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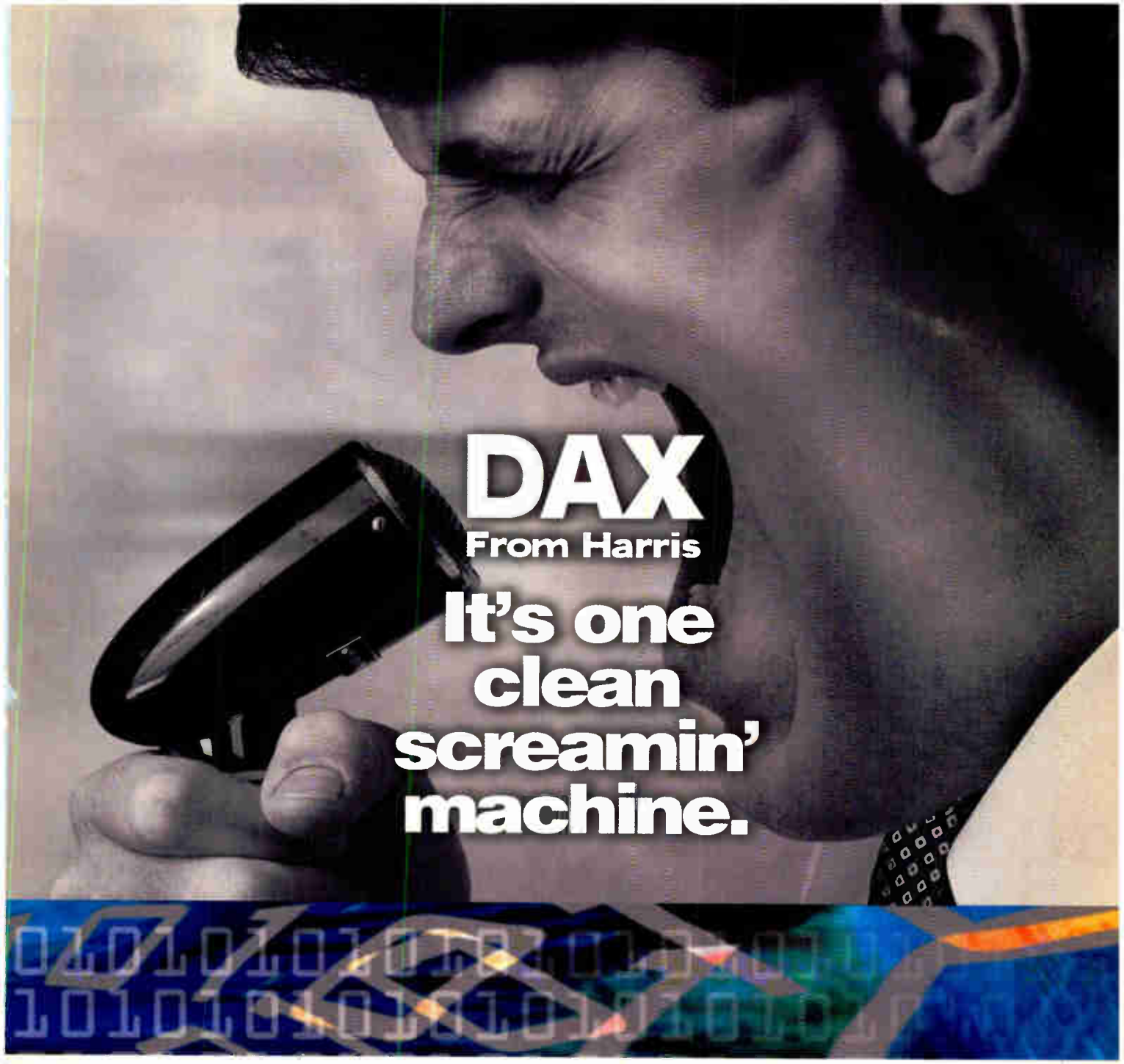

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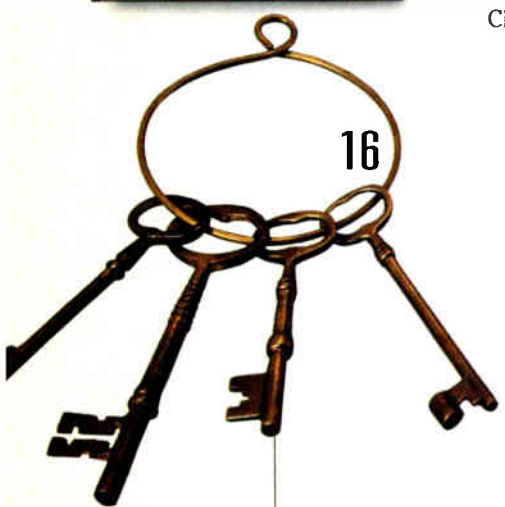

ON THE COVER:
How do you get from 'hear' to there? The logical choices in routers go beyond the audio aspect and cover a broader range of ins and outs.
Cover design by Michael J. Knust.

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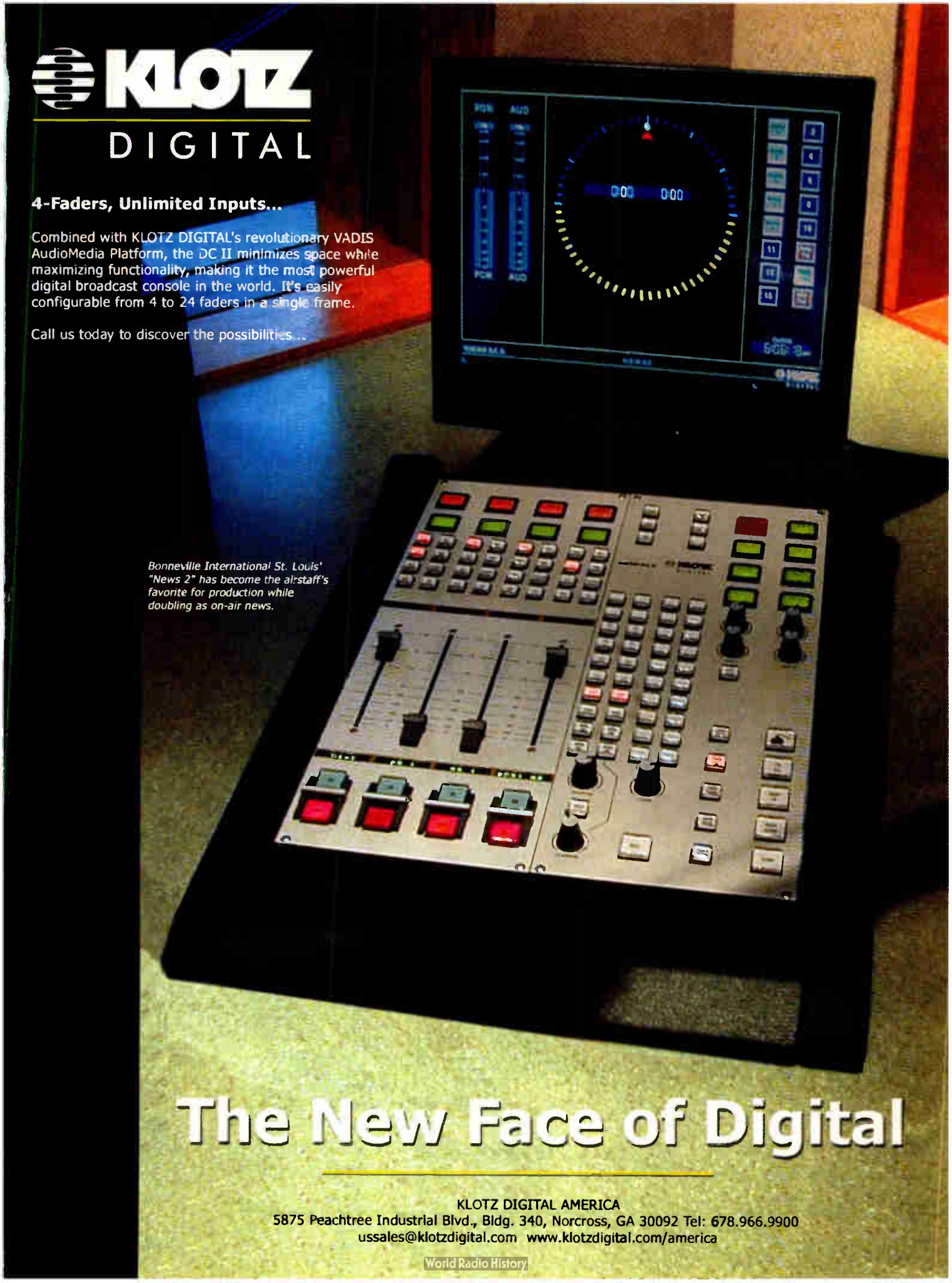
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DEMO ROOM

Currents Online

Highlights of news items from the past month

Beeler Golf Benefit at NAB2003

A memorial golf tournament to benefit Beeler's family is being organized for NAB2003.

15 Ottawa Stations Approved for DAB

The country's capital gets 15 Eureka-147 signals.

Orban Releases 8400 v.3.0 Software

The new version adds some tricks that were found in the Gregg Labs processors in the 1980s, and adds IBOC output support.

Senate Confirms Adelstein for FCC Slot

Former Senator Tom Daschle aide takes the fifth FCC seat after a unanimous Senate vote.

FCC Amends Part 74 BAS Rules

The ruling allows digital modulation in the BAS band, but it also changes the method of coordinating frequencies.

Site Features

Engineer's Notebook

More new features have been added. One is a tower light flasher alarm circuit courtesy of John Harris at KUAC. Another is a link to identify mystery computer components by using the FCC ID. Click the Electronics tab.

Studio Spotlight

Take a tour of the new studios of WJCU-FM, John Carroll University in Cleveland.

Industry Links

Schools, museums, associations and more.

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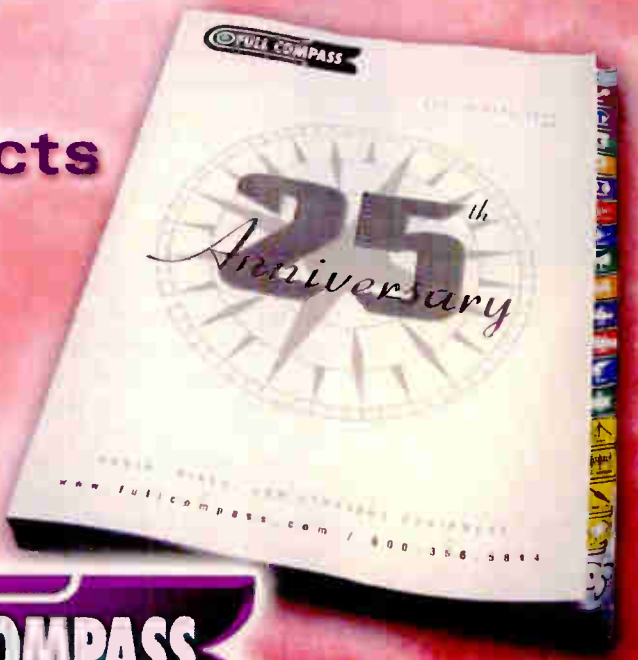

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Cause and effect

Another year is almost at its end. I'm not going to reflect on the fast passage of time, and how exciting it is to be a part of radio's history at this moment. Instead, I want to look at some recent radio events and explore their resolutions.

Radio from above. Everyone has his own opinion about satellite radio. I find that this topic is an easy way to break the ice in a group of radio professionals. The usual argument comes down to the viability of a subscription-based service and the programming content. That aside, judged on technical merit, the systems that the two providers use work well. Still, there is plenty of speculation about the longevity of the two providers.

Recent financial reports have discussed the long-term business plans of both providers, saying that both companies are on the verge of bankruptcy. Both companies deny these speculations. Many feel that General Motors will buy XM, integrating the service into its automobile line. This has some merits but doesn't really change the situation. The service needs subscribers. GM is already a point of sale for the service.

My feeling is that in the end, one company will make a move to buy the other. Depending on the mood of the Justice Department, this may or may not happen. Regardless, there will be only one provider at some point down the road.

Radio from across town. The recent rulemaking concerning changes to Part 74 of the FCC Rules brought welcome news in some ways. The main positive point is that it allows stations to operate digitally modulated STLs without also obtaining an STA. The main drawback is that applications now must be coordinated through the same procedures used for Part 101 applications. The broadcast auxiliary spectrum has increasingly shared space with other services, which has created some questions about responsibility and authority in these bands. The ruling forces these questions to be answered. Look for a tricky transition and lots of misinformation as the new processes come into being.

Radio from the Web. Between the DMCA and the never-ending battle over royalty payments, Internet radio has been dragged to nearly a standstill. Small netcasters are allowed to negotiate their own deals with rights holders. This is good news for the little guys. Why stop at the small Webcasters? Let's allow the industry to handle its own affairs and negotiate its own deals. I'm all for someone getting his fair share for his work, but the minutia of record-keeping and reporting tied to the charges will continue to strangle Internet radio and keep it from reaching its full potential.

Radio from a digital pipe. It's been 10 years in the making and it is finally becoming a reality. IBOC has been accepted, albeit with a wide range of opinions and feelings. I don't see the compelling wow factor to IBOC, but we're on the front of this train. While there are capital costs and licensing fees, there are some strong potentials. The contrary view is that if we do nothing, there will still be no wow factor. Some strong radio groups are making their move to IBOC, which speaks loudly to me. I see slow and guarded implementation of IBOC through the beginning of 2003 that will pick up later in the year. When will we see a final sunset on analog services? It's too soon to tell. The predictions of eight years seem too short to me.

Radio from the source. An item that quietly moved through the business pages shows that Clear Channel has begun working directly with several manufacturers to arrange equipment purchases, bypassing the equipment dealership. Naturally the dealers don't like this. The decrease in volume for the dealer can come back to other broadcasters when equipment prices are raised. In the end it's all free enterprise, so I don't fault the largest owner from trying to get the best deal for itself. Many groups have held preferred customer status with dealers in the past. This is the next step. Clear channel owns five times the number of stations as the next largest owner, so I don't see this as the start of a new trend.

With a new year ahead of us, we can all look forward to the next exciting radio development. And despite what I said at the beginning, these are exciting times after all.

Chriss Scherer, editor
cscherer@primediabusiness.com

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Be an effective record keeper

By Mark Krieger, CBT

The creation and maintenance of logs and technical records represents an inescapable responsibility for every broadcast engineer. Before the days of the now-ubiquitous computer, this was achieved through the use of reams of paper and manila file folders. Early attempts at radio station systems integration saw operating logs stored in a wide variety of data formats, while maintenance records were relegated to notebooks. Ultimately, hard copies of all FCC-required records were deposited in a file to meet inspection accessibility requirements.

Deciding what to keep and what to discard can be a daunting task.

Unfortunately, this haphazard amalgam of data and paper represents the current state of affairs at many radio stations, despite advances in information technology, and seems to be particularly acute among those operations that employ contract engineers.

First, consider exactly what records should be kept. For the FCC, every station needs a technical operating log or record that provides transmission system operating parameters, (power output for FM, antenna current and phase and ratio for AM), EAS activity and tower obstruction light operation. All of this information may be routinely gathered by an automated control system or human observation.

Depending on the nature of the operation, there may also be requirements for quarterly tower inspections, AM directional antenna monitor points and related data, along with annual AM emission checks (RF mask) and one-time measurements (harmonic and spurious emissions, antenna impedance) necessitated by additions or changes in the transmission system.

Practically speaking

On the purely practical side, keep a transmitter site maintenance record that includes operating parameters of all equipment and physical condition observations, along with technical discrepancies and their resolution. A similar record may be maintained for the studio facility. Don't overlook regular audio performance checks of the air chain, and include data on generator maintenance and any other mission critical equipment such as air conditioning.

Once you've decided what information you're going to save, select the best way to do it. In most cases, this can be narrowed down to a single word—spreadsheets. Programs such as Excel are, friendly, flexible, economical in terms of file size, and have the ability to create a wide variety of customized templates for various types of logs and records. The beauty of this approach is the ease with which the user can create archive copies with multiple backups. For example, save every bit of desired data for each station in a single master file. Many years of records can be burned to CD-ROM and multiple copies kept by the user and the client. An addded benefit is not having to maintain bulky paper files, so your system can retain the desired records over a long period without suffering a space crunch. It also makes indexing a snap.

The disadvantage of switching to electronic record keeping is that it requires discipline and additional time and effort in terms of inputting data. It's still a lot easier to pick up a clipboard than it is to carry around a laptop, but by creating customized spreadsheet templates for different applications, and using the unfilled printouts as the forms,

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the post-inspection inputting is simple. Don't overlook the possibility of using some of those slow old PCs that are taking up rack space and performing routine transmitter and studio functions, as a convenient entry station for your records—it doesn't take much processor speed or RAM to run a simple spreadsheet. If the user is networked, this becomes an even more attractive proposition.

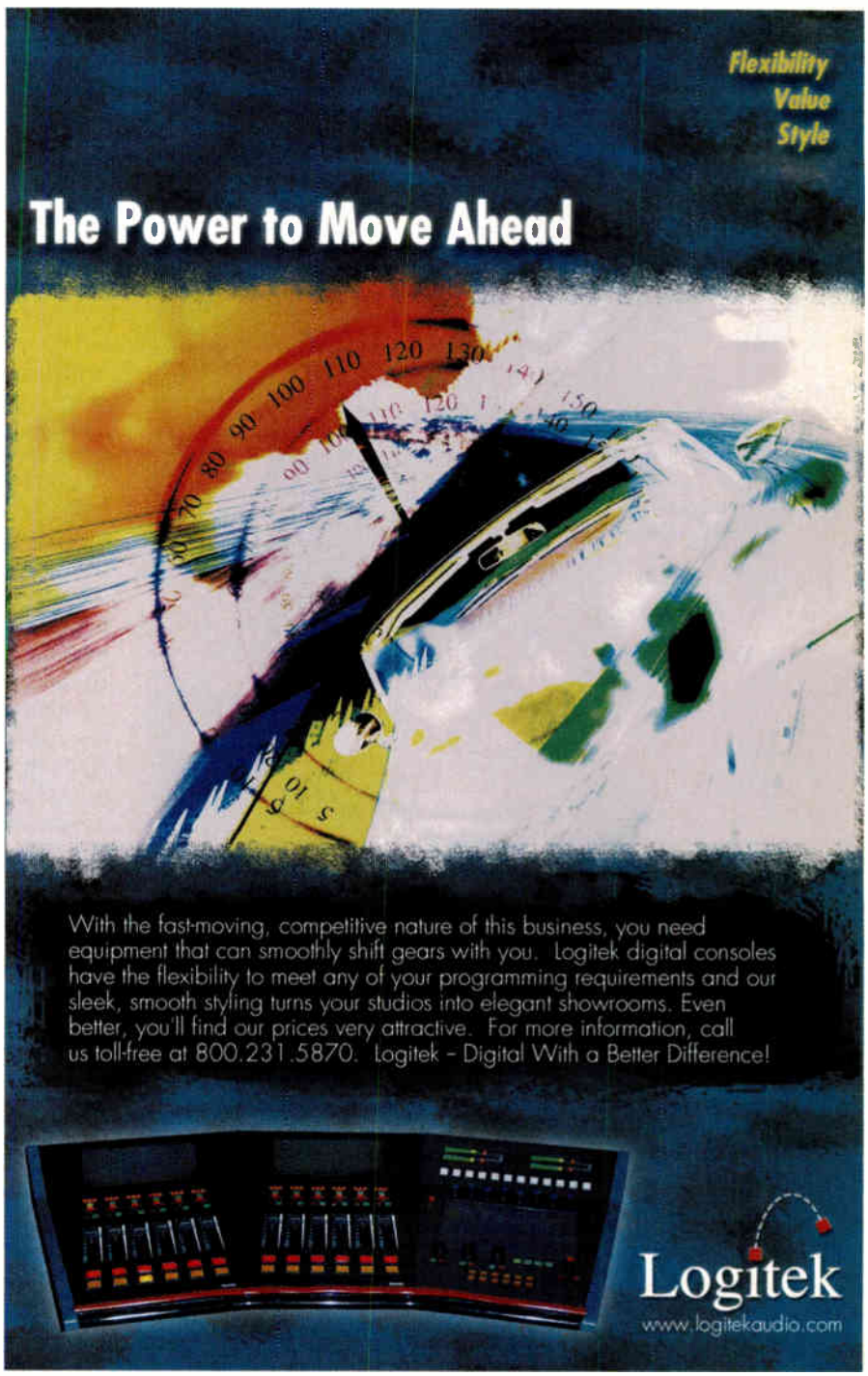
What about automatically collected data from the transmitter control and EAS? Is there an easy way to merge this data?

