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July 1998
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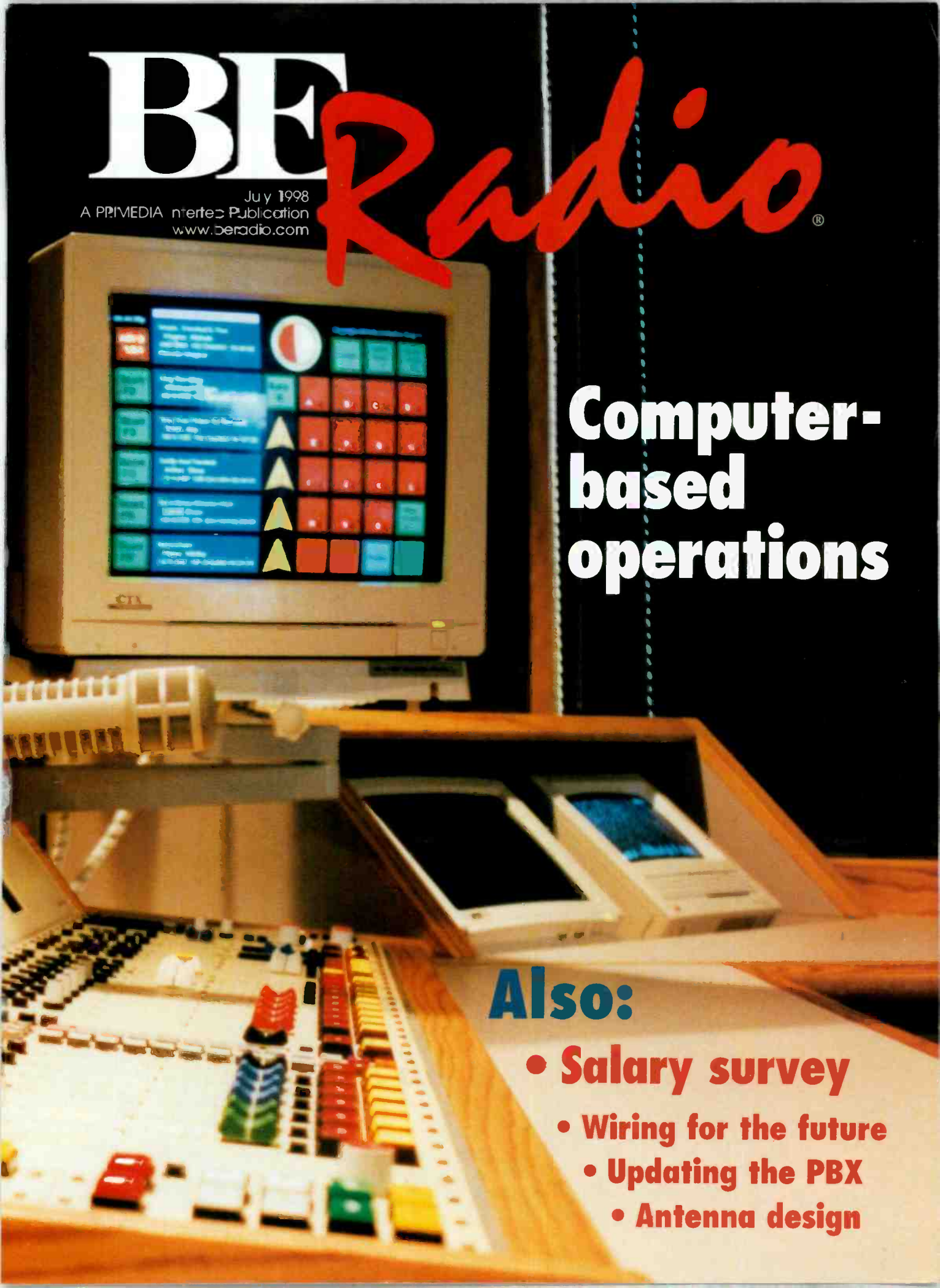

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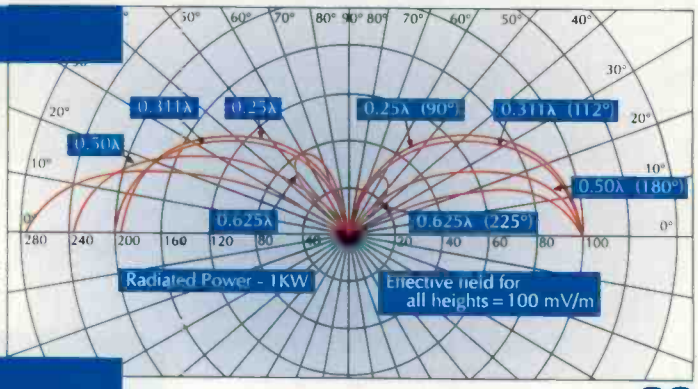


