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Coping with multiple formats

REMOTE CONTROL
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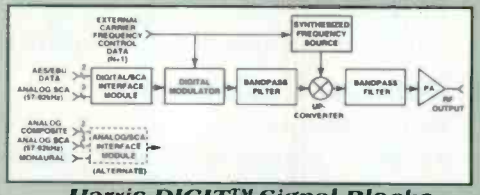

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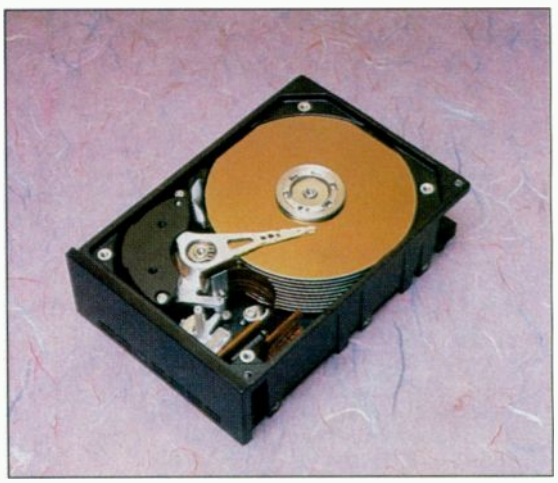

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DEPARTMENTS

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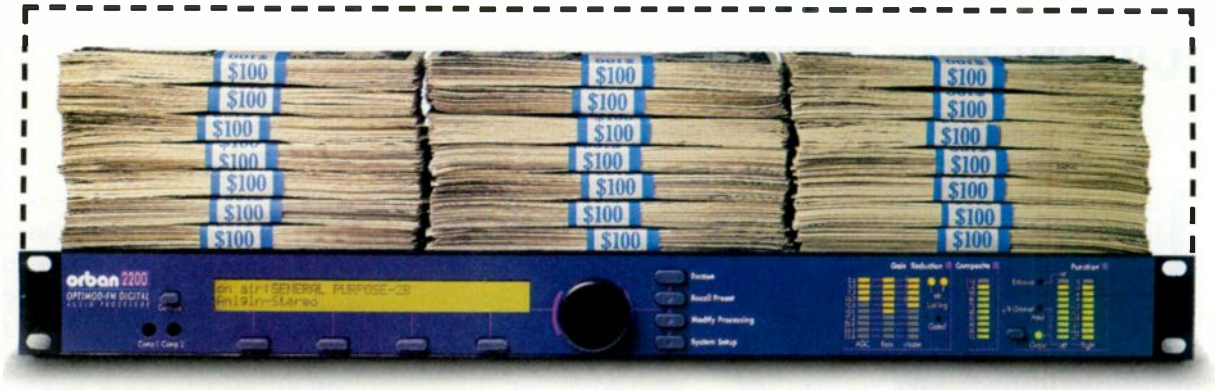
ON THE COVER: At first glance, the future of radio may seem austere and unfamiliar to many veteran broadcasters. *Inset:* Prototypes of DAB receivers look pretty different, too. (Cover design by Stephanie Masterson, *BE Radio* art director.)



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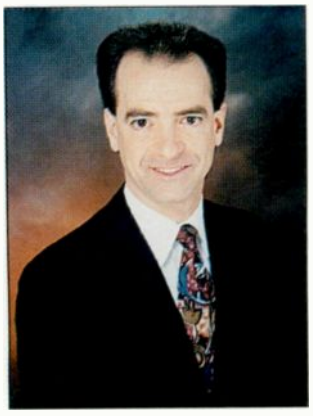
Editorial

Coping with change

In this issue, *BE Radio* takes out its crystal ball for a long hard look at the future. You'll find a lot of speculation in these pages on what's in store for radio broadcasters — owners, managers, operations staff and engineers alike.

You'll also get an interesting look at some of the hardware that broadcasters and their listeners may be using before too long. But how about the nature of the business itself? Forget technology for a moment: The U.S. commercial radio industry has undergone massive revision this year due to *regulatory* change. The Telecommunications Act of 1996 fundamentally altered the radio environment far more deeply and quickly than any technological advance could.

We're just beginning to see the effects of this change, and as groups grow and merge, it won't be long before we have megagroups that own as many stations as today's major networks have affiliates. Imagine such a "network," but with 300 O&Os. Unthinkable a year ago, it could be commonplace a year hence. The speed at which this process is taking place also is truly remarkable. Is this just because it's good business or is there an underlying fear that it's too good to be true and the ownership rules might be rolled back soon?



Critics who lament this consolidation of the airwaves' control mistake radio group owners for Hearsts, when they're actually more like Rockefellers. The new groups care little about shaping public opinion or wielding the power of information-control; they care far more about profitability, market share and corporate control.

Ironically, the audience has hardly noticed — at least for now. Consolidated stations have remained relatively faithful to their previous on-air identities so far. Smaller-market stations and their audiences may actually benefit from the change, as once-marginal performers become associated with deeper pockets, allowing them to improve their quality and content. Another change, probably for the better from the audience's viewpoint, is the greater variety of radio formats that may develop over time. An owner with five signals in a market may be more willing to experiment with riskier or more niche-oriented formats on one or two of those stations.

Another unanticipated result may affect technical staffing. A superduopoly's multiplicity of stations could justify the return of a full-time chief engineer — or even an engineering staff — to stations that currently use contractors. The loss of the apprenticeship path for radio engineers that the industry suffered over recent years may be replaced by working one's way through the ranks of a group's stations and an associated mentoring process. The new order will be nothing if not cost-conscious, however, so contract engineers may still keep the jobs if their price is right. This may cause contractors to become more competitive with each other, perhaps forcing them to lower their rates or offer new services in hopes of retaining existing clients or gaining new ones.

In a parallel development, the increased reliance on computer-based systems at radio stations will likely change what station managers look for in technical support (especially for any newly created on-staff positions). New hires will tend to be less RF- or audio-skilled and more computer-service oriented. Audio and RF maintenance may still be outsourced by many stations, but the priority of computer maintenance may ascend to a point where full-time, on-site staffing is justified.

There are clearly wide-ranging changes ahead for radio technology and the people who work with it. Preparing for these changes now makes sense for those who wish to stick around and excel. I hope this issue will help you to do just that, and stimulate your thinking about the future of radio. I'd also enjoy hearing your thoughts about where the industry is headed. Send your comments to the destinations listed below.

Skip Pizzi, editor

P.S.: The *BE Radio* staff's excitement about the future was recently tempered by a present-day shock, as we learned of the untimely death of our colleague Jason Perlman. See the appreciation on p.58.

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The future of radio engineering

By Chip Morgan

Back in the "golden age" of radio, a station was run almost completely by engineers. Every job required technical ability because radio was, after all, a technical business.

In the 1960s, even a small-market station with co-located studios and transmitter might have had three full-time engineers and one part-time engineer who might double in traffic or production. A large-market AM/FM station typically had 20 or 25 engineers, including transmitter engineers, studio engineers, board operators and engineering managers.

In today's deregulated radio environment, it's common to have five or more busy stations in a large market engineered by only one or two people. In theory, because equipment is more reliable and easier to repair, fewer engineers are needed. But in fact, engineers are dealing with far more complicated systems and a wider range of technologies than ever before. Most of the repair work is board- or equipment-swapping, and there's precious little time for preventive maintenance or component-level repair, much less for design and construction.

Today an engineer had better be extremely computer literate and have a reasonable background on older technologies, as well as the latest equipment. A typical radio station may have equipment that was originally purchased in four or more different decades, implementing basic technologies that can date back to the 1920s.

Looking ahead

The future of radio engineering really began in the 1980s when non-broadcast investors started to purchase radio properties heavily. Many stations were bought and sold with no technical review. Docket 80-90 brought new FM frequencies with marginal coverage potential, and AM radio seemed largely out-of-date. The new breed of owners were not broadcasters, they were investors. The old breed of broadcasters remembered that technical excellence was part of a winning formula and they prospered.

Today, radio is a mature industry that shows moderate growth and good stability as a business, but great tumult of ownership. The early pioneers generally no longer own radio properties, and investment firms consider trading properties and station stock to be as lucrative as operating the facilities. Some feel that the recent regulatory changes allowing greater consolidation of radio properties is the beginning of another radio renaissance that will further increase audience and revenues. But when stock market prices and station sale figures are the barometer of radio excellence instead of ratings, you can see that broadcasting isn't what it used to be. It probably won't be long before only a handful of groups own most of America's rated-market radio stations.

Nevertheless, the future will undoubtedly bring new opportunities for engineers and technically oriented people. Your destiny will be guided by the future of communications, and if you look at where the growth is, it becomes clear how to prepare.

In the recent past, it has become common for a single engineer to be responsible for six or seven stations or more (meaning that five or six chief engineers have lost their jobs over the years). Typically the older, more experienced, more expensive staff engineers have been eliminated. In their place are usually solo contractors or contract engineering firms. In some cases, the experienced engineer that used to be on a station's staff now services that same station (along with several others) as a contractor. Many smaller-market and some medium-market properties have been operating this way for awhile. The latest round of merger-mania will probably accelerate this trend.

Coping skills

What's the impact of these changes on the typical broadcast engineer in radio today? There are three major possibilities for the experienced engineer. One is to hone your project management and political skills and press on in a career path to engineering management. You'll probably work with one of the major groups as a maintenance engineer or a project manager.

Another is to change industries, applying the knowledge gained from radio engineering to another field. Possible new directions are cellular/PCS, paging, land mobile radio, satellite communications, computer telecommunications and similar fields or combinations thereof.

Finally, you could start your own company or join up with other engineers in an independent engineering firm that provides technical services to the broadcasting industry. This service may or may not be limited to a single market/metro area.

Unfortunately, at many of today's stations engineering is considered less of a core function and more of a necessary evil. Broadcast engineers have excelled in their responsibilities and eliminated their own jobs by designing and promoting equipment that needs little human intervention. Anybody can buy products from a catalog

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and build a radio station these days. That's not to say that it'll be a technically advanced facility, but if technical excellence isn't on the mission statement, it needn't be reflected in the facility.

As a broadcast engineer, you need to decide where your future lies. Unfortunately, the technical ranks of our industry are becoming polarized. New engineers at a station tend to scorn the previous engineer's work. Employees of radio stations tend to be in conflict with employees of independent engineering firms — and that's truly sad. Now more than ever engineers need to work together to preserve their value to the industry. Rather than dismissing other engineers' work, you need to understand and support it. Don't let fear of the future destroy its opportunities. There's plenty of work — it's just that the way you'll *do* the work that is changing. This is true not just in broadcasting, but in practically all industries today.

Think about how you want to live and how it fits in with the future. For example, do you like to work with a group of like-minded engineers whose job passion is using their engineering skills to design and build technically superior solutions? Or do you like your responsibility to be keeping costs low and patching things up until the station is sold and everything changes again?

This is not cynicism or sour grapes — it's reality around the old engineering shop these days. Engineering is not thought of as a revenue-producing part of the business except in those rare instances where owners and investors really realize that signal is to radio as location is to real estate; or where they understand that although a good musician can play any old instrument, a superior instrument encourages a superior performance.

What about the new blood in radio engineering? How can a young person learn the business? The answer is the same as it ever was — show up at a station and work for free until you're offered a job. You'll work all hours of the day and night, get little training and be expected to handle emergencies due to lack of planning and split-second decision making. That's what you must love if you want to be a radio station staff engineer these days. It can be a lot of fun — and hard work.

The changes in our industry open up many new possible ways to make a living. In fact, there's never been such potential in recent history. But the pioneers always get the arrows, and you'd better have thick skin, a lot of talent and a strong will to succeed in radio engineering these days. The good news is that radio is still big business, perhaps bigger than ever; it's still show business, too, and the curtain is always up. As long as there's a radio audience, radio engineers will be needed to do whatever it takes to get the job done right.

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

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Dealing with new competition

By Larry Paulausky

Competition is good. It's the driving force behind the American system of free enterprise. It benefits consumers and producers. So it must be beneficial, right?

Well, if you're putting the finishing touches on your station's income and expense budgets for fiscal 1997, the thought of justifying how much you must spend and how much you might earn may cause you to question this central tenet of our economy.

Or perhaps you're wondering if your present market situation hasn't lately been infused with altogether too much of this "good" thing. It hasn't yet been 10 years since the FCC relegated its once-inviolate "seven-seven-seven" station ownership rule to a quaint historical footnote, but the changes wrought by the new rules to the broadcast competitive landscape are so profound — and now occur so quickly — that you need a scorecard to know who your competition is. Remember when group ownership data was published annually? Now a cottage industry has sprung up to provide *weekly* reports of group holdings.

Maybe you're in one of those markets where frenzied facilities trading has created a multistation behemoth controlling as much as 50% of ad dollars. Cable and direct-to-home (DTH or "fixed DBS") radio is already available in many markets; mobile DBS radio is on the horizon, perhaps just itching to siphon off some of your national ad revenue. And you don't even want to think about the possibility of technical parity from a dozen or more existing AM signals in your market, should DAB someday become a reality in the United States.

So how can competition be a good thing? Mainly by its generation of a host of positive side effects: It exerts downward pressure on consumer prices, it encourages innovations in science, manufacturing, reliability and safety, it is the motivator of style and marketing and it fires the economy as it employs talented people to dream of a better future. Still think your world would be better off without serious competition? You must love your power utilities, your incumbent officials running unopposed for re-election and the labor practices of most professional sports.

Taking stock at home

Coping with, and ultimately succeeding in, today's highly competitive broadcast environment takes nerve and vision. But what it requires most is a relentless dedication to give your customers the best product and the best service available — the same thing that success in any business has always demanded. Distinguish your business from others in the crowded marketplace with quality and consistency. A station that superserves its customers is a hard station to say "no" to, either for a listener or for an advertiser. The first step in achieving (or maintaining) competitiveness has, paradoxically enough, nearly nothing to do with the competition. It involves a careful assessment of your own station's physical infrastructure. How well does your signal cover your market? Perhaps there is an opportunity for an upgrade to help you reach a potentially larger audience — either by seeking a better transmitter site or, in the case of FM stations, by replacing an older antenna of outdated or marginal design.

Today's listeners, accustomed to the quality of CDs and satellite-delivered multichannel TV sound in their homes, are becoming aurally sophisticated and will not long abide poor-sounding radio. Is your station's audio path (which includes every component that passes audio from the production room to the transmitter) designed to modern quality standards? Is it really operating as designed? Or is now the time to consider the replacement of outmoded and poorly performing analog consoles or audio processors with new components offering increased flexibility and better quality? How about replacing those older maintenance-intensive cart machines with a centralized hard-disk-based audio playback system?

These considerations are independent of your competition because a robust RF signal and a pristine audio channel by themselves won't make you superior to other stations in most markets. Healthy coverage and fidelity are simply essential to just get you on a level playing field. Only after your basic technical facility is in good shape can you confidently take on the next truly pivotal steps in the process: identifying your customers, learning exactly what they want, and then giving it to them.

Analyze your competitors

Examine how your competitors operate. Gather every fact you can about their formats, target demographics, ratings, delivery systems, marketing strategies and business policies. Painstakingly sift this data, paying attention to strengths but looking particularly for vulnerabilities to be exploited. These analyses become the basis for your own strategy, either by verifying that you're already being well-received by the demographic groups most in demand by your advertisers or by suggesting a change to a format with high ratings potential that is being ignored by the rest of the market.

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successful stations have been doing all along, and it is really a continuous process. For as much as smaller groups and independent stations lament today's competitive balance, what's really different in the current market isn't the number of signals in a market, but the quality of the players. Ten years ago, every major market had plenty of "also-ran" stations — stations that, whether through poor capitalization or inferior signal or just poor management, were never serious ratings or ad dollar contenders. Many of these facilities have since been acquired as the second or third station in a market by owners already running successful primary stations. By virtue of the dollars behind them and the presumed operating savvy of their new owners, these weaker stations suddenly have the potential to be real competitors.

The other contestants in your friendly little poker game just got a crash course in strategy and a new stake with which to play. Regardless of how good you used to be, to survive you've got to get better.

Quality control and vision

Continuously stress, in all you say and do, the importance of quality customer service to every member of your staff. Every contact your station has with a potential customer — from answering the phone quickly to driving the station van courteously — should project an image of professionalism. Promotional appearances and remote broadcasts must be well-organized. Deadlines must be met and promises kept. Sales proposals and correspondence must look professionally prepared. And every moment of on-air programming must be dead-on target to your chosen listener demographic. Your consistency and professionalism is what will set you apart from your competitors.

Finally, the superduopoly station combinations of your competitors by their very nature may tend to lock even their most imaginative managers into a single corporate vision, with little tolerance for different ways of doing things. They may also be spread too thinly over multiple stations. Take advantage of this phenomenon by encouraging your staff to think creatively about unique and unconventional promotions or on-air presentations, perhaps cultivating an offbeat image for your station to further differentiate it in the market. Extend this out-of-the-box thinking to the sales side as well, mining non-traditional income sources like vendor advertising and "non-spot" revenue, including promotional merchandising, station web site tie-ins, and other means of getting your clients' message to your listeners.

In short, keep your focus on presenting the best possible product in the most professional manner. Use your competition to keep you sharp and on target, and revel in success against a larger and better-equipped foe; it is this struggle that provides the true measure of your ability.

Larry Paulausky is chief engineer at WPEN/WMGK, Philadelphia.