Unfortunately, answers to this question depend completely on the systems in use. Most transmitter remote and automated control systems use proprietary software to save the operating parameter files in formats that may or may not be easily imported to a spreadsheet. If the PCs used by the system are networked, collecting and backing up those files may be relatively simple, but the "sneakernet" is a viable alternative. EAS activity may also be dealt with by using some of the free software to spool EAS printer output to a text file. Once again, the type of EAS hardware used will determine how easy this is to do. Ironically, many stations still rely on the tiny thermal roll printers provided in most EAS encoder and decoders as the sole source of their EAS records. As a consequence, they often lose days, or even weeks, of records when the tapes run out or the printers fail. Saving the data files simplifies things and increases reliability.

The station should maintain some hard copies. Two years worth of printouts of all FCC-mandated logs and technical records should be kept available by the station licensee in the same location as the station's public file logs (even though electronic records are legally acceptable, if suitable a computer and printer for retrieval are available) for easy access in the event of an inspection. These records should be printed weekly, along with a review affidavit form, which the designated chief operator signs when the batch is placed in file. This form attests that the data has been reviewed to ensure full compliance with applicable regulations, and should include an area for notations explaining the reasons for any discrepancies that appear (such as missed EAS tests, equipment malfunctions or logging errors), as required by FCC rules. By printing the copies, the station will establish a routine that ensures proper reviews are made on schedule.

Record keeping is a chore, to be sure. By harnessing the power of the PC, you'll manage it efficiently and effectively.

Krieger, Radio's consultant on contract engineering, is based in Cleveland and can be reached at mkrieger@drfast.net.



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Test your RF system

By John Battison, P.E., technical editor, RF

Construction standards for most transmitting equipment today is generally so high that testing of individual components is uncommon and unnecessary. However, the overall testing of an RF transmitting system is necessary because the FCC has mandated annual NRSC mask compliance tests for directional and non directional AM stations. FM transmitters nowadays only require testing when putting a new one into service. The old days of running channel separation measurements and other proofs have been eliminated.

No matter what problems may be encountered, a recorded set of operating parameters will make troubleshooting and repair much easier.

I can't help wondering whether it's the penny-pinching efforts of management that have communicated themselves to the FCC and resulted in this reduced number of tests that station engineers are required to perform. Or is the FCC finally beginning to realize that modern equipment is reasonably stable, and capable of performing in accordance with its specification, so that repetitious equipment tests are no longer mandated?

Apart from the two mandatory tests, there are various RF tests that conscientious chief engineers should perform on a regular basis to keep their transmitters operating on the top line, and that will add to the overall performance of their stations. Unfortunately the bottom-line attitude of too many managers has greatly reduced the time that most chief engineers can spend on this rewarding work.

A time to act

Unless you are lucky, the time will come sooner or later when something goes wrong with your RF system. It may be a small thing that is easily fixed, or something that puts the operation so far out of normal parameters that it is necessary to close down or reduce power. No matter what the problem, a recorded set of RF system operating values always makes the process of correcting the problem much easier.

When joining a new station, look for this information and if it is not available, compile your own set of operating conditions. A loose-leaf binder with suitable tags and dividers works well for initiating this information record, and keeping it up-to-date. Even if you are not lucky enough to inherit one, your successors will bless your name.

For AM stations, DA and non-DA, the mandatory annual NRSC mask proof is important, not only because it is an FCC requirement, but also because it gives the engineer an idea of how his transmitting system is performing.

A spectrum analyzer and recorder are required to perform this proof properly. It is possible to make these measurements without this equipment, but it is time consuming and difficult to substantiate. The necessary equipment is expensive, and for a single station or just a few stations, it becomes difficult to justify the expense. Find a contract engineer service group that will make scheduled calls to do these tests. In some states, the state broadcasters association has made arrangements with one of these groups to offer this service for a reasonable fee. The charge is usually only a few hundred dollars. If a number of stations need to be tested, it might be more economical in the long run for a station to own the equipment. However, this depends on individual corporate circumstances and philosophy.

The FM station engineer has even fewer mandatory tests or proofs to make. In the past annual stereo separation proof requirements were imposed as well as audio proofs. Today, unless an FM station is under construction or a new transmitter is being installed, there are no mandatory FM tests required. However, this lack of FCC requirements should not encourage engineers to let systems run for long periods of time without checking the overall performance. Components change, adjustments change, "knob twiddlers" come along, the quality changes and no one realizes that the overall signal has suffered.

The combination of operating impedance bridge (OIB) and generator and receiver detector is probably the most

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versatile tool in the average AM station. These instruments are the best set of equipment that an engineer can have when AM antenna problems develop. A non-directional station antenna operating impedance doesn't usually change, but when it does, the OIB is invaluable in tracing the cause, whether it is in the ATU, transmission line or antenna itself.

An OIB is essential for a directional AM station. The common point operating impedance seems to be susceptible to change from many causes including cracked guy insulators, ATU and phasor capacitors changing in value, adjustable inductances that adjust themselves and animal life that inhabits ATUs.

Like most test equipment, it is possible to rent OIBs and associated equipment, but after a few rentals it usually becomes cheaper to buy it outright.

A time-domain reflectometer (TDR) is useful for AM and FM stations, however transmission line problems don't seem to develop as often in AM stations. Fortunately the backwoods marksman is less attracted by the ground supported AM lines than the beckoning lights on the FM tower. As a consequence, FM lines suffer more from straight bullets. Luckily, many electric power companies include TDRs in their tool inventories. It may be possible to borrow one from a power company employee, and frequently this will supply sufficient information to locate a damaged portion of FM transmission line on a tower.

For the AM station with a damaged transmission line that is buried, a TDR can be worth its weight in gold. When not buried deeply enough, underground transmission lines are sometimes damaged by traffic passing overhead, from manufacturing faults or simple deterioration throughout the years. Digging up a buried line is almost as bad as trying to repair a damaged FM line on a tower. The TDRs used by the power companies are invaluable when dealing with a suspected faulty buried AM transmission line, and faults are usually traced to the nearest foot.

An OIB is a vital piece of equipment for a directional AM station and can be used to quickly diagnose antenna system operating problems.

Being ready

Throughout the years, the FCC has reduced its mandated RF and other tests. Gone are the after-midnight audio proofs. Does 24-hour operation have anything to do with it? Taking two hours from midnight to 2 a.m. or more, for FCC tests, when those hours could have been earning money may have rubbed many managers the wrong way. Has management's unhappiness influenced FCC thinking about unnecessary RF tests that decrease a station's total earning hours? Whatever the cause, routine tests after midnight by engineering should be fewer these days.

E-mail Battison at batcom@bright.net.

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The DB-10 provides 99 password-protected snapshots, and 9 project settings for easy recall. Multiband selectable equalization, compressor/limiter dynamics, 2 AUX, 2 TEL, and 2 PGM busses as well as two digital mix minus (N-1) busses, are available on all channels. The DB-10 handles sample rates from 32kHz to 96kHz using the highest quality sample rate converters. Synchronization can be achieved via internal or external 48kHz word clock, providing a reliable digital lock every time.

Up to 4 DB-10 consoles can be cascaded together to provide additional channel inputs as needed. When cascading DB-10 consoles, both the talkback and Emergency Bypass signals are shared between all consoles, allowing for one man operation. All of this in a compact footprint perfect for small studios, while also being expandable for use in larger facilities. Furthermore, the DB-10's portability makes it the perfect choice for OB trucks.

Need computer backup? DB-10's console snapshots, project settings, and GPIO data can be quickly saved and recalled using a standard PC serial link. The outboard power supply unit supports 100-240VAC and optionally 24VDC. And by adding another optional power supply unit, the DB-10 can be redundantly duplexed for failsafe operation. If your station's been waiting to provide "all digital" content, here's the on-air console solution to take you securely into radio's future. The **Otari DB-10** delivers digital technology today - with the simplicity, reliability and familiarity of analog's past.

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Security through encryption

By Kevin McNamara, CNE

Sometimes it is necessary to keep certain data files private, whether the files are on a disk or perhaps sent over a network through e-mails. Financial institutions, large corporations and government agencies routinely employ complex data encryption methods to hide sensitive and potentially damaging information stored on workstations and servers throughout the world.

Data encryption is simply a more advanced form of the secret codes or cryptology, used by the military for nearly the last century, essentially scrambling information is such a way that can only be read by the intended recipient.

Any computer connected to the Internet can be fair game for a motivated hacker that desires to read, or worse modify or destroy, important information. The function of data encryption algorithms is to permit the seamless transfer of sensitive information between two parties and to maintain that information on a storage medium that can read by only an authorized user.

What's in a name?

While we call these data encryption algorithms, the actual process depends on encryption and decryption methods. The more appropriate term would be cryptographic algorithms.

Fundamentally all data cryptography methods need at least two components:

1) The algorithm defines the specific encryption method.

2) The key identifies a specific instance of the algorithm.

Most data cryptography use these components and are also called key-based algorithms. Another method, called a restricted algorithm, does not use a key, but rather defines a specific encryption and decryption mechanism that is embedded between the source and the destination. The assumption with restricted algorithms is that the coding is kept secret and can not broken by outsiders. In contrast, files protected by key-based cryptographic schemes may use any number of encode algorithms, providing the proper key exists at the destination in order to decode the files properly.

There are two types of key-based cryptographic encryption algorithms: symmetric and asymmetric.

Symmetric key method

Symmetric key, also called secret-key, is the most popular form of data cryptography in use today. This method uses a single key for the sender and recipient. How does the recipient get the secret key? It must be sent separately through a trusted and secure channel.

The most popular implementations of symmetric algorithms include:

· DES, or data encryption standard, was originally developed by IBM in 1974, was adopted by the National Institute of Standards (NIST) in 1977 as a national standard to address the need for protecting non-classified data. DES uses a key length of 56 bits. While DES is still widely used throughout the world, it has been determined that a 56-bit key is not sufficiently large enough to be impervious to hackers. DES is applied to data in blocks of 64 bits—i.e. 64 bits of incoming text is converted to 64 bits of encoded text. The maximum key length is limited to 56 bits because the least significant digit (in binary) is used as a parity bit and ignored, leaving only the seven most significant digits yielding a maximum length of 56 bits.

· Triple DES is a stronger form of DES using three 64-bit keys for a total key length of 192 bits. The 192-bit key breaks the key into three separate keys. From here the process is essentially the same as standard DES, however the data is first encrypted with the first key, decrypted with the second key and finally encrypted for a second time with the third key. While triple DES is far more secure, it operates about three times slower than single DES.

· Advanced encryption standard (AES) became effective as a standard on May 26, 2002. AES specifies three key lengths: 128 bits, 192 bits and 256 bits. Data encoded with the AES 128-bit key is 1,021 times stronger than the traditional 56-bit DES scheme.

· Blowfish, developed in 1993, uses variable key lengths from 32 bits to 448 bits. It is gaining popularity as an alternative to DES.

· International data encryption algorithm (IDEA) uses a key length of as much as 256 bits. The key phrase is applied to another algorithm know as MD-5 (MD stands for message digest) which digitally creates a 128-bit key. IDEA is not freely distributed commercially, but is used with the

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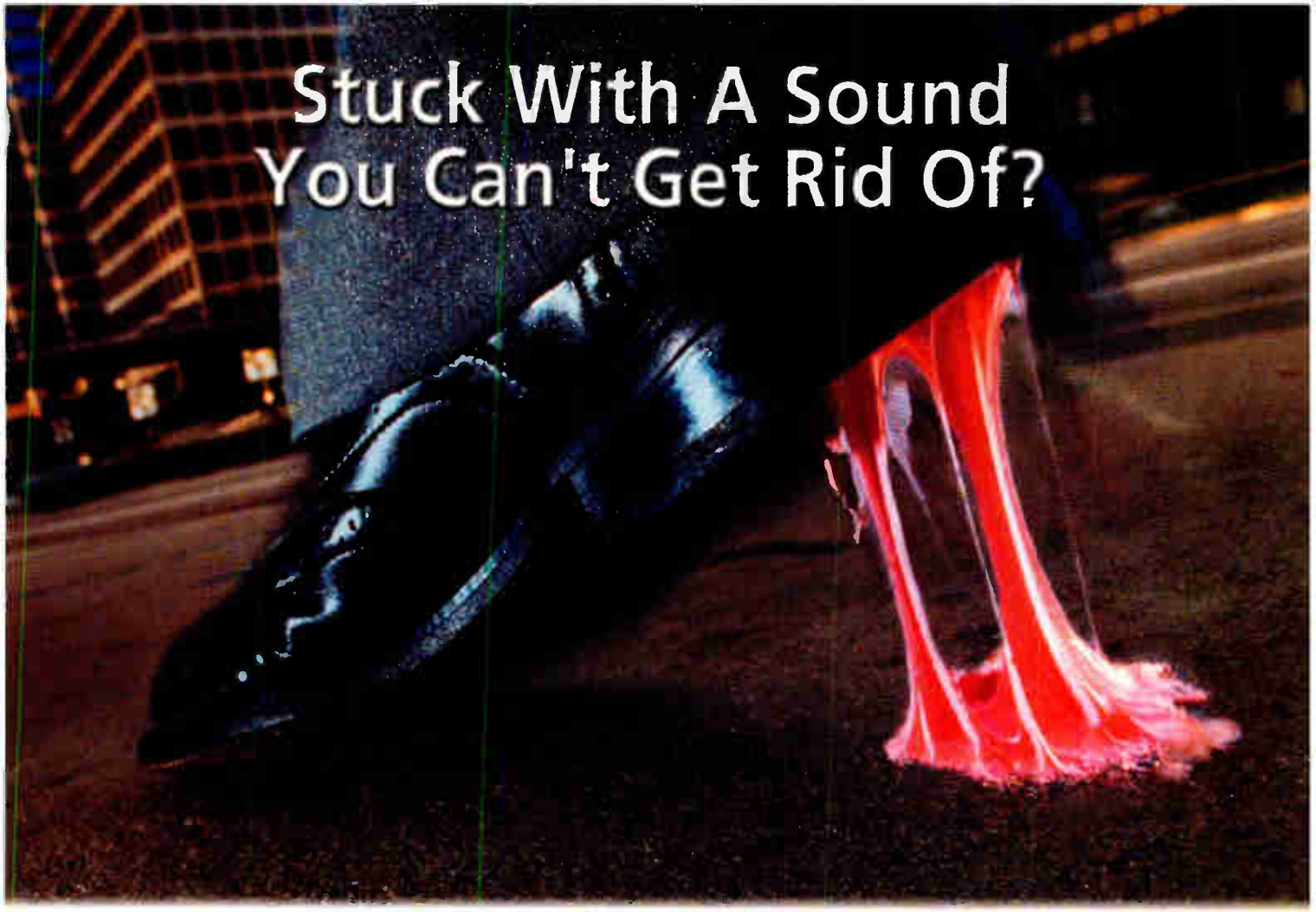

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popular data encryption program PGP (pretty good privacy).

Asymmetric key methods

Cryptography based on the asymmetric key method is also known as a public-key infrastructure (PKI) algorithm. PKI uses public and private keys to maintain a high level of security for files that are typically sent via a public or private network. Each user has access to the list of public keys for the other users across the network. To establish a secure connection between two users, the originating user must find the public key for the destination. The file is encrypted using the public key assigned to the user at the destination. The user at the destination can decrypt the file using his private key. One popular implementation of PKI is called RSA.

RSA, developed in 1977, uses encryption and digital signatures to create highly secure crypto text. Its function is complex, but the RSA Laboratories website explains it well. Further information can be found at the RSA Securities website at www.rsasecurity.com.

This is only a brief overview of methods available to secure your data. The Web provides a rich source of information to research these and other methods.

McNamara, Radio's consultant on computer technology, is president of Applied Wireless Inc., New Market, MD.

All of the Networks articles have been approved by the SBE Certification Committee as suitable study material that may assist your preparation for the SBE Certified Broadcast Networking Technologist exam. Contact the SBE at (317) 846-9000 or go to www.sbe.org for more information on SBE Certification.

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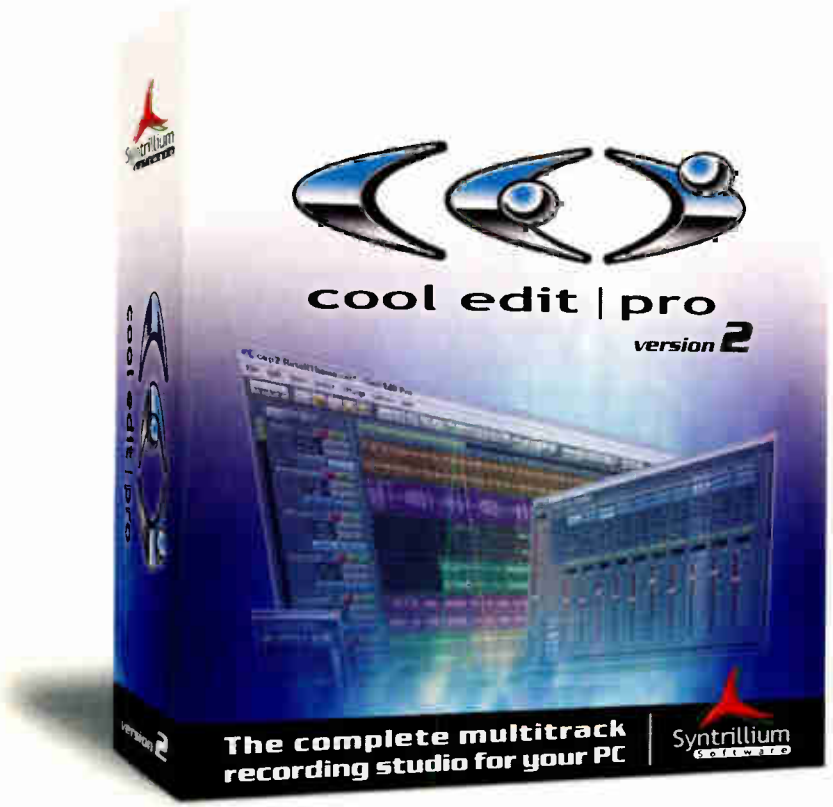

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Digital radio launched

By Harry Martin

In October the Commission announced procedures that allow AM and FM stations to immediately begin interim IBOC digital transmissions on a voluntary basis.

The IBOC system, adopted by a unanimous Commission, is now available for full-time FM and AM daytime use. Nighttime AM use will be approved only after interference problems are resolved. According to Ibiquity, AM nighttime interference problems are likely to be resolved next year.

The Commission has not set a timetable for a complete transition to digital radio. But the new IBOC technology allows radio stations to transmit the same program in analog and digital modes within their existing spectrum. Proponents of the new technology say it will improve sound quality, offer more robust signals and provide potential for new auxiliary services, such as data transmission and audio-on-demand. It is also expected to provide solid competition to satellite radio.

