128kb/s link on a single ISDN-BRI line (which still involves IMUXing of two B-channels) can sound pretty good for a single-hop stereo path using Layer III encoding. And respectable mono voice feeds can be done on a single 64kb/s B-channel. (See "Using ISDN for Remotes," September/October 1995.)

Perils of the two-way street

Will your remote broadcast be self-contained from the remote site or will the site interact with sources from home base? ISDN makes interactive remotes more cost-effective than ever before. Because ISDN is a full-duplex technology, the backfeed from the station to the remote site is provided at the same fidelity as the feed from the site.

KFJC, Los Altos, CA, is a college FM station that does frequent remotes on a budget using ISDN lines for backhaul. (Photo courtesy of Mackie Designs.)

But the data processing involved in the coding systems can introduce throughput delays that may approach a half second for the full round trip. Different algorithms introduce different amounts of delay, with a substantial range of possibilities currently available. In addition, an individual algorithm that offers a variety of transmission data rates may introduce longer delays for its lower data rates. Of course, on long-distance remotes, delay times are further extended by longer terrestrial transmission paths, and any satellite links will add about a quarter of a second apiece.

Any delay over a few hundredths of a second can make a full-mix backfeed from the studio unworkable for monitoring at the remote site, because the echo will confuse the remote talent. Therefore, be prepared to implement "mix-minus in both directions," and make sure you have a field mixer that will let you create a headphone mix at the remote site that combines the backfeed signal with the local program mix.

Note that although the use of a higher bit rate usually implies less coding delay, ISDN connections that involve IMUXing of more than one B-channel may actually create *longer* delays. This is because the receiver uses additional buffering to accommodate the possibility of different paths being taken by the multiple B-channels. So in the quest for better fidelity, you actually may be elongating a path's throughput time.

These delays also interfere with the natural timing of conversational interaction between the studio and the remote. If your plans include interactivity between your studio and the remote site, consider all the alternative codecs and paths available, making throughput delay one of your primary criteria of choice. Another way to lessen (although not eliminate) the delay problem is to abandon the high-quality ISDN return path and instead use a standard dial-up phone line for the backfeed. The monitoring quality at the site won't be as good, but the timing will be more natural and an overall better program may result.

The POTS alternative

One of the newest transmission systems available is the so-called *POTS* (Plain Old Telephone Service) *codec*. These systems combine an audio codec with a 28.8kb/s analog modem and connect via standard analog telephone (POTS) lines. Here again, different systems offer a range of throughput delays, but some can have a low enough delay to allow conversation without perceived echoes, and possibly negate the need for "mix-minus" assignments. More important, they can also save you the wait and the expense of getting an ISDN line installed at the remote site.

POTS codecs can provide reasonably good voice-quality audio remotes over a single analog dial-up phone circuit. Noise and distortion are lower and frequency response is wider and more natural than a direct analog feed into the same phone line. On some units, if the phone line cannot support a full 28.8kb/s feed, a lower fidelity connection will be provided. For example, one such system delivers 7.7kHz audio bandwidth at 28.8kb/s and 5.7kHz on a 19.2kb/s path – still better than analog use of the line, even with a frequency extender.

POTS codecs cost about as much as their ISDN brethren, so there's not much savings to be squeezed out of the equipment budget. The currently available

systems are not compatible with one another (nor with other ISDN or Switched-56 codecs), so you need two of the same units – one for each end of the POTS-line path. The ability to use a single existing phone line for broadcast-quality audio should greatly expand your possible remote sites, however.

Could you be even more portable by combining one of these codecs with a cellular phone connection? Sorry, we're not quite there yet. Cellular phones with modem ports typically don't support data rates higher than 9.6kb/s, and the current crop of POTS codecs need twice that bandwidth to function even marginally.

Life on the noise floor

For connecting to remote sites within several miles of your station (or via a fixed relay point), consider another emerging technology: spread-spectrum wireless digital transmission. These techniques are used by unlicensed, low-power wireless modems in recently established spectrum at 902-928MHz and 2,400-2,485MHz. They can provide clean capture of signals using carriers that barely pop up out of the noise floor.