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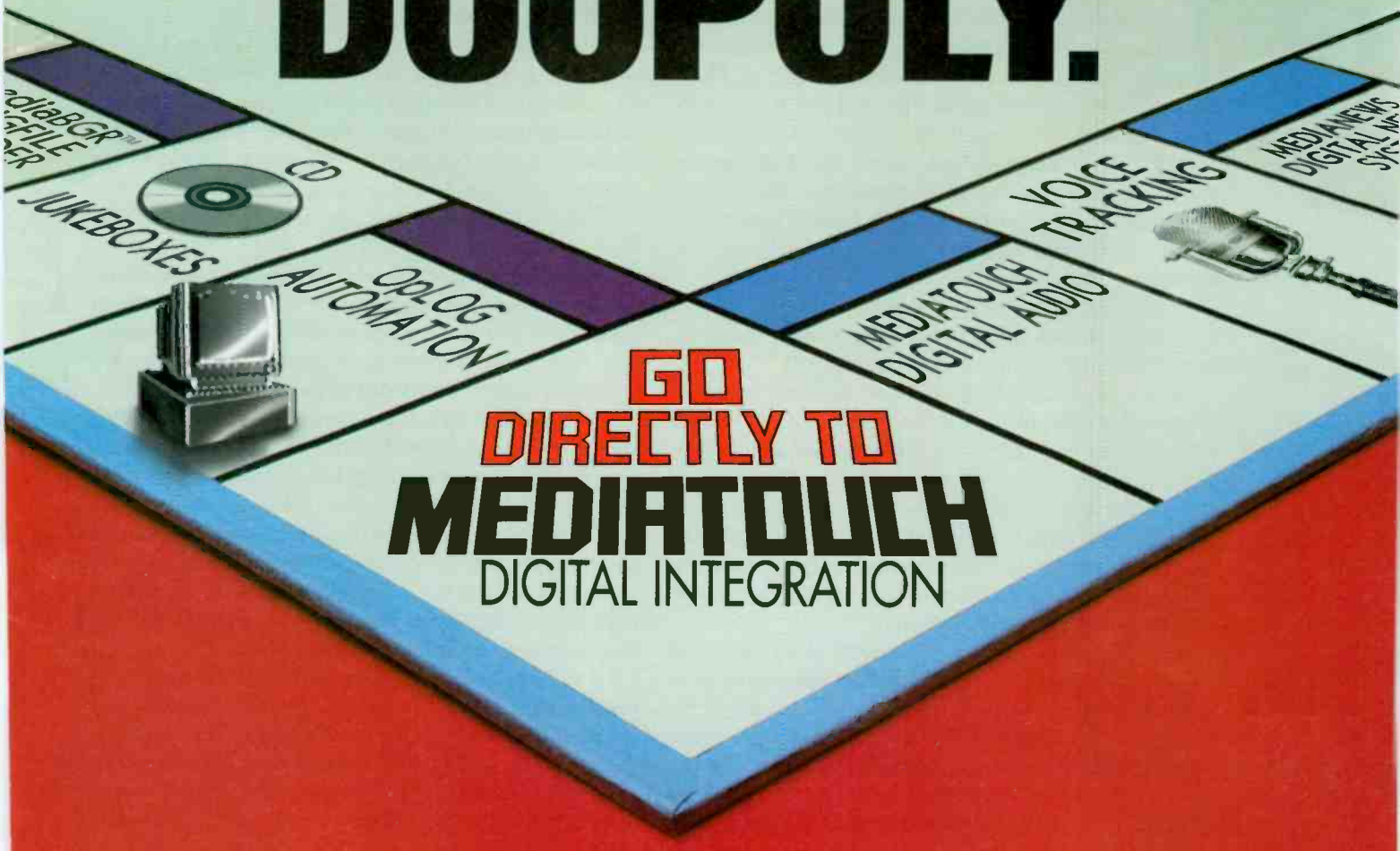

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Circle (24) on Action Card

Remote control

By John Battison, P.E.

Take your memory — or imagination if you are that young — 45 years back in time to a scene you may have forgotten about or may never have seen and certainly never will see again. Visualize a neat, probably brick building surrounded by well-cut grass, nestled among one or more towers. Inside the building the surroundings are clean and neatly laid out. There might be a small cooking facility and certainly toilet facilities. At a large console or desk a man, probably wearing a tie and maybe a coat, sits writing on a pad of forms or in a notebook. A muted hum of blowers and other rotating machinery creates the aural ambiance, and above it, music or voices are heard. Where are you?

This was a typical scene in radio broadcasting before the beginning of deregulation. Those were the days when the FCC required log entries of a station's operating parameters every 30 minutes. It made no difference if the station was directional or non-DA — the entries had to be made.

At sunset, the engineer on duty for a station required to change pattern would briefly cut high voltage and switch antenna configurations, often from his seat at the console with the press of a single button.

Many of today's most experienced radio broadcast engineers served their apprenticeships running such an AM transmitter. The time between obligatory meter readings and repairing something for the station's owner was usually spent doing homework. Hundreds of those technicians, as they were called then, became engineers working their way through college and doing their engineering studies between meter readings. I know several who worked clear through to their Ph.D.s while baby-sitting a transmitter.

Today the picture has changed. In most cases, the transmitter that management grudgingly spends money on sits alone in a little cinder-block or wooden building somewhere in the boondocks. There is no cooking facility, the toilet is the nearest tree and there is no console or desk, although there may be a small bench for repair work. Air-conditioning or heating equipment provides the mechanical noise and a monitor speaker blares out loud, compressed audio. There may be a telephone line or two or, more likely, various antennas ranging from yagis to dishes oriented toward the studios or a repeater site. There may also be dishes oriented to the skies to pull in network-originated programs from great distances.

Control of the transmitter can quite easily be handled through the same dish that brings in the program material, and hundreds of miles away, an electronic brain has replaced the human struggling to make his EE exams.

From then to now

The changes started when the FCC, bowing to NAB pressure, allowed the creation of "90-day wonders" whose crammed memory courses often seemed to consist of the actual questions the examiner would ask in the test. Having become "engineers" in addition to jocks, the station's air talent now ran the transmitters. Many will recall the adage, "Last week I couldn't spell enjunear. Now I are one!"

As the rules changed, one thing remained constant: the need for transmitter logging. But the interval changed from every 30 minutes to every three hours, as transmitting equipment became more stable. Meanwhile, FM radio also began its remarkable ascent that would eventually supersede the once dominant AM band. This allowed far greater flexibility in the placement of transmitter sites, including more urban locales, such as atop high-rise office buildings. The amount of data to be logged also was reduced and constant frequency and modulation monitoring fell by the wayside. This continued until today when only directional AM stations need the traditional transmitter control facility and maintain a requirement to keep relatively complete operating logs.

The industry passed through a period of automatic transmitter control where the parameters were logged on a printer until cheaper methods came along. Then it passed through the "fail safe" period with quite stringent restrictions on wired remote controls with dedicated control points, until today there exists what you could call the "infinitely variable" remote-control point with dial-up control.

Spread spectrum

Moving beyond dial-up transmitter site control, the next step is to wireless control. The latest innovation in this area uses *spread-spectrum* transmission in the 902-928MHz band. It is notably attractive because the equipment can be unlicensed, which removes the need to file Form 313 in the auxiliary service for remote-control equipment authorization.

Spread-spectrum operation has another advantage: It is almost tamper-proof. In some markets, rival operators have been known to sabotage competing stations' control systems. Spread-spectrum operation is extremely difficult — probably impossible — to interfere with in this way.

The veteran remote-control specialists at Burk Technology offer such a system in its BDT-115 RF data link, which interfaces with its ARC-16 remote-control unit. (See "NAB 95 Pick Hits," May/June 1995.) The RF power is low, but ranges of up to 20 miles can be obtained. This certainly

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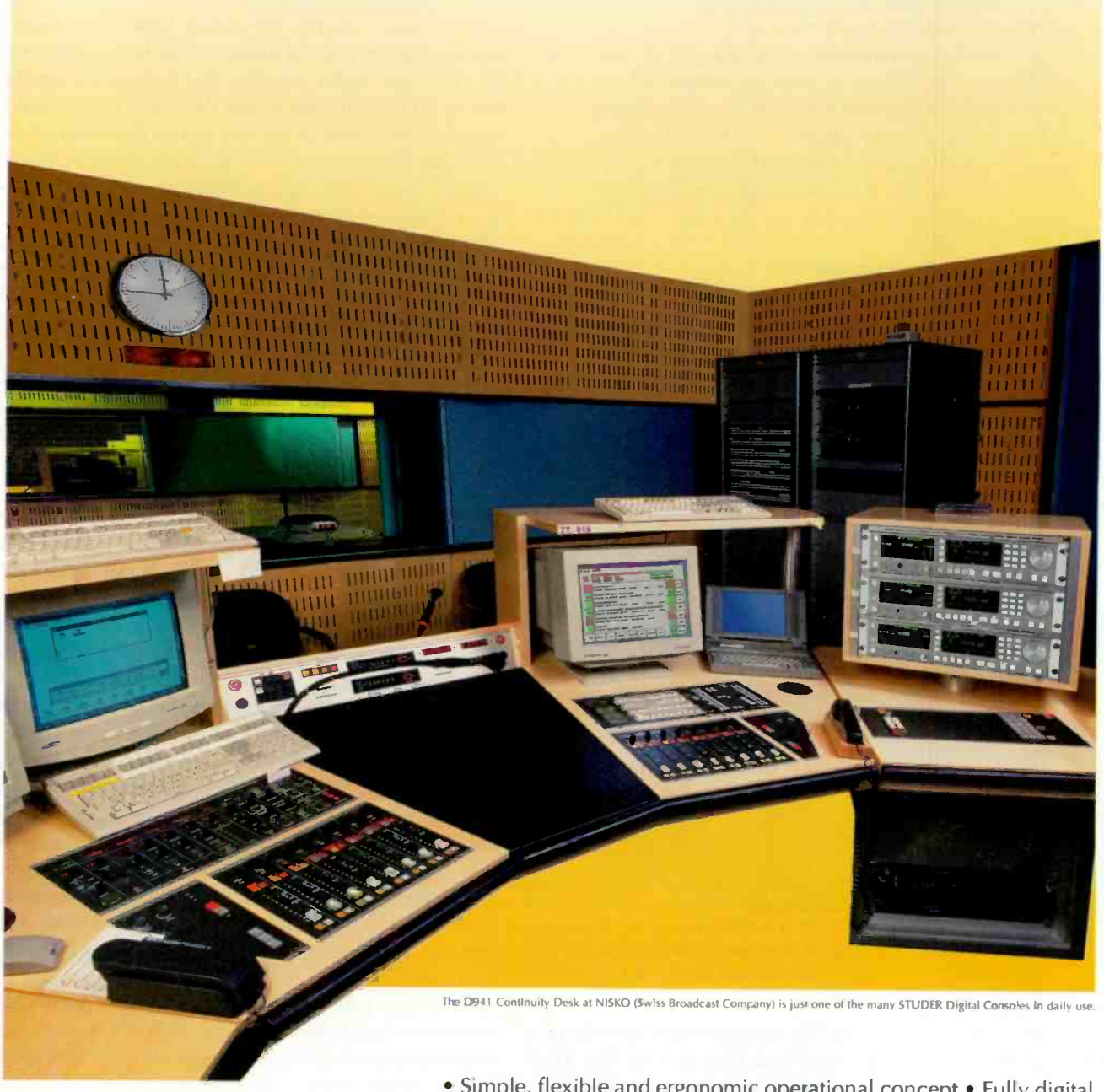

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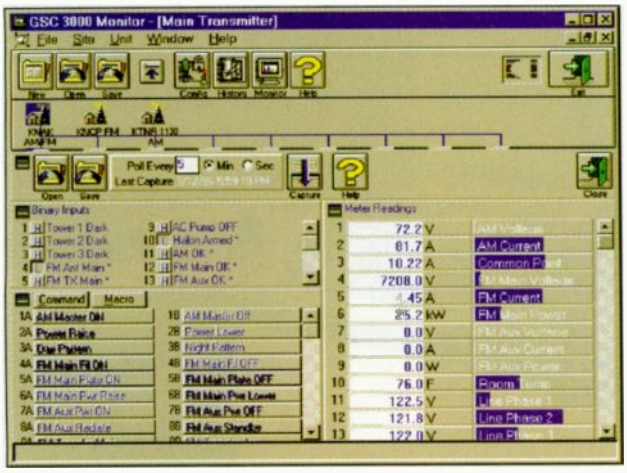
is a long way from the old yagis and dishes that were used in early wireless remote control.

As another reminiscent aside, the use of unlicensed 900MHz frequencies is now so commonplace that it brought back memories of illicit five-meter operation in 1930 using a "unity-coupled" transmitter with the grid inductance threaded through the copper tube of the plate circuit. Back then, those were high frequencies! Now the use of unlicensed 900MHz signals is legal and popular.

Multiple site control

You've no doubt observed the recent spate of acquisitions and mergers stimulated by changes in telecommunications regulation. Not too long ago, the first group owner passed the 100-station mark. Ignoring the implications of such broad control of the airwaves, the logistics of operating 100 stations pose significant problems.

In 1986, Gentner Communications unveiled its VRC1000, the first dial-up remote-control system. This year, Gentner



The Gentner GSC 3000 uses a modem-equipped, Windows-based PC at its control point. The user views screens like this one to observe parameters and execute point-and-click control or adjustment commands.

introduced the GSC 3000, a system designed for the new radio environment. (See "Pick Hits of NAB 96," May/June 1996.) It uses a networking approach, allowing it to control all the transmitter sites of one of those 100+ station megagroups from a single control point, if desired. One's mind tends to boggle at the thought of remote control being carried to such extremes, but the GSC 3000 could do it, controlling up to 256 stations, with management of up to 256 parameters at each site. Not much time for doing EE homework at that transmitter control console, however!

Cellular dial-up control

Although dial-up remote-control units at the transmitter site are generally attached to wired phone lines, in some cases, a cellular connection can come in handy. These situations include covering for emergencies when wired phone service to the site is temporarily lost, or at extremely remote or temporary sites where wired phone service is not (yet) available.

An interface box like Motorola's *Cellular Connection* can be attached to a cell phone (of the same manufacturer) at the transmitter site. The RJ11 jack on the interface box is then connected to the RJ11 jack on the dial-up remote-control unit at the site, just as if it were a wired telco line. The interface provides all the elements that the remote-control unit expects from the wired phone line, such as dial tone, ring voltage and battery.

But using a cellular phone at the transmitter site for dial-up control can have its problems. Cell-site switching during DTMF control commands may cause errors at the receiving end. (Often a transmitter site is on such high ground that it can see many cellular towers, so this switching can take place fairly frequently.) The cellular hook-up can be maintained as a good permanent back-up control path, however, equipped for automatic switch-over whenever the wired phone line goes down.

Another trick to prevent cell-site switching is the use of a yagi aimed at the closest (or best-path) cell-site. This should "lock" the transmitter site's cellular phone on that cell, unless some obstruction or reflector (such as a semi truck parked right in front of the yagi) interrupts the path. When using a yagi at the transmitter site, it's also a good idea to set the cell phone to the "home-only" mode. This is because it's quite possible to reach distant cellular systems from such high ground and thereby get hit with some steep cellular roaming charges unintentionally.

Using a cellular phone to *access* a wired dial-up remote controller can be handy when working at an off-air repeater or translator site, where no wired phone line may be available. Checking readings and adjusting settings on the main transmitter from the translator site can be helpful in troubleshooting or optimizing performance. If you're out of cellular range (or just want to avoid roaming charges), try the yagi and "home-only" setting mentioned earlier.

Finally, be sure you're up on the latest unattended operations regulations from the FCC, in which remote control plays an important part. Should control of the site be lost, make sure you have a fail-safe way of shutting down the transmitter within the time period allowed. This applies even if the STL is also lost and no programming is reaching the transmitter site. In this respect, getting the remote-control signal to the transmitter is more important (at least to the FCC) than getting your audio signal there.

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

Acknowledgment: *Thanks to Jobie Sprinkle, chief engineer of WCQS-FM/WFQS-FM, Asheville, NC, and William Fawcett, president of Mountain Valley Broadcast Service, Harrisonburg, VA, for their contributions to this article.*

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More on antenna registration procedures

By Harry C. Martin

The commission is requiring owners of antenna structures to register their towers between July 1996 and June 1998. The registration requirement generally applies to structures more than 200 feet above ground or located near an airport. Tower owners in the following states must register by Oct. 31: Alaska, Arizona, Hawaii, Massachusetts, Michigan, Missouri, Montana, North Carolina, New Mexico and New York. In November, towers in Illinois and Wyoming must be registered and in December, registrations are due for Nevada, Oklahoma and Puerto Rico.

New Form 854R

Upon registering an antenna structure with the FCC, an owner will receive a registration form (FCC Form 854R) containing a unique seven-digit registration number that identifies the structure. The owner must provide each tenant licensee and permittee with a copy of the registration. Licensees and permittees must then reference this registration number on all subsequent commission filings.

Effective July 1, each applicant for a new or modified FCC license or construction permit must have specified a seven-digit registration number if the antenna will be mounted on a structure that is required to have been registered at the time of filing. If the application form does not provide a specific place to designate the registration number, the applicant must include it as an attachment. The FCC will not process applications (including renewals) that fail to include an FCC tower registration number.