Just as important, the transition to digital will not be subject to the paralysis that has characterized the transition to DTV. Fraught with delay and met with a lukewarm reception from a viewing public unwilling to buy costly new sets, DTV has faced an uphill battle. Where consumers are currently asked to pay thousands of dollars for digital television receivers, it is expected that radio equipment capable of receiving digital IBOC transmissions will cost about $100 more than the equivalent analog equipment now on the market.

There is some potential difficulty with IBOC technology. Low-power FM stations fear interference. Some receivers used for radio reading services for the blind may also be impacted. IBOC licensing and service rules have not yet been adopted. Because Ibiquity is the only IBOC vendor, stations that wish to use IBOC technology will have no choice but to make arrangements with Ibiquity. When it adopted the IBOC item, the Commission announced that these and other IBOC issues will be dealt with in a future rulemaking.

IBOC broadcasts are expected to begin before the end of the year in New York City, Chicago, Los Angeles, San Francisco, Seattle and Miami. The average IBOC conversion cost per station is estimated at $75,000, and may vary depending on the quality of the station's infrastructure. While $75,000 may be a substantial expense for many stations, it is cheap compared to the $1 million-plus in costs associated with the conversion to DTV.

Recent enforcement actions

The FCC recently announced that in the past fiscal year (Oct. 1, 2001 to Sept. 30, 2002) the agency fined companies more than $28 million. The chief of the FCC's enforcement team claimed that the agency's enforcement actions are aimed at benefiting consumers, but that did not stop the chief from proudly announcing the multi-million dollar fine total. Some recent fines include:

· $105,000 for tower violations—The FCC collected $105,000 from a North Carolina company for failing to properly paint, light and mark several towers. Although the original forfeiture notice cited all of the company's towers, the company won a $6,000 reduction by showing that one of its towers was exempt from painting and lighting requirements.

· $15,000 for tower violations—An FCC agent recently visited an AM station on three consecutive days and ended up fining the station $15,000. On day one, the agent observed the towers of the station and noted that they were neither properly illuminated nor marked with the FCC-issued Antenna Registration Number. On day two, the agent dropped by the station to advise the licensee of the violations, but was told that the tower was less than 200 feet high and, therefore, exempt from marking and lighting requirements. On day three the agent returned, measured the tower and determined that it was 230 feet high. Soon thereafter the station received notice of a $15,000 fine.

· $21,500 fine reduced by $10,000—An FM station that initially was fined $21,500, had its fine reduced by nearly half when it proved that it did indeed have a public inspection file. Although the FCC noted that the file was not provided to its agent when the station was inspected, further evidence convinced the FCC that the file existed.

Martin is an attorney with Fletcher, Heald & Hildreth, PLC., Arlington, VA. E-mail martin@fhhlaw.com.

Dateline:

Jan. 10 is the deadline for placing fourth quarter issues and programs lists in the public file. No longer required in the public file: granted applications (except contour maps or information showing main studio and transmitter location, or applications granted pursuant to a rule waiver).

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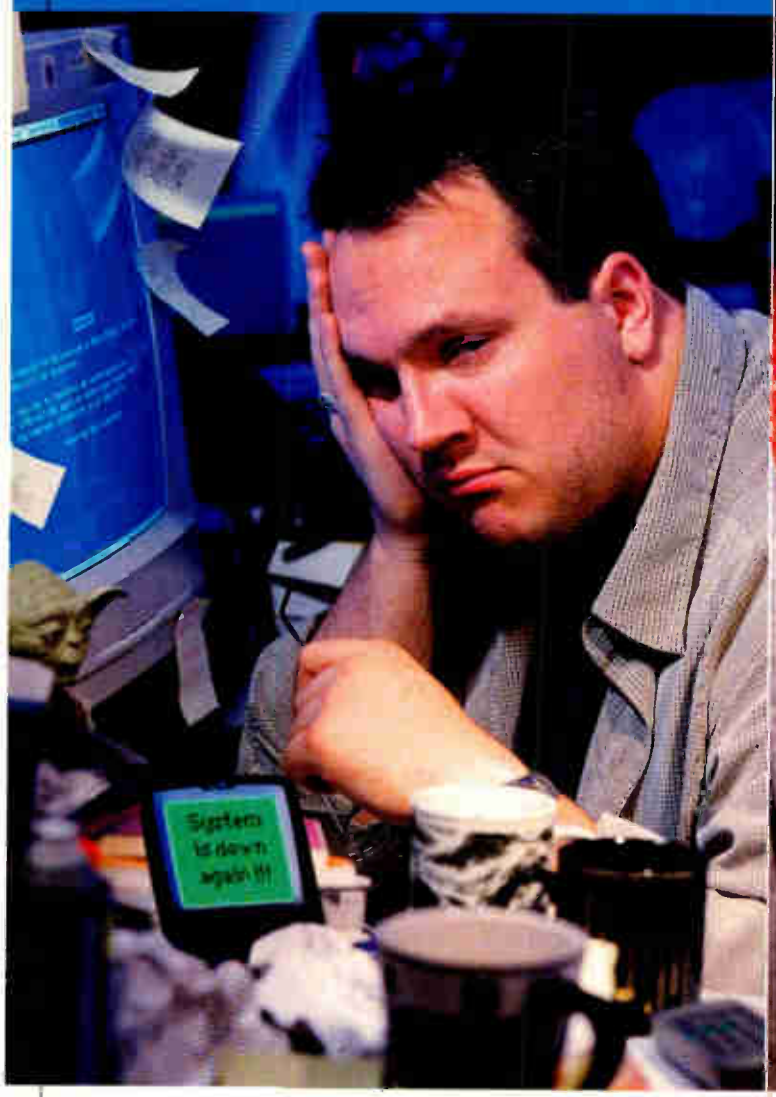

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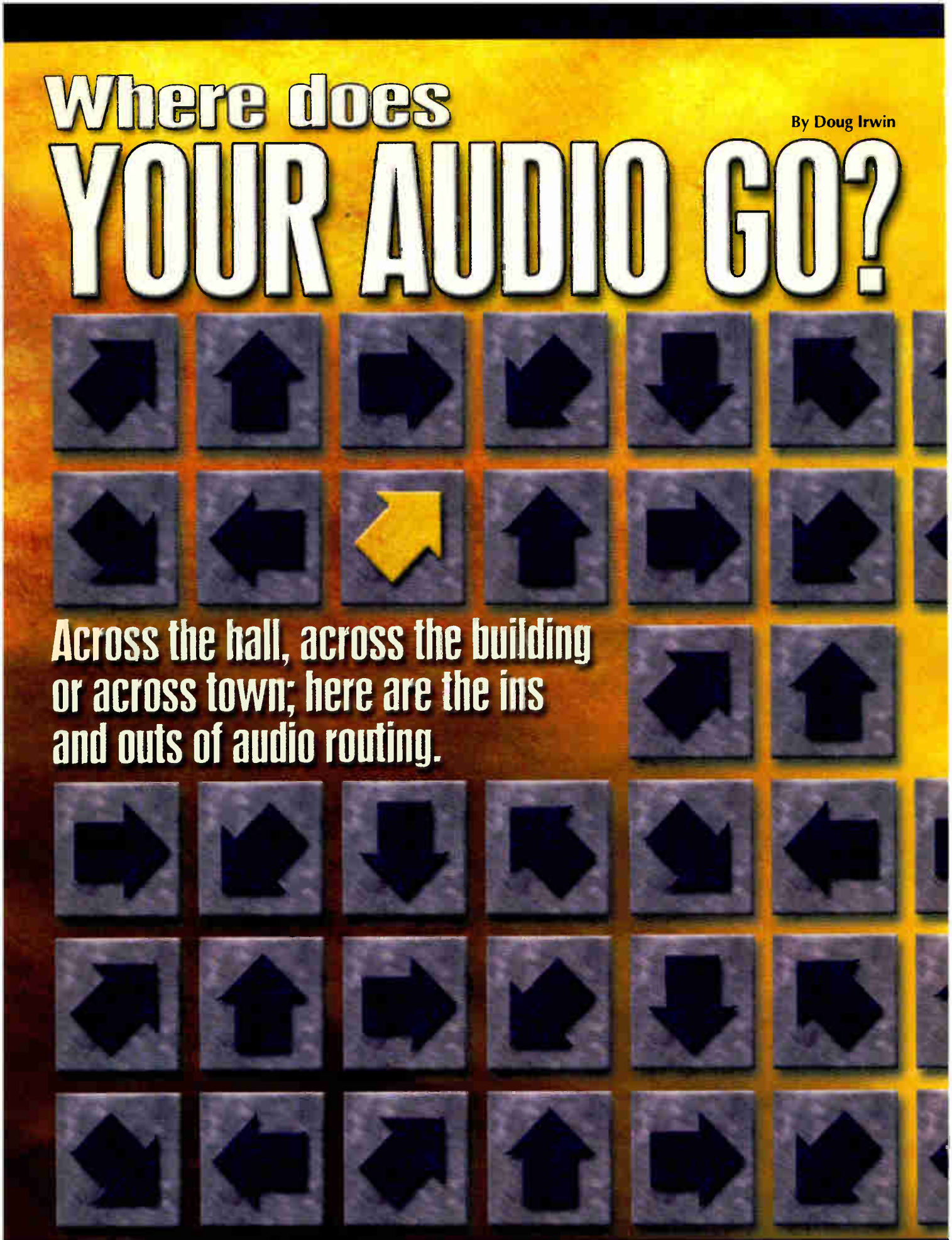
Where does YOUR AUDIO GO?

By Doug Irwin



Across the hall, across the building or across town; here are the ins and outs of audio routing.

World Radio History

Here is a common scenario faced by radio stations scattered throughout the country: Station X buys Station Y. The need arises to share resources amongst the two; and shortly after the sale is announced, the engineers are left to figure out just what to do and how to do it.

Rarely will each station be equally equipped. One station may have an excess of ISDN transceivers, while the other has none; one may have a far-ranging RPU system, while the other has nothing but local loops from a telco; one may have a spare satellite dish that would, in fact, be more useful across town. One may have an extra studio that can be used for voice talent, while the other may be short by one studio. One may have an STL shot that the other, across town, cannot see. Similarly, one may have great off-air reception, while the other has nothing but tall buildings in the way.

A little history

In the not-too-distant past, the most practical means by which stations across town could be connected was with leased-lines from the local telephone company. Because of the expense involved, most arrangements like this were strictly single-channel, and by their nature only worked in one direction, which is called simplex.

The most a pair of stations would probably have was one circuit for each direction between the two. About 10 years ago, ISDN transceivers began to appear; they were the first relatively inexpensive means to communicate between facilities. Their functionality was much greater than that of the analog telco circuits, because they could pass audio both directions (full-duplex). This represented a revolutionary change in the way things were done around the radio station. Not only could the audio quality of the connection be altered, but the connection itself could be started and ended as needed. Having the return path for audio from the far-end was just an added feature and at first not crucial. However, soon afterwards, with the passage of the Telecommunications act in 1996 and the subsequent land-rush of radio station consolidation, the ability to communicate between facilities saw rapidly expanding use.

Prior to the explosion in the use of ISDN transceivers, some stations began using leased T1 circuits between facilities, along with the encoder and decoder pairs, and channel banks that became available in the late 1980s. Again, these provided high-quality, full duplex connectivity between stations; many engineers came up with more and more uses for the bi-directional capability.

Once two stations realize that they can effectively share resources, they must come up with the most economical means (that doesn't mean cheap equipment) by which to do it. Typically, any radio station will have a set of remote program sources: satellite receivers, ISDN transceivers, POTS codecs and RPU receivers. In addition, there will be a set of program feeds from each studio on premises and there will be a studio-to-transmitter (STL) link of some sort, as well as an off-air confidence return feed. These circuits are often available in master control—also known as the rack room. Because the circuits are common to this location, it is ideal to house the central switching engine here. Likewise, install remote feeds from and to the remote location in this room.

There are at least two passive and mechanical means by which this can be accomplished. The first is the good old-fashioned patch bay; the second is a switch-bank. Sources are then patched with the patch bay or a selection is made on the switch bank. In either case, follow the feed with a distribution amp to isolate each destination within the facility. The second aspect to consider is the return audio feedback to the remote location; once again, either the patch bay or a mechanical switch can be used.

Simplicity and economy (meaning cheap) are fine, but perhaps you are inclined to have your station operating in the 21st century, with the latest technology.

Routing switchers

Routing switchers are nothing new, but in the last five years, several manufacturers have added one to their product line, and several new companies have appeared, with routing switchers as their primary product. In the old days, these switchers could only handle analog signals, but today there are multiple products that handle analog, AES digital or some combination thereof. The routing switcher takes the place of a patch bay, mechanical switching and distribution amps.

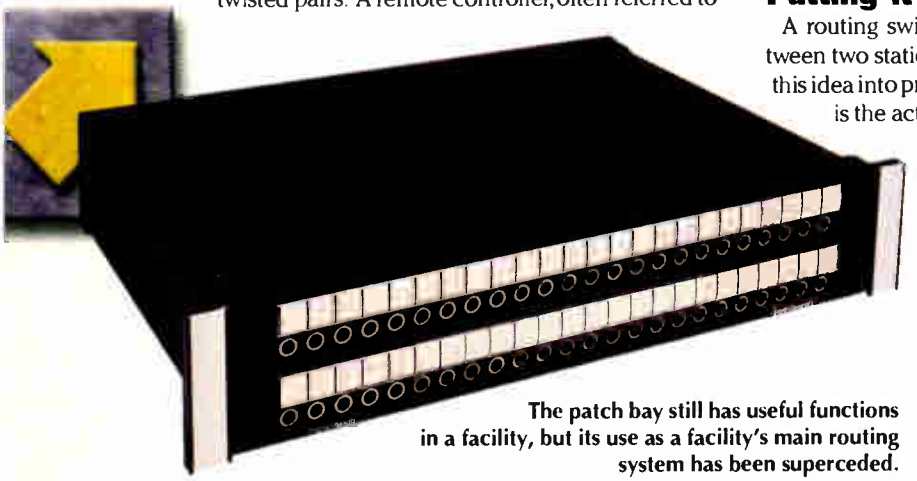
The idea behind the routing switcher is really quite simple. Any input *X* can be connected to any output *Y*. You can think of this as the part that displaces many of the distribution amps. It is possible to have all the outputs fed by any input; and on an output-by-output basis, the input can be assigned individually. This is the part that replaces the patch bay and mechanical switches. Functionally, the router output is similar to the output of a mechanical switch or a feed from a patch bay in that only one input can be assigned to a particular output at a time. However, with the addition of DSP, some routers have the built-in capability to mix functions ahead of an output

World Radio History

Where does YOUR AUDIO GO?

Within the facility, control of the routing switcher functions is done in two ways. For starters, there will be a computer connected to the router mainframe via a serial connection. Housekeeping functions, such as input naming, are accomplished in this way. Because the router lives in the rack room, remote control switching functions from the studios are needed, typically by an RS-485 connection over twisted pairs. A remote controller, often referred to as a head, can be placed in the studio, for instance, and it allows the end user to decide what input is assigned to the particular output.

There have been evolutionary changes in the functionality of routers. A typical feature is the ability to route AES data streams. Most of the switchers that are marketed now give the engineer the ability to conveniently switch analog and digital signals within the same router. Another important change is the ability to communicate via TCP/IP. A computer that once served only to talk to the router can now be located on the station's LAN, giving anyone at the station the ability to carry out housekeeping or switching functions.



The patch bay still has useful functions in a facility, but its use as a facility's main routing system has been superceded.

Putting it in play

A routing switcher can be useful in handling connectivity between two stations that are across town from one another. Putting this idea into practice is really quite simple. The first thing to decide is the actual means by which the stations are connected. If the station can afford a full-time connection, the likely choice will be a service offered by the local telephone company, such as a leased T1 circuit. Count the cost of the encoder and decoder pair, in addition to whatever expense the local telco will charge for installation. If connectivity can only be justified on an as-needed basis, make use of an ISDN transceiver, connecting the inputs and outputs to the routing switcher.

Once the connectivity between stations is working, there is the inevitable issue of operating controls on the far end. It used to be necessary to

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call a colleague at the other station to have him switch the feed. Today, engineers can take complete advantage of a WAN and the efficiency that this technology offers. If the computer that controls the switching function on the far end is on the LAN, remote control can be accomplished with TCP over a private network or perhaps even the Internet.

Facility photo by Gary Kline.

A facility based on a router located in a rack room provides a simplified audio distribution path.

Going one step further

The functionality of routing switchers has increased dramatically. Using what has become known as an audio engine, engineers now have at their disposal not only routing functions, but also console functions such as mixing. In many cases, the functions of these devices can be remotely controlled, giving the users flexibility in the design of their systems. Both Computer Concepts and Logitek have audio engines at the heart of their router and console systems. The audio engine looks and feels like a router: it is a mainframe that mounts in a rack, and has I/O cards to handle inputs and outputs, along with separate control and communications cards. A user interface, (which was once called a console) is connected to the audio engine with a Cat5 cable. While this is an Ethernet cable, the communication protocol is not. A computer is used to carry out the housekeeping functions and the console functions. Channel input assignments can be assigned on a channel-by-channel basis. The destination of outputs can be changed on the fly, and each channel can be controlled by means of a virtual fader, even by means of a TCP connection.

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The XM Broadcast Operations Center oversees all the audio routing functions.

exceeds switching a feed on the far end. The engineer may actually need to access console functions on the far end. Take the same concepts discussed so far and expand on them. One example of this is David Lawrence of the show *On-Line Tonight*. He recently did this in conjunction with CINET radio in San Francisco. Aside from his normal show broadcast from 7 p.m. to 10 p.m. PT, he added an early morning show from 3 a.m. to 6 a.m. PT. In this application the Logitek Audio Engine was used.

From his home studio in Washington, DC, Lawrence links with the network at CINET remotely via a virtual private network (VPN). He then communicates with the computer in San Francisco that has the application Logitek Supervisor running, as well as software used to control several Telos Zephyrs. By way of the remote connection, he would dial out on one of the San Francisco Zephyrs to his own studio unit; this established the duplex audio connection. When it was time for the show, he used Logitek's V-Fader software to control two faders (one was his own feed, and the other was a mix-minus air-monitor return sent back to his studio) on the CINET Studio A Audio Engine. That is not to say that he was physically running the faders up and down, but his remote application showed him via a graphic user interface (GUI) where the virtual faders were. In this way, he was able to have complete control of the production of his program from Washington, while the studio in San Francisco was silent and empty.

Klotz Digital's Vadis system can be taken one step further. The user interface can be physically separated, and connected via a WAN. An entire console can be controlled remotely. A Vadis system installed in a particular facility will run on its own network. The far-end system, physically removed and running on its own LAN, can be connected to the near-end system with a network bridge (a full T1 has all the data capacity necessary to handle the control functions). Duplex audio connections are made via a separate path. With all of the control information necessary to do so running over the data circuit that bridges the networks, a control surface at the near end can seamlessly take the place of a control surface on the far end.

XM Satellite has built a sophisticated system that makes efficient use of the remote control capabilities of Vadis. The heart of their system, known by the acronym BOC (Broadcast Operations Center), located in Washington DC, is connected to two remote locations. One is the studio facility in New York and the other is the studio facility in Nashville. Audio encoders and decoders are used in conjunction with T1 circuits to provide audio connections between facilities. The Vadis system in each location operates on its LAN segment; the three segments are bridged together to make up a WAN (with yet other T1s). The operator at the BOC is able to click on an icon on the desktop of a computer there, which in turns opens client software that communicates with Nashville or New York. The monitor display seen by the operator in Washington is identical to that seen at the remote locations, and the functionality is completely duplicated. This not only facilitates production, but maintains control from one central point, as well.