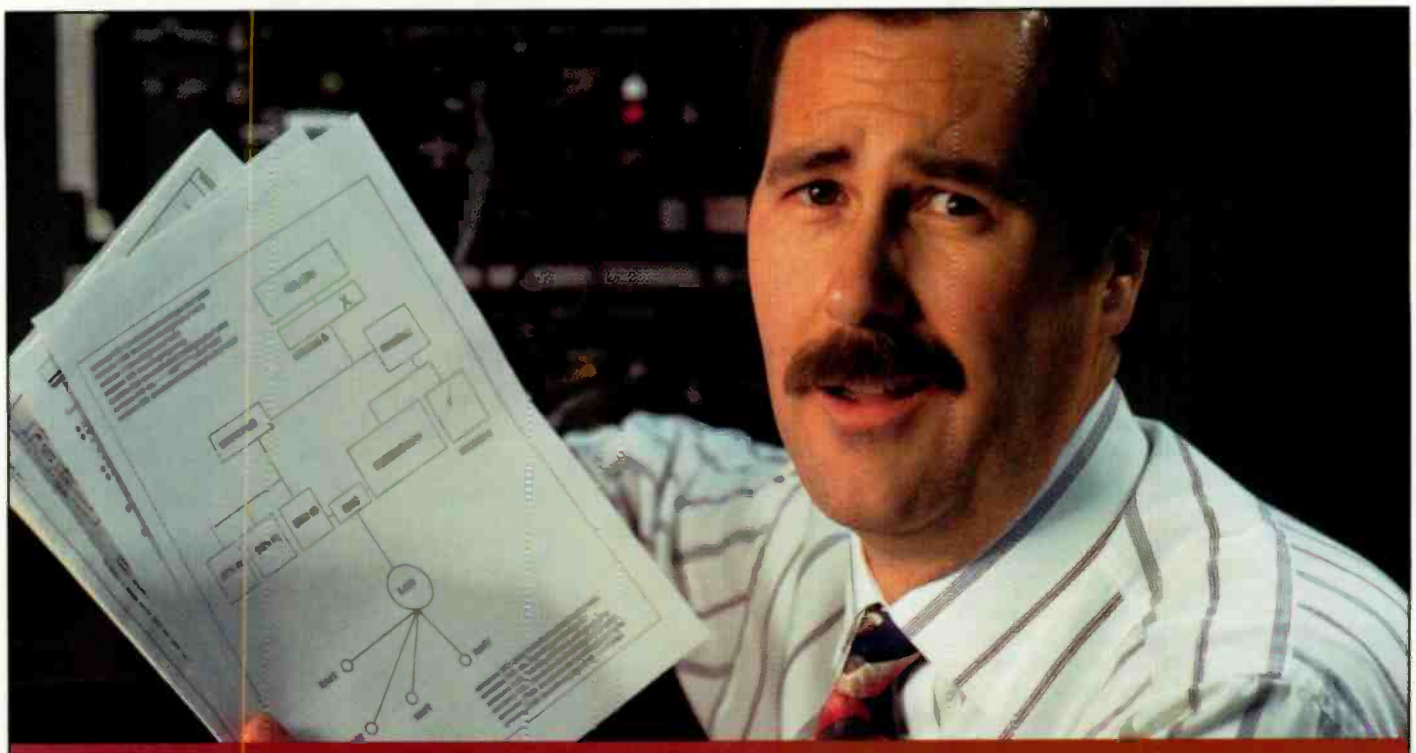
Various models support synchronous data rates of 64, 128 or 256kb/s in the 902-928MHz region (for use with the same data-compression codecs employed in ISDN transmission) or at higher data rates in the 2,400MHz band (for uncompressed audio feeds). When used with a directional Yagi antenna and line-of-sight path, these units can be used across distances of 10 miles or more. Combined with appropriate digital audio codecs operating at those data rates, you could have a broadcast-quality audio link with no installation or usage charges. Some systems feed wideband audio in only one direction (although the feed direction on the link can be easily switched), while others are inherently full-duplex (two-way).

During Super Bowl week last January, MJI Broadcasting established an ad-hoc network of stations for sports-talk programs fed directly from Phoenix via this ISDN codec/TA setup. (Photo courtesy of Comrex Corporation.)

Remote recording

Of course, not everything your staff wants to put on the air from a remote site needs to be carried *live*. A substantial amount of new technology has been applied to equipment used in gathering and producing audio in the field.

Among these are new portable audio recording systems, including the DAT and NT-1 (or "Scoopman") tape formats, the MiniDisc format, the ADAT and DTRS formats of modular digital multitracks (MDMs) and a variety of portable hard-disk recorders. Among the latter you'll find a wide range of fixed, removable or PCMCIA drives. Some of these systems allow field editing,



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Circle (44) on Action Card

and a few even incorporate a codec and an ISDN terminal adapter for real-time or file-based transmission back to the studio. New battery chemistries and outboard battery packs have also eased the hassles of keeping portable recorders powered in the field.

A variation of the portable hard-disk recorder is the "laptop audio workstation," which can be purchased as an off-the-shelf item or assembled by the user from commonly available, general-purpose computer hardware and software.

New MiniDisc field recorder features include a mono record option that doubles the recording time more than two hours per disc, plus some nifty high-speed playback options that make dubbing, logging and locating particular moments much easier. Remember, however, that MiniDisc recorders are susceptible to disruption of their recording due to jostling or vibration. A memory buffer helps protect MiniDisc *playback* from these motion-induced problems, but in most models, the recording process is not similarly protected. If you do all your field recording without moving the recorder, this should not be a worry.