When tenant licensees must register

In the event a tower owner fails to register its structure with the commission in a timely manner, tenant licensees and permittees must assume responsibility for ensuring that the structure is registered in accordance with the appropriate filing window. However, because not all structures will be registered until June 1998, applicants may omit the registration number if the structure is not yet required to be registered with the commission.

Correcting errant site data

The commission has acknowledged that some owners of existing structures may wish to correct errant site data upon registration. However, the FAA requires a new aeronautical study for corrections in latitude or longitude of one second or more or a correction in height of one foot or more. Because owners correcting errors of this magnitude must re-notify the FAA prior to registration and could wait several months for a new FAA determination, the commission has adopted an alternative filing method for these owners.

Instead of filing during the applicable state-by-state filing window for existing structures, tower owners wishing to correct errant site data must re-notify the FAA immediately (i.e., prior to the applicable filing window), and register their structures only after receipt of the new FAA determination.

Thus, owners who intend to verify site data should do so as soon as possible to avoid delays.

Filing with non-errant data

The commission has made clear that this alternative filing procedure does not alter the standard filing procedure for proposed antenna structures or existing structures that do not require a new aeronautical study by the FAA. Proposed antenna structures must be registered prior to construction, and existing antenna structures not requiring a new aeronautical study must be registered during the appropriate filing window.

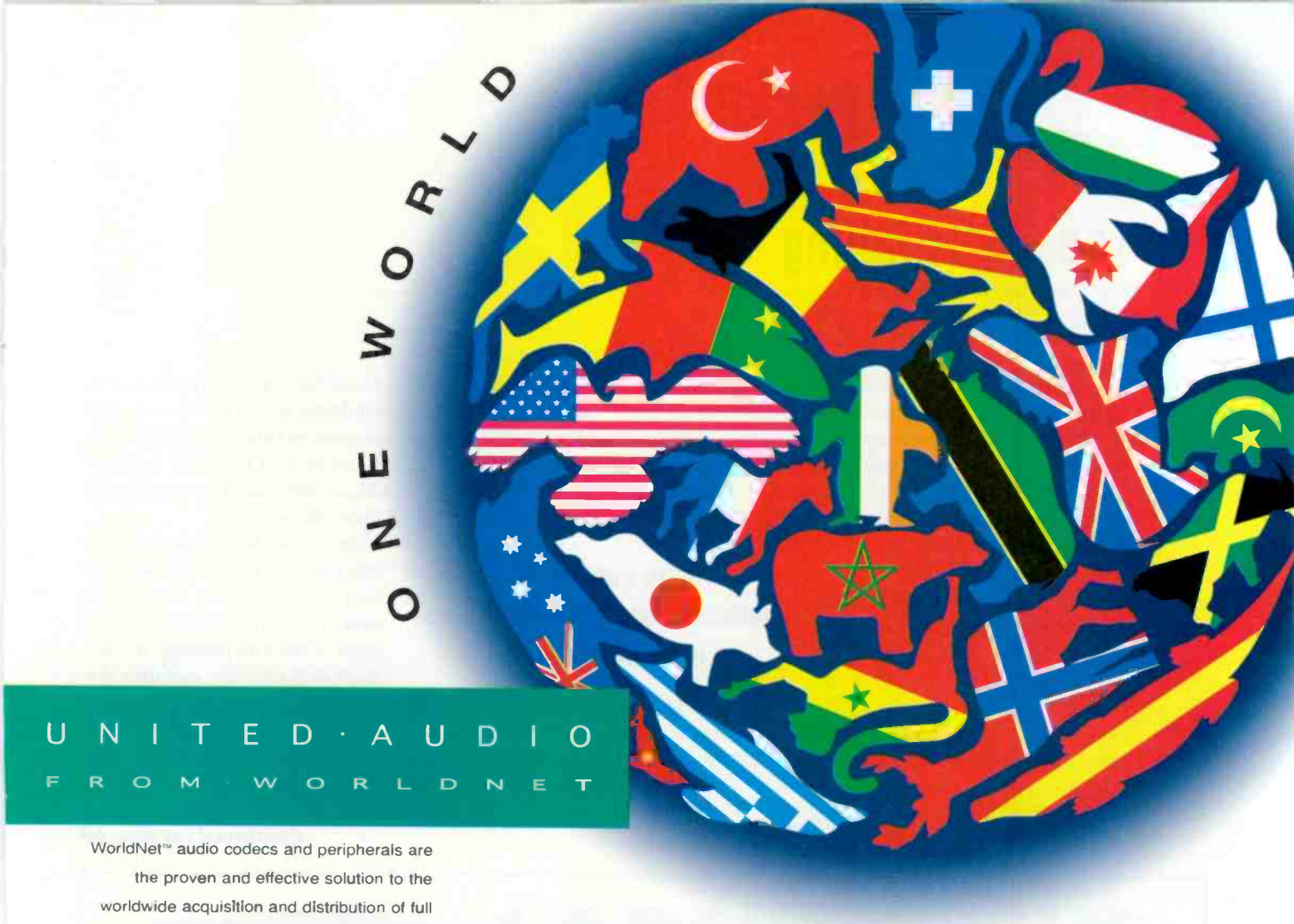
However, because the registration form (FCC Form 854) was not available until this past June, the commission has provided additional time — until Oct. 31 — for owners to register existing structures located in the following states: Alaska, Arizona, Hawaii, Michigan, Montana, North Carolina, New Mexico and New York. Owners of antenna structures in these states were originally required to be registered either in July, August or September of this year.

As noted above, all new antenna structures requiring FAA notification must be registered with the commission prior to construction. Thus, even after issuance of a construction permit, construction of a new structure may not commence until a tower registration number has been obtained.

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

dateline

Radio stations in the following states must file their renewal applications by Dec. 2, 1996: Colorado, Minnesota, Montana, North Dakota and South Dakota. Commercial stations in the following states must file their annual ownership reports or report certifications by Dec. 2. 1996: Alabama, Colorado, Connecticut, Georgia, Maine, Massachusetts, Minnesota, Montana, New Hampshire, North Dakota, Rhode Island, South Dakota and Vermont.



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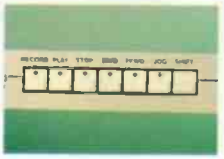

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EAS Update

The sky is falling

By Leonard Charles

When Jan. 1, 1997 arrives and the digital technology of the Emergency Alert System (EAS) is on-line, broadcasters, cable operators and the emergency management community will posses the ability to alert the public almost as quickly as a disaster is evident. Once originated, the notification can reach its destination without further human intervention. That's good, right?

Actually, it's good only if careful planning precedes implementation. A challenge to that planning is identifying how many sources in your local web are likely to activate the system for the same disaster. Anticipating those redundant sources is the first step in determining how to handle their messages.

Will an automated or unattended station re-broadcast redundant alerts?

Who's on first?

A phone call from a participant in the June 1996 FEMA Teleconference best revealed this potential problem. The caller described nearly simultaneous alerts from a sheriff's office, an emergency management center and the National Weather Service, all prompted by the same tornado. The caller asked, "Would an automated or unattended station re-broadcast all three alerts?"

The answer lies in the programming of that automated station's EAS equipment. To understand how this works, review the contents of the EAS message *header*. Each EAS message includes this header, which contains embedded codes identifying the alert's event, its location and the originator of the message. In the caller's scenario, all three messages will carry the same "TOR" (tornado warning) event code and the same location code, but the originator codes will differ.

Continued on page 69

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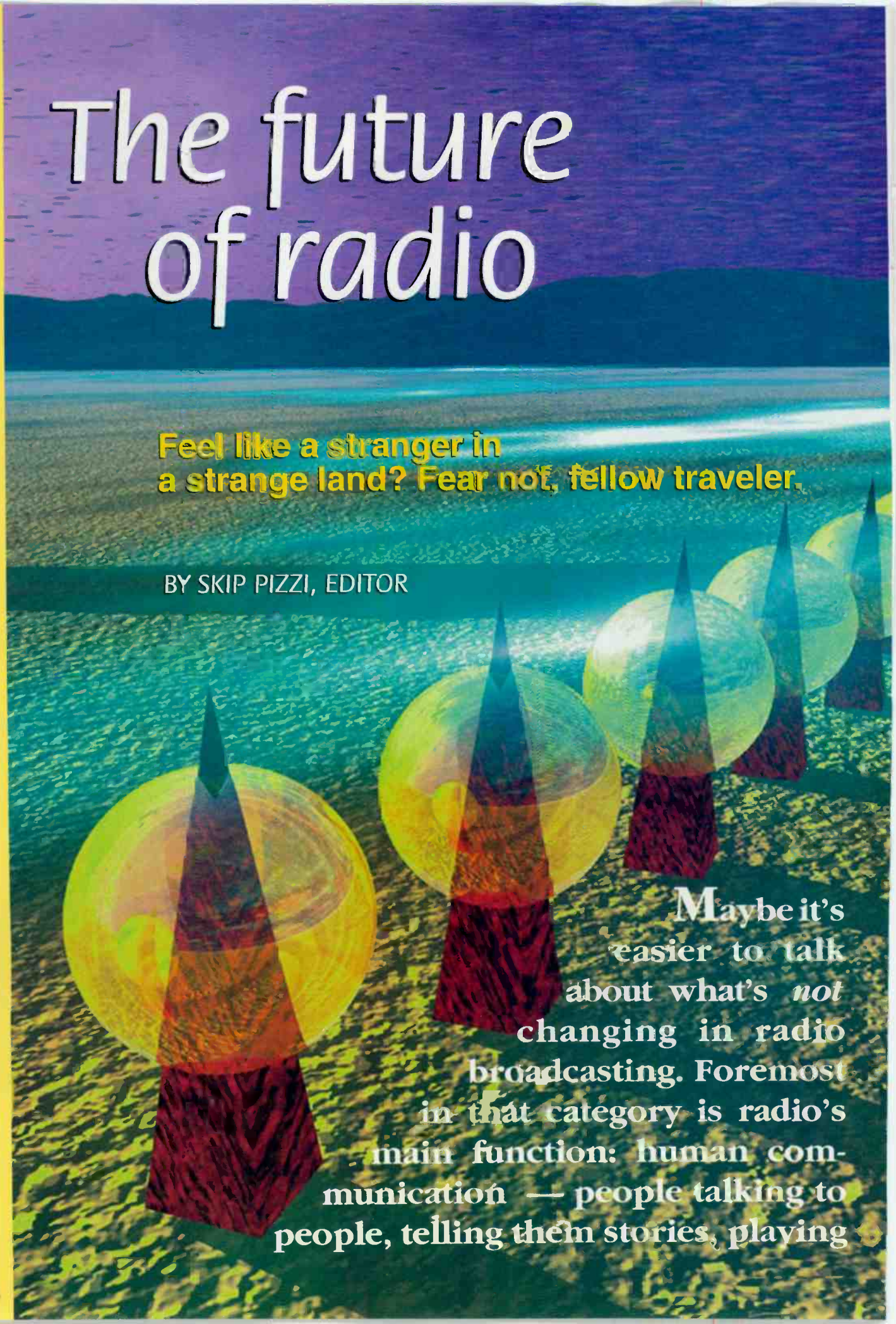
The future of radio

Feel like a stranger in a strange land? Fear not, fellow traveler.

BY SKIP PIZZI, EDITOR



Maybe it's easier to talk about what's *not* changing in radio broadcasting. Foremost in that category is radio's main function: human communication — people talking to people, telling them stories, playing

them music, entertaining and informing them. This is perhaps humanity's oldest art form, and one that is ultimately compelling to the hearer. You simply can't *not* listen to the well-told story or the well-sung song.

It's simply the tools broadcasters use to create and deliver these wares to their listeners that are changing. Coincidentally, the rules that govern American broadcasters and the competitive marketplace in which they exist are also being refashioned. Although this combined evolution may make it seem like the entire context within which radio exists is shifting beneath broadcasters feet, it's helpful to remember that the main reason for radio's existence and popularity isn't really changing at all.

Nevertheless, to the radio manager or engineer facing wholesale upheaval of a radio facility by the invasion of computers (and perhaps a few more stations), the near term seems anything but stable.

JUST ASK ALICE

As Lewis Carroll said in the voice of his best-known protagonist, "You have to keep running faster and faster just to stay in the same place." A similar lament is on the minds of many broadcasters as the blistering pace of technological change makes them tired just watching it go by.

Broadcasters are pressured by apprehensions of moving too soon vs. too late or of choosing the "wrong" technology for their facility. In many ways, their fears are justified. It's never been easier to make a single, big mistake when purchasing new equipment.

The best way to defuse the justifiable fear of this technological onslaught is to divide it into manageable parts. The first easy division is one that distinguishes new services from simple refinements to existing services. The technical and business processes applied to these two sectors are quite different, so it makes sense to keep them apart from the start.

Truly new services take time to develop, and may involve "chicken-and-egg" issues in which broadcasters and consumers must move in concert on the purchase of new hardware and on the supply/demand of new content. Regulatory approvals may also be involved. In the long term, direct financial return may result from a successful new-service implementation, thus establishing a new profit center for the operation. Few opportunities for these kinds of new technologies exist, however. (See Table 1.)

On the other hand, refinement (or replacement) technologies are unilateral implementations on the broadcaster's part, requiring no coordinated change by consumers. Financial returns are indirect, typically originating from reduced operational costs, but they can occur immediately. No new profit centers are established, but a positive effect on the existing operation's cash flow may result. The available options in this area are myriad today, bringing the broadcaster back to a fear of choices. (See Table 2.)

PARALYSIS BY ANALYSIS

One attempt to solve this dilemma is the "transplant" approach, in which every existing device in the signal chain is replaced by an updated version, using a piecemeal process. In most cases, this involves taking an old (analog) box out of service and putting a new (digital or digitally controlled analog) box in its place. Such a process can take place in many separate steps, with each step requiring only a short amount of time and staff adjustment.

Unfortunately, this is not the case for the full-blown, conventional-to-computer-based transition that many stations are currently contemplating or conducting. Unlike the "out with the old box, in with the new" methodology, a single computer system typically replaces many discrete devices. Interconnection is not a simple unplug and replug, because audio and data (local area network [LAN]) interfaces may be involved. And no matter how well-prepared the station and the system are, there is an inevitable configuration and debugging period before any computer-based system works properly — not to mention an operator learning curve to be climbed.

Once completed, however, the transition to a computer-based system can produce benefits that an updated "conventional" (discrete-device) system could never provide. The basis for such additional powers lies in the *integration* potential of computer-based systems. Putting the traditionally separate processes of audio production, traffic/scheduling, news/show preparation and on-air program assembly all on a common, multiterminal computer network provides distinct advantages. They include improved productivity, reduced operational costs (particularly in consolidated facilities), remote access/connectivity and increased quality. (Note that the transition to digital systems, once driven exclusively by audio *quality* concerns, is now dominated by other, more tangible business issues, with technical quality relegated to almost a secondary consideration.)

A computer-based system is also a prerequisite for the on-demand delivery paradigm that future on-line radio services contemplate. Thus, the transition to computer-based radio may have other long-term implications for broadcasters. If the on-line world develops into an important new media marketplace, who better to serve its audio requirements than radio broadcasters? Broadcasters can start using computers to *make* radio today, while listeners may use their computers to *receive*

programs tomorrow. It seems a natural evolution when considered in this way.

Nevertheless, most broadcasters approach such a dramatic shift with trepidation. It's a basic part of human nature to be averse to change, and many broadcasters also will cite the adage of not fixing things that aren't broken. Ideally, the radio facility of the future will improve upon present-day technology without losing the benefits and acquired wisdom of earlier systems and experience. Perhaps more important, new radio technologies will better position the broadcaster to cope with future competitive challenges, many of which don't even exist today.

That's why these changes must be considered in an "offensive" and "defensive" manner. Yes, today's technologies may be adequate for today's radio needs, but regulatory and market developments are changing that world. Should broadcasters keep polishing the rails on their tracks while their future competitors are building runways?

SERVICES	CURRENT	EMERGING	FUTURE
RADIO BROADCAST DATA SYSTEM (RBDS)	X		
ON-LINE RADIO	X	X	
HIGH-SPEED DATACASTING		X	X
SERVICE-PROVIDER ALLIANCES (CABLE, TELCO, DBS)			X
DAB			X

Table 1. New radio services and their current implementation status.

CONTENT VS. SERVICE

Another way to dismiss technophobia is to understand the rules of the new media game. Today's media marketplace breaks its purveyors into *content providers* and *service providers*. Content providers *produce* programming while service providers *deliver* it to consumers. Yet broadcasters have always performed *both* of these functions, putting them into a competitively strong position when measured by today's media benchmarks.

This enviable arrangement has not gone unnoticed by potential competitors. It is important for radio broadcasters to realize the value of their position, and exploit these assets against new competitors who may be constrained in their content or service potentials.

One approach to extending radio's lead is simply to keep doing what it does best: responding to audiences' needs for free access, timely and convenient audio programming. As these audiences' needs change, radio programming must respond in kind.

But another way to cope involves fighting fire with fire. Because broadcasters provide content and service, how about branching out? A radio station or network may be able to compete as a "pure" service provider by offering to deliver content provided by other entities. This is the approach used in the current trend toward *datacasting*. Leveraging a reliable, existing transmission system to serve up noncompeting content to the market results in almost pure profit for the broadcaster. Welcome to the world of the service provider.