Ten years ago, a routing switcher was considered to be a luxury item at a radio station, but with consolidation, the fundamental changes in the way radio stations are operated and programmed, and with remarkable changes in technology, routing switchers have nearly supplanted mixing consoles as the heart and sole of the radio station technical facility.

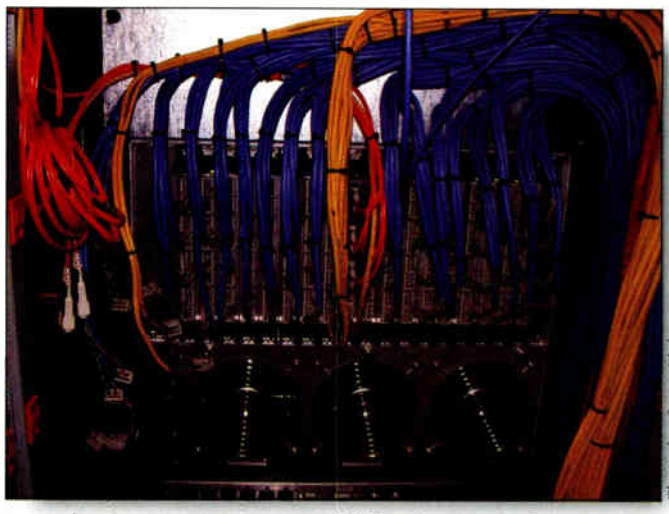

Photo by Steve Fluker.

Centralized routing brings a facility's input and output sources to a single destination, as shown with this installation of a Computer Concepts Epicenter.

Irwin is director of engineering for Clear Channel, San Francisco.

***Next month*: Better Studio Designs**
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- In the January issue of Radio *magazine -*

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TRENDS IN
TECHNOLOGY

The changes in automation

The traditional centerpiece takes on many new faces.

By Barry Thomas, CPBE CBNT

Consolidation and technological advances have made radio automation affordable and necessary for modern broadcast facilities. In response to the industry, automation systems are becoming better described as digital-asset management systems. Simple cart replacement isn't the goal anymore. Stations expect digital playback systems to help manage media inventories, automatically record and insert live feeds and voice tracks, work seamlessly with satellite formats and operate as a live assistant for shows. The need for interaction, control and insertion from a distance has become extremely important, as have WAN-based media sharing and the ability to manage multiple stations from a central site.

Most manufacturers have addressed these needs, and now these systems offer much more than radio automation. Many systems available are designed to take advantage of interaction with Rich Media associated with radio and audio content. This capability has direct applications as stations exploit their Internet presence. Automation systems can send "now playing" data to Web pages, and some companies offer solutions that allow listeners to hear radio on specially designed audio players with a station logo and sponsor ad space, as well as methods for Internet listeners to click and find out more about the music or spot being played or even begin a purchase process. This type of interactivity is still in the early stages but expect this information and extra features to be a part of future digital radio iterations.

Perhaps the decision has been made for the engineer as a member of a larger company. If this is the case, this information may be able to give you an idea of how the system works and how its features can be used in the station. Use this information as a beginning, following up the research by contacting the manufacturer or the broadcast equipment dealer for more information.

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Scott systems have radio's most robust hardware, including redundant power supplies, back plane rack cases and easy to open ball bearing pull-out rack drawers.

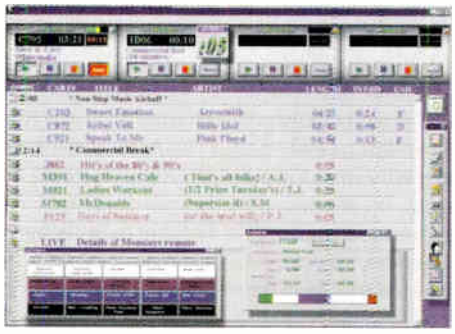
Good — Digital Universe

Digital Universe software that CBSI and Wicks Broadcast Solutions sold for $9,000 is now owned, updated and improved by Scott Studios. And it can now be yours for ***only $1,495!*** Digital Universe radio automation includes on-air software with full capabilities for music on hard drive, including Voice Tracker, production recorder and CD ripper. Simply add your own computer and an inexpensive non-proprietary sound card. Or, for a small labor charge, Scott Studios will install Digital Universe on Dell computers at ***no hardware markup*** over factory prices.

All Scott Studios' systems feature "wet" Voice Tracking, where announcers hear music heads, tails and segues in their headphones. "Wet" Voice Tracking makes recorded shifts sound smoother than the "dry" recordings of other affordable software. For $249 extra, any computer in your station can be a Digital Universe Voice Tracker!

Scott Studios also offers pre-dubbed Digital Universe music libraries, on-site training and satellite format capabilities. For details, go to digitaluniverse.com.

Better — Maestro



Computer Concepts' Maestro—and its predecessor, DCS—are widely regarded as ***radio's most robust*** and ***most reliable*** automation systems. Many are still in daily use after 13 years. (Computer Concepts is a wholly owned subsidiary of Scott Studios.)

Maestro leads the industry in unattended local spot insertions in network shows, and walk away automation for satellite formats. Maestro is very powerful at handling multiple background recordings and time shifting of programs.

Maestro has one of live radio's best phone recorder/editors, automated satellite or Internet distribution of spots, music, liners and news for hub-and-spoke clusters, and a sophisticated ***ability to think*** and ***make informed decisions*** during automated shifts. You can ***relax***, knowing Maestro is handling every situation as you desire.

Maestro integrates seamlessly with our Voice Tracker, pre-dubbed music on hard drive, and famous NewsRoom copy and audio editor. Maestro 3.3 now includes the industry's best CD ripper, Cart Chunk compatibility, and records and plays WAVE files.

Best — SS32

Scott Studios' SS32 is both the best and best-selling digital studio system—regardless of brand—because SS32 has the ***best user interface*** and is ***easiest to use***. Also, SS32 offers virtually ***every feature*** radio stations want!

SS32 offers an Invincible hot standby with hands-free auto-transfer. It switches in less than a second, picking up at the exact syllable where the first one left off. It's one reason why so many stations in New York, Chicago, Los Angeles, Houston, Boston, Dallas and many other major markets choose Scott.

SS32's built-in phone recorder has an easy-to-use jog wheel and adds auto-sequencing features you can't get anywhere else.

SS32's Voice Tracker also leads the industry with convenient features for local and distant city use.

You also get Cart Chunk and News-Room compatibility, auto-fill for network breaks, macros to simplify schedules, Power Fill so programming ends as specific times and remote control over the Internet.

For more info, go to scottstudios.com, or call toll-free: 888-GET-SCOTT.

24/7 Technical Support: 888-SCOTT-411
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World Radio History

The changes in automation

Broadcast Electronics
www.audiovault.com

Audiovault has been the basis of Broadcast Electronics long history of radio automation. Its current product line includes the standard, Vault2, a system based on non-proprietary hardware, but is designed for large radio operations and VaultXpress; a low-cost. In the Vault2 and VaultXpress systems, the company employs the familiar AVAir and AVRecord user interfaces. Vault2 stores all audio files on shared file servers and uses individual workstations for playback, production and traffic. VaultXpress uses individual workstations that store and play sound files locally. The company offers a wide variety of Web-centric tools that work with Audiovault products. It licenses Everstream's proprietary technology as a new service called SoniXtream; an integrated set of tools and Web interfaces that provide Web managers with tools necessary for complete rich media management; ad serving, insertion and management; branded audio players; reporting and even services like media hosting and multiple audio channel origination.

RCS
www.rcsworks.com

RCS offers the standard software for music and promo scheduling with Selector and Linker. Master Control XV is the companion automation product with integration into all RCS products. RCS has built a its customer base by maintaining the programming focus of its products. The company offers interfaces for most traffic software and, through Linker, offers tools to manage the rotation of all non-spot and non-music elements on the station, such as promos and sweepers. Master Control's Enterprise edition is designed for large interconnected radio stations with shared music libraries and scheduling. The Master Control system is available with Internet voice tracking, which allows talent to record tracks and create voice insertions from anywhere in the world. For Internet applications or station Web presences, the company offers the iSelector fully branded Internet player. ISelector lets users hear Internet radio stations customized to their musical preferences within any musical genre. SplitStream ad insertion allows unique commercials to be sent to individual Web listeners. RadioShow is a real-time Web animation and interactivity product that integrates with Master Control. RCS Webcasting and its other Internet tools are designed to allow radio stations to extend their on-air presence to the Internet easily.

Article continued on page 69

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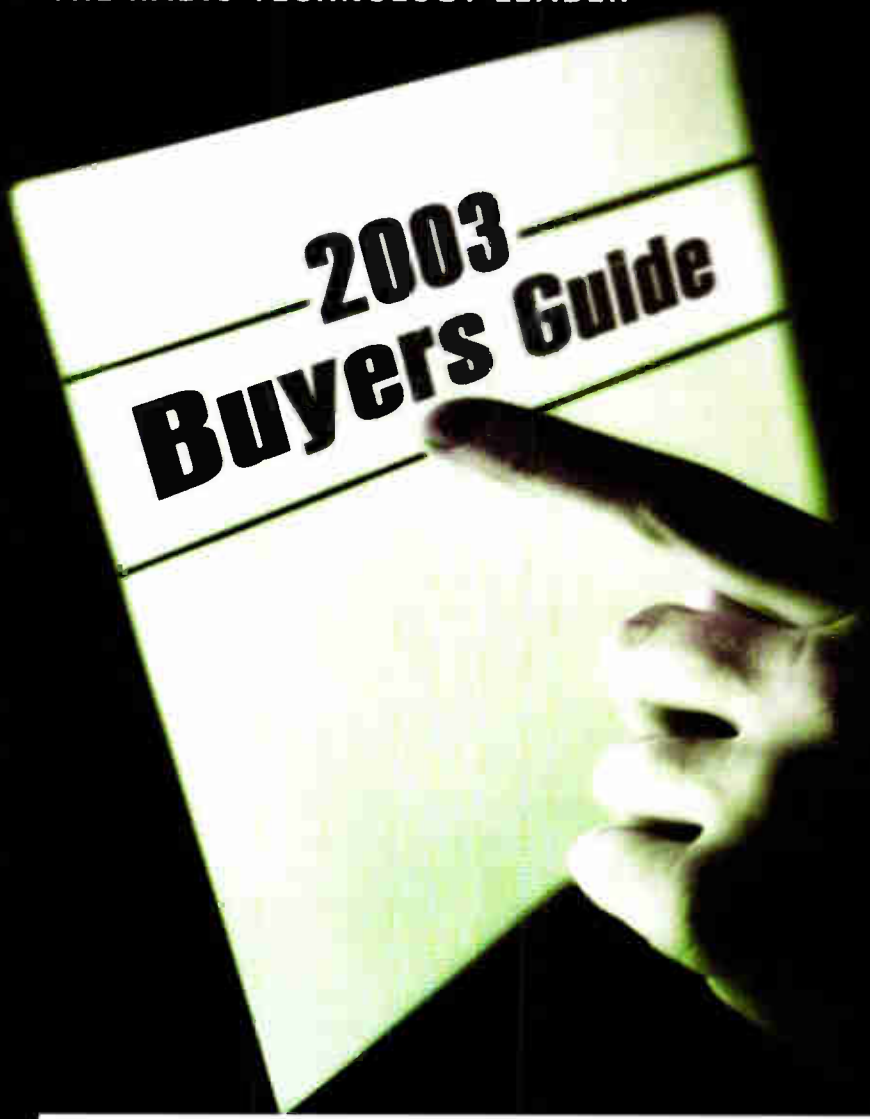

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Test and measurement equipment 50
Towers and tower services 50
Transmitters, translators and exciters 51
Wire, cable and connectors 51

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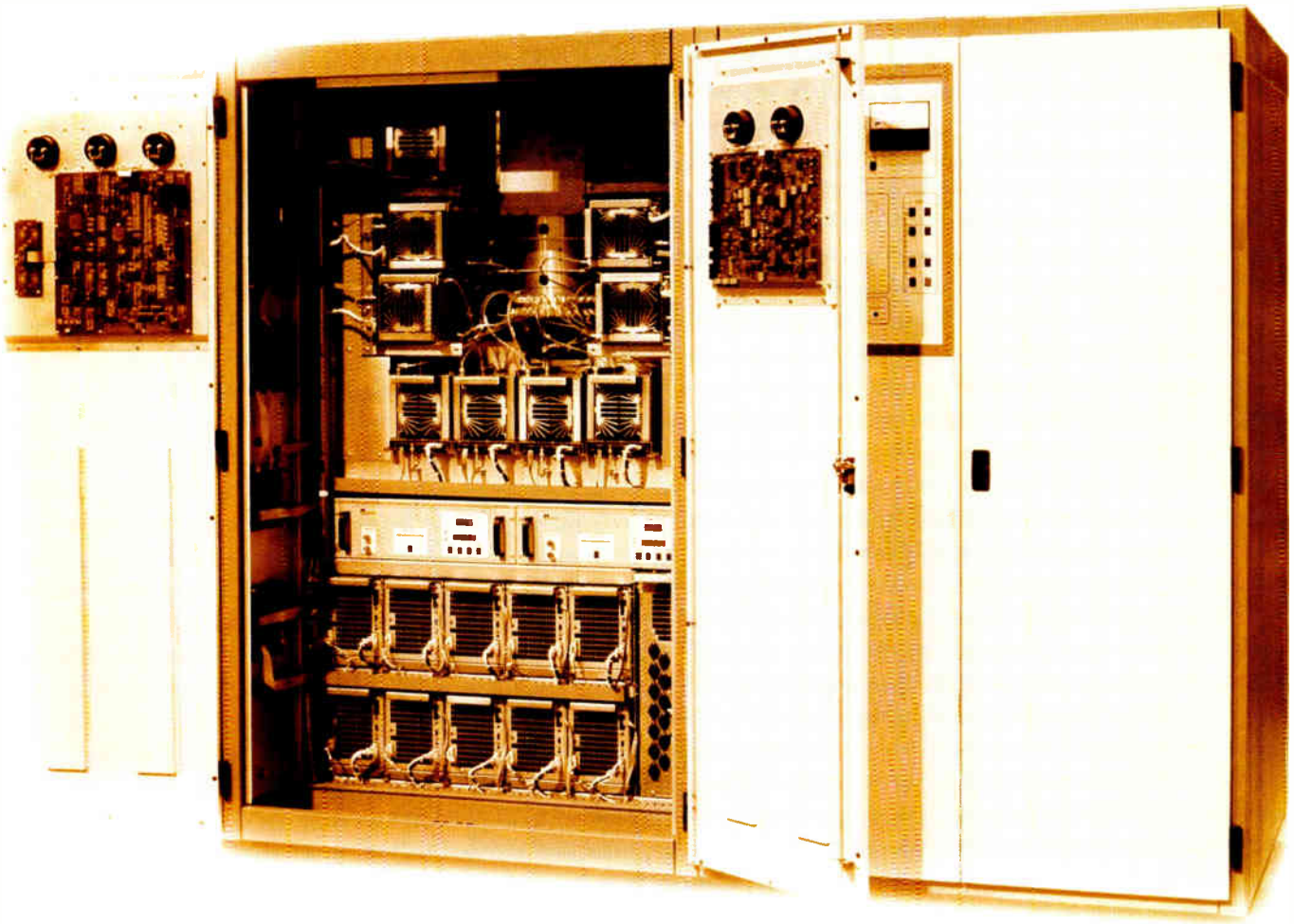

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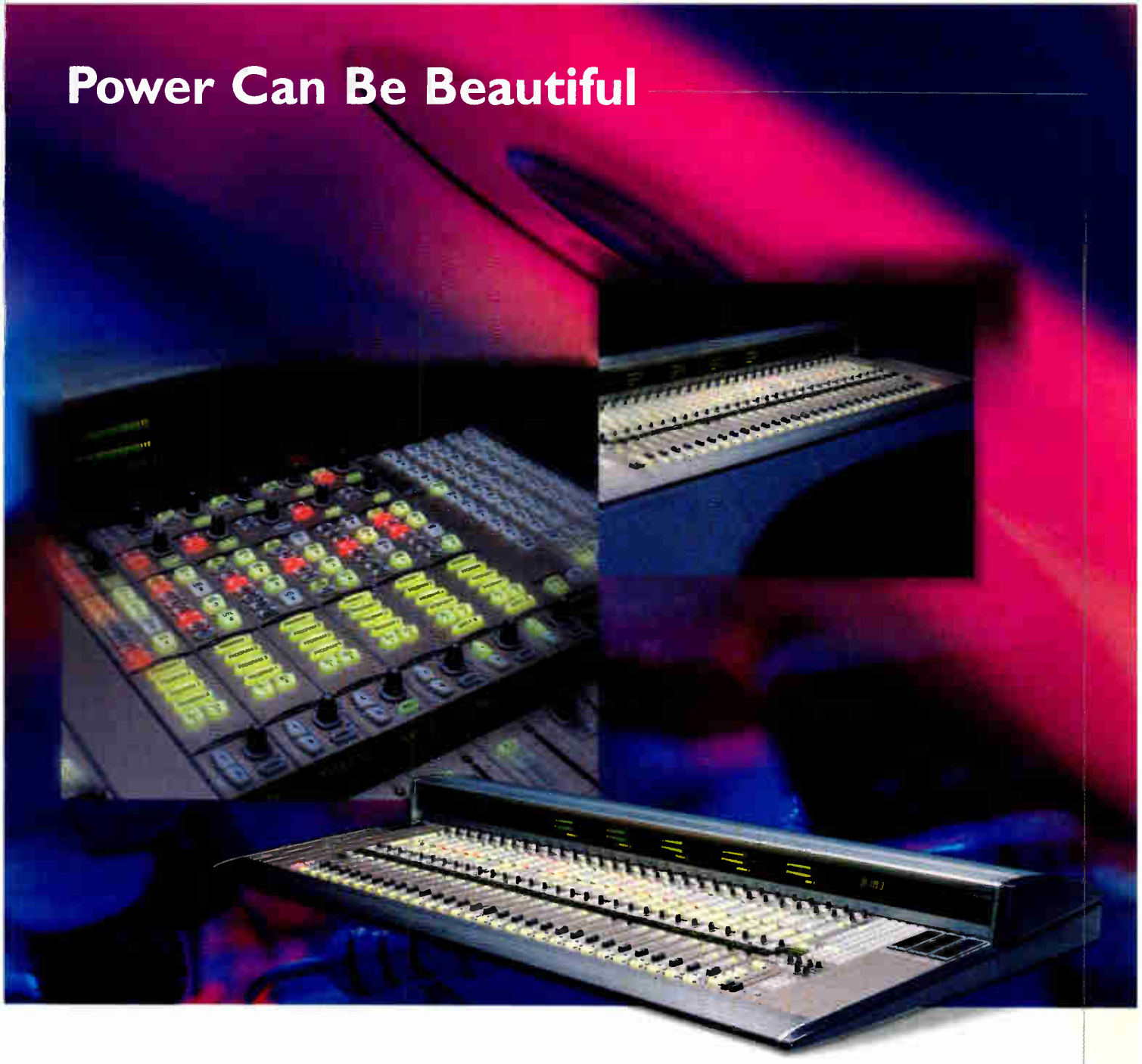
Power Can Be Beautiful



Sure, it's the best looking broadcast console you've ever seen. But, beneath the sleek, elegant exterior beats the heart of a true warrior! Harris' BMX*digital* by Pacific has everything you need to win the digital revolution. Whether it's the number of output buses, mix-minuses, off-line mixes, stereo sends, direct IFB's, monitor inputs and outputs, inter-communication paths or logic interface, BMX*digital* offers more.