Continued on page 35

Extreme remote: Bosnia

By Leo del Aguila

From the moment I was assigned to set up the technical operation for NPR's coverage of NATO's implementation of the Dayton Peace Agreement in Bosnia and Herzegovina (BiH), I tried to prepare for every possible scenario our crew (three reporters, one producer and myself) would face while in the field. This included situations like traveling with U.S. troops on reconnaissance and establishment-of-perimeter missions, interviews with local citizens and officials, visits by high brass and dignitaries and impromptu press briefings. Added to this was the lack of reliable communications and electrical service.

Beyond simple versatility, however, was the commitment to audio excellence by NPR's engineering and news departments. It paid hefty returns on this assignment, as the sonic quality of all the reports from BiH brought radio listeners to this military theater with vivid realism.

From past experiences in similar environments around the world, I knew that in order to keep up with the fast pace of unfolding news and programming deadlines, our field recording, production and communication equipment had to be compact, rugged and reliable. Most of this gear also had to be battery-powered. User-friendly operation was a plus, in case nontechnical members of the crew were called upon to operate technical equipment. (Under extreme field conditions such as these, jurisdictional and job-description boundaries are sometimes overlooked!)

Portable uplink feeding the Inmarsat AOR-E satellite through a window in a Tuzla, BiH apartment providing POTS or ISDN connectivity to the U.S. Codec and fax machine are on tables at rear.

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Traveling light?

Checked baggage for this trip amounted to eight large cases — including our flack jackets and cold-weather clothing. We also brought aboard two "M" Satphones, one reporter's kit and two large carry-ons. Traveling with this much gear requires a detailed inventory (for insurance and customs purposes) and lots of stamina, because you'll have to handle it all yourself every step of the way. While this minimizes the possibility of losing anything in transit, we also knew there would be no skycaps at the curb in BiH.

Our first destination in BiH was the city of Tuzla. Getting there took us from Washington, DC to Zurich, Switzerland to Zagreb, Croatia where I got UN credentials, and then to Split, a beautiful city on Croatia's Adriatic coast — all in one 21-hour journey. In Split, we had to rest for a day due to a violent winter storm. We rented two four-wheel drive vehicles for the trek to Tuzla, and then loaded one vehicle with the gear and the other one with groceries and supplies. (We were well aware of the lack of food and basic staples in BiH.) The adventures we encountered on that road trip would fill many pages. Suffice it to say that it included the experiences of several normal lifetimes.

Two days later, we were greeted in Tuzla by a member of our crew who had already secured a comfortable apartment. It had an enclosed porch with windows facing the southwestern sky — a critical point, because the Satphone we brought to transmit our reports back to the United States would use a satellite located in that part of the sky.

NPR reporters Tom Gjelten and Martha Raddatz in Tuzla, BiH, during a live interview with an NPR studio host in Washington, DC.

Field recording

Most of the time, NPR reporters work on their own and are issued a kit which contains modified Sony TCM-5000s or Marantz PMD-421s (both audio cassette recorders), with either a beyerdynamic M-58 or Audio-Technica AT-835 microphone (or both), plus appropriate cables and headphones. The network also provides them with laptop computers on which they can log into the NPR mainframe computer via modem.

Because NPR reporters are accustomed to getting the story on their own, an engineer's job in the field is complementary. By using more technically sophisticated equipment, and by acting as an "audio photographer" — capturing those unique sounds, often nonverbal, that sonically portray times and places — the detail and impact of the reports can be dramatically enhanced.

A typical engineer's kit for this work includes a Sony TCD-D7 or -D8 DAT recorder (usually modified with outboard battery pack that uses four D-cells), a Neumann KMR-81 short-shotgun microphone, a Sonosax SX-M2 stereo mic/line amplifier, Sony MDR-7506 headphones, zeppelin windscreen, shock-mount, pistol grip and collapsible fishpole, plus a variety of cables and adapters, mic-mounting hardware, batteries, gaffers tape, pads, pens and labels, plenty of blank tape and spares of practically everything.

The reliable and high-quality KMR-81 and the SX-M2 are a nice complement to "consumer" portable DAT recorders. The SX-M2 has three gain settings, a low-cut filter, balanced XLR inputs and unbalanced (3.5mm stereo mini-plug) line output. It provides up to four hours of 48V phantom power from two 9V batteries.

The Sony TCD-D7's recording capabilities are vastly improved by this combo. Because its line input is being used (instead of its mic input, which consumes battery power faster) the outboard D-cell tray can power the D7 for up to 14 hours.