Conversely, there may be other pure service providers out there who desire content for *their* customers. Radio broadcasters can offer programming to these operators, using this partnership to reach unserved markets or demographic groups with commercially supported, interactive programs (audio-only or audio-plus-text/graphics). Alternatively, the broadcaster can simply sell non-commercial programming to the service provider. These programs could be produced either in traditional real-time streams or simply shelved into an on-line archive for on-demand playback by individual consumers. Either way, welcome to the world of the content provider.

While broadcasters carefully explore the revenue potential of these new domains, they can keep their core, on-air businesses going, in which they retain that coveted content-plus-service architecture. Welcome to the best of all possible worlds.

LEVERAGING ASSETS

Today's radio broadcast facilities bring together a vast array of incoming materials: music services and/or storage media, news wire and other data services, traffic/weather/sports reports and so on, all delivered by phone line, wireless transmission, satellite or physical delivery (mail/freight) services. The facility also stores a lot of these materials and keeps them on hand for ready access. At significant expense, facilities are developed for producing these raw materials into the radio programming desired by listeners. For this same purpose, skilled individuals are also employed. Finally, an admin-

NEW SYSTEMS	WHERE APPLIED
DIGITAL AUTOMATION/AUDIO MANAGEMENT SYSTEMS	ON-AIR STUDIOS, TRAFFIC, PROGRAM & MUSIC DIRECTOR DESKTOPS
DIGITAL AUDIO WORKSTATIONS (DAWs)	PRODUCTION STUDIOS, PRODUCER DESKTOPS
DIGITAL NEWS PRODUCTION SYSTEMS	STUDIOS/ANNOUNCE BOOTHS, EDIT BOOTHS, NEWSROOM, REPORTER DESKTOPS
HIGH-SPEED LOCAL AREA NETWORKS (LANs)	INTERCONNECTING ALL ABOVE PLATFORMS
AIR CHAIN IMPROVEMENTS	STLs, ON-AIR PROCESSORS, EXCITERS
ADMINISTRATIVE COMPUTER SYSTEMS	CONTROL ROOMS (FOR ADMINISTRATIVE COMMUNICATION), OFFICE DESKTOPS
AUDIO TRANSPORT SYSTEMS (REAL-TIME & FILE BASED)	CONTROL ROOMS, NEWSROOM (USING ISDN TERMINALS & CODECS)
FIELD ACQUISITION SYSTEMS	REMOTE RECORDING/BROADCAST SYSTEMS, REPORTER KITS, CONTROL ROOMS

Table 2. A list of replacement technologies currently undergoing deployment at radio facilities and where they fit into the operation.

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istrative infrastructure exists to support the operation in a profitable manner, which includes physical and human resources.

All these elements are used to produce a single "product" — the station's air signal. Separate copies of such a considerable asset base are traditionally required at every independent radio station. Good business sense dictates that this may fall short of optimum efficiency. Broadcasters should explore methods of efficiently creating more "products" from these investments. That is just what the industry is currently undertaking, exploiting the new environments that have been serendipitously offered by simultaneous regulatory and technological change.

Computer-based systems make it possible to expand program offerings without a proportional expansion in space, staff or equipment requirements. That's why these systems fit so nicely into the consolidation efforts many station groups are currently undertaking.

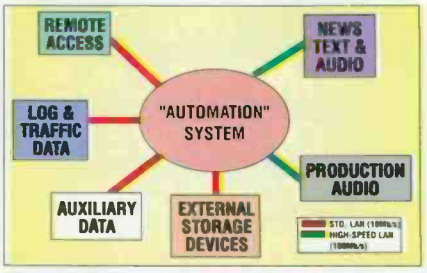

Figure 1. The computer-based station of tomorrow will require integration of several key components via LAN, centered on the on-air delivery system.

Yet this same expanded application of a station's asset base can be applied in another way. Instead of simply using it to consolidate several existing stations into a single facility (a "regressive" consolidation or "fusion" model), the same systems can be used expansively, applying a multiversioning process to create brand-new content streams (a "progressive" consolidation or "fission" model). The latter approach can be used for producing new programming in a pure content-provider mode, in which case the programs are delivered to consumers by other service providers (cable, telco, DBS, Internet service providers, etc.).

CONVERTING TO COMPUTER-BASED OPERATION

As noted earlier, the conversion to a computer-based operation is not as straightforward as the traditional upgrade process of replacing discrete devices. The integration of computer-based systems, which is so key to their value, also makes them complex to implement. Any computer-based conversion plan must take a long and wide view. Even though the actual implementation of such a system may take place in stages over a period of years, the end game must always be in sight.

The choice, purchase and configuration processes of these software-based systems also differ from the traditional. Unlike the process of specifying and interconnecting hardware devices, the computer-based system is specified conceptually by the customer and configured by the vendor or system integrator.

This makes every system purchase take on the atmosphere of a government bid specification. A broadcaster

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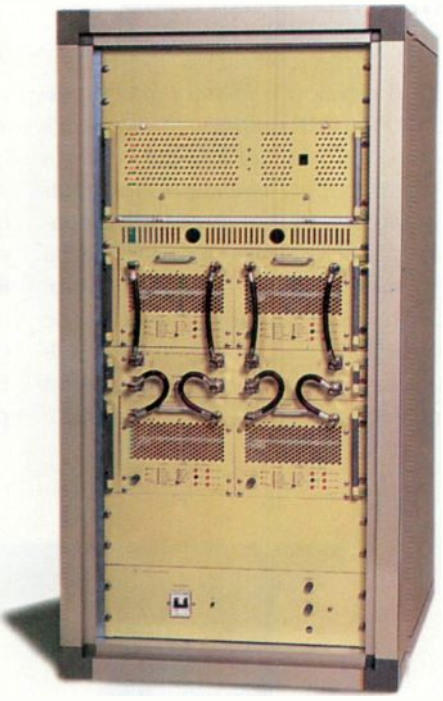

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should develop a *Request for Proposals* (RFP) that outlines the system's required capabilities and the vendor's ability to supply and support it. After sending this RFP to appropriate vendors, the broadcaster should request a demonstration from a few finalists. Once a decision is made, the system should be specified in detail, along with an installation schedule, a training plan, support arrangements and an upgrade path.

Reliability is a key consideration in such systems, but it is often overlooked. Archival storage is another area frequently given short shrift. Be sure your RFP addresses these issues adequately. (See "Computer-Based Audio Storage," p. 42.)

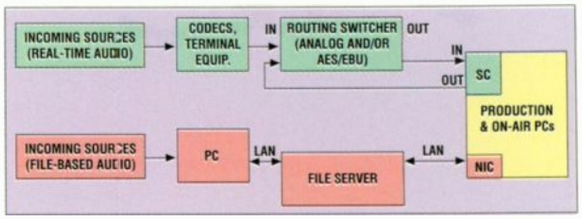

Figure 2. Tomorrow's stations will route audio by real-time and file-based paths. Computer audio platforms may connect to both, via sound cards (SCs, for real-time audio paths) and network interface cards (NICs, for file-based paths).

Phasing the system into the operation may be the greatest challenge of all. The best place to start from a system design standpoint is at the center of the operation: the on-air delivery process. Once this foundation or "hub" is established, other "spokes" can then be more easily integrated to the system. These appendages include logging and traffic functions, local audio and news production processes, remote access to the system and eventually the management of dynamic auxiliary data (such as RBDS Radiotext synchronized to the audio programming for artist/title data and the like).

Yet the on-air operation is perhaps the most *difficult* place to start from a logistical perspective. It is the area of station operations that can least afford interruption or failure. Therefore, many stations find it easier to begin their computer-based transition in the production studio by implementing a digital audio workstation (DAW). Unfortunately, unless the whole system is specified first, there is no guarantee that a DAW will be able to integrate with the rest of the system later on; if not, the dollars and time spent on such a system's first step will have been at least partially wasted in the long view. A "systems" approach, centered on the on-air delivery process is, therefore, critical. (See Figure 1.)

A high-speed LAN will connect the various computers used in such an integrated system, but the LAN will not fully replace the radio facility's audio routing process. Ideally, the LAN will be used for all or most audio storage and retrieval, in a file-based rather than real-time mode. Meanwhile, analog and/or digital (AES/EBU) audio signal routing will be used for real-time audio signal paths throughout the station. The file-based and real-time routing systems will intersect at many of the facility's computer platforms, which will include sound cards and network-inter-

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face cards (NICs). Various ports of the computer system also will appear as sources or destinations on the audio routing system. (See Figure 2.)

STAFF REQUIREMENTS

Rather than looking at computer-based systems as robotic jukeboxes or "payroll-compression algorithms," broadcasters should view them as new tools for radio personnel to better perform their work. Typically, these systems don't replace human resources, and in fact, can create new staffing requirements.

Naturally, a moderate computer literacy level among staff (or at least an openness toward learning new methods) is helpful. Equally important is the user interface of the system chosen — some are more user friendly than others. The vendor's training and ongoing support will also have an impact here.

Expert computer support becomes a critical need at the radio station of the future. At least one new staff position will likely be required for in-house computer support. Beyond a strong computer competency, occupants of this position should have at least a basic understanding of audio technology, as well. Stations are advised to keep the multiplicity of computer platform types to a minimum, in order to keep costs down in this area. The more platform types that computer-support staff are required to be facile with, the higher a salary the station should expect to pay these individuals. In the radio broadcast environment, this implies the use of the PC platform exclusively.

LOCAL PROGRAMMING

While pursuing their future, radio stations are advised to keep one overarching goal in mind. Most, if not all, of local radio's future competition will not be locally originated (i.e., cable or Internet radio), and may not be locally delivered (i.e., Satellite DAB). This means that new services will not be willing (or perhaps able) to include local programming content.

Today's listeners have grown up expecting at least some degree of local content on the radio. This expectation is not likely to change and may actually grow. Therefore, a radio station's trump card against new competition will be its locally customized content.

Although new automated technologies and network offerings may entice stations to rely more on outside programming services, the prudent station will resist this temptation. Remember that the same new technologies can be used to *increase* the amount of local programming a station produces in a cost-effective manner. The station that uses new technologies to expand its local production capabilities and expertise will serve its listeners better today and will be far better armed to fend off competition in the future.

In some cases, digital automation/production systems can be combined with new signal-distribution technologies (such as ISDN), allowing customized local content to be cost-effectively generated at a group's central facility and imported to smaller sister stations.

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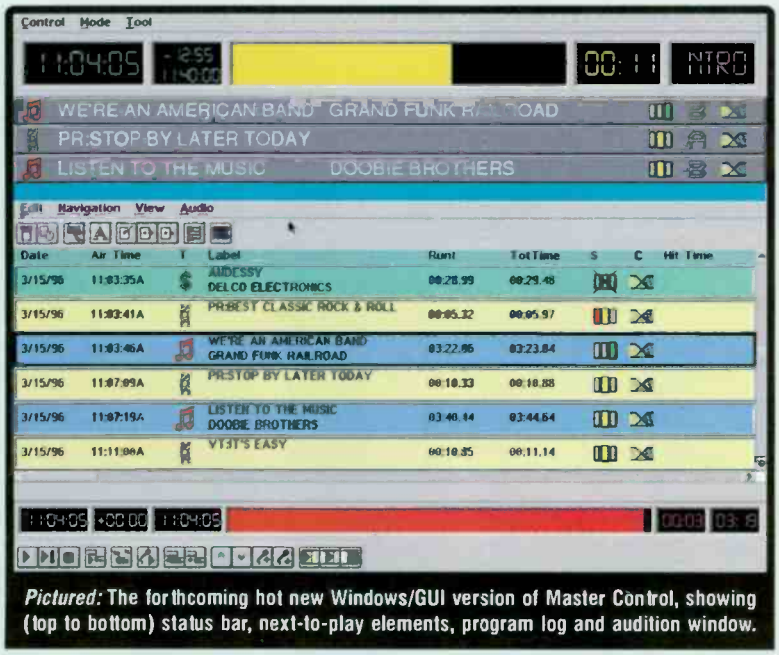

Pictured: The forthcoming hot new Windows/GUI version of Master Control, showing (top to bottom) status bar, next-to-play elements, program log and audition window.

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RIDING THE WAVE

Announcements of radio's impending demise are premature to say the least, but broadcasters will continue to hear them. Rather than laughing them off, however, broadcasters should explore ways to co-opt these new ideas. Try to match them with more efficient applications under an existing station's (or group's) economies of scale and existing asset base.

The radio station of the future will still have a lot in common with the stations of the past, although it may look a lot different. It will also be far more efficient than its predecessors, with the facility that produces a single program-stream output becoming an extreme rarity.

Getting from here to there in the next few years with the least upheaval of service and the highest profitability are the primary tasks facing broadcasters today. Smart applications of new systems will be the key to success in these efforts. For those who welcome a challenge and enjoy technology, it's a great time to be making radio.

A first look at DAB

By Skip Pizzi, editor

The current hiatus in progress toward digital audio broadcasting (DAB) in the United States is not evident in some other parts of the world. While radio broadcasters in the United States wait for the final results of DAB format tests by the Electronic Industries Association (EIA) and National Radio Systems Committee (NRSC) (see *News*, p. 58), many other countries are making headway toward real DAB implementation using the Eureka 147 DAB format. (See Table 1, p. 36.)

The U.S. radio marketplace still holds hope for an *in-band* DAB solution that would use existing radio broadcast spectrum (and perhaps retain existing channelization) in a compatible fashion to current AM and FM services. But as test results become known and formats drop out of the testing process, this hope is dwindling. Most European DAB experts — even those with high hopes for the in-band approach — have already written the concept off as a glorious but failed experiment, based on the EIA/NRSC's first round of laboratory tests.

This Blaupunkt DAB prototype receiver is designed for automotive applications. The box at right (expected to be smaller in actual production models) mounts in the vehicle's trunk, with the control head and screen in the dashboard. Screen is intended primarily for display of navigational or traffic data.

One new light on the horizon for U.S. DAB is the WCRB/Sanders *in-band/on-carrier* format, which uses an FM station's existing subcarrier region for a digital audio and data signal. Substantial development and testing remains to be done on the format, but it does provide a ray of hope for in-band supporters who haven't had much to cheer about lately.

STANDARD DEVIATIONS

While the countries listed in Table 1 are unanimous on a format, the table shows

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2. Would you like your stations to share voices and talent more efficiently? ☐ Yes ☐ No
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that there remains a disparity on the spectrum to be used for DAB across the nations. This implies that even for simple pan-European compatibility, a DAB receiver will have to be multi-band or at least of modular front-end design.

Note that terrestrial and satellite DAB applications are planned for L-band DAB, although terrestrial systems are the only type currently in operation (or expected for the next few years).

Teracom Components of Sweden designed a tabletop DAB receiver that has a large LCD screen with touchscreen capability.

One variation from Eureka 147 for the global DAB marketplace has been proposed by a U.S.-based firm called *Worldspace*, which expects to begin satellite L-band DAB service to developing nations in 1998. Its initial service will use a geostationary satellite over Africa, followed by two others targeting Southern Asia and Latin America. It plans to use a less complex format than Eureka 147, allowing the use of inexpensive (<$100 U.S.) receivers. Programming is expected to include domestic services from the targeted countries, as well as imported programs from international broadcasters.

There have also been rumblings in Japan about another non-Eureka, non-in-band format, but no formal announcement has been made to date.

DAB WORLDWIDE PROGRESS

Country	Frequency Band	Current Status
Denmark	• VHF for national SFN (255- to 240MHz) •L-band for local services (1452- to 1467.5MHz)	500W ERP transmitter at 237MHz under test in Copenhagen since 9/94
France	• L-band (1452- to 1492MHz)	Tests being done in Paris
Germany	• L-band and VHF Channel 12	Numerous pilot projects under way
Italy	• VHF (Channel 12)	
Netherlands	• VHF for national services (216- to 230MHz) • L-band for local services	SFN test (using four transmitters on Ch. 12) provide 40% coverage of Dutch population
Sweden	• VHF (Channels 12 and 13)	Four DAB transmitters in operation — plans to cover 35% of population in 1996
Switzerland	• VHF (Ch. 12) for four blocks • L-band (1452- to 1467MHz) adopted for nine blocks	Swiss Telecom PTT operating two SFNs, one on Ch. 12, one at L-band
UK	• VHF (217.5- to 230MHz)	BBC began introductory service in September 1995
Canada	• L-band (1452- to 1492MHz)	Four experimental sites covering 25% of population
Australia	•L-band (1452- to 1492MHz)	Terrestrial and satellite experiments under way
India	• VHF (terrestrial) • L-band (satellite)	Three-phase plan for introducing DAB
Mexico	• L-band (1452- to 1492MHz)	Terrestrial and satellite experiments undertaken

Table 1. Current status and plans for implementation of the Eureka 147 DAB format around the world. (SFN=Single Frequency Network.)