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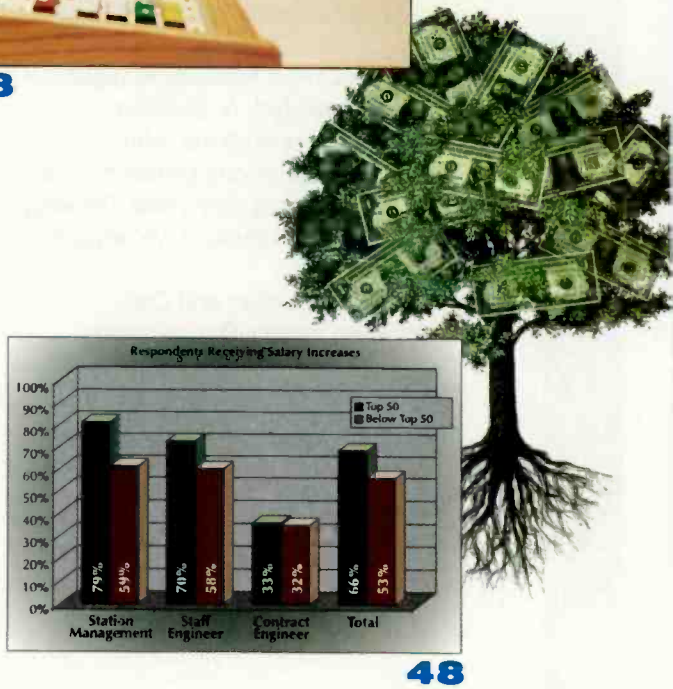


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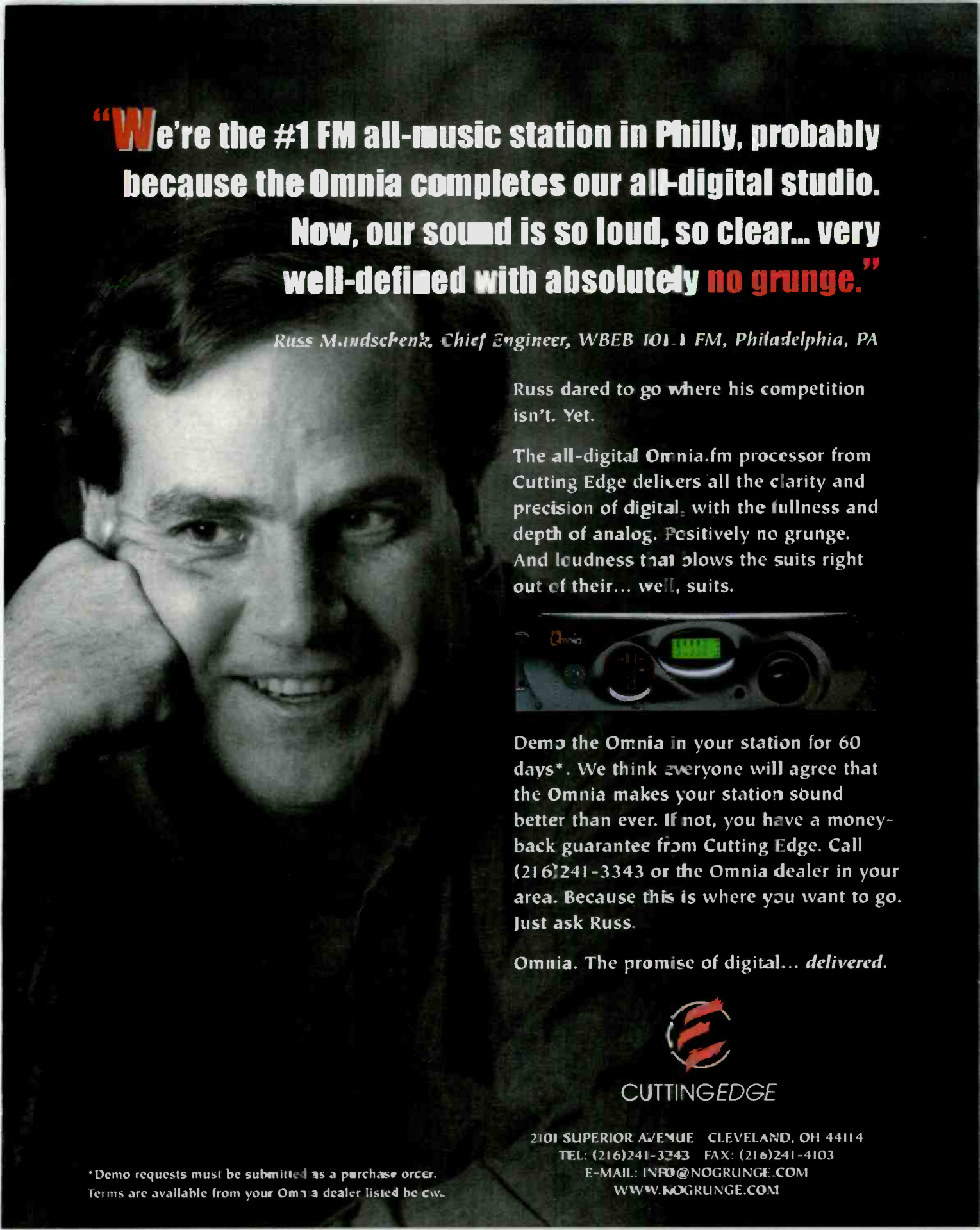
**ON THE COVER:** Computers play a large role in most station operations. Business, traffic, on-air and more are all working together. Further integration is just around the corner. (Photo courtesy of Scott Studios.)