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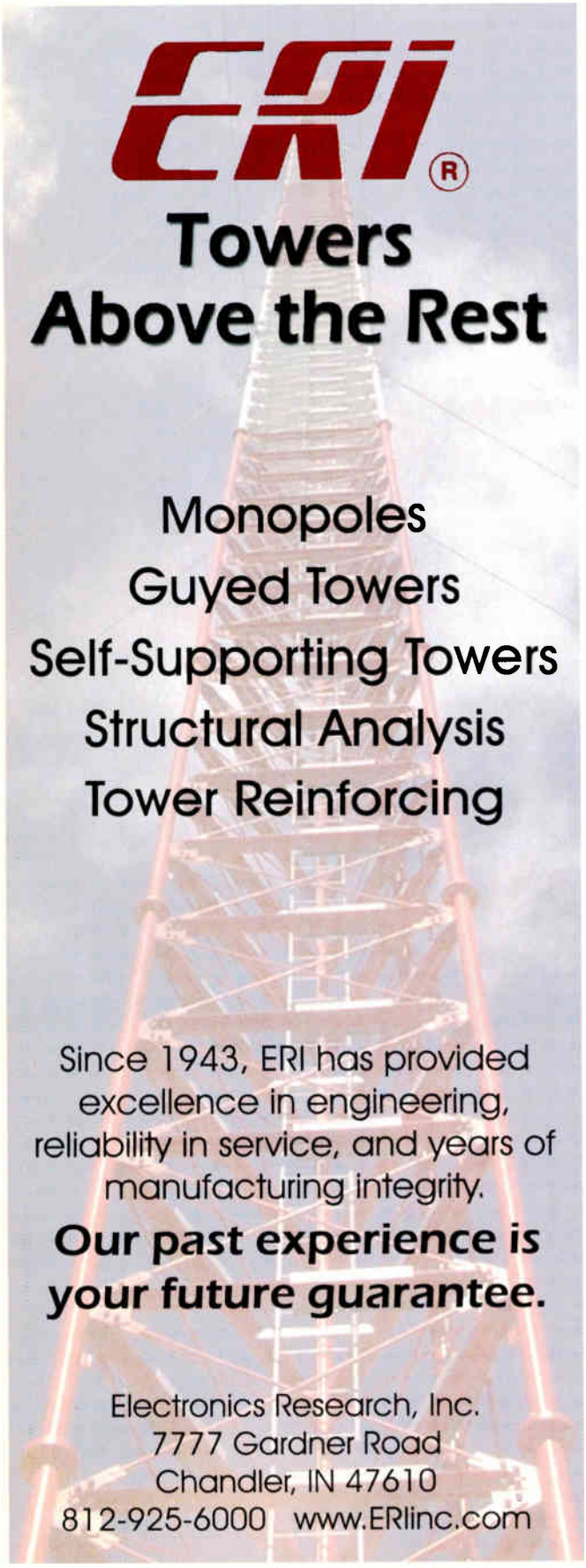

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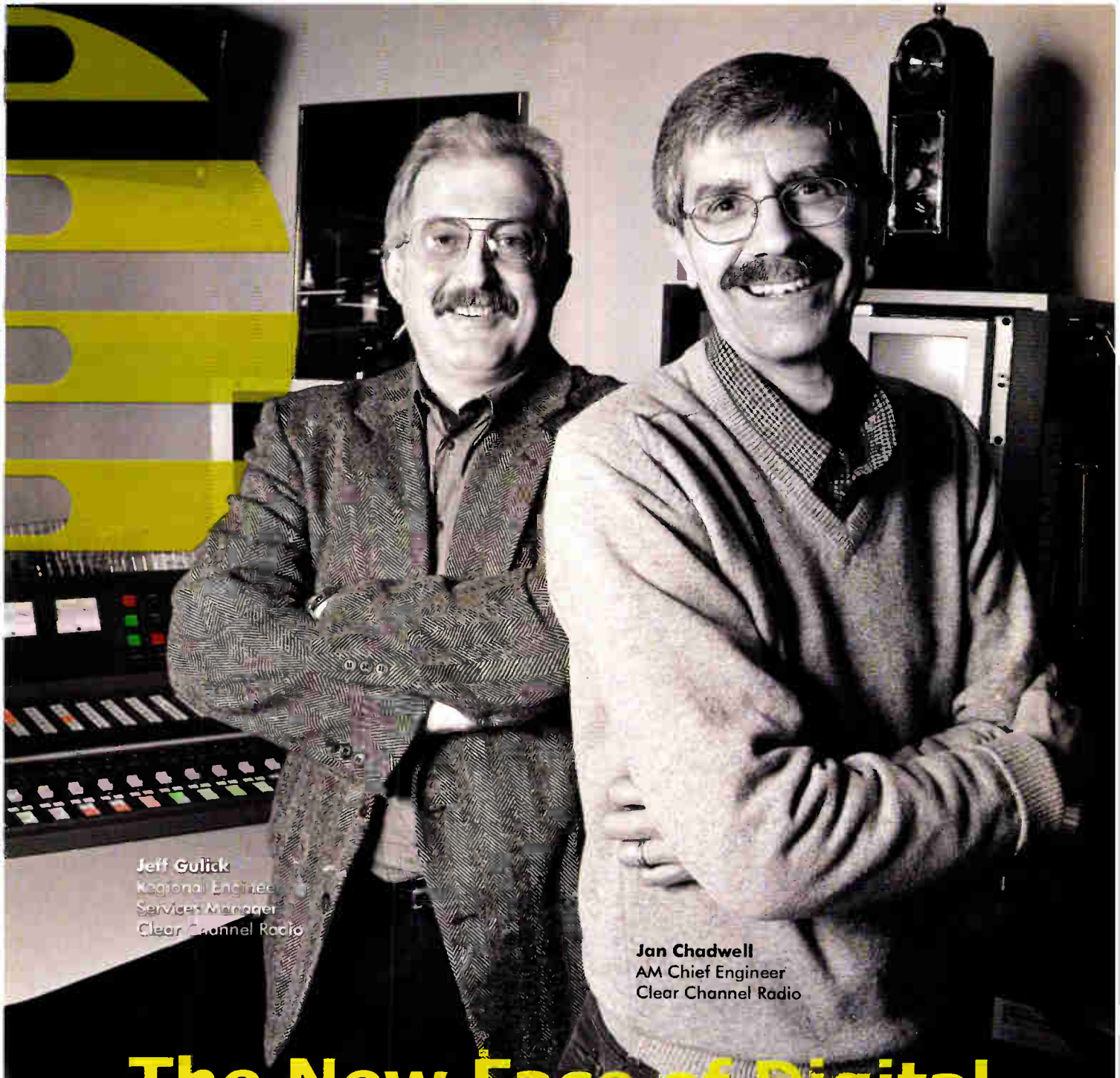

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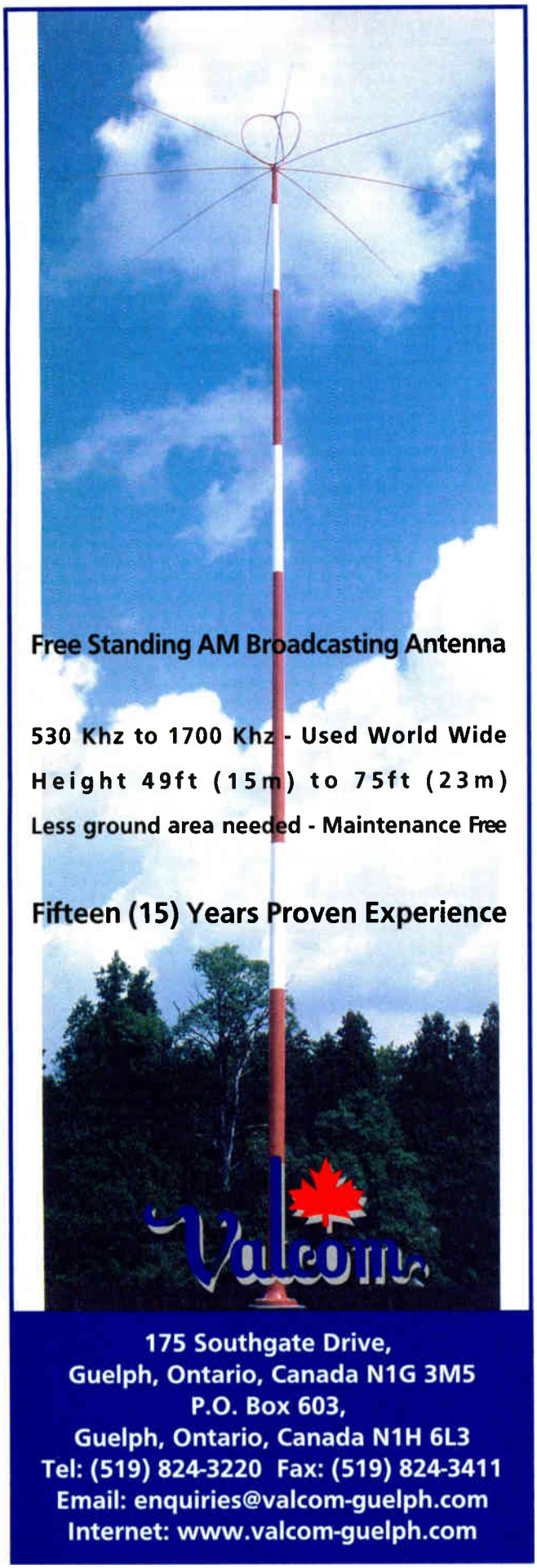

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"We trialled Vector, Scoop Reporter and Tieline. We chose Tieline because they sounded better and made better connections. Now, we always have other stations asking what we're using when they can't get on the air with their remote equipment and we can".

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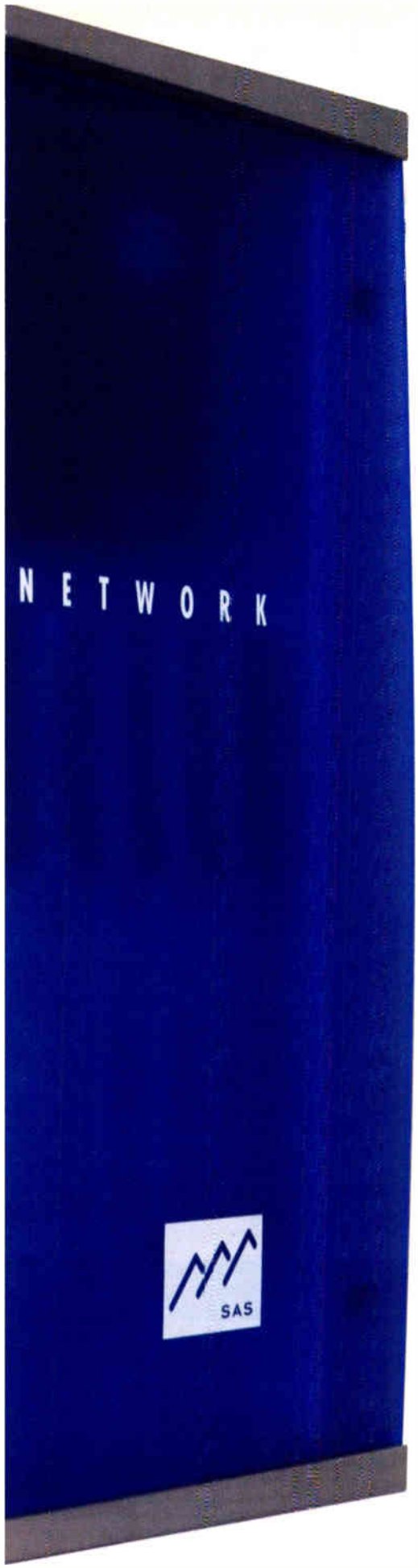

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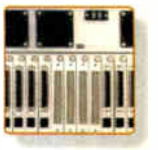

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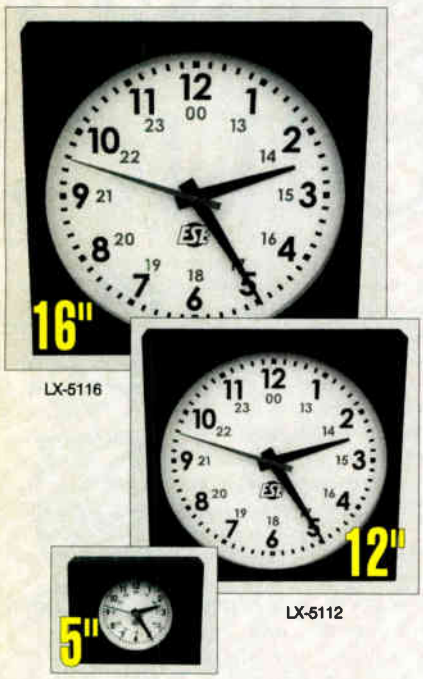
ANALOG CLOCKS

"5100" Series



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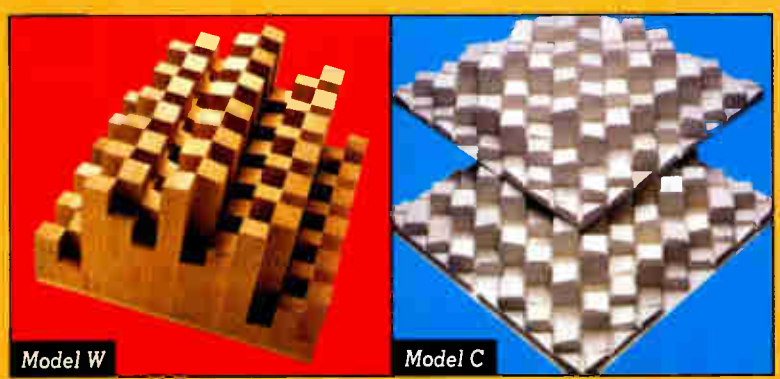

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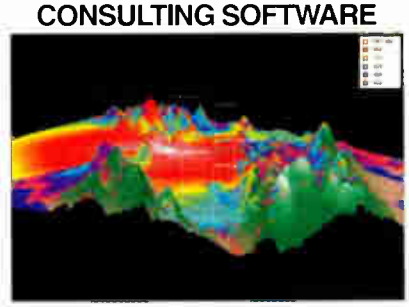

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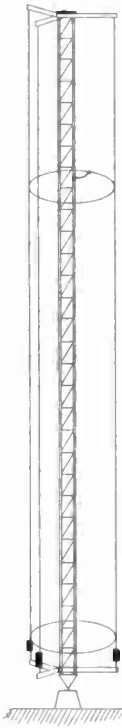

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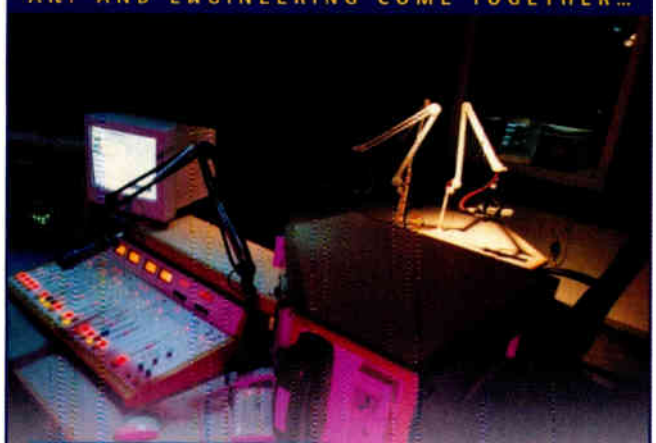

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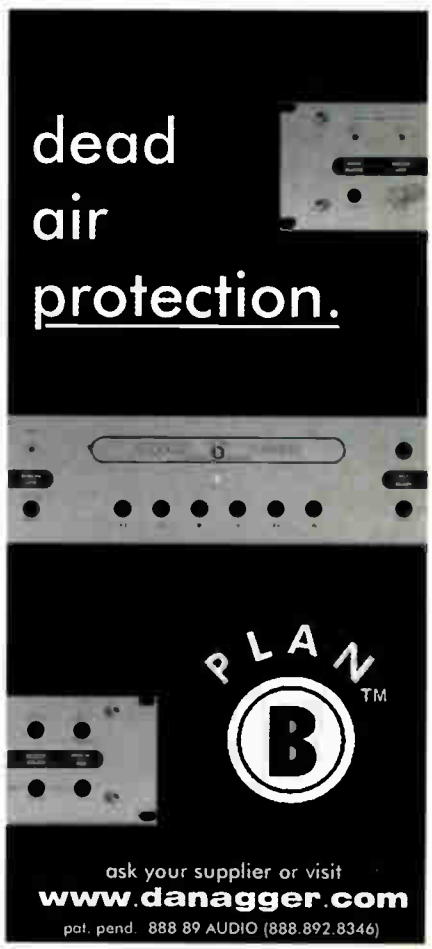

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World Radio History

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ESSENTIALS

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The DB-10 provides 99 password-protected snapshots, and 9 project settings for easy recall. Multiband selectable equalization, compressor/limiter dynamics, 2 AUX, 2 TEL, and 2 PGM busses as well as two digital mix minus (N-1) busses, are available on all channels. The DB-10 handles sample rates from 32kHz to 96kHz using the highest quality sample rate converters. Synchronization can be achieved via internal or external 48kHz word clock, providing a reliable digital lock every time.

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Need computer backup? DB-10's console snapshots, project settings, and GPIO data can be quickly saved and recalled using a standard PC serial link. The outboard power supply unit supports 100-240VAC and optionally 24VDC. And by adding another optional power supply unit, the DB-10 can be redundantly duplexed for failsafe operation. If your station's been waiting to provide "all digital" content, here's the on-air console solution to take you securely into radio's future. The **Otari DB-10** delivers digital technology today - with the simplicity, reliability and familiarity of analog's past.