THE CHICKEN AND THE EGG

Now that initial DAB services are on the air in several countries, the DAB receiver marketplace can begin to show life there. Several prototype receiver designs have been put forth

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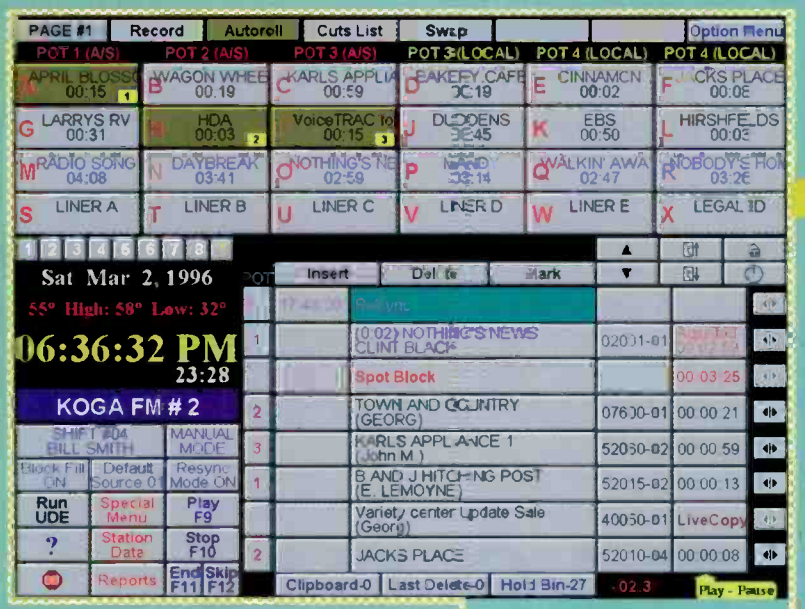

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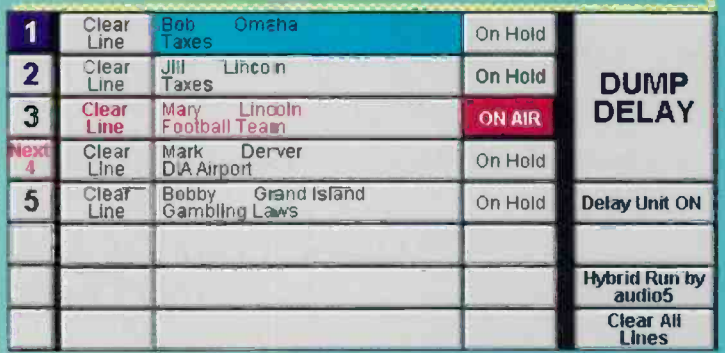

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Another mobile DAB receiver from Grundig also uses a two-piece design. Larger box in center foreground goes in trunk or under seat, while unit mounted in display panel at rear mounts in dash.

by European manufacturers. (See photos.)

A marketing problem expected by some manufacturers is how to position DAB receivers as sufficiently different from high-quality FM radios or tuners to attract customers, particularly when DAB services are simply simulcasts of programming available via conventional means. In some cases, this is achieved through the use of additional graphic displays, for either home or mobile applications. Of course, this auxiliary (non-audio) data reduces the broadcast channels' capacity for audio signal-quality or channel-quantity.

Other "smart-radio" features are also planned, taking some lessons learned from today's *Radio Data System* (RDS) on FM stations and applying them on a larger scale to DAB. Most DAB radio manufacturers are supporting a concerted effort to debut consumer production units in the fall of 1997.

Meanwhile, broadcasters in countries where DAB service has begun are addressing other important technical

Kenwood's prototype DAB receiver, currently housed in three separate boxes, includes an in-dash control unit that looks remarkably similar to a traditional car radio.

details. These include development of hardware for comprehensively managing and linking the Eureka 147 format's multiplexed signals, the inclusion of conditional access ("scrambling") features, cost-effective terrestrial coverage extension to rural areas (via unsynchronized off-air repeating), management of auxiliary data services, receiver antenna refinements (including diversity techniques and single satellite/terrestrial antennas) and worldwide DAB spectrum planning.

Although some developmental work is still required, in some countries the DAB train has already left the station.

Move Up from Carts to Touchscreen Digital Audio

Play Anything...At A Touch

The ***best*** way to improve your radio station is to put all your spots, sounders and sweepers ***on-line*** and ***ready to play instantly*** from hard disk. Creative talent sounds better than ever with ***Scott Studios'*** new touchscreen digital audio system.

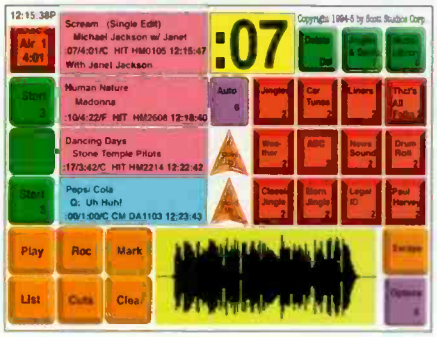
Here's how it works: Six buttons on the left of the large computer touchscreen play what's on your log. Scheduled spots, songs, promos, PSAs and live scripts come in automatically from your production studios, traffic, music and copy computers. Jocks can revise sweeps at a touch (with the arrows at mid-screen), or work with the full day's log and add or rearrange anything.

On the right, 17 "hot keys" start ***unscheduled*** jingles, sounders, effects, comedy or promos ***on the spur of the moment***. Your morning show will benefit from 26 sets of 17 user-defined instant audio "hot keys".

You can ***preview anything*** in a cue speaker at a touch. The Scott hard drive even lets you listen to endings ***while*** that song is playing on the air.

And ***nothing*** beats the Scott System for easy levels. Touch the label on the screen, moving right to left to fade as desired. If you'd rather adjust levels on the console, channel numbers show clearly on each start button.

The Scott Studio System is your *best* way to make the move to digital audio and eliminate troublesome carts. The touchscreen instantly plays whatever you want. All scheduled spots, jingles, promos, scripts and songs come in from your traffic, copy and music computers.



Phone Recorder On Screen

Touch ***one button*** and you're recording calls to hard disk. Another button and you've got the world's easiest editor. When it's ready, one touch and your call's on the air. The phone recorder only adds $1,000 to the system.

The *Best* Digital Audio

When spots, promos, PSAs, or any other digital audio events are recorded, they're immediately playable in ***all*** your Scott System air studios. Nobody wastes time carrying carts down the hall or redubbing spots for additional stations.

One question you ***don't*** have to worry about is "What if it breaks?" The Scott System comes complete with ***every*** spot and jingle stored ***redundantly*** on ***two*** hard disks. It's a snap to switch to the "hot standby" system! You get touchscreen convenience, digital quality, and backup redundancy for no more money than cart machines and commercial tapes.

The World's Fastest Requests!

Touch either of the two buttons at the top right of the main screen to see our "Wall of Carts" with all your audio ***on-line***! Touch the spot, song, jingle, sounder, promo, PSA or comedy you want and it plays ***instantly***. Or, you can put it anywhere you want in the day's schedule.

During play, all Scott screens include large digital timers that automatically count down intro times, and flash warnings 60-, 45-, and 30-seconds before the end. You also get clear countdowns the last 15 seconds of each event.

Instant Requests from Hard Disk

There's no way to play requests faster than with the Scott System! Touch the music button and first letter of the title or artist's name. You get a "Wall of Carts" with songs that play at a touch!

All your music will be pre-dubbed ***free*** from your playlist. Scott Studios has radio's highest quality music on hard drive.

The Full Day's Log

Scott Studios lets you see the whole day and make any changes you want.

Large & Small Have Made the Move!

The Scott System ***leads the industry*** with major broadcasters like Disney/Capitol Cities/ABC, Westinghouse/CBS, Chancellor/Shamrock, Alliance, Salem, Liberty, Saga, Liggett, Regent, Tichenor, Benchmark, Max, Atlantic, and Ralco in Canada. Scott Systems are in Detroit, D.C., Dallas, Houston, Philadelphia, San Diego, Denver, San Antonio, Ft. Lauderdale, Cincinnati, Dayton, Lansing, Las Vegas, and smaller markets coast-to-coast from Bangor to Bakersfield.

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Computer-based audio storage

The era of audio-specific storage media may be ending.

BY KEVIN MCNAMARA

(Photo courtesy of Seagate.)

As computers replace cart, reel-to-reel and even CD playback equipment at radio stations, general-purpose computer peripherals are becoming the primary repository of audio material. Yet how much do broadcasters really know about these systems? And how much of what they might know about them is actually still up-to-date?

The major computer-industry issue of how to store and retrieve data faster and more reliably is being addressed in a multitude of ways today, and most of those will affect broadcasters soon, if not already. Although some approaches may not make economic sense at the moment, it's still important to be aware of them because they may become the preferred technologies of tomorrow.

Before considering the various computer-based hardware storage solutions, it will be helpful to review some of the interfaces required to connect peripherals to the computer, as well as some performance issues that are common to all peripherals.

DATA BUSES

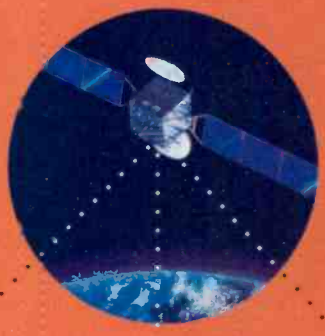
High-performance drives are only as good as the interface between them and their host computers. The most prominent interfaces are the *Small Computer Systems Interface* (SCSI, pronounced "scuzzy") and the *Integrated Device Electronics* (IDE) bus. Each of these has evolved significantly since its inception, and together they have spawned a wealth of acronyms, such as E-IDE (Enhanced IDE), ATA (AT Attachment), ATAPI (ATA Packet Interface), SCSI-2, SCSI-3, Wide SCSI and so on. All of these terminologies have their roots in the IDE or SCSI interface specification.

Introduced in 1987 and still the most popular interface, the IDE standard was developed by Western Digital. IDE has drawbacks such as: 1) its lack of support for peripheral devices other than hard drives; 2) an inability to support more than two hard drives; 3) hard-drive capacity limited to 528MB; and 4) relatively slow data transfer rates of 2-3MB/s. The E-IDE specification addresses these limitations by providing support for four or more drives of up to 8.4GB capacity, support for other non-disc peripherals, such as CD-ROM or tape back-up units and data transfer rates up to 16MB/s.

SCSI defines a set of physical and electrical specifications for connecting a host computer to peripherals in a daisy-chained fashion. In its original form, SCSI is capable of operating at speeds near 5MB/s, transmitting on an eight-bit parallel data bus. Unlike IDE, SCSI uses a protocol based on "logical" devices, which allows it to be shared with several other types of peripheral devices. Each device on a SCSI bus has a unique "ID" or address identifying it to the host computer and other devices on the bus. SCSI can support up to eight devices on a bus.

Enhancements have been made to the original SCSI specification in the form of SCSI-2 and SCSI-3. SCSI-2 provides support for devices, such as CD-ROM, scanners and LANs, as well as increased transfer rates of up to 10MB/s. SCSI-3 increases the amount of allowable devices (IDs) on the bus to 32, along with even faster transfer rates and support for fiber-optic transmission. Due to its flexibility and performance, SCSI has become the interface of choice for higher-performance multimedia applications.

It's not whether you win or lose, but



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Computer-based audio storage

RELIABILITY

Like almost anything else in the computer world, reliability of digital storage is a *scaleable* parameter. This is advantageous because different digital audio storage applications require different degrees of reliability. For example, in those cases where a station is using a digital workstation in a production environment, making frequent, manual backups to a tape or second hard drive is probably an adequate strategy. On the other hand, for a station that is running all of its music and spots on a hard-disc-based server, a more sophisticated backup plan is warranted.

As with any mechanical device, hard drives have a finite life. The Mean Time Between Failures (MTBF) for these drives varies among manufacturers, but it's reasonable to expect about five years of continuous operation (assuming proper installation and ambient conditions). For a music station, a single 9GB hard drive can store all the music on a playlist, plus a standard spot load, assuming a 4:1 data compression algorithm is employed. Backing this data up may not be practical, primarily due to the time it would take to make and restore that much data. A more sensible solution is the use of a second hard drive in one of several redundant schemes.

Originally suggested by researchers at the University of California at Berkeley as a means to decrease storage costs in mainframe computers, the *Redundant Array of Inexpensive Discs* (RAID) scheme replaces a large, single disc drive with several smaller and cheaper drives. RAID has since been applied to smaller, PC-based computers and network servers. RAID defines seven possible levels of redundancy (numbered 0 to 6). By virtue of cost and complexity, most smaller PCs and PC-based networks, including those used for many audio storage systems, use level 0 or 1.

RAID Level 0 — also called the "just-a-bunch-of-discs array" — uses a computer with more than one disc drive. The data can be written across two or more discs while treating those drives as a single drive. It is not considered a redundant system although data would be preserved on the working drive, making it easy to restore the system. Level 1— also called *mirroring* — allows data to be written to two discs. Overall performance is increased because requests are made to the drive that has its heads located closer to the point on the platter that contains the information. Level 1 can also handle concurrent requests to each drive, a benefit to systems that support real-time audio and video. If one of the drives were to fail, the system would still operate, albeit at slightly lower performance.

RAID Level 2 is not used with PC-based systems. In Level 3, data is "striped" or split across multiple discs. Parity data is recorded on a separate drive. This method yields significant performance gains because contiguous data is accessed from multiple drives simultaneously, in effect allowing them to operate in parallel. RAID Level 4 is similar to Level 3, but works at the sector level of the disc for even higher effective performance. In Level 5, the parity data is rotated across all of the discs in the array. Each disc contains data and parity information. Level 6 includes proposed improvements to Level 5 that are yet to be implemented.

RAID arrays can be established either within a single PC or

in a stand-alone cabinet containing only the drives, power supply and interface electronics. Many RAID systems offer "hot-swappable" drives that can be removed and replaced while the system remains in operation. The array then rebuilds the replaced drive as a background operation over a period of hours, after which it is back to its full level of redundancy. Higher RAID levels can handle multiple, simultaneous drive failures.

DISC PERFORMANCE

The performance of a disc drive is characterized by five measurements:

1. *Access time:* The period of time that extends from when the drive receives a request for data to the time that it subsequently returns the requested information.
2. *Seek time:* The time required for the heads to move from their current location to the track containing the requested data. Most current drives will provide average seek times of around 8ms.
3. *Latency:* The waiting period that extends from when the heads find the correct track to when the correct sector passes under the heads. This is directly related to the rotational speed of the platter.
4. *Command overhead:* The time it takes for the disc controller to process a request.
5. *Transfer rate:* The rate that data can be read/written to the disc. This can range from 5MB/s to 40MB/s.

MULTIMEDIA-SPECIFIC DRIVES

Video, and to a lesser extent, audio multimedia applications, are particularly demanding on fixed-disc systems because of their need to provide an almost constant stream of data to the client application. The disc drive's access time may not deliver data to the application fast enough, resulting in pauses or glitches in the program material. This is sometimes handled by *buffering* the data in RAM.

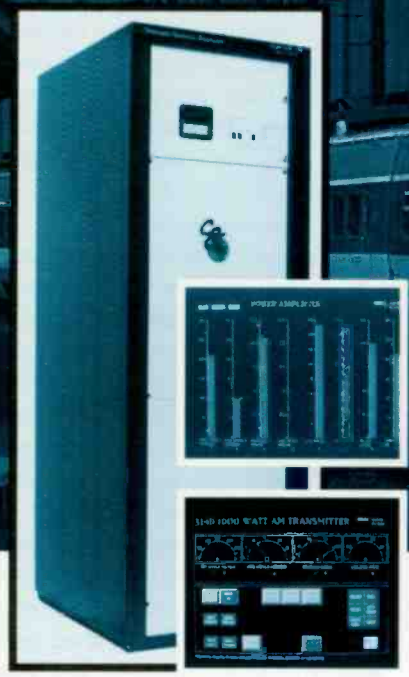
Recently, several manufacturers have introduced disc drives intended specifically for multimedia applications. In order to speed up access times in these multimedia-specific drives, manufacturers have eliminated several of the time-consuming internal housekeeping functions found on standard drives.

HARD-DISC BASICS

Hard drives (also called magnetic rigid disc drives) were first developed by IBM in the mid-1950s. Since that time, the capacity of hard drives has increased significantly. They have become physically smaller, more reliable, faster and much cheaper. You can purchase a hard drive today for about $0.30/MB. Just six years ago this price was about $5/MB. It's no wonder that the hard disc is used almost exclusively as a storage media within the various digital audio workstations and delivery systems on the market.

Hard drives consist of four basic components: platter, heads, actuator and controller. The platter is made by applying a thin film of magnetic material, such as iron oxide to a foundation (substrate) material. Aluminum was used as a substrate for many years, but current generation drives use highly polished glass or ceramic composite substrates. Drives consist of one

TAKE THE "D" TRAIN



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or more (usually more) platters mounted on the spindle of a brushless DC motor that maintains a constant speed. The speed varies by model, but ranges between 3,000rpm and 5,500rpm.

Heads are designed to read and write data to the magnetic coating of the platter. Each drive contains one or more heads attached to a "headstack" assembly. The assembly maintains the heads at a constant spacing (on the order of millionths of an inch) from each platter. The actuator moves the headstack assembly across the disc platter and is controlled by an electromagnet. Varying the current on the electromagnet allows the actuator to place the heads in the desired position. When power is removed from the actuator, the heads are positioned by spring to a point on the center of the platter (where there is no data) in order to prevent the head from inadvertently damaging the platter. As its name implies, the drive controller takes care of sending the proper signals to the actuator and heads. The controller is integral to IDE and SCSI drives.

When hard discs are formatted, the platter is divided into concentric tracks beginning with track 0 (located on the outermost portion) and increasing toward the center of the disc. Most hard drives contain more than 600 tracks. Each track is divided into one or more (usually more) sectors, each normally 512 bytes. In some cases, the user can specify the sector size at formatting.