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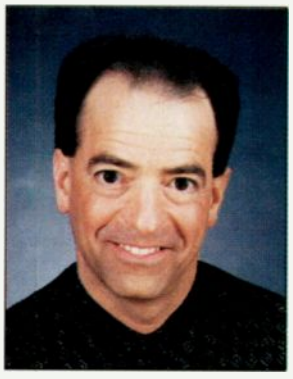
# Deep impact

A little over a century ago, humans did not have the ability to capture sound. Today we take this incredible power for granted, as we routinely acquire, manipulate, distribute and reproduce sound through a variety of highly accessible technologies.

Consider the profound sociological impact of this capacity. A primary example is the telephone, with its dramatic effects on interpersonal communication. A less obvious consequence occurred in the aesthetic domain: Music is the only major artform that exists not in space but in time. Therefore, until audio recording was possible, music was only experienced live, and could only be captured in a written score. This defined what we now call the Classical period, when the composer was king. Once the ability to capture a specific *performance* through sound recording became possible, the performer assumed dominance, and the era of "popular music" was established.



This significant change is analogous to the effect that photography wrought upon the visual arts during the previous century. That transition is eloquently discussed by the Romanian-born author/poet/professor (and radio commentator) Andrei Codrescu in his essay entitled "Against Photography" (from *The Muse is Always Half-Dressed in New Orleans and other essays,* St. Martins Press, 1993). Codrescu notes that with the development of the still camera, "Henceforth art is free of the exigencies of reporting reality according to the eyes. That becomes the job of photography."

But this liberation was difficult on artists (as the audio revolution must have been on composers). Codrescu continues, "The photograph brought Art down from its pedestal and gave it to the masses to have fun with. Which left artists desperately searching for new specialized stances in the mechanically violated wilderness of representation." The easy reflection of realism through technology allowed (or forced) artists to move toward altered states and other extensions of their craft.

In the aural world, similar movement stimulated the improvisational genres of jazz and rock music, which may never have flourished without the recording and broadcasting industries. Today, the great processing power of digital audio allows the creation of sonic experiences that could never exist acoustically.

But Codrescu ultimately dwells on the darker side of photography's impact, by which its popularity diluted an appreciation of visual representation's finer points. In characteristically wry style, he concludes that "Tourists are terrorists with cameras, while terrorists are tourists with guns. Tourism is the civilian aspect of imperialism. After the natives have been pacified by force of arms, we finish the job with cameras. It's no coincidence that both activities are called 'shooting.'" Electronic journalism, another result of the audio (and later video) revolution, could be accused of similar grievances. On balance, however, the world is probably richer for all of these technological developments and their social consequences.