Field production

Some of the remote recording gear noted earlier performs double duty during the production process. A second Sony portable DAT recorder and a couple of Sony TC-D5 Pro II cassette recorders are added, along with a Shure FP-31 mixer,

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a Shure FP-22 headphone amplifier and a second set of MDR-7506 headphones for simultaneous monitoring by the engineer and the reporter or field producer. When no mics are open and the room is quiet, a Fostex 6301 personal monitor speaker may be employed in lieu of headphones.

For this kind of news coverage, where you may have to set up shop in the back of a car, an Army tent or a funky hotel room, the field production approach has to be simple. The process, after recording the day's events, goes something like this:

- the conceptualization of the report;
- listening and logging of recorded tape (absolute time for DAT or counter numbers for cassette);
- drafting of script;
- dubbing of sound bites and ambiance beds from field recordings;
- content editing (with field producer or network editor via fax, POTS or Satphone);
- recording of reporter script.

The individual, edited elements are then transmitted back to the network HQ on ISDN via Satphone (typically using the 24kHz-sampled ISO/MPEG Layer II coding provided by the Musicam USA CDQ-1000 codec). The portable uplink is a California Microwave LYNXX Transportable Inmarsat-B earth station, equipped with the high-speed data (HSD) port, which provides full-duplex data calls at 56 or 64kb/s in addition to standard POTS-type analog service for voice or fax. Standard calls are billed at $5/min, while HSD calls cost $16.50/min.

The final fixing and mixing of the reporters' stories is done back at the network studios, and the pieces are then placed into various daily news programs and distributed to hundreds of broadcast stations across the United States. (This distribution adds another generation of Layer II coding, but there does not seem to be any audible problems from cascading.)

In many cases, the programs are also carried on *America One*, the US public radio channel carried in Europe on the Astra DBS service. This allows reporters in Europe to occasionally hear their work while they are still on location — a welcome, recent change that many U.S. broadcast crews are enjoying as a result of increased international distribution of American broadcast media.

The availability of high-quality, reasonably priced and reliable field equipment coupled with the numerous methods of digital audio backhaul make hi-fi radio remotes possible nowadays from anywhere — even the most extreme, hostile or inaccessible locations on the planet.

Story and photos by Leo del Aguila, a bureau engineer for National Public Radio based in Los Angeles.

(Not so) Remotes

Continued from page 28

Microphones for the field

Advances in microphones are finding their way into field equipment. Improvements in the pickup patterns, off-axis response, output levels and handling-noise rejection of shotgun and short shotgun mics are welcome examples. Enhancements among the hand-held omnidirectional mics preferred for most reporter work include new designs, increased ruggedness and higher outputs.

Wireless microphones have also seen significant improvements in reception-reliability and range, audio fidelity, transmitter/receiver size and battery life. In addition, the growing selection of single-point stereo microphones also makes it easier for reporters to record events and ambiances in stereo.

Portable mixing

Need to create a mix-minus for sending to your ISDN codec? Even small tabletop mixers (less than a square foot in size) now have multiple buses or aux sends that can be applied to such purposes. Need to send a mic-level signal to a PA system or press mult and maintain separate level control? Several mixers are purpose-built for just these kinds of applications, and a few codec manufacturers have integrated codecs, terminal devices and/or small mixers into one- or two-box portable solutions.

For those multimic situations where there's no telling who will speak next, an automatic mixer can help. These mixers are continuing to improve in quality while coming down in price. But it takes a lot of processing power and programming intelligence to do this kind of mixing smoothly. Unlike sound-reinforcement applications where occasional closure of all inputs or missing the first part of a word may be tolerable, broadcast audio makes more stringent demands on an automatic mixer. So audition an automatic mixing system carefully, preferably with headphones, to see if it is suitable for broadcast use.

It's comforting to know that remote broadcasts are as much in radio's future as they are in its past. Even if you do remotes from the same venue over and over, each event will have a different challenge. If you prepare well for those challenges, remotes can be as much fun for you as they are for your listeners.

Flawn Williams is a bureau engineer for National Public Radio, based in Chicago.

Feature:

Unattended operations

Fully automated operation is now legal — but with some important caveats.

The FCC's new rules on unattended operations allow broadcasters unprecedented freedom in automating their stations. To do it right, however, some appropriate new equipment is required, and a few optimal items are not yet available. There are also some important new procedures to be followed.

By Chip Morgan

"Who's in charge around here?" asked the FCC inspector. "I am," replied the 10-year-old boy sweeping the floor. The inspector glanced up at the computer display indicating modulation peaks at 98%, day pattern "ON" and common point at 4.1 amps = 100%. "Looks like everything's OK at the transmitter. Could I see your ID, please?"

These days, all you need to operate a broadcast transmission facility is a system that monitors specific parameters, notifies you when something is wrong and shuts down the transmitter if you don't fix it in three hours. You don't need an operator on duty and you don't even need an operator's license. In the following paragraphs you'll learn about the new FCC rules on this subject, as well as how things got to where they are today. You'll also find some recommendations to keep your station legal and on the air without duty operators.