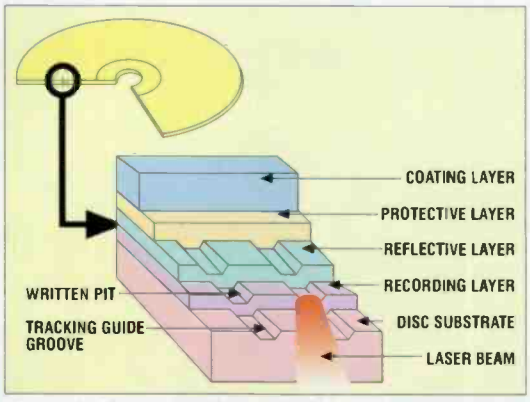

Figure 1. A cross section of the CD-WO disk, showing record laser accessing disk from below. Playback laser reads disk from above.

OPTICAL DISCS

Optical-media discs are far more resistant to external magnetic fields and have a storage life of 10 to 30 times that of magnetic media. They also offer higher storage densities than magnetic-disc media, although this is countered by their generally slower access times. The latter is due to the higher mass (and, therefore, greater inertia) of optical read-heads, and is worsened by some optical systems' use of *constant linear velocity* (CLV), which implies that the drive's platter speed must change whenever track-radius changes. (CLV effectively doubles the capacity of a given disc, however, compared to the alternative *constant angular velocity* [CAV], in which platter speed never changes.)

The most popular optical storage formats today by far are the CD "family" of systems. For example, worldwide shipments of CD-ROM drives will top 44 billion units this year. This is a technology that now has been embraced by various sectors of the entertainment industry. CD-ROM also will soon become the only distribution media for large software applications.

The physical formats of the CDs can be defined under several standards. The most common are documents contained in books

with differently colored covers, so they are referred to in the following manner:

- *Red Book:* Specification for digital audio CDs (CD-DA), the original CD format. Extensions include the CD+G (graphics) and CD+MIDI formats.
- *Yellow Book:* Defines the physical arrangement of the CD-ROM format for data storage. It does not specify file or directory structure.
- *Green Book:* Used for interactive video formats, such as CD-I.
- *White Book:* Defines the CD-ROM/XA (extended architecture) format, which includes specific applications, such as the Video CD (CD-V) and Photo CD formats. (CD-V is not to be confused with the Laserdisc or DVD formats — more on DVD later).
- *Orange Book:* The specification for recordable CD devices, write-once (CD-WO, also called CD-R) and erasable (CD-E, also called CD-MO). A revised version, called *Orange Book II*, covers the most recent generation of CD-WO, which includes multisession capability.

In addition to these physical standards, *ISO-9660* is used as a file system standard for MS-DOS applications. It uses the DOS standard naming convention of an eight-character file name and a three-character extension. For Macintosh operating systems the *Hierarchical File System* (HFS) is used, which includes support of long file names.

RECORDABLE CD

If you're looking for an inexpensive way to archive or distribute audio and/or data files, CD-WO peripheral drives have now dropped below the $1,000 mark. Depending on how your computer is equipped, these drives can be used to write either CD-ROMs or CD-DAs. Blank media is available in reasonable quantities for about $10 each. Each CD-WO can store up to 650 MB of data or 74 minutes of audio.

The recordable compact disc is comprised of a plastic substrate that is pregrooved in order to provide timing control and tracking guidance for the laser beam during recording. (See Figure 1.) The substrate is coated first with an organic dye, which serves as the recording layer. A thin coating of gold is applied next to form the reflective layer. Two additional layers provide protec-

tion and an outer coating for handling and labeling. During recording, a laser below the disc is focused through the substrate onto the reflective layer. When activated, the laser's heating of the dye

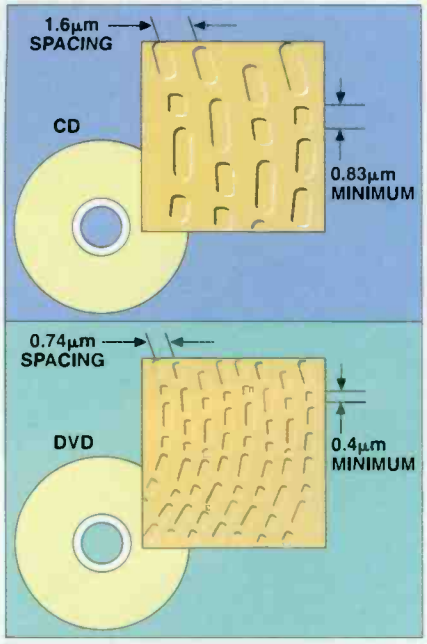

Figure 2. Comparison of storage densities on the CD and DVD formats.

layer causes it to shrink, which in turn creates pits in the reflective layer above. These pits are then readable by any CD player (which reads them through the disc's top surface).

DVD

DVD originally stood for *Digital Video Disc*, but its ability to also store audio and data spawned the alternative name of *Digital Versatile Disc*. At present, the acronym remains officially undefined, but a number of derivative formats have already been named, such as DVD-ROM, DVD-R (a write-once recordable format), DVD-RAM (an erasable recordable format) and RAIL (*Redundant Array of Inexpensive Libraries*, using multiple DVD-RAMs in a RAID-like arrangement).

DVD media looks like a conventional (5.25-inch) CD, but it can hold up to 17GB of information. Unlike the CD, a DVD disc is made from two substrates bonded together, thus decreasing the distance between the disc surface and the pits below it. Because the laser has less surface to travel through, it can be focused on a smaller area, allowing the pits to be packed tighter, resulting in increased capacity of the disc. DVD also uses visible-red laser light rather than infrared, further increasing storage density due to the light's shorter wavelength. (See Figure 2.) The format has been defined in single or dual layer modes, as well as single-sided or two-sided modes.

DVD players will read standard CDs. Standards already have been adopted for DVD video formats, but a standard for DVD audio-only discs is still under development. Once established, however, a DVD audio-only standard will likely boost performance well beyond what is available with current CD technology. It is probable that the format will support an emerging digital audio standard of 96kHz sampling with 24-bit resolution. Comparing this format to the current CD format (which uses 44.1kHz sampling and 16-bit resolution) yields an increase in dynamic range from 96dB to 144dB and an upper frequency-response limit extension from 22.05kHz to 48kHz. The DVD audio-only format will probably also support multiple, discrete channels of audio.

MAGNETO-OPTICAL DRIVES

Magneto-optical (MO) drives combine elements of magnetic and optical technologies. Similar to conventional hard drives, MO drives can hold large amounts of data and are rewritable. Unlike the hard drive, however, the media in an MO drive is removable and claims a shelf life of more than 30 years. MO drives tend to have slower access times than hard drives and are more costly, but several manufacturers are making a commitment to the MO technology that has resulted in the recent availability of higher-performance, lower-cost units.

REMOVABLE CARTRIDGE DRIVES

Removable cartridge drives consist of a drive unit that houses the motor, heads and controller circuitry. A cartridge containing magnetic disc media can be inserted into the drive unit for reading/

writing data, and then removed for safekeeping or for use on another drive. In recent years, there have been two main types of removable cartridge drives in common use: Syquest and Bernoulli.

Syquest drives use a rigid platter mounted inside of a 5.25- or 3.5-inch cartridge. Bernoulli drives use a flexible magnetic disc within their cartridges. (This drive gets its name from the method that is used to draw the flexible disc into the headstack.) In terms of capacity, Syquest offers 44MB, 88MB, 105MB and 256MB cartridges. The Bernoulli Multidisc 150MB supports 35MB, 65MB, 105MB and 150MB cartridges.

More recently, a company called Iomega has introduced two successful removable magnetic disc products, the *ZIP* and *JAZ* systems, offering 100MB and 1GB capacities, respectively. These products are quickly taking market share from the earlier systems due to their favorable pricing and higher capacities.

REMOVABLE HARD DRIVES

A removable hard drive is essentially an entire hard drive unit (discs, heads and controller) housed in a protective case. It is plugged into a mating unit that provides the removable drive with power and interfacing to a host computer. These drives are currently available in capacities of up to 2GB.

Damage to the drive and possible loss of data can occur if the unit is subjected to physical abuse or exposed to magnetic fields. These units can be quite successfully used as backup media or as alternatives to hot-swappable drives, however.

TAPE DRIVES

Tape drives are the most economical means to back up your data. Two types of tape drives are available: *QIC* (quarter-inch cartridge) and *helical*. QIC cartridges operate much like an audio cassette where the tape is moved along a fixed head. Several types of QIC drives are available, and using data compression a cartridge can store up to 2GB. Helical drives use a recording principle similar to VCRs, in that the tape is wrapped around an offset spinning drum containing the read/write heads. There are two types of helical tape drives for computer data: Digital Audio Tape (DataDAT) and 8mm. Using hardware compression, DAT drives can hold up to 4GB, while 8mm drives can store as much as 10GB.

In the near future, look for the use of optical storage systems, particularly DVD, to become popular with the deployment of digital video and high-end multimedia systems. Nevertheless, the magnetic hard drive is, and will continue to be for the foreseeable future the primary storage media for computer data, along with many multimedia and audio applications. Removable media (magnetic and optical) may begin to replace tape in some applications, such as field acquisition. Radio stations should keep abreast of all popular storage media, and continually explore their value to different aspects of broadcast operations.

Kevin McNamara is president of Exegesis Technologies, a consulting firm in New Market, MD.

Mackie MS1202-VLZ

By Brian Sanders

You've been there: staring at the production room schedule trying to figure out how to fit a two-hour production into one hour of available time. Or cramming the remote equipment into the station vehicle — your Honda Civic with bad shocks.

Studio overbooked? Gargantuan road console? Consider the Mackie Designs MS1202-VLZ mixer. It's a slightly bigger brother to the now venerable MS-1202, the company's original stereo micro-mixer. Four mono mic/line channels with high-quality pre-amps complement four mono/stereo line-only channels. There are two auxiliary sends and two stereo returns. Metering is via two columns of bright LEDs with a >50dB range.

The new design keeps to the original 1202's clean, straightforward look. On closer inspection the experienced 1202 user will come to two conclusions: 1) This is a powerful little mixer; and 2) Mackie listens to its users, many of whom have been asking for just these improvements to the 1202 design.

Features at a glance:
- High-fidelity, low-cost utility mixer
- Three-band EQ
- Solo bus
- Balanced XLR main outputs
- Alternate stereo bus
- Independent main mix and monitor level

What's new?

Some new features are obvious: three bands of EQ (up from two), a low-cut filter on mic inputs, a solo feature, channel mutes (with routing to a new, second stereo bus) and an all-new monitor section.

Look more closely and you'll find three new pairs of outputs. While the original 1202 had quarter-inch TRS main outs, the VLZ adds a parallel set of XLRs. That means one less set of oddball cables to tote around. Another pair of balanced quarter-inch outputs drive control room monitors (or headphones) via an independent level control, and anything you've assigned to the channel mutes comes out yet another pair of quarter-inch TRS jacks (the "ALT 3-4" bus). In fact, all the I/O on the board (except the RCA phono jacks for tape send/returns) are balanced.

Some features new to the 1202 series are straight out of the 1990 vintage CR-1604, Mackie's first product. One is the EQ section. The VLZ carries three bands of 15dB control: a higher than usual HF band shelving at 12kHz, the bass pegged at a lower than usual 80Hz, and the midrange control centered at 2.5kHz. The new model adds a steep (18dB/octave) high-pass filter. This will help eliminate stage rumble, wind, handling noise and other undesirables, yet save the bass EQ for a boost in the fat-bottom band.

The new solo feature makes setup and troubleshooting snappy. Arranged as post-EQ and pre-fader in the signal path, the feature is a welcome addition. Hit a solo button, use the meters to set trim, dial in your sound then move on. Without channel solos, tracking down a bad mic or cable during setup is at best inconvenient. During the gig, it's the stuff of recurring nightmares. Now if something goes south, damage control is swift and efficient. And you won't easily forget something is soloed. A "rude solo light" (that's how it's labeled) is an oversized LED that winks tirelessly until you disengage all soloed inputs.

Also common to the VLZ and the larger 1604 is the ingenious system of channel mutes. Though being able to turn off a channel isn't exactly innovative, turning it off and sending the signal someplace useful is rather novel. "ALT 3-4" is an independent stereo bus; it lacks a master gain control, but is perfectly suited for a direct patch to a multitrack or a mix-minus feed, for instance.

A major redesign introduces a source matrix to the monitor section of the VLZ. One of my biggest complaints about the original 1202 was that gain changes at the main mix control didn't register in the headphones. This is no longer a problem. The headphones/control room source matrix selects its audio source from either main mix, ALT 3-4 or tape return. The tape return can also be assigned to the main mix.

Low noise is good news

The "VLZ" nomenclature comes from "Very Low Impedance" architecture, which Mackie claims is the reason its mixers are so quiet. According to the product's literature, VLZ design "reduces thermal noise by making internal impedances as low as possible in as many places as possible within the console. . . scaling down resistor values by a factor of three or four."

There are improvements in a few other areas, as well. The phantom power switch has a different shape to it now.

You'll never again mistake it for the main power switch as you fumble around in a dimly lit club. AUX 1 is now switchable pre/post fader. Effects returning on AUX 2 can also be assigned to AUX 1 monitor mix. The top panel slopes up about 10°, enough to make panel markings and controls more visible. The markings themselves are more extensive than on the original 1202, providing helpful reminders of EQ ranges, gain structure, signal flow and so on. And even though the 1202-VLZ is slightly larger (yet lighter) than its predecessor, it's still less than a foot square. Both should fit the same road case.

A little workhorse

A micro-mixer such as this is not going to replace the main production board at your radio station. What it will do is augment that console, let you add a new small utility studio perhaps or take you on the road with minimal fuss and excess baggage fees.

Studio time is always at a premium, no matter how large or small the operation. Desktop productions with a 1202 make tight studio schedules a thing of the past. Sonic compromise is not an issue. This mixer can help with everything from simple projects, such as dubs (a real studio time waste) to complex production gigs.

The mixer also performs well for full-blown music recording and production on the road. Concert production is a snap even in difficult remote conditions. The six-and-a-half pound 1202-VLZ offers great flexibility with its generous input and output offerings. Your field production could include A-B music rolls, ambience tracks, theme music, pre-produced announcer and interview segments — all without risky patching and unpatching during the broadcast.

Need to run multiple copies at the performance? For safety and ease of dubbing, it is a good idea to run two DAT machines and a cassette at the concerts. While cumbersome with the original 1202, the 1202-VLZ drives one DAT with the XLR outs, another off the quarter-inch pair and a cassette from the RCA jacks. Redundancy is maintained all the way to the tape.

The VLZ is so versatile it could become your first-line problem-solver: Use it to submix all the guests on your big studio talk show special to one main console mic input (you can attenuate the main XLR output by 30dB to feed a mic input). Use it to fix impaired audio using its handy EQ or as an active adapter/splitter between unbalanced and balanced audio sources or as a headphone amp. The list goes on and the mixer's attractive price tag may encourage you to buy more than one.

Finally, Mackie should be commended for its useful, readable (even entertaining) owner's manuals. As a low-priced mixer boasting professional standards, some of the 1202-VLZ's features may be new for many users. This is not a problem with the descriptions and typical setups included in the 50-page manual. The appendix includes a glossary ("A Haven of Non-Techiness for the Neophyte"), a bit on connectors and a chapter called "Balanced Lines, Phantom Powering, Grounding and Other Arcane Mysteries." If you need a slightly different configuration than stock, Mackie's designers share some helpful modifications.

(By the way, if you're looking for something like the 1202-VLZ but with faders rather than pots, check the Mackie Designs MS-1402VLZ, the next step up the VLZ line. Besides full-length faders, it also adds two more mic inputs and positional solo.)

If your facility is involved with any kind of local production, either in the studio or in the field, you owe it to yourself (and your budget) to check out the Mackie Designs MS1202-VLZ and its siblings. You'll be hard pressed to find better audio quality, flexibility or reliability for the price.

Brian Sanders is senior producer at KNPR-FM, Las Vegas.

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FOR MORE INFORMATION

Circle (102) on Action Card.

Orban 8208 stereo encoder

By Christopher H. Scherer, CBRE

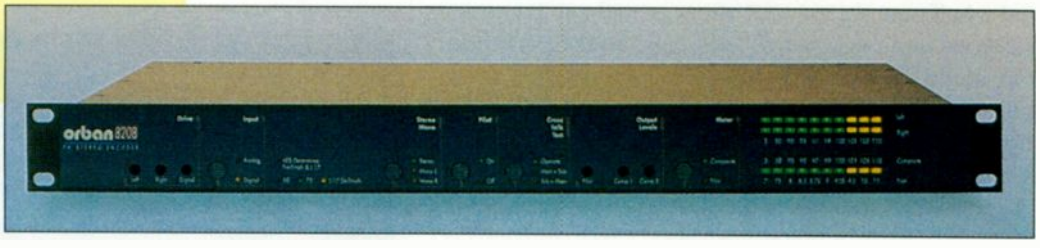
The word "digital" is creeping into more and more of the equipment we use everyday. It has even become a part of the on-air processing chain, either as full DSP or digitally controlled analog.

You may be looking for the next step in an all-digital air chain or perhaps your stereo generator just isn't giving you the performance you need. For these purposes, Orban offers the 8208 digital FM stereo generator.