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World Radio History

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John Kennedy,
Engineering Director,
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World Radio History

Broadcast Software International • www.bsiusa.com

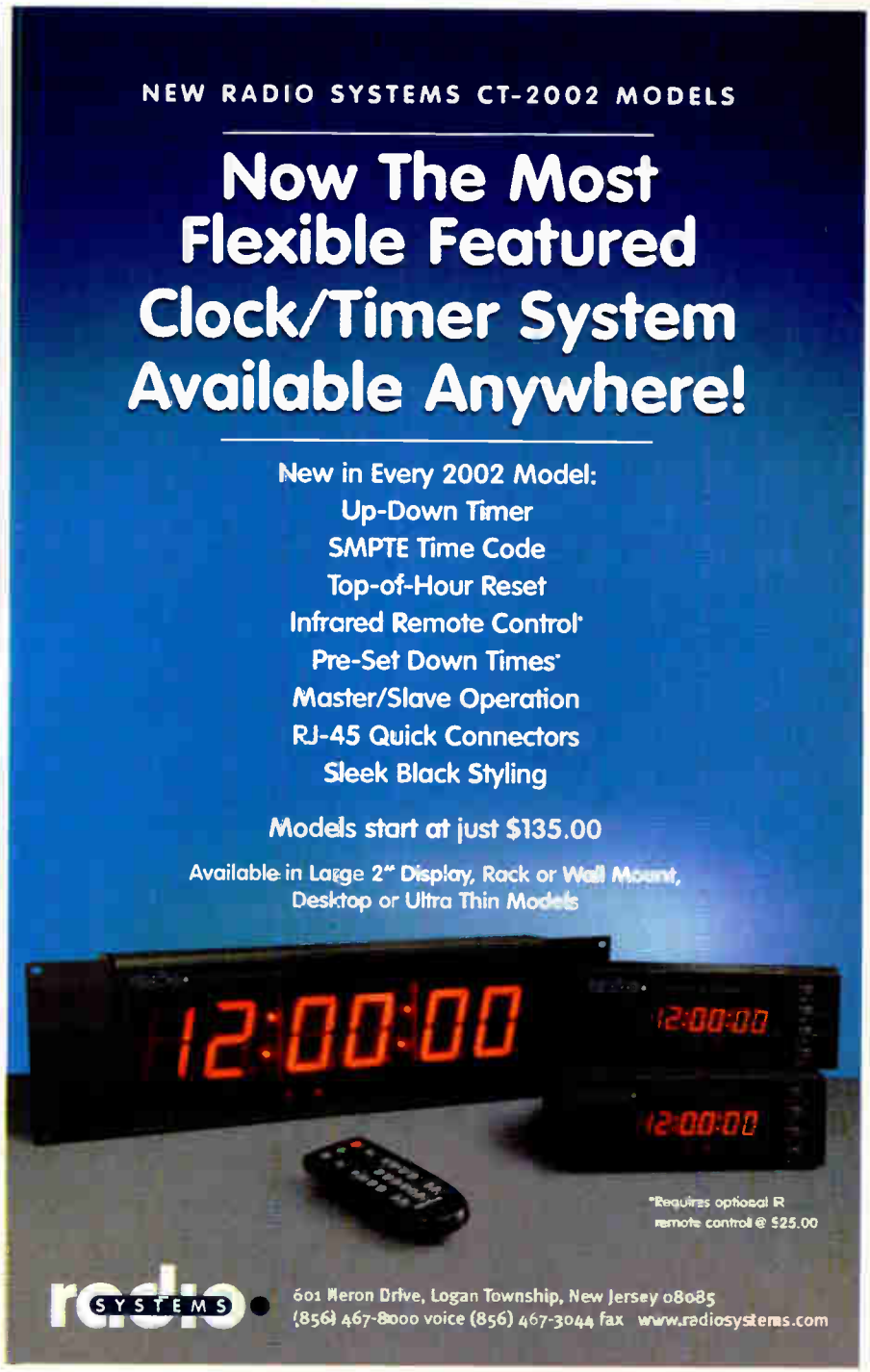
BSI offers an inexpensive automation, cart replacement and instant audio product with Stinger. The companion products offer automation solutions for stations on a tight budget. Its systems use standard PC hardware and the Audioscience audio adapters. The Simian automation system can manage satellite operation playback, live assist and background recording. External controls are managed by optional external trigger and relay packages. Simian interfaces with most traffic systems. Using Webconnect Pro, Simian systems can be controlled and managed via the Internet. The BSI software systems are is designed to use CoolEdit Pro for production and can play Microsoft standard audio files, MP2, MP3 files and TM Century files. BSI also offers a digital cart replacement, Wavecart and a PC-based instant audio player. BSI's software was recently selected to power Radio Kabul, which is the BBC's first entry into the reformed nation of Afghanistan.

Cartworks/dbm Systems www.cartworks.com

Cartworks offers one of the least expensive options for automation. Its system uses individual PC workstations for live assist, voice tracking and satellite automation. Audio from home computers, professional digital audio workstations, the Internet or most any source can be played by Cartworks without conversion. The system supports standard Microsoft .wav, MPEG and many other digital audio formats. Cartworks supports CoolEdit and Saw 32 for production. The system was designed by broadcast engineers and boasts real broadcast engineers and computer programmers on its 24-hour support lines. Check the free software section of its website for some useful engineering ware.

Scott Studios www.scottstudios.com

Scott Studios has been ubiquitous in small and medium markets, and has focused on providing solutions for combined operations and custom applications. Their current SS32 products offer configurable user interfaces designed by station talent. Voice tracking and newsroom software are available. There is a phone call recorder available, but the system is designed to integrate with production software like Audicy, Sound Forge and CoolEdit. Access to audio cuts can be obtained quickly using a cart wall screen, which is accessible remotely or even over the Internet. Scott integrates with all popular traffic and music software systems and offers solutions for Internet ad substitution that works directly with its on-air systems.



World Radio History

The changes in automation

Dalet Digital Media Systems
www.dalet.com

Dalet's system is an ambitious product designed to support a multimedia environment. Dalet approaches its digital delivery system as a component of a complete digital asset management system. Its Multimedia scheduler system provides scheduling capability for radio and for many other associated media. Dalet holds to a "produce once, broadcast many" approach, which allows its radio broadcast system to integrate with its audio production, digital content management, news and playback systems. It has developed a common set of production tools to simplify the production and delivery of multimedia content through a multitude of platforms. Dalet offers a radio automation system with collaborative capabilities and standard integration into audio, video and Web systems. Dalet's system has developed a large following in Europe, and is the system of choice for the Paris-based NRG group. It has also gained U.S. approval as the selected digital asset management system for XM Satellite Radio.

Enco
www.enco.com

DADPro is the heart of Enco's product line, which uses a standard workstation platform with multiple types of on-screen windows that can be tailored for different types of applications and operator expertise. The player windows are capable of live assist or fully automated modes, and transparent transition between modes, with full support of crossfaded or overlapped segue transitions and voice tracks. Even spot rotations can automatically insert accurate time announcements and tags. Some of the players can be user-customized cart walls or instant-play hot buttons for cart replacement applications. The recorder windows can be used for automatic phone recording, simple editing and automated and unattended network feed acquisition. Multiple record windows can be opened at once. The Enco system can also use the cart head control surfaces, known as fish finders, used by the Orban AirTime system. Control of external gear can be achieved using serial communications or its custom GPI. Enco can provide full graphic two-track waveform editing and a separate multichannel editor. File import from editing software is also supported. The DAD system can be controlled via modem and can be configured for Global WAN, which allows central control of multiple sites.

World Radio History

The best selection

FM Educational Circular Polarization antennas.

Model	No. Bays	Max. Input Power	Price
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MP-2	2	800 W	$650
MP-3	3	800 W	$950
MP-4	4	800 W	$1,250
MP-4R	4	2000 W	$1,750
MP-5	5	3000 W	$2,250
MP-6	6	3000 W	$2,700

FM Low Power Circular Polarization antennas.

Model	No. Bays	Max. Input Power	Price
GP-1	1	1500 W	$350
GP-2	2	3000 W	$1,350
GP-3	3	4500 W	$1,800
GP-4	4	6000 W	$2,500
GP-5	5	6000 W	$2,900
GP-6	6	8000 W	$3,500

FM Medium Power Circular Polarization antennas.

Model	No. Bays	Max. Input Power	Price
SGP-1	1	3000 W	$650
SGP-2	2	6000 W	$2,450
SGP-3	3	8000 W	$3,500
SGP-4	4	8000 W	$4,380
SGP-5	5	8000 W	$5,100
SGP-6	6	8000 W	$5,900
SGP-6R	6	15000 W	$6,500

Please Contact the OMB America Sales Department, for other antenna systems configurations

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TV & Radio antenna systems

World Radio History

The changes in automation

IBM/Jutel Oy
www.jutel.fi

The Finland-based IBM radio automation product, Radioman, has been a quiet entry into the field. The IBM system was originally developed for the Finnish Broadcasting Company by Jutel Oy for its nationwide radio systems, but has recently been chosen by the BBC World service for their operations as well. The Radioman system is designed specifically for collaborative operation, and is useful for news and talk formatted stations. Multiple departments can be working with files simultaneously: a news person can be writing copy and inserting sound bites, the production operator can be editing and preparing audio cuts, the programmers can be adjusting and updating the schedule and the talent can be reading the copy or playing the prepared audio at the same time. As is typical for IBM, the Radioman product is designed to be a complete automation solution and encompasses a vast array of products for scheduling, editing, Internet and digital broadcasting, data transmission and file management.

Prophet Systems
www.prophetsys.com

Prophet has had a long history of offering automation systems from its modest beginnings in Ogallala, NE. In use at Sirius Satellite Radio, its current product—NexGen—offers tools for companies who are consolidating operations and voice tracking or fully-automating their stations. Prophet's WAN-casting system enables stations to share data and audio between interconnected sites, allowing small stations to be voice-tracked, programmed or updated from combined radio facilities, consultant's offices or remote broadcast locations. Clear Channel Communications, the parent company, is now installing these systems and is using WAN-casting features in markets throughout the United States. The NexGen system is composed of program modules that can be purchased and configured to meet the stations' specific needs: Auto Phone Call allows remote talent to phone-in traffic, weather and news alerts to be included into the programming. The time announce and temperature announce modules allow fully automated systems to play accurate time and temperature announcements, helping maintain the live station sound. The company also offers its Wizard multitrack audio editing system as well as an automatic digital reel-to-reel system for unattended recording of network feeds.

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World Radio History

OMT
www.OMT.net

Since 1984, MediaTouch (now iMediatouch) has developed touch-screen automation and digital audio systems for radio. Its current products use standard PC hardware and allow remote operation of its automation system from multiple locations. The software programs have codecs by Q-Design (MP2), Fraunhoffer (MP3), Microsoft (ADPCM & Windows WMA) and PCM. All formats can be played in overlaps simultaneously, regardless of audio card capability. Its touch-screen interfaces are designed to reduce or eliminate the mouse pointer table chase and increase the speed and efficiency of live-assist operations. The iMediatouch system offers a flexible voice tracking function that allows talent to record voice tracks as far into the future as there are schedules in the system. OMT offers two products specifically for Internet integration: Adcast, which is a spot-substitution product useful for dealing with a station's AFTRA issues, and Media MultiStream, which is a multichannel live audio stream encoder. Its iMediaLogger has also been used with some Internet sites to provide recorded archive show clips for on-demand Internet listeners.

Arrakis
www.arrakis-systems.com

Arrakis offers its software free of charge with Digilink Free. It's a radio automation package designed for stations and Internet broadcasters with limited budgets, and augments Arrakis' product line of consoles and studio furniture designed for cost-conscious radio broadcasters. Arrakis now offers Digilink+Plus for an additional charge, which adds RS232 serial control, multiple sound card support and greater scheduling features to Digilink Free. Digilink Supreme is a full-featured automation system that offers broadcast-quality balanced audio, logic controls and full satellite automation capability. Arrakis also offers related programs, such as an audio file manager and scheduling tool are available. Support is available on a fee basis.

Computer Concepts
www.ccc-dcs.com

Computer Concepts has been a reliable player in the digital delivery systems arena. Although the company was purchased by Scott Studios and has been moved to the Scott headquarters, the DCS and Maestro product lines are still being supported and improved. The current version of Maestro, 3.1 boasts support for Windows 2000 and XP as well as more audio cards from Digigram and Audioscience. This version offers global site support that allows for audio distribution and control of multiple stations and server sites.

Computer Concepts has also increased support for audio switching devices from Broadcast Tools and its own digital audio engine Epicenter. New waveform editing features in the Voice Tracker and cart editing programs. The Transposer option rips CDs directly into Maestro format which makes music formats easier to implement.

LPB
www.lpbinc.com

LPB's products fill a low-cost niche for radio broadcasters. Its automation products continue this practice. Webjocky is an inexpensive cart replacement solution for stations with limited budgets, Webcasters or LPFM operators. The system supports MP3 and .wav file playback and includes a 36-key instant player. The system offers on-air, Next and played LED indicators, on-screen faders and individual muting for each channel. Salsa is a larger-scale station automation system and offers GPI controls scheduling, news and traffic solutions as available options.

More resources

Additional automation system providers

A-Ware Software
www.a-ware.com

Broadcast Technical Services Group
www.btsg.com

Management Data Media Systems, Inc
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Register Data Systems
www.registerdata.com

ScheduALL by VizuAll Inc
www.scheduall.com

Smarts Broadcast Systems
www.smartsbroadcast.com

Wireready
www.wireready.com

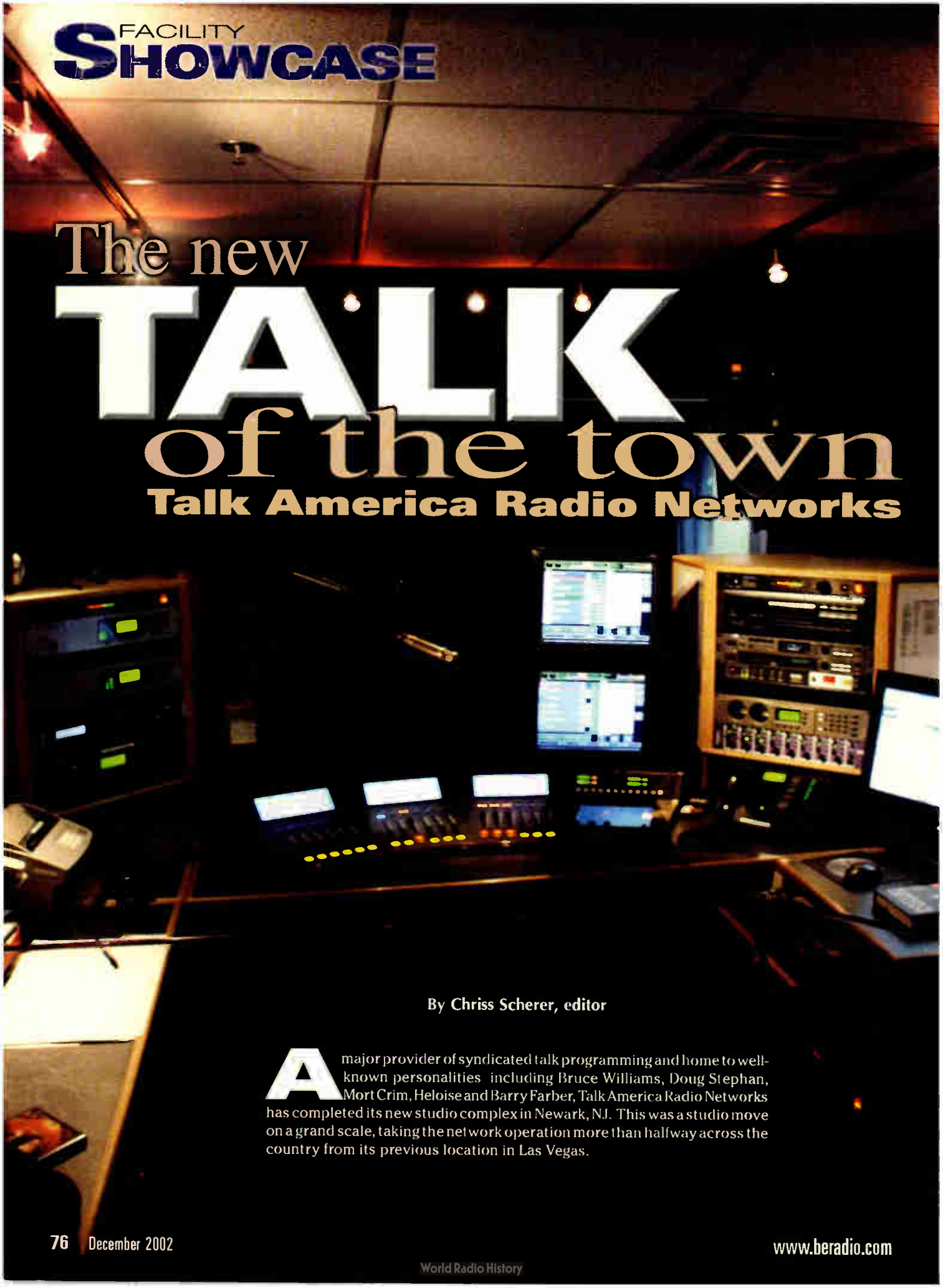
Digital delivery and cart replacement is simply a small portion of the services offered by today's automation systems. Use this information as a starting place, contact the manufacturers and discuss the station's particular need. They can offer the best ways to integrate a system into the station and help to plan an installation in the future.

Thomas is a contract engineer in Los Angeles and chief technology officer of Stratosaudio.

World Radio History

The new TALK of the town

Talk America Radio Networks



By Chriss Scherer, editor

A major provider of syndicated talk programming and home to well-known personalities including Bruce Williams, Doug Stephan, Mort Crim, Heloise and Barry Farber, Talk America Radio Networks has completed its new studio complex in Newark, N.J. This was a studio move on a grand scale, taking the network operation more than halfway across the country from its previous location in Las Vegas.

World Radio History

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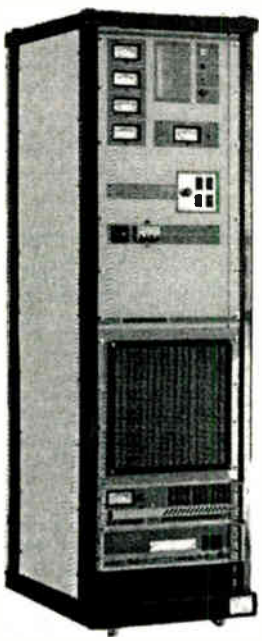

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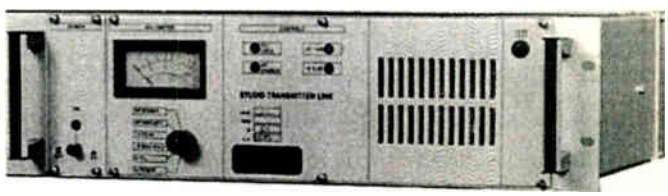

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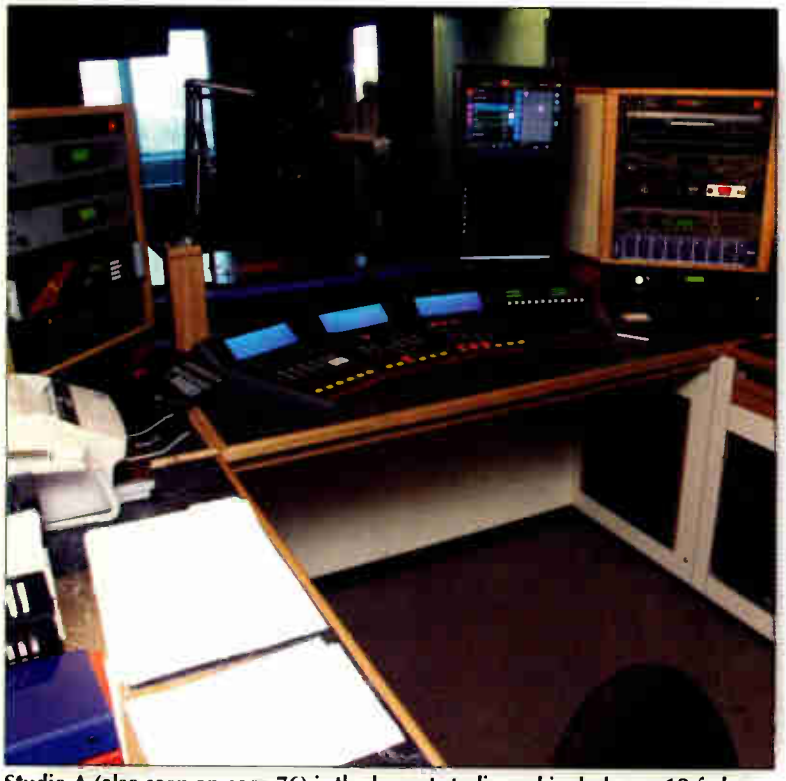

Studio A (also seen on page 76) is the largest studio and includes an 18-fader console and call screener booth.

Talk America, owned by IDT Media, a division of IDT Corporation, moved to the East Coast to consolidate several IDT business divisions into one location, allowing them to share facilities and resources, including studios and other technical facilities. There are three control rooms. Two rooms are designed for on-air use, while the third is used mainly for production. If needed, any studio can be used to feed programming to the satellite uplink.

While this installation looks similar to most radio facilities, it has its own unique aspects. Creating network trigger tones is the biggest difference between this facility and a traditional radio facility. The studio move allowed Talk America to change how it deals with generating these tones and keeping the schedule running on time.

The facility's audio is stored and delivered with a Mediatouch system. While the company has installed numerous systems for stations that receive satellite-delivered programming, this was the first time that the system was being used by a program originator.