How it all started

Way back in the days of crystal radio, many of the on-air performers were also engineers. Not surprisingly, however, most of these people were far better at engineering than performing. Propeller-heads owned and operated radio stations. Later, when business owners realized the power of the ether, they started buying fledgling stations or building their own – so they could advertise.

With an influx of operating capital, the new owners hired and trained engineers to build and maintain the facilities. Radio prospered and became big business in the '30s and '40s. Transmitters grew larger and more complex. At the same time, the studios were becoming much more sophisticated. Radio stations needed transmitter engineering staffs to ensure maximum coverage and reliability and studio engineering staffs to ensure proper operation of the studio equipment. Radio was complicated. It involved live broadcasting, multiple formats, network affiliations and complex production needs.

When new technology combined radio with pictures, many of these engineers moved into television. The older radio folks who stayed in radio tended to work at transmitter sites while the younger ones worked in the studios as board operators. Meanwhile, radio station owners looked for ways to cut costs as revenues decreased. Manufacturers introduced equipment that allowed simple radio stations to be operated by remote control. This allowed the studio engineers to do the work previously done by the transmitter engineers.

Forward into the past

By 1950, improvements in telephone line quality and increased success in the sales of radio time dictated that studios should be built in prestigious locations rather than out in a field with the antennas. Newly built FM transmitters were often the first to be operated by remote control. Especially at smaller stations, engineers were expected to perform

double duty as studio and transmitter operators. With this change in technical operation, extra control and monitoring equipment became more common at the studios (because the FCC required it).

When records and locally produced shows became more popular than network programming in the '60s and '70s, it wasn't unusual for disk jockeys to run the mixing console except in the largest or unionized stations. Remote control of the transmitter was added to disc jockeys' responsibilities especially if they had a "first phone," allowing them to control the transmitter at lower-powered stations. This eliminated the need for engineers at studios except for maintenance.

By the 1980s automation and satellite programming had become a common way for stations to reduce programming costs. Because there was now little or no need for talent at the station, and the talent also served as an engineer, who would run the transmitter? The FCC still required an operator on duty. In fact, that person was required to make operation of the transmitter top priority, with programming taking a secondary position.

Owners began to try various semi-FCC-compliant schemes including using answering service operators or other 24-hour businesses to act as transmitter operators.

In October 1995, the FCC finally acknowledged that many stations saw no value in human transmitter control (or human operation of anything at the station, at least for some dayparts). By then, technical stability of equipment was reliable and an automatic system was more capable of determining an interference condition than the average disk jockey. The commission, therefore, eliminated all the operator-on-duty rules. A station owner could shut the door at the end of the day, and the station could run by itself until the next person came to work.

Moving into the 21st century

If you could have the ultimate unattended operation, what would it look like? First, it would have to automatically comply with all FCC regulations. Second, it would have to require minimal intervention for normal operation. Third, it would have to keep an accurate record of what happened. And fourth, it would have to be capable of obtaining human help when things got wacky.

The bad news is that from an engineering standpoint, many of the critical functions of fully unattended operation are just now being developed. But there are a few systems that already provide the capability or can be modified to provide the capability needed.

There may be added savings at smaller stations from replacing older transmitter and remote-control systems with more modern designs. Older transmitters without automatic VSWR reduction or overload protection may literally burn up during a failure event. If there's no staff member on duty or listening when this happens, the fire department may be the first to know of the problem.

A simple and business-savvy way to deal with problems is to use backup systems. Often when a failure occurs, it can't be repaired within the aforementioned three-hour window even if your engineer sleeps at the transmitter. The smart solution is to have a complete backup transmission system that is tested and ready for instant use. When the main system fails, the backup system automatically comes on-line and engineers are notified. For the bean counters, the advantages are obvious. More physical facility means higher property value; less off-air time means more revenues; and sad but true, investment in backup systems is cheaper in the short term than investment in engineers.

The three-hour limit for correcting problems that might result in interference applies even if an operator is on duty. In addition, all stations must have the capability to shut down within three minutes upon FCC request. The old fail-

safe rule no longer applies, however. Dial-up control systems are acceptable.

Operating power, mode of operation, modulation levels, tower lights and AM DA parameters must be monitored. The FCC doesn't say how often these need to be monitored, but it's recommended that a log be kept either automatically or by operators. The modulation monitoring requirement is new (primarily because modulation monitors were not even required in recent years). Transmission system inspections by the designated chief operator are still required, but they don't have to be logged and can be done on a "periodic" rather than a weekly basis.

A simple and business-savvy way to deal with problems is to use backup systems.

One of the primary motivations behind the Emergency Alert System (EAS) was to make it fit within the context of a fully automated environment – something the EBS could not do. The design and programming of a station's EAS system is an integral part of any unattended operations plan.