Product overview

The 8208 comes in a 1RU chassis and can operate on 110 or 220VAC via an IEC power connection. The front panel has multiturn pots for pilot injection, analog left, analog right and AES/EBU input levels, plus composite 1 and composite 2 output levels. There are switches for selecting analog or digital input, stereo/mono L/mono R operation, pilot on/off, crosstalk testing and a meter select for composite or pilot metering. The front switches are slightly recessed to avoid accidental switching. There are LED indicators for each of the switch selections, as well as indicators for pre-emphasis and de-emphasis. Metering is shown with 10-segment LED indicators.

Features at a glance:
- Impressive operating specs
- FM composite signal generated in DSP
- AES/EBU input
- 2 SCA inputs
- 2 composite outputs
- Remote controllable



The rear panel has XLR connectors for the analog left and right audio and the AES/EBU inputs. Four BNCs are provided for two SCA inputs and two composite outputs. Remote-control connection is made with a DB25 male connector. There is a bank of four DIP switches for emphasis selection and a ground-lift switch.

The DB25 remote connector allows the user to change operating modes of the 8208 by momentarily applying 5V to 12V AC or DC to the appropriate control pin. There are also connections for audio and a pilot reference on the connector.

The SCA inputs are affected by the composite output trimmer, but must be individually controlled from their sources. The SCA input impedance is 600Ω. The composite output can set for either 0Ω or 75Ω source impedance by changing a jumper inside the unit.

The specifications of the unit are impressive, with 70dB separation (20Hz - 15kHz), 0.005% THD, 0.01% SMPTE IMD, -85dB crosstalk and 38kHz suppression of -70dB.

The manual includes a section on installation of the 8208 with older exciters that have special requirements for stereo transmission. There is also a detailed section on audio wiring practice that is always a good review for anyone.

Operation

Installation of the 8208 is simple, and I was able to test it on-air by feeding it audio from main and backup air chains, which each include a different audio processor. I felt this to be an excellent real-world comparison, because I was able to use the entire existing air chain except for the processors' internal stereo generators.

Verifying the specifications of the 8208 directly into a modulation monitor showed no surprises. The published specs were easily met.

The front-panel control for main-to-sub and sub-to-main is convenient, but does have some risk. This feature applies audio from the left channel input into the main channel only (in the main-to-sub position) or to the stereo subcarrier only (in the sub-to-main position. While this is a valuable test for system performance, selecting one of these modes while the unit is on the air does not sound good (especially the latter). I would have preferred this to either be a rear panel switch or given a lockout by electrical (switch) or physical (cover) means. Nevertheless, because the switch

The 8208 is perfectly suited to stations who want their processing at the studio and use a digital STL.

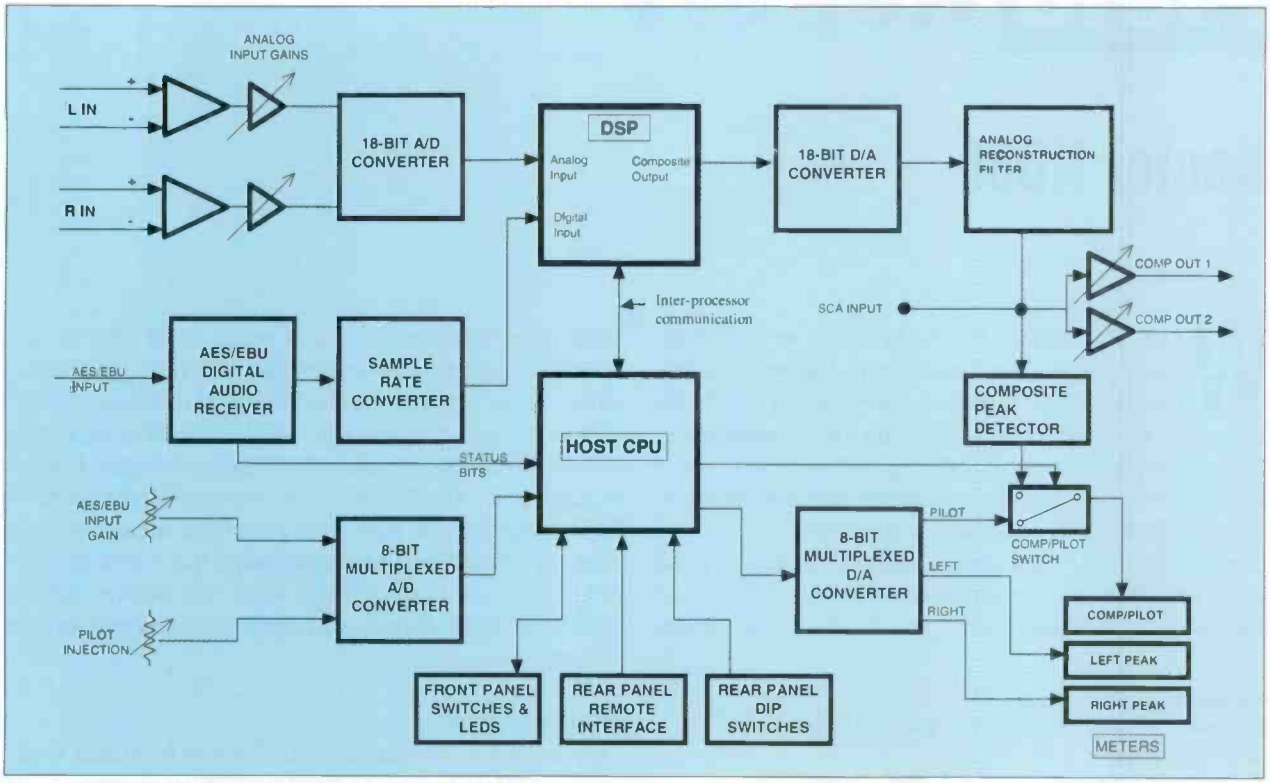


Figure 1. Block diagram of the Orban 8208 digital stereo generator.

is recessed it should be fairly immune to accidental switching.

The meters are easy to see, but their operation is a bit unusual. The 10-segment display shows reference level in percentage with the following scale: 5, 50, 90, 95, 97, 99, 100, 101, 105, 110. In a normal situation, you would see the scale lit up to the 100% mark, with a possible occasional 101% reading (assuming no subcarriers at the input). But because of the unusual scale, the display takes some getting used to.

Orban claims that the introduction of a DSP-based stereo generator is part of its continuing effort to provide the highest quality products for FM radio broadcasting.

Hearing is believing

I was able to use the 8208 on-air for about two weeks. The audio specs look great on paper, but your ears are always the final test. I thought that the sound of the 8208 was as good as, if not better than, the other stereo generators I tried in-line. There seemed to be better separation overall. The effect was subtle, but noticeable during A/B comparisons.

Because the FM baseband signal is created in DSP on the 8208, I was concerned about any audio delay that might be inherent to the processing. No one on the air staff noticed a change. I didn't tell any of them until it had been on the air for a week. If there was a perceivable difference, they would have told me immediately.

Orban claims that the introduction of a DSP-based stereo generator is part of its continuing effort to provide the highest quality products for FM radio broadcasting. The analog-to-digital and digital-to-analog converters are 18-bit and the internal processing is capable of 24-bit using the Motorola DSP56004.

Overall, the 8208 is an excellent high-quality stereo generator. Because of its AES/EBU inputs, it is perfectly suited to stations who want their processing at the studio, and can take advantage of a digital STL (or for stations that want to feed multiple transmitter sites from the same audio processor). It is also an easy upgrade to your air chain.

Chriss Scherer is chief engineer at WMMS-FM, Cleveland.

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FOR MORE INFORMATION

Circle (101) on Action Card.

Nautel ND50

When ABC station KGO-AM 50kW in San Francisco put in new transmitters last year, it was clearly a high-priority engineering project for the station. That is why KGO-AM's director of engineering Bruce Schirmer was prepared to spend the better part of a month installing and tweaking the station's two new Nautel 50kW ND50 solid-state transmitters.

As it turned out, installation took him less than a week and it would be one of the few times Schirmer would see the inside of the transmitters. The station's past experience with transmitters called for tube replacement every 10,000 hours (on average for some tubes), and cleaning was a constant vigil. A high-voltage power supply can cause dust build-up on insulators and other components, which can lead to arcing and transmitter failure. The ND50s operate at a safe, nominal 72VDC, dramatically reducing maintenance requirements, according to Schirmer.

Performance at a glance:
- High-power, all solid-state 50kW AM transmitter
- Operating voltage is only 72VDC
- High efficiency reduces heat-exchange requirements
- Modular power amplifiers in parallel groups
- On-air serviceability
- Built-in duplicate exciter sections
- Broadband output filtering

Improved efficiency

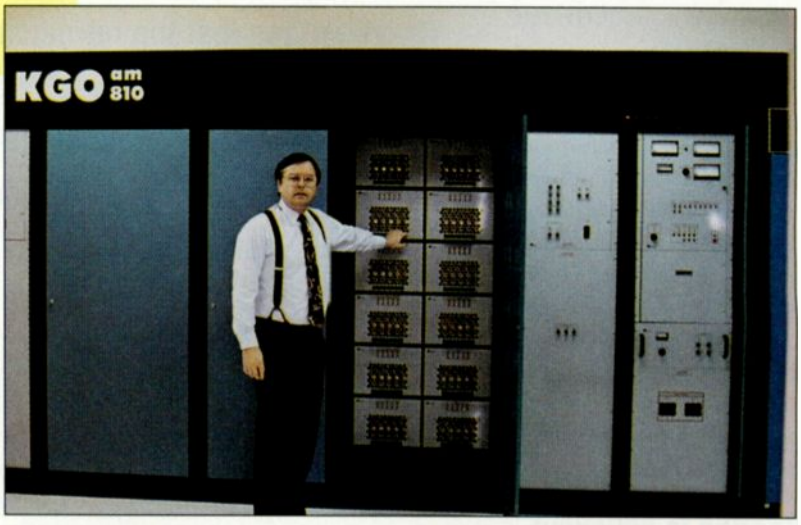
The ND50's high efficiency requires a much simpler air-handling system than some other designs. The transmitter has modular power subsystems, each with its own small cooling fan and thermal protection. Ambient air is drawn in from the rear of the transmitter while exhaust air is dissipated at the front of each module. As a result of its high efficiency, total heat dissipation is roughly half that of tube transmitters.

At KGO, the transmitters are operated in a completely closed environment. The air is simply recirculated within the room and cooled by an air-conditioning system as needed. This keeps the transmitters extremely clean. The station's previous transmitters required lots of air brought in from the outside by high-speed blowers that required frequent maintenance.

Schirmer estimates KGO-AM saves about 30% on the electric bill compared to the station's tube transmitter days. Given his past experience with solid-state transmitters, Schirmer wasn't surprised at the efficiency. The station previously purchased a 10kW solid-state auxiliary transmitter, the Nautel ND10, which performed flawlessly following the 1989 earthquake that rocked the Bay Area and felled two of the station's three towers. The ND10 was used periodically when the station had to operate at reduced power while the antenna system was rebuilt.

Plug and play

A Nautel field technician had flown in for initial setup of the ND50s and to walk the KGO engineering staff through their operation. By his second day in San Francisco, the transmitters were fully operational.



KGO-AM's director of engineering Bruce Schirmer with one of the station's two Nautel ND50s.

Hookup to remote control was also fast and easy. The ND50 has an easily accessible barrier strip for control of all transmitter functions, metering of forward and reflected power and monitoring of alarm indicators. All functions are conveniently located behind a front-panel access door, at eye level. Control voltage is 24VDC and all functions are activated with a simple closure to ground.

The only problem encountered in the installation was a defective MOSFET power amplifier transistor (one of more than 900 in the transmitter), most likely due to

infant mortality during initial turn-on of one of the transmitters. This provided the manufacturer's field tech with an opportunity to demonstrate the module repair and replacement procedure. The defective module was removed to the bench, the bad MOSFET located, the replacement MOSFET installed, and the module returned to the transmitter in less than half an hour. This maintenance was performed while the transmitter remained on the air at full power. The ND50 has enough reserve that even with a power module removed, full power and modulation can be easily maintained.

The ND50 is designed with 24 power modules in parallel, each with five Class-D power amplifier assemblies contributing independently to the total RF output. Even distribution of power in the modulator and power-amplifier devices at any carrier or modulation level avoids uneven device utilization, a critical factor in the Pulse Duration Modulation (PDM) design of the transmitter.

Protection and redundancy

For transient protection, circuits sense reflected power and will momentarily cut out transmitter power if peak reflected power exceeds 8.8kW (1.5:1 SWR, 100% modulation at 55kW).

The ND50 has a broadband output filter, eliminating the need for output tuning and loading controls. To get the same advantages of narrowband output filtering, but without the need for loading adjustments, the broadband filters cut off steeply, preventing harmonics and spurious signals from reducing performance.

Even during extreme modulation conditions, the ND50 remains spectrally clean. Schirmer's last measurements yielded a flat frequency response out to 10kHz (NRSC filter) and THD at less than 0.5% at 95% modulation. ND50 specifications include IPM at -36dB, THD less than 1% at 95% modulation and IMD less than 1%.

The ND50 has redundant exciters, driver sections and power supplies. At the KGO installation, if one of the main power supplies was lost, thereby shutting down half the transmitter, the station would still be on the air at about 15kW, considering combiner losses. Compared to the station's past experience, the reliability improvement alone has made KGO-AM's investment in the Nautel ND50 worthwhile.

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FOR MORE INFORMATION

Circle (103) on Action Card.

News

DAB field tests begin

The Electronic Industries Association (EIA), announced that field testing of DAB commenced in July. The field tests are being conducted to complement earlier laboratory test results with data obtained under typical, off-air broadcast conditions in the San Francisco area. Field tests include formats submitted by AT&T/Lucent Technologies, VOA/JPL and Thomson Consumer Electronics (Eureka 147/DAB). Formats from USA Digital Radio were withdrawn from this round of testing by the proponent. Tests should conclude this fall.

Some of the equipment in the EIA's DAB test van.

More news from EIA

The Consumer Electronics Manufacturers' Association (CEMA), a sector of the EIA, also reports an increase in Radio Data System penetration in the United States. Three hundred stations have joined the EIA's campaign to make the RDS an American radio industry staple.

Denon Electronics, Delco Electronics, Pioneer Electronics, Becker and Blaupunkt are now making RDS car radios, while Kenwood and Audiovox plan to follow suit in the future. Other manufacturers include Onkyo, Bang & Olufsen and Denon Electronics for home radios; Grundig for portable radio; Advanced Digital Systems and Philips for PC peripherals and Nokia and Panasonic for RDS pagers.

Also, CEMA is developing an industry certification program to safeguard employees and employers. By clarifying the competencies needed for work-ready electronics technicians, these skills standards will enable educators to develop performance-based curricula so that graduates are qualified for the job.

The manual for the standard "Raising the Standard — Electronics Technician Skills for Today and Tomorrow" is available from CEMA's Product Services Department, 703-907-7670; fax 703-907-7968.

Farewell to a Friend

On Sept. 5, 1996, Jason Perlman died. If you are an advertiser in this magazine, you probably knew Jason. If you are a reader, you probably did not. Either way, Jason's contributions to *BE Radio* and its predecessor, *Broadcast Engineering*, over the many years he was associated with the magazines were far-reaching. He made a positive difference in what you read and see in each issue. He worked tirelessly to improve the magazines for the readers and advertisers. He was a hard worker and a good friend.

Since *BE Radio's* inception, Jason served as one of its marketing representatives in the Western states. In that capacity, he worked with advertisers to showcase their products, technologies and ideas. He was far more than simply a salesman. He understood that selling a product or a service is the art of communication and cooperation. He knew that the best way to sell a product was to improve and refine that product. In the end, everyone wins: the publisher, the advertiser and — certainly — the reader.

While an easygoing and outgoing individual, Jason was also quite private. He was dedicated to the publishing business and to his job, but not obsessed or consumed by it. He understood the benefits of "having a life" outside of work. You could have an intense editorial discussion with Jason in the afternoon and by 5:00 p.m. be talking about vintage prestige automobiles.

Jason's ability to suggest and forge compromises to complex situations earned him the respect of his fellow workers at Intertec. He was a master at finding a middle ground that all parties could accept.

As a marketing representative for *BE Radio*, Jason provided an important bridge between management and customers — both advertisers and readers. Being on the front-lines of the business, his input to the editorial department was valuable and welcomed.

Business aside, Jason was a good friend. His association with Intertec Publishing goes back more than a decade. And while his passing has left us shocked and saddened, we are also left with a rich inventory of memories. Jason was a world-class storyteller, virtually without peer. He was always a pleasure to see and always upbeat. No one could liven up a business gathering better than Jason.

When we think of him, it is most often with a smile or a laugh. Time will surely dim our sense of loss, but it will not dim our appreciation for having known Jason.

Cameron Bishop
Senior vice president
Intertec Publishing Corporation

Contributions in Jason's memory may be sent to the Juvenile Diabetes Foundation, 1030 S. Arroyo Pkwy., Suite 204, Pasadena, CA 91105.

Business/ People

BUSINESS

Ward-Beck Systems, Scarborough, Ontario, sold four custom Renaissance MKIII 24-channel radio consoles to WODS/WBZ, Boston, bringing the total number of Renaissance consoles at the facility to 10.

Orban has acquired the product and development rights to the DDS digital delivery system from **Radio Systems**. Manufacturing and product development of DDS have moved from Radio Systems to Orban's San Leandro, CA, facility and sales will continue to be handled by Harris on an exclusive basis.