Breaking away from its old ways, and eliminating many of the common problems associated with satellite programming, Talk America uses the Mediatouch system to generate the cue tones. Mediatouch did not have to modify its software in any way. Instead, some operational methods were applied to allow the system to generate the cue tones and automatically schedule

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World Radio History

Equipment List

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AKG K141 headphones
Antex LX-44 audio cards
Aphex 120A distribution amplifier
Aphex Compellers
Arrakis furniture
Belden 1854F wire and cable
Comrex Matrix w/ ISDN
Comrex Nexus ISDN codec
Conex tone generators and decoders
Cybex KVM extenders
Denon DN 720R cassette
ELO TouchSystems monitors
EV RE27 mics
Eventide BD500 delay
Fostex rack-mount monitors
Furman power conditioners
Gentner DH30 hybrid
Gepco Gep-flex wire and cable
Hafler P1000 amplifier
Harris IntraPlex T1 interface
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Telos Desktop Director phones
Telos Two×12 ISDN phone system
Telos Zephyr Xstream ISDN codecs
Tieline Commander w/ ISDN Card

The production studio is the smallest studio. The console, which sits on the tabletop and is connected by a few cables, can be placed wherever it is needed when the room is in use.

World Radio History

the fixed breaks.

The local spot breaks are on a fixed time schedule. To eliminate slight variations in timing, these breaks are initiated by the Mediatouch system. As a break approaches, a bumper begins to play automatically, increasing in level to the final post. Likewise, once a break has ended, the rejoiner is played.

Profanity delay operation is also handled through the automation system. The first five minutes of each hour are covered by a newscast, which needs to be in real time. When the top of the hour approaches, the automation system plays the show's theme to the end and then dumps the delay, instantly joining real time. At the same instant, the newscast begins. Once the news has finished, the show begins again and delay is slowly added.

The Talk Studio is set up with minimal equipment between the host and the guest, which makes guests feel more comfortable.

Satellite studios

Of all the programs carried by Talk America, only one host is actually in the studio facilities. The others contribute their shows from remote locations through ISDN codecs. The ISDN return carries a low-delay, mix-minus feed and an IFB. Additionally, some hosts have complete access to the Telos Assistant Producer call screening software through the data connection. The hosts have access and control of their callers, the same as if they were in the studio with the telephone equipment.

All the audio events are handled through the main studio. At the heart of the audio routing and switching is a Logitek Audio Engine. Each air studio has three ISDN codecs available for the greatest flexibility.

The smaller production studio is designed around the DAW. The console, a Logitek Remora, is used primarily for line selection and level control of signals feeding the DAW. It is often pushed out of the way during a production session. If necessary, the production studio can feed the network.

When a host plans to take time off, the

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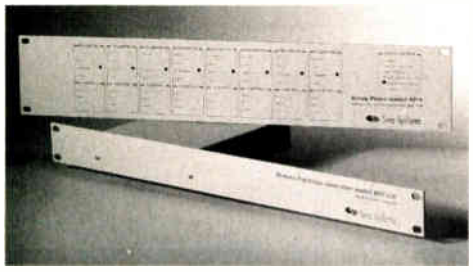

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Studio B, the mid-size studio, has a similar look and layout as Studio A. Any studio can be used to put the remote hosts' programs on the air.

network prefers to not rerun previously aired shows. Instead, a live show is prepared off line and played back in the time slot.

There are two primary on-air control rooms. Studio A also has a call-screener station. The facility's rack room is in the corporate data center, which is about 300 feet from the studios. It houses five racks and 150 punch blocks.

Studio A boasts as the largest console configuration with 18 faders on the control surface. Studio B houses a 12-fader control surface. The production studio has a four-fader control surface.

There are no system computers in any of the studios. The studios are connected to their computers through Cybex extenders. In case of an automation system failure, there are mirrored Mediatouch systems running in tandem for complete redundancy. If one system fails, the other can be brought up to take control. As a further safeguard, the network tries to run backup programs on the second system in case a show host's ISDN connection is lost. Also, to aid troubleshooting, one Mediatouch OpLog system is set up as a receive station to verify that all tones and cues are being sent and received properly.

The completed audio program and its embedded cue tones are sent to ABC Satellite Services to be uplinked. Program audio for both channels is sent via a T1 on the Harris IntraPlex system with an ISDN backup ready to go if needed.

Talk America's new facilities are designed to serve the needs of the network, as well as some additional demand from its collocated parent company. The network currently serves nearly 1,000 affiliates, and boasts one of the most varied lineups of talk shows available during its weekday service.

The Facility Showcase on Universal Studios Orlando in the October 2002 issue included an equipment list. Ward-Beck Systems POD12 digital audio distribution amplifiers are also used in the facility.

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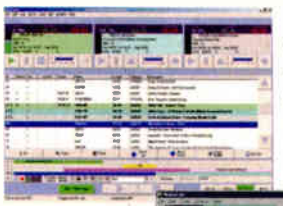

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Motorola Symphony Digital Radio

by Chriss Scherer, editor

The Motorola Symphony Digital Radio is a matched chipset approach to digitize the receiver section of a radio. The three-chip approach uses the Motorola DSP56300 general-purpose 24-bit Onyx DSP core with an RF front-end and IF analog interface. The pieces could be placed into a single-chip package instead of three discrete ones, but keeping them separate allows design improvements in one of the three sections without affecting the other parts, requiring an entire tooling process to be redesigned.

First creating a stir at the Fall AES and NAB Radio conventions this year, Motorola has developed this system to improve radio reception at the receiver by using the 1,500 MIPs processor to demodulate the received signal. The improvement comes without any transmission changes required of the the broadcaster.

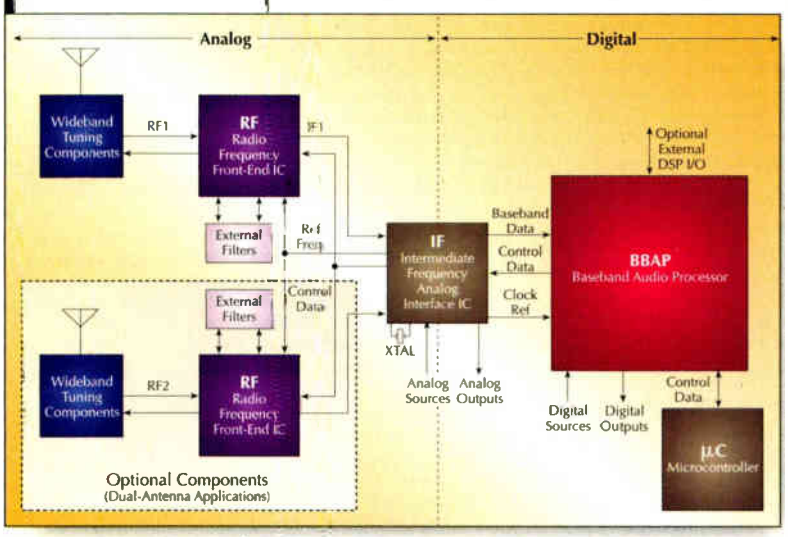

Figure 1. Signal flow and component structure of the Symphony Digital Radio.

The initial stages of the radio design are familiar building blocks. Figure 1 shows the system's block diagram. The wideband tuning and RF front-end carry the same workload as their predecessors to provide a bandwidth-limited signal to the IF stage. The bandwidth limiting is adjusted to fit the signal being received, providing the first step in eliminating unwanted noise and interference. The variable IF filter algorithm used in this system automatically adjusts to 100kHz and 200kHz band channel spacing.

Once the signal has been received, the RF front-end stage upconverts it to 10.8MHz. This is the point where the fundamental design difference begins.

This IF stage digitizes the RF signal before passing it to the Baseband Audio Processor. Once in this DSP stage, the signal can be demodulated and processed with the improved accuracy that DSP offers.

While some of the DSP structure is used for equalization and other listener-defined settings, the core is used to examine a signal and more efficiently remove the effects of multipath noise and interference. Additionally, improvements to the radio design can be implemented without redesigning the entire radio. Updates can be programmed into the radio directly.

The design also lends itself to decoding new formats, such as multichannel sound, if this is ever developed for radio. The ability to decode RBDS data is inherent to the design because of the microprocessor control and demodulation.

To add more flexibility to the system, an optional RF section can be added. These additional components can be used to provide a diversity tuning option, further enhancing reception. The diversity receiver differs from current designs in that the IF does not switch between the better signal at any given moment, but instead takes both signals into account, creating a better signal from the two. This method provides a more robust signal to be digitized.

Another use of the second RF section is to provide a second received source. The two RF sections can remain separate. One application would be the ability to listen to one station in the front seat and another station in the back seat.

Motorola has stated that this approach was designed for current analog transmissions, but there is no reason that it could not be applied to other methods, including IBOC.

Motorola is working with several established consumer radio manufacturers to produce receivers. Hyundai Autonet has already announced plans to build and market Symphony radios with delivery scheduled for the end of 2003.

One more advantage to the new design is that the overall cost to produce the radios is slightly more than the existing designs, which should speed acceptance of the new products because of the marginal price increase.

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Radio Magazine Wins an Ozzie Award for Best Cover

Recognition by one's industry peers is the highest possible honor. Every year, radio stations compete for honors and awards, such as the Marconi Radio Awards and the Crystal Radio Awards. These awards are chosen by the radio industry to recognize the outstanding efforts of radio stations serving their customers. Similarly, publications have their own awards programs where magazines can be evaluated and honored for their outstanding efforts in serving their audiences.

The Ozzie Awards, now in its 16th year, is an awards program for magazines held by *Folio:* magazine and presented at the Folio: Show. This year, *Radio* magazine won the Gold Ozzie Award for Best Cover (B-to-B, circulation under 35,000 circulation) for the May 2002 cover, which was designed by Michael Knust, the publication's senior art director.

The *Folio:* Show's Ozzie and Editorial Awards, judged by an independent panel of industry experts, are given annually to consumer and business-to-business magazines for editorial and design excellence. At the awards ceremony presentation, The *Folio:* Show's Ozzie and Editorial Award judges commented on the May 2002 cover: "Well designed and very readable logo that has incorporated a special icon of a related element. The photo relates well to the subject of communication and the problem it can have. There is an effective touch added by weaving the string through the logo. The colors are subtle but effective and very readable."

"It is an honor for our publication to be deemed as one of the design leaders in the industry. Our covers invite subscribers to explore the pages of each publication to find out the latest challenges and opportunities in the radio industry," said Dennis Triola, group publisher of *Radio* magazine and *Broadcast Engineering*.

This is not the first award that *Radio* magazine has received. *Radio* has also received awards from the American Society of Business Publication Editors for design layouts and editorial features.

World Radio History

Stardraw.com Stardraw Radio

By Gordon S. Carter, CPBE

Stardraw Radio is a computer-aided design (CAD) program for designing radio studios. It is sold as a subscription service, with the cost covering a one-year subscription. The program contains a library of broadcast equipment from a variety of manufacturers. Monthly updates to the program and the library are included with the subscription. A new feature is added to the program each month.

The stated computer requirements are fairly modest: Pentium processor, 16MB RAM, 25MB hard drive for program storage plus 150MB for symbol library. It runs on Windows 98 SE, ME, 2000 or XP. While the program will work adequately with the minimum requirements, a faster processor and more RAM will improve performance. I tested the program on a 1.9GHz Pentium IV with 512MB RAM running Windows 2000. The program is OLE compliant.

Performance at a glance

Easy learning curve
Extensive and growing libraries
Powerful report generation
Detailed rack drawings
Export capability to other CAD programs

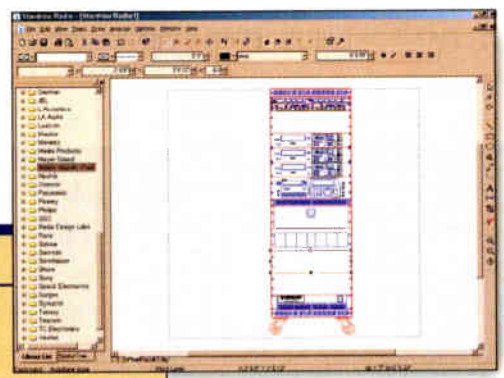
While Stardraw is new to radio, the company has published similar applications since 1994. Using the same CAD engine, it has released applications for stage and lighting, audio and audio-visual design. Each application is customized for its particular field with appropriate libraries.

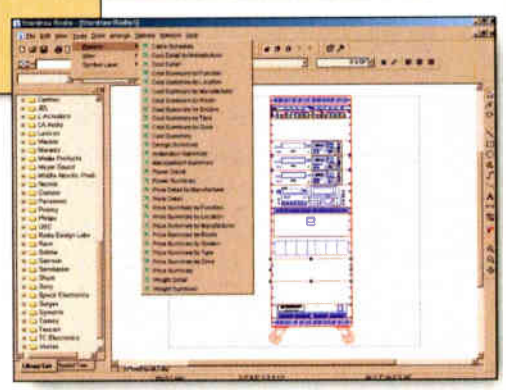
Getting started

Installation of the program is what we have come to expect from Windows programs. Insert the CD and if the computer is auto-run enabled, answer all the pertinent questions. The first time the program runs, the user is prompted to go online to receive the latest updates of the program and its libraries.

Users with any previous experience with CAD programs or Visio will find that the Stardraw screen looks familiar. In fact, with only a few quick references to the manual, the user can begin drawing a block diagram of his dream radio station. However, I recommend taking the time to read through the manual while at the computer because Stardraw Radio has many features not found in other CAD programs.

The program guides the user through the entire design process for a radio station's studio facility. It begins by drawing a block diagram of the system. Select a component from the list on the left side of the screen, and drag it to the drawing area. All inputs and outputs, including power, are listed in the drawing, so once all the components are selected, wiring the system is a simple matter of connect the dots. The properties of each interconnect and component can be set as components are connected or after all the connections are made. Selecting the item and clicking on properties opens a window with the various parameters that can be entered. Information for components includes cost, selling price, weight, power consumption and installation time. For interconnects, the information includes the type of connection, label information (can be separate for each end) and where it connects at each end.





A variety of reports can be generated for a project.

After the block diagram is finished and the information has been entered for all the items, the user now has the opportunity to place all the rack-mounted components in a rack or racks and arrange them. The information from the block diagram is ported to the rack layout module and the user now has the front panels of all of the components waiting for him to arrange them in a rack. Several rack

World Radio History

manufacturers are included. Blank panels, vent panels and other specialized items can also be added. The rack can be viewed from the side or rear as well, to look at clearances and wiring access. The front and rear panels are detailed drawings, creating a realistic drawing of how the rack will look. Anything added during this step is also added to the materials list.

Once the rack layout is complete, move on to the reports. Several reports are available, but the user must have Microsoft Excel installed on his computer to use this feature. These reports can be used for further planning of the system (power requirements, for instance), establishing the costs of the project, ordering and installation.

While overall it is a useful product and fairly easy to use, I did find some shortcomings that may be corrected as the company comes out with further enhancements to the product. The list of manufacturer's libraries is rather extensive, but no major broadcast consoles are included in the libraries. Stardraw has announced that it will be adding libraries for Wheatstone, but they are not yet available. Some libraries are incomplete, such as the Mackie library, which does not include any of its audio mixers. While I understand that this may be partially the responsibility of the manufacturers, the program loses some versatility by not having them. Also, no commonly used broadcast audio processors are included.

While the program has provision for audio consoles in the block diagram, it does not have any means to show them in the drawings because the drawings are simply rack diagrams. Some inclusion of standardized studio furniture modules and a means of showing consoles in them would greatly extend the power of this program.

While Stardraw Radio is a powerful engineering tool, it is also a powerful sales tool. Drawings can be ported to AutoCad for inclusion in larger building drawings, but give a customer or manager a good idea of how things will look when finished. The reports make it easy to come up with cost figures for the project, and minimize the possibility of omitting a key element that may cost money in the future.

While this may be a useful tool for contract engineers and system integrators, most individual radio stations would not be able to afford this program.

Carter is chief engineer of WFMT-FM, Chicago.

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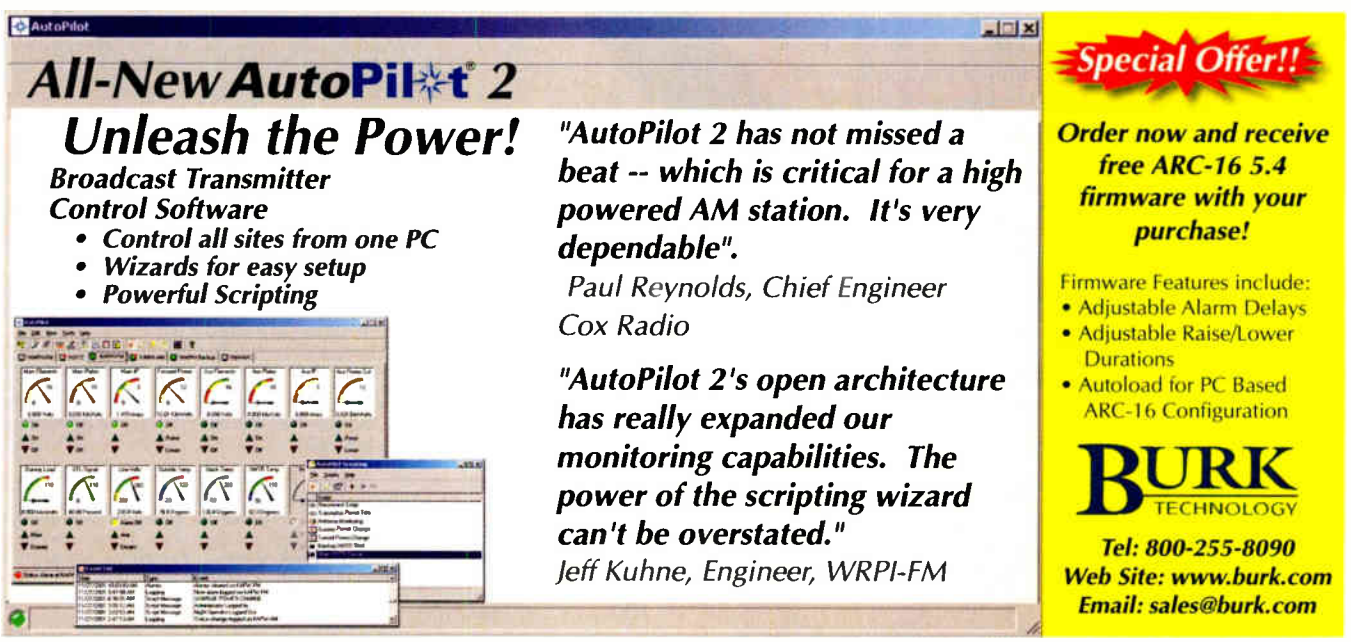

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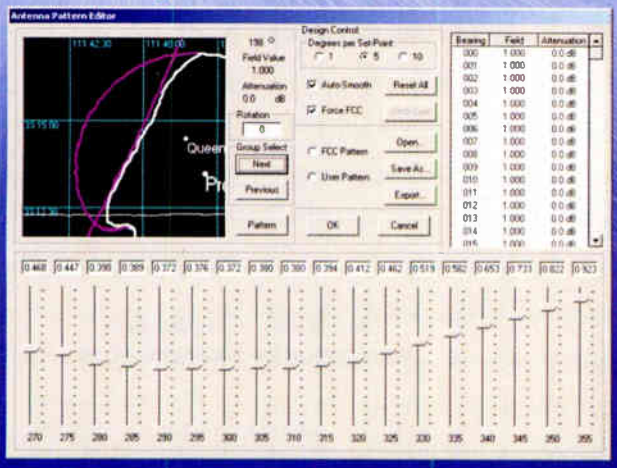

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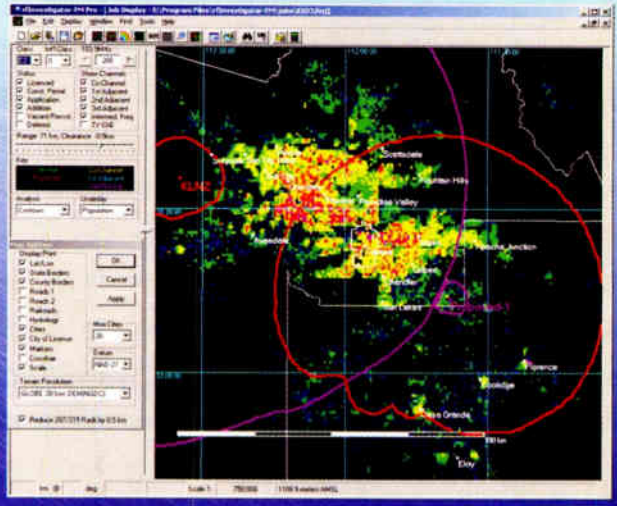

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New Products

By Kari Taylor, associate editor

Fiberglass antennas
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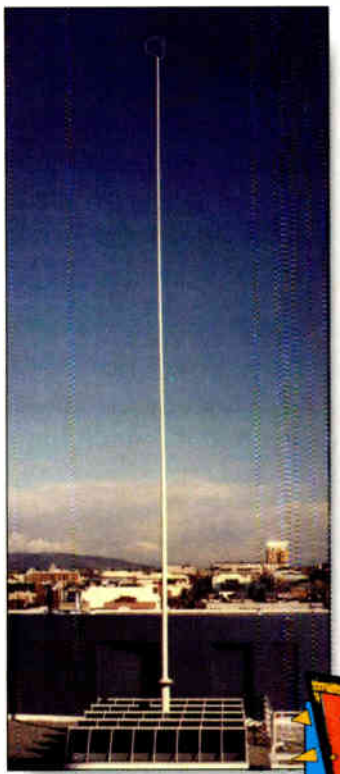
V-33070 and V-147-CL2: The V-33070-CL2 is a coil-loaded, 74-foot whip antenna for AM applications. The second section is inductively loaded to the resonant frequency as specified by the customer. Notable applications are high efficiency coast station requirements in the 100kHz to 1,500kHz bands for marine and aeronautical radio beacon and communicating systems. The usual method of installation is with an above-the-base feed-point. The V-147-CL2 is a coil-loaded, 49-foot whip antenna. This antenna incorporates features of the base section of the Canadian naval whip antenna and the loading section design of the low-frequency whip antenna. The pedestal base mounts the antenna to its foundation and the base is made of the same filament fiberglass used in the antenna. The result is a base insulator with electrical and mechanical properties. Power handling capabilities are improved while eliminating the weight of conventional brass and porcelain insulators. The shape transmits the bending moment evenly to the base mounting bolts. The antenna is available in two standard configurations to meet various system and installation requirements.