Things to keep in mind

One fundamental rule has not changed: Licensees are still responsible for operation of their stations. You must monitor tower lights at least once a day or have automatic alarms. If you establish a new control point, you must notify the FCC within three days. Directional AM stations must still have a working antenna monitor. A station log is still required. A designated chief operator is still required. A main studio is still required.

Operating staff should be trained in the basics, such as how to find the transmitter site, how to get in the building, how to manually turn it on or off and how to take basic readings. In an emergency, anyone with a basic familiarity can perform technical functions while under the direction of an engineer on the telephone.

What lies ahead?

With today's proliferation of multiple stations under one roof, and the subsequent demands on all personnel at such facilities, having a computer do the mundane tasks of monitoring and controlling transmitters makes good sense.

Most of today's broadcast transmitters aren't set up to be tuned or adjusted by computers, but there's no reason they couldn't be. As the jobs in radio engineering become even less glamorous (were they ever, really?) it won't be unusual to see a bunch of computers running the engineering department. After all, they've been running the programming department for years!

Of course, both departments will still benefit from human oversight and intervention during crises. But if day-to-day operations can be automated, operating costs are reduced, reliability can be increased, reaction time may be shortened, and the station's human resources can be better applied to those higher-level and creative tasks that keep radio interesting – and which machines will never be able to perform.

Chip Morgan owns Chip Morgan Broadcast Enterprises (CMBE), a broadcast design, systems integration and station fine-tuning firm based in Sacramento, CA.

For more information on transmitter remote control, circle (103) on Action Card.

USADR pulls out of DAB field tests

Field tests of proposed U.S. DAB formats will take place without the participation of USA Digital Radio's (USADR) AM and FM IBOC formats. The proponent withdrew its systems from further testing by the Electronic Industries Association (EIA) and the National Radio Systems Committee (NRSC) after negotiations on an agreement between USADR and the testing groups broke down.

One apparent sticking point was USADR's unwillingness to subject the technical details of its systems to further scrutiny (although EIA sources claim that similar language in agreements for the earlier round of laboratory tests drew no such complaint from the proponent). USADR also found fault with EIA's plan to compare the results of IBOC formats with non-IBOC formats in making its final recommendations to the FCC.

Datacasting tests begin

The NRSC has begun a comprehensive series of laboratory tests for high-speed FM subcarrier data transmission systems at the NASA Lewis Research Center in Cleveland (the same site used for the EIA/NRSC lab tests for DAB formats). These systems are designed to allow FM broadcasters to implement revenue-producing or program-enhancing datacast services in the future, using existing subcarrier spectrum.

Three systems are being evaluated: the FM Subcarrier Information Service (FMSS) from Digital DJ/NHK, the High-Speed Data System from Seiko Communications, and the Subcarrier Traffic Information Channel (STIC) from the Mitre Corporation.

Meanwhile, Digital DJ has announced that it will begin commercial datacasting service in the San Francisco area on KPIX-FM (95.7MHz). KPIX will provide a variety of text and graphic services, including news, weather, sports and traffic information. DDJ will offer receivers throughout the market in hand-held, automotive, home and PCMCIA varieties. The receivers have storage and retrieval capabilities that allows access to numerous services in an "on-demand" form, as well as addressability that provides the option of personalized messaging and other customized services.

On-line radio update

- NetRadio Network has introduced NetCompanion, an web browser that includes the capacity to create a personal audio program stream that can be built from a menu of music formats and news services.
- Audio Highway (formerly Information Highway Media Corp.) is developing a hand-held device that will allow users to select, store and playback audio content via the Internet, accessed through broadband wireless service partners. http://www.audiohwy.com
- FirstRadio Internet, an Internet-only radio station based in Melbourne, FL, has joined the NAB. http://www.firstradio.com
- A new and expanded listing of RealAudio-enhanced sites is now located at: http://www.realaudio.com/raguide.cgi
- *PC WEEK* magazine's Online service has added PC WEEK Radio, an audio news service featuring daily commentaries and opinions from the editors of PC WEEK. It requires a RealAudio 2.0 player. http://www.PCWEEK.com/Radio

Business/People:

BUSINESS

The AudioVAULT digital audio storage system from Broadcast Electronics, Quincy, IL, has been chosen to control the Fountain of Rings in Centennial Olympic Park in Atlanta. During the Summer Games, the system, traditionally used by radio stations, will be programmed with musical selections, such as the Olympic theme song, the theme from *Chariots of Fire*, and *Santorini* by Yanni. The entire fountain project will remain in Atlanta following the Games as a gift from the Atlanta Committee for the Olympic Games to the city.