Comrex, Acton, MA, was a major presence at the National Association of Radio Talk Show Hosts meeting in Washington, DC, where the programs were broadcast over ISDN using the Nexus ISDN codec and Codec Buddy remote mixer. More than 20 hosts broadcast their programs live from the Omni Shoreham Hotel during the three-day convention held in June.

Axcess Global Systems, Metairie, LA, selected **SpaceCom Systems** satellite technology to provide the backbone for the paging carrier's new network of alphanumeric paging and information services. The network will use Radio Broadcast Data Service FM-subcarrier signals, which could eventually allow customers to use pagers anywhere in the world.

Earlier this year, the **Jones Satellite Networks (JSN)** began using SpaceCom Systems as an integral part of an ongoing digital retrofit of its 24-hour formats. This followed a similar decision by ABC Radio Networks Satellite Services division to use SpaceCom satellite network services and equipment.

In addition, SpaceCom Systems has unveiled the FM Quad, a satellite transmission technology that is analog and digital using the same satellite transponder.

CBC selected **MediaTouch** to automate GALAXIE, which will offer 30 distinct channels of high-quality music services from opera to country, to kids programming in English and French delivered via direct-to-home satellite and/or cable services.

In a collective move toward the adoption of a technical standard, a number of groups have pledged support for MUSICAM EXPRESS, the joint venture between **VirteX Communications** and **Infinity Broadcasting**. The groups voicing support include: SFX Broadcasting, Multi-Market Radio, Triathlon Broadcasting, Greater Media, Heritage Media, Entercom Broadcasting, Press Broadcasting, Gannett, Zimmer, Lotus, Ingstead, Chancellor, Group W and EZ Communications.

Enco Systems Inc. relocated to larger facilities at 24555 Hallwood Court, Farmington Hills, MI 48335-1667.

HHB Communications Inc., Portland, ME, has been appointed the exclusive U.S. distributor for the current line of **ATC Loudspeaker Technology Ltd.** speakers.

Also, HHB, the U.S. distributor for **Pioneer** announced that the Pioneer D-9601 high sampling-rate DAT recorder is being used in conjunction with the **Sonic Solutions'** Sonic System digital audio workstation.

The **Harris Corporation**, Quincy, IL, was awarded a contract to provide a high-power AM medium-wave solid-state radio transmitter system to the government of Vietnam.

PEOPLE

Greg Mackie, founder and CEO of Mackie Designs, Woodinville, WA, was presented with the 1996 High Technology Entrepreneur of the Year Award.

Also, Mackie Designs recently announced several new appointments including: **Richard Rosenzweig**, vice president, operations; **Tami L. Pereira**, vice president, international sales and marketing and **Cal Perkins**, head of a newly formed analog team.

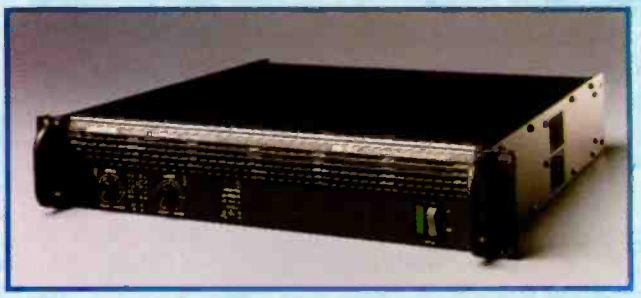
John Lanham (a.k.a. **Jay Collins**) was appointed director of music services for Computer Concepts Corporation, Lenexa, KS.

Explosive growth at Intraplex has brought about the following personnel additions: **Jim Alnwick**, vice president of sales; **Dan Rau**, broadcast sales manager; **Christine Beaupre**, industry market manager; **Brad Thompson**, software engineer manager; **Rod McLeod**, principal hardware engineer; **Junius Kim** and **Dave Johnston**, project engineers; **Mike Daly**, support engineer; **Jim Keefe**, buyer/planner; **John Dolson**, electronic technician and **Terry Sheehan**, assistant office administrator.

Debbie Ivie was promoted to regional sales manager for the Electron Device Group at Richardson Electronics, Ltd., LaFox, IL.

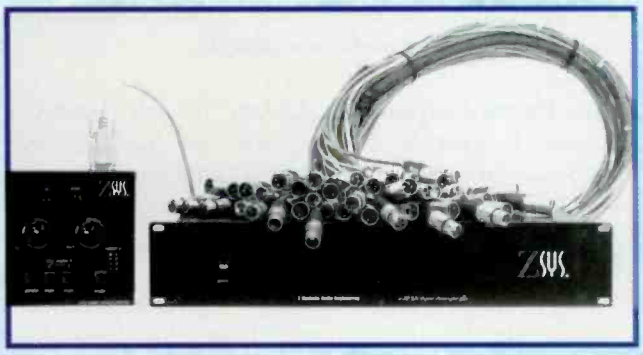
New Products

Premium power amplifier
Mackie Designs



• **Fast Recovery Series (FR Series) M•1200:** a professional power amplifier featuring T-design constant gradient cooling for enhanced thermal cooling; the "Fast Recovery" refers to the M•1200's ability to sound good when driven to the edge and beyond into loudspeakers; the key is low negative feedback and technology borrowed from high-speed digital circuitry.

800-898-3211 or 206-487-4333; fax 206-485-1152
Circle (151) on Action Card



Automated patchbay, router and distribution amplifier
Z-Systems

• **z-32.32r:** the newest member of the Digital Detangler Pro family designed to work with digital audio signals (AES/EBU and S/PDIF); the z-32.32r is an automated patchbay, router and distribution amplifier all in one package; it features 32 AES/EBU stereo pairs in and out, allowing you to physically interconnect, in the digital domain, all of your gear, such as digital audio workstations, CD players, A/D and D/A converters, MDMs, signal processors and DAT machines, allowing the routing pattern to be changed dynamically without having to unplug and rearrange cables.

352-371-0990; fax 352-371-0093; www.z-sys.com
Circle (152) on Action Card

MO recorder
Genex/HHB Communications

• **GX8000:** an eight-track, high-bit, random-access magneto-optical recorder from Genex Research; it is designed to replace the 16-bit eight-track digital tape recorders in applications as diverse as music recording, post production and broadcast; the GX8000 uses a 2.6GB magneto-optical drive to deliver all the advantages of a random-access medium, along with the exceptional accuracy of high-resolution recording up to 24 bits.

0181-962-5000; fax 0181-962-5050; sales@hhb.co.uk
Circle (155) on Action Card

CDQPrima enhancement
MUSICAM USA

• **CDQPrima:** a digital audio codec that offers MUSICAM, the enhanced ISO/MPEG IRT-certified Layer II bitstream in addition to ISO/MPEG Layer III, as well as G.722; unlike other codecs that operate at a maximum data rate of 128kb/s, CDQPrima offers full independent stereo at bit rates of up to 384kb/s with MUSICAM and 320kb/s with Layer III; CDQPrima guarantees full contribution-quality Layer II and Layer III.

908-739-5600; fax 908-739-1818
Circle (153) on Action Card

High-voltage microphone amplifier
Danish Pro Audio

• **HMA4000:** a two-channel microphone amplifier that is set to become a standard for applications where low-level frequency response, distortion characteristics and dynamic range are critical; the HMA4000 is the result of extensive design enhancements to the 2812 MkII mic amp, which have made possible a wider frequency range, with even better low-frequency performance while still maintaining the wide dynamic range of 140dB.

+45 4814 2828; 519-745-1158; 519-743-2364
Circle (159) on Action Card

Active monitor series
Tannoy

• **AMS10A:** a bi-amplified, fully active, fully powered high-output studio reference monitor; the system features linear amplitude and phase, both on and off axis, independent high-frequency and low-frequency, high-current and MOSFET amplifier modules producing 160W each continuous.

519-745-1158; fax 519-745-2364
Circle (170) on Action Card

Microprocessor-controlled receiver
Universal Electronics Inc.

• **SCPC XE-1000:** a state-of-the-art microprocessor-controlled audio broadcast receiver that incorporates all the features needed for broadcast-quality reception of all SCPC audio networks; full flexibility contained in one receiver allows the reception of all SCPC channels on any satellite; there are no costly frequency boards as the SCPC XE-1000 is fully frequency agile and fully transponder agile with the push of a button.

614-866-4605; fax 614-866-1201
Circle (164) on Action Card

PCI-based digital audio adapter
Antex Electronics

• **StudioCard:** a PCI-based digital audio adapter with four tracks of studio-quality, 18-bit sound and real-time digital mixing capability; the 32-bit memory-mapped board delivers less than 0.003% total harmonic distortion and 92dB dynamic range; its high-end features are ideal for multimedia and post-production professionals.

800-338-4231; fax 310-532-8509; rbird@antex.com
Circle (158) on Action Card

CD player
Tascam

• **CD-201:** a 3U rack-mountable CD player that features an advanced one-bit delta-sigma D/A conversion system, S/PDIF digital output and auto cue function with two sensitivity levels; other features include remote fader-start capability, a single-play function and a timer on/off switch on the unit's rear panel.

213-726-0303
Circle (173) on Action Card

Eight-channel compressor/gate
PreSonus Audio Electronics

• **ACP-8:** an eight-channel compressor/gate housed in a steel, 2U rack case; each compressor features control of threshold, ratio (1:1-20:1), attack, release and gain; each gate features threshold, release and variable attenuation range; the ACP-8 accepts balanced or unbalanced inputs and outputs, and for every channel, there is a side chain jack for spectral processing and a separate jack for gate keying.

504-344-7887; fax 504-344-8881
Circle (175) on Action Card

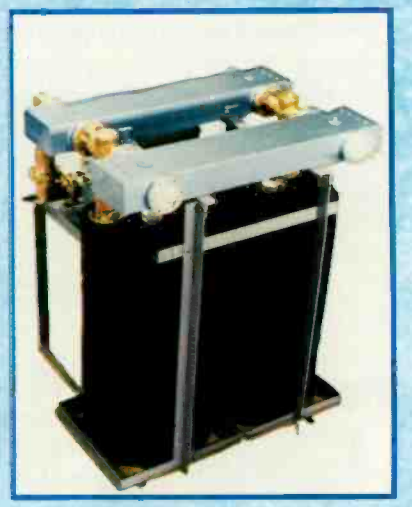
Digital on-air console
Fidelipac

• **Dynamax MX/D:** a digital on-air console featuring ease of installation, straightforward operation, and functionality; the MX/D allows broadcasters to establish a fully integrated digital signal path at a small cost premium to conventional means; mixing, switching and audio signal processing within the MX/D are performed by a modified version of the main processor section from Graham-Patten Systems' D/ESAM 200.

609-235-3900; fax 609-235-7779
Circle (154) on Action Card

New Products

High-power FM multiplexers
Micro Communications Inc. (MCI)



• **Multiplexer:** product for use when it is necessary to combine two or more FM channels to a single master antenna input; new frequencies at any power level can be added in any order by connecting another multiplexer in tandem to the previous unit; the patented design is accomplished without special cooling requirements; each unit contains a through or broadband port and an injected frequency port.

603-624-4351; fax 603-624-4822
Circle (174) on Action Card

International terrain databases
SoftWright

•**International terrain databases for TAP:** several international terrain databases for more than 90 countries are available in digital elevation models; the databases can be integrated into the Terrain Analysis Package to substantially reduce the time and labor in evaluating the suitability of radio transmitting and receiving sites; another significant benefit is the ability to locate areas where the system cannot be relied upon due to an inadequate level of signal.

303-344-5486; 303-344-2811; sales@softwright.com; www.softwright.com
Circle (162) on Action Card

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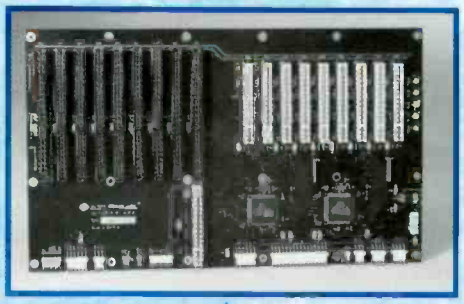

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Reader Feedback

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Confusion over DAB systems

Dear Editor,

We are a Gospel radio network comprising six high-power shortwave transmitters, two FM stations, six AM stations and one high-power AM for international broadcast. We are based in the Philippines.

We have been following closely the trends on DAB at *BE Radio* magazine, and at present we are confused as to the different systems of DAB being used (or tested). We would like to have a list of the DAB systems being tested in the United States and in Europe and what has been successful so far.

John Marcon
Far East Broadcasting Co., Manila, Philippines

The editor replies:

At present, no DAB systems are in use in the United States, but four systems are being tested. (See "News," p. 58.) Two are from AT&T/Lucent Technologies (one FM in-band on-channel system, and one FM in-band adjacent-channel system), one is from Voice of America/Jet Propulsion Laboratories (an S-band satellite system) and the last is Eureka 147 (for L-band terrestrial application). Three other systems from USA Digital Radio (two FM in-band on-channel systems, and one AM in-band on-channel system) have been withdrawn from testing, but are apparently still in active development.

Meanwhile, four other companies have proposed S-band satellite radio service for the United States, using proprietary or unspecified formats. They are currently awaiting action by the FCC.

Elsewhere in the world, the Eureka 147 format predominates, with numerous countries testing the system, and a few (U.K., Sweden, Netherlands, Switzerland, Canada and Germany) already starting real terrestrial services. Some of these countries will use the L-band (Canada, France, Australia, Mexico), some will use the VHF (TV) band (U.K., Sweden, Italy), while others plan to use both L-band and VHF (Denmark, Germany, Netherlands, Switzerland, India). (See Table 1 in the sidebar of "The Future of Radio" on p. 36.) Some of these countries' plans include a future satellite DAB component. Consumer receivers (for the terrestrial services only) are not expected until late 1997.

I realize this is confusing, but that seems to be the way DAB will go. Pity the poor radio listener of tomorrow, especially one who travels internationally. Best of luck to you, and keep reading!

Continued from page 22

Because the EAS decoder can differentiate originator codes, it is possible to program the equipment to relay only one of the messages and ignore the others. Here is how:

As the codes are now specified in the rules, the sheriff's office and the emergency manager's messages will carry the same originator code of "CIV" (Civil Authority). The National Weather Service message will carry the originator code "WXR" (National Weather Service). Thus, if the station's EAS decoder is programmed to relay a message with the event code TOR only when accompanied by an originator code of WXR, the station will re-transmit only the National Weather Service message. If the station's EAS decoder is programmed to relay TOR messages when accompanied by *any* originator code, all three messages will be re-transmitted.

Don't assume that the weather service's message always will be the first to arrive.

There is one more consideration in this scenario: Which message will arrive first? Don't assume that the weather service's message always will be the first to arrive. If, over time, you find that alerts from a source other than the one you've selected are consistently arriving first, you might consider changing your EAS decoder programming in the interest of getting the alert to the public in the shortest time. The accumulated printouts from the EAS unit will make this determination easy.

Manual transmission

The problem of who's first is much more manageable in a non-automated situation. With an operator on duty, all three messages can be programmed for manual forwarding. The operator will then forward the first message received (wherever it comes from) and none of the others. Nevertheless, after you've run the EAS in manual mode for a while, you might also analyze the station's alerting history to see if the time taken by human intervention results in a consistently slower delivery of the alert than automating one of your sources would require.

Remember these important issues when the time comes to program your EAS equipment. Like any other computerized technology, its operation is only as good as its programming.

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

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10KW	FM	1970	Harris FM10H3
10KW	FM	1968	RCA BTF 10D
10KW	FM	1976	RCA BTF 10E
20KW	FM	1974	Collins 831G2/ Cont 816R2
20KW	FM	1975	Harris FM20K
25KW	FM	1980	Harris FM 25K
1KW	AM	1982	Harris SX1
10KW	AM	1974	CSI T-10-A
10KW	AM	1980	Harris MW-10
10KW	AM	1976	Continental 316F
25KW	AM	1982	CSI T-25A
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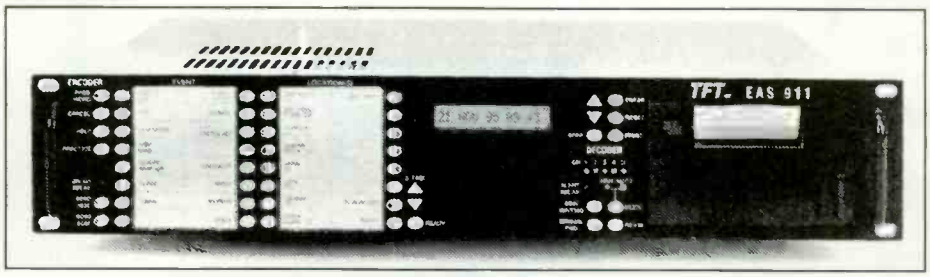

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Coming in the next issue of BE Radio

Studio Infrastructure

With all the emphasis placed on new digital equipment, it's easy to forget about the foundation of the radio facility that contains and connects all of its elements. Without the racks, wire, switchers, power systems, cabinets, patchbays, clocks, distribution amps, communications systems and other "invisible" components of the typical studio, even the highest-tech audio gear would be of little value to its users.

Cover Story: Maintenance

The old story is still true: A facility is only as good as its maintenance keeps it — but now the requisite skill set is changing. Maintenance of today's digital facility requires new understanding and techniques from engineers, operations staff and managers. Find out the latest in this comprehensive report.

Control-Room Monitoring

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Plus, new products from World Media Expo, the latest technology news and business happenings and more!

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