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RE510: This super-cardioid hand-held condenser microphone offers the flexibility to adapt to different applications. The mic delivers sound via a broad, smooth bandwidth, low distortion and a wide dynamic range. The low-frequency boost switch makes it possible to configure the mic as a classic sounding live vocal mic or as a high-performance studio mic. In the roll-off configuration, the low end of the mic compensates for proximity effect, while the upper-mid frequencies offer a clear and natural response. When the mic is configured for studio mode, the low-end response is lifted so that it becomes a versatile instrument microphone, or it can be used to add warmth to a performer's or announcer's voice. The wide bandwidth and high SPL handling capability, makes it useful for home micing an acoustic guitar, guitar amplifier, cymbals or a kick drum. The configuration switch for changing the mic from vocal to instrument mode is located beneath the ball screen and can't be changed inadvertently. Design features include a Warm Grip handle for reduced handling noise, a multistage pop-filter to reduce breath noise and a Memraflex grille for durability.

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www.electrovoice.com; pro.sound@telex.com

Audio spot distribution
FastChannel Network

Freedom 4.0: Freedom 4.0 streamlines the management of audio advertising assets, while giving users the ability to share information about those assets with co-workers, clients and broadcasters. Key features of this system include research tools that now give users the ability to search and filter by multiple criteria, be it ISCI, advertiser, trafficker, destination, P.O. number or status; and Access Control, which allows users to restrict or grant access to any part of the company environment. Access control empowers the user administrator to control access to the system at every level; Traffic Only Orders allows the user to create, distribute and track traffic only orders to every station in the system; and Order Entry and Management, which allows users to place a single order for an entire market or campaign.

800-499-0880; fax 617-489-3006
www.fastchannel.com; info@fastchannel.com

On-air mixer for radio
D&R Electronics

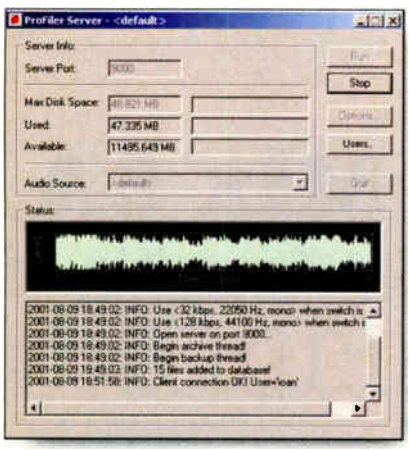
Airmate Mixer: Built around low-noise circuitry, this console is a workhorse for the efficient on-air environment. Eight triple input modules in a 19-inch rack mounted, RF shielded steel chassis offer flexibility. Line B can accept a plug in R.I.A.A. equalized phono pre-amp on every module, when necessary. Every module has a balanced mic input with phantom power as standard.

+31 294-418 014; fax +31 294-416 987; www.d-r.nl; info@d-r.nl

World Radio History

Audio logging system
Telos Systems

Profiler: Automatically log a radio station's program audio using this industry-standard MP3 audio compression technology. No more clunky tape machines or expensive hardware—this system runs on a standard PC under Windows 2000 or Windows XP Professional. Configure the system once and it runs unattended, producing time-annotated MP3 files for space-efficient digital backups of a station's audio. It records one stereo channel per audio card; record as many as four streams by adding more audio cards. This product is useful for stations legally required to log program content, for production directors who assemble audio composites or program hosts who wish to archive their broadcasts. Archived audio can be auditioned remotely via LAN, WAN or the Internet. Someone can also listen to live audio during the encoding process, which is useful for consultants or group PDs. This system stores time-stamped audio in easy-to-search 15-minute blocks for fast retrieval. The system can simultaneously record and encode audio and feed live audio to a LAN, WAN or the Internet (dependent on network bandwidth).



Encoded program segments can also be set to upload automatically to a Web server via FTP. Select and export audio segments to .wav format for external editing. Industry-standard MP3 compression technology allows logged audio to be played back on any standard MP3 player. Play files in the included Profiler Archive Player to view detailed time-of-day data and user annotations.

216-241-7225; fax 216-241-4103
www.telos-systems.com; info@telos-systems.com

Music library
TM Century

Mpowermix: Based as a subscription service, this platform combines the components of the Imaging package in a modular format that allows for different modules to be arranged together, like audio Legos, to create hundreds of imaging elements. All the modules are delivered in a .wav file format, broken down into its individual audio tracks. The vocals and instrumentals are separated into discrete tracks, allowing the stations to remix the modules in countless different forms. The company provides continuous updates to the packages for clients. At least once a quarter, new music will be posted on the site. This music can be combined with the stations' existing vocal tracks to create scores of more IDs and branding and imaging elements.

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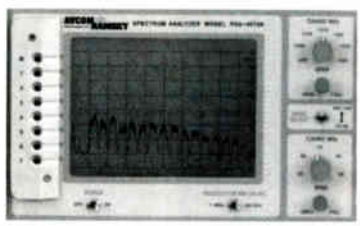

Avcoms' new PSA-4570A allows the optimum use of rack mount space in mobile communication vehicles. In the 950-1450 MHz position, the PSA-4570A displays L-Band satellite signals. With precise center frequency tuning the PSA-4570A enables quick satellite identification and rapid antenna alignment. Software selectable LNB frequency offsets aid the operator to quickly identify transponders. With a flip of a switch you can monitor the 50-90 MHz uplink exciter or receiver IF frequencies with a resolution bandwidth of 1 MHz or 300 KHz. The PSA-4570A uses the latest 1/4 VGA display and microprocessor technology. Convenient function keys enable rapid option selection. Memory store and recall functions allow saving satellite "footprints" for future evaluation. The PSA-4570A comes with a 15 month warranty.

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Stereo switcher
Broadcast Tools

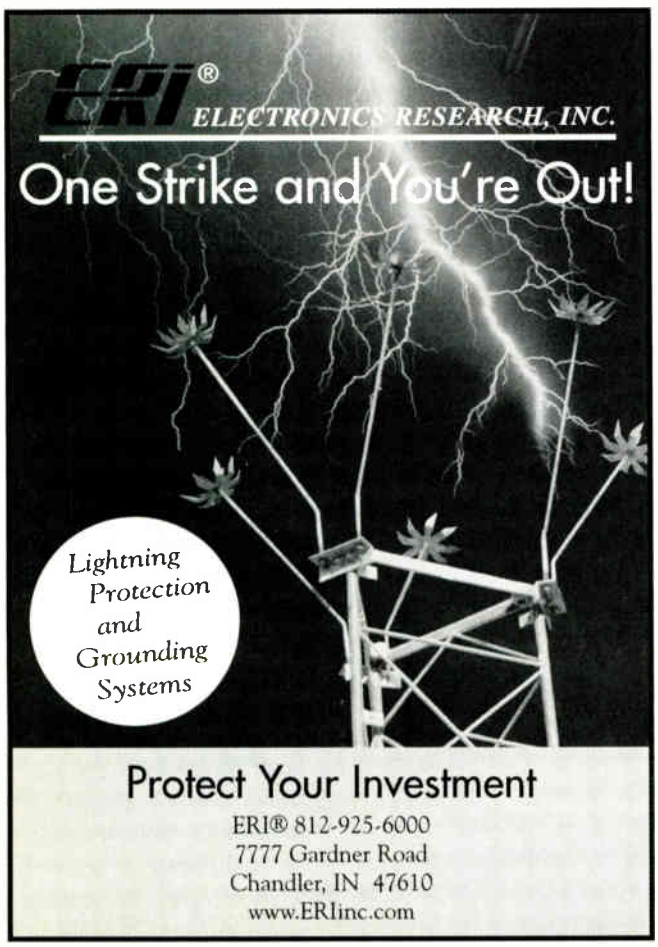
SS 16.4: This switcher accommodates 16 stereo inputs, four stereo and four monaural outputs. The front panel is equipped with push buttons for input, output, macro and mute selection. LED indicators display the status of inputs, outputs, silence sensors, PIP and power. The switcher may be configured for three switching modes: mix mode allows the mixing of any inputs to any outputs; the overlap mode provides the overlapping of any two inputs to an output. The duration of the overlap may be set in increments of 1/10 of a second, with a maximum of 9.9 seconds; in the interlock mode, the selected input is immediately connected while the previous input is immediately disconnected. Features include 16 open collector status outputs, eight SPST relays, four silence sensors, power-up selection of inputs to outputs and a flexible system configuration.

877-250-5575; fax 360-854-9479
www.broadcasttools.com; bti@broadcasttools.com

Speaker muting, warning light controller
Jasoni Electronics

Kontrollex Model A-1: This controller was designed for users of audio mixers that do not have provisions for muting speakers and turning on a warning light when live mics are used in the same studio as monitor speakers. The controller can be activated three ways: audio send from mic channel, on-off switch and 5-35V dc. The warning light can be programmed to illuminate in a solid or flashing mode. Multiple lights can be used. If self-powered speakers are used, the user can loop the audio through the controller via RCA jacks. Monitor amplifiers are properly terminated into a resistive load when muted. Additional product information and a specification sheet is available on request.

702-791-3394



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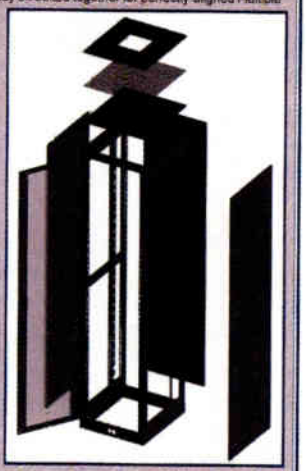

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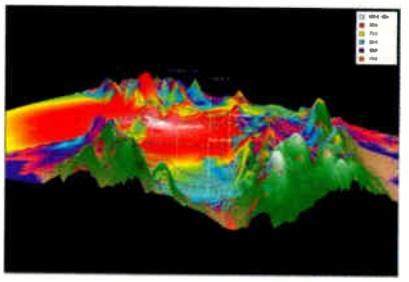

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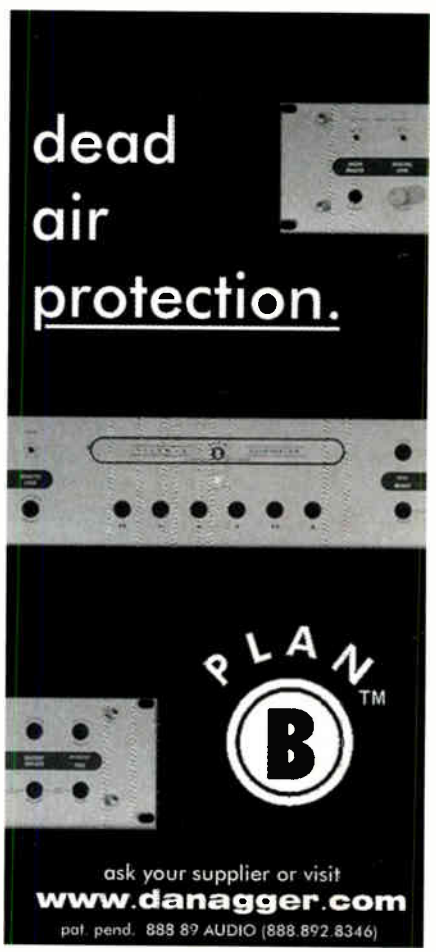

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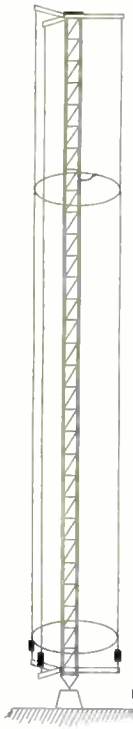

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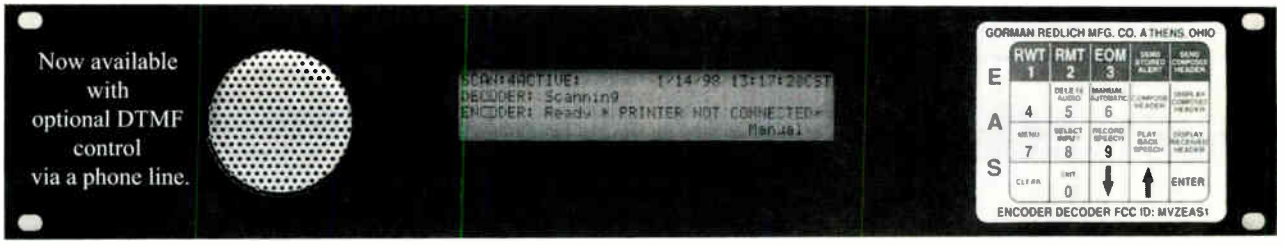

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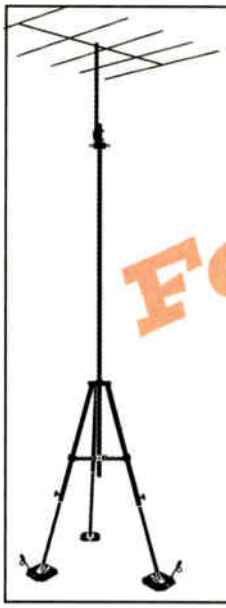

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Contributor Pro-file

Meet the professionals who write for *Radio*. This month: Trends in Technology, page 30.

Barry Thomas, CPBECBNT
President
Thomas Media Systems
Los Angeles, CA

With a 22-year background in broadcast engineering, Thomas has specialized in radio facility design and construction, and managed engineering projects in the Southeast, Midwest and West Coast. His company provides broadcast facility design, installation and maintenance services to stations and networks in the Los Angeles area. He also helped form Stratosaudio, and serves as its chief technology officer. He is a past secretary and current board member of the Society of Broadcast Engineers and actively supports the broadcast engineering community.

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THE RADIO TECHNOLOGY LEADER

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Written for radio professionals

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Editor – Chriss Scherer, CSRE, *cscherer@primediabusiness.com*
Technical Editor, RF – John Battison, P.E., *batcom@bright.net*
Associate Editor – Kari Taylor, *ktaylor@primediabusiness.com*
Sr. Art Director – Michael J. Knust, *mknust@primediabusiness.com*
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Ad Production Coordinator – Natasha Franz, *nfranz@primediabusiness.com*
Classified Ad Coordinator – Mary Mitchell, *mmitchell@primediabusiness.com*
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Audience Marketing Director – Wendy Liskey, *wliskey@primediabusiness.com*
Audience Marketing Manager – Sonja Rader, *srader@primediabusiness.com*

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Shaping radio today and tomorrow

By Kari Taylor, associate editor

Do you remember?

This picture of WKLS, Atlanta, was used in a Stanton Magnetics ad in 1977. The ad described the 681 Calibration series cartridges, which were suitable for use by the station with its 100 percent disc-to-air broadcasts. These cartridges offered improved tracking at all frequencies, and achieved flat frequency response to beyond 20kHz. Each 681 cartridge was guaranteed to meet its specifications within exacting limits.

The Stanton Company boasted that these cartridges were used by the SJR Communications group—all eight of them; a large group of stations at that time.

That was then

This 1930s on-air sign comes from the Radio City studios of NBC, and for many years resided in the office of David Sarnoff, president of NBC and RCA, in the RCA building in New York. The sign is unique because of the small NBC element above the on-air sign. It was made expressly for Sarnoff. This sign was a gift of John Milton Williams to the John Milton Williams Museum of Radio Broadcasting History. Photo submitted by Larry Kass.

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A look at the radio industry

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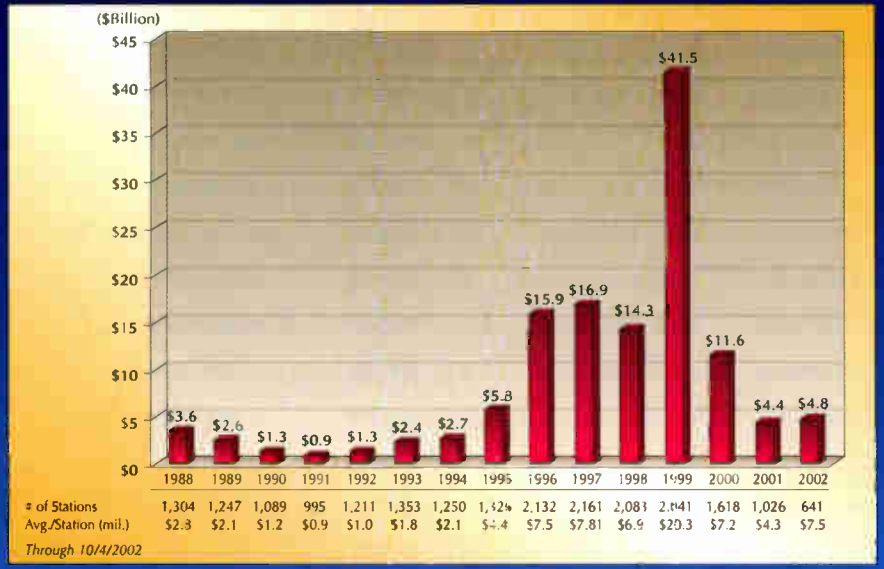

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