Sony Electronics, Park Ridge, NJ, produced a five-part videotape series on the care, handling, troubleshooting and manufacturing of videotape. The Media Forum Series includes the titles "Troubleshooter's Guide," "The Tape Handler's Guide," "Manufacturing the Magic," "Magnetic Magic" and "Magnetic Tape by the Numbers." For more information, call Leeann Lavin at 201-930-7321.

Harris Corporation's Broadcast Division, Quincy, IL, received an order for the world's first 2,000kW all-solid-state medium-wave (AM) broadcast transmitter, the Harris DX 2000. The Qatar Ministry of Information and Culture awarded the contract to Manco Contracting Company, Harris Broadcast Division's partner in Qatar.

TFT, Inc., Santa Clara, CA, announced an alliance with the Broadcast Supply Division of Continental Electronics, Dallas, to provide Emergency Alert System equipment to the broadcast market.

SYPHA, London, announced the publication of the fifth edition of the Tapeless Audio Directory. The new edition provides details of more than 300 systems, covering the range of professional tapeless systems, from cards and software packages to comprehensive turnkey systems. The directory costs $24.95 (plus shipping and handling) and is available from NAB Publications, Washington, DC, 800-368-5644 or 202-429-5373; fax 202-775-3515.

PEOPLE

John George joined Continental Electronics Corporation, Dallas, as a district sales manager.

Neil M. Johnson was appointed vice president, engineering for Digital Courier International, Inc., Vancouver, BC.

Mary Higgins was named marketing communications manager for Switchcraft, Inc., Chicago.

CORRECTION:

Because of a reporting error, some information about the SADiE product line was incorrect as it appeared in the NAB wrap-up on page 27 of the May/June issue. The correct information is as follows:

"Using the new SADiE3 software, up to 10 24-track Octavia modules can be chained together for significant increases in processing power and storage capability."

Reader Feedback:

DAB and the radio paramedic

Dear editor:

All I can say is "well done!" Your *BE Radio* piece on DAB ("Editorial," May/June 1996) has got to be the most concise evaluation of where things stand to date. And on one page, no less!

At the risk of sounding old-fashioned or trite, I've got to tell you that I miss short pieces in magazines that get right to the point.

Marty Sacks
Northeast Broadcast Lab, Inc.
Elkridge, MD

P.S.: Nobody seems to be able to answer a question that I have: Is the IEC-958 digital I/O format that is now showing up on broadcast equipment the same as SPDIF?

The editor replies:

Thanks for the nice letter, Marty. Your check is in the mail. Regarding your question, I guess I'll fill in for Dr. Radio this issue. (I'm not a real doctor, but I play one in the print media.) In any case, you'll be sorry you asked. Trust me, I'm a doctor . . .

IEC-958 is a document that covers professional and consumer digital audio interconnections. Unfortunately, it blurs the boundaries between them. It describes both the AES/EBU and the SPDIF types of data structures and electrical formats, but (either accidentally or on purpose) it doesn't specify which data structure should be used with which electrical format. So simply saying a digital audio input or output is "IEC-958 compliant" doesn't really tell you whether it's AES/EBU or SPDIF – in fact, it could be a little of each! (There are actual devices out there like this.)

For clarity, the unofficial terminology of IEC-958 Type 2 has been applied to the SPDIF digital format. But SPDIF remains the most specific and widely used nomenclature for a now nearly universal and unambiguous format. So Marty, when you're referring to the consumer digital audio interface, keep using "SPDIF" and call me in the morning.

The best reference I've found for this subject is "The Digital Interface Handbook," by Francis Rumsey and John Watkinson, from Focal Press, Stoneham, MA, 1993.

New Products:

Self-setting analog clock

ESE

▶LX-5112: a 12-inch wall-mount analog clock designed to operate as a time-code reader, a stand-alone clock or an impulse clock; it can automatically set itself to the correct time as received via any one of three different time-code inputs (SMPTE/EBU, ASCII or ESE); if time code is lost, an error indicator is lit and the clock continues counting while referencing an internal crystal time base.

310-322-2136; fax 310-322-8127

Circle (151) on Action Card

Digital portable audio recorder

Maycom Automation Systems

▶ Digicorder: a portable digital audio recording, playback, editing and communication device; it stores up to four hours of audio on credit card-sized hard disks or flash cards; on-site recordings can be instantly edited using cut and paste techniques; the Digicorder can be directly connected to ISDN and telephone lines for data transmission.

+31(0)481-377740; fax +31(0)481-377380

Circle (163) on Action Card

Turret for digital studio monitors

Spacewise Broadcast Furniture

▶ DT-1: a digital turret that swivels your digital workstation at eye level and gets your PC and cables out of the way; a swiveling feature allows the monitor to be viewed within a 240° rotation; a 3.5-inch floppy drive mounting bracket comes standard in the base for incorporation of an external floppy drive.

800-775-3660; fax 520-579-9877

Circle (155) on Action Card

Universal headset for lavaliere mics

Sennheiser

• NB2: adjustable headsets with form-fitting boom assembly; the pliable boom is detachable for left or right placement and accepts any Sennheiser lavaliere microphone including MKE2, MKE102 and MKE104; cable routing of the microphone along the boom is simplified by the assembly's flexible, rubberized construction.

860-434-9190; fax 860-434-1759

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Circle (18) on Action Card

Rack-mount CD player/ cassette deck

Marantz Professional

▶ PMD350: a rack-mounted combination CD player/cassette deck; features include independent I/Os and pitch controls, headphone monitor select, stereo microphone inputs, independent fader starts, CD play programming and a lock for remaining track time.

708-820-4800

Circle (158) on Action Card

Broadcast production DAW

Studer Editech

• Dyaxis IIbv: a broadcast version of the Dyaxis II with all the features of the parent product minus the synchronization and expansion capabilities of the Dyaxis II; features include built-in automated digital mixer for dynamic level control, panning, five-band parametric EQ and metering.

415-326-7030; fax 415-326-7039

Circle (156) on Action Card

Digital radio system

Radio Wolf International

• Radio Wolf: a fully computer-based digital broadcast production studio in a single package; some of the features include play lists, automatic cue, effects, dynamic control, single page/single screen layout and repeat play; optional modem cards allow Radio Wolf to be controlled from a remote site.

+61 3 9421 0122;
fax +61 3 9421 0133

Circle (154) on Action Card

Multipoint broadcast service

AT&T

• Multipoint Broadcast Service: AT&T made a 40% cut in the price it charges radio stations to connect to its Multipoint Broadcast Service making "radio teleconferencing" a cost-competitive alternative for broadcast distributors; with digital sound quality equal to that of a compact disc; Multipoint Broadcast Service makes branching of broadcast distribution simple; to broadcast a football game or a concert, a distributor calls AT&T's service and obtains a teleconferencing 700 number for radio stations to dial into.

800-367-7956

Circle (157) on Action Card

Phono cartridge line

Shure Brothers

• Phono cartridge line: four new models in addition to two models from the previous line featuring a diamond-tipped stylus and all the necessary mounting hardware for use with most 1/2-inch commercial and consumer tonearms; two models may also be used on P-mount tonearm systems.

708-866-2200; fax 708-866-2279

Circle (153) on Action Card

Patch panel

Neutrik USA

• PatchLink: a 1/4-inch modular patching system that is designed to streamline patchbay installation for professional audio applications; the PatchLink offers a self-contained, fully wired, printed circuit board patch panel in a 19-inch rack-mount case.

908-901-9488; fax 908-901-9608

Circle (164) on Action Card

Nearfield monitor

Tannoy

▼ System 600 & 800: dual concentric nearfield monitoring with high sensitivity (+90dB) and power handling (150W+) that achieve high sound pressure levels at the mix position; a new, innovative landscape cabinet design provides a clear line over the console, improves overall tonal balance and results in deeper bass extension.

519-745-1158;
fax 519-745-2364
Circle (160) on Action Card

Digital audio system

MediaTouch

• MediaDISK IV: a digital audio system that operates in the production mode; each category database supports more than 3,000 items; features include tape transport-style buttons, outcue entry, mark start/stop position, fast forward/rewind with "Delta" set, rotation feature and buffered auto start.

800-636-0123; fax 352-629-7000; E-mail <bgs@mbs.net>
Circle (166) on Action Card

Teleconferencer

Gentner Communications Corporation

• ET10: a telephone accessory that turns virtually any business telephone into a high-quality, full-duplex teleconferencer; the user simply places the telephone handset on the ET10 to send two-way audio through its built-in speaker and microphone; the ET10 allows connection to most digital or analog telephones used in PBX and key systems.

800-945-7730 or 801-975-7200; rgentner@gentner.com or
kpaxman@gentner.com
Circle (161) on Action Card

PC card satellite receivers

International Datacasting

• SR253 DataNet & SR263 FlexData: complete satellite data broadcast downlinks in a plug-in expansion card that turn a computer into a high-speed satellite data broadcast terminal; the receivers install into a standard personal computer ISA slot and use the PC's power supply; they can provide serial data directly on the PC bus using a software driver or directly output the data on a rear data output connector.

404-446-9684; fax 404-448-6396
Circle (159) on Action Card

Effects upgrade for DSE 7000

Orban

▶ DSE 7000 effects upgrade: a digital effects upgrade for the RAM-based, eight-track DSE 7000 digital audio workstation; the upgrade package includes a replacement DSP board with 24-bit internal processing and new version 6.0 software; the multi-effects upgrade package also may be retrofitted into existing Orban 7000 units.

510-351-3500; fax 510-351-0500
Circle (162) on Action Card

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