**"Nothing is worth doing unless the consequences may be serious."**

***— G. B. Shaw (from Misalliance)***

Of course, the transition is never complete. Today's newest technologies, the computer and the Internet, will leave a deep impression on our children's generation and beyond. How they will reshape society is uncertain, but one lesson is clear: As disciplines that were once the sole province of experts trickle down to the general public, those who would remain atop the discipline must keep climbing.

Today's radio broadcasters must build upon the work of Edison, Bell, Berliner, Marconi, Armstrong and others to take radio to the next level, and make the impossible real. As history shows, the far-reaching impact of these cycles of progress will continue to change the world in unexpected ways.

**Skip Pizzi, editor-in-chief**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# Hit the Road

Courtesy of WEKS-The Bear

## Remote broadcasts have never been easier!

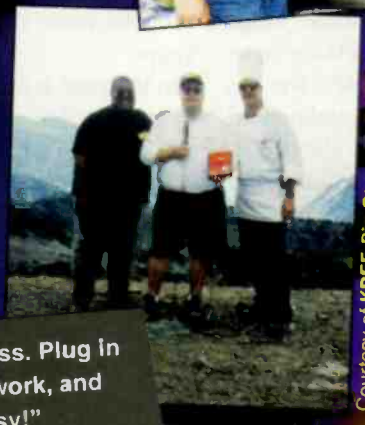
Sometimes it's impractical to install a special circuit like ISDN for a one-time remote, and often your RPU just won't make it. However, a plain telephone line is usually available and the HotLine delivers up to 10 kHz, two-way audio, on just one dial-up line. Want to sound great from anywhere, anytime? Hit the road with a Comrex HotLine.

"People thought the interview was being done in the studio!"

Courtesy of KTNN

Courtesy of Middleburg Broadcasting Network

"I didn't have to do my usual routine of pulling a muscle contorting my radio antenna to avoid (RPU) interference."



Courtesy of KBEE-Big Steve Kelly Show

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Courtesy of Jason Gant — Ask the Computer Doctor Show


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# Viewpoint

## Stand down

The stand-off is over. The rules have been upheld. On June 16, U.S. District Judge Claudia Wilken announced her decision in the dispute between Stephen Dunifer and the FCC in the illegal operation of Radio Free Berkley. The debacle that became a rallying cry for other pirate radio stations — oh, I'm sorry, the politically correct term is "micro-broadcaster" — has ended.

When the FCC first tried to shut down Dunifer's RFB three years ago, the fun began. RFB, at a power level of 50W, was classified as a Class D station. The current rules do not allow any Class D stations to operate. Dunifer turned it around and claimed that his First Amendment rights were being violated by the prohibition of Class D operations. Instead of dismissing the entire case, Judge Wilken allowed it. For three years she thought it over. Now she has ruled that Dunifer's unlicensed station — which was allowed to continue operating during the process — was in violation of FCC rules. Why? Because he never filed for a license or a waiver of the rules. It took three years for her to think of that. In the meantime, countless "kits" have been sold to other wanna-bes, and pirate stations started appearing all over the country. Some communities have more problems with these operators than others with not just one pirate, but as many as six or more. Many of these pirates also claim to be operating within the technical standards of the rules. Most are not. Many of them also sell advertising. Advertising drink specials at a local club certainly qualifies as free speech, right?

The specifics of the ruling prohibit Dunifer from any unlicensed operations and further prohibit him from helping others — directly or indirectly — to operate or initiate illegal stations.

The entire issue of free speech had nothing to do with the final ruling. I agreed with that from the start. Any broadcaster knows how much chaos could result from multiple unlicensed stations and that is the real point of the FCC action.

One catalyst for many pirate operations has been an effect of consolidation. Every dollar counts to cover the debt service for some of the large groups, which sometimes leads to homogenous formats that may not offer something for every listener. The solution is for the pirates not to take the law into their own hands.

If you are hesitant to notify the FCC of a pirate broadcaster in your area, think it over when you prepare the paperwork and write the check for your next set of regulatory fees. You know, the fees that the pirate isn't paying. The response so far has been that if you hold a license, you must obey the rules or pay the fines that are levied. If you don't have a license, the FCC will shake their fist at you.

It pleases me that the FCC was able to win this situation. Unfortunately, the damage may already be done. The day after the ruling, I heard reports of some pirates shutting down around the country. I'm hopeful that trend will continue and that the FCC can further step up its efforts to shut down more of them. The FCC claims to have silenced more than 200 operators during the last two years.

In the past, it appeared that Field Offices were hesitant to serve notice on some of the pirates, perhaps awaiting the outcome of this decision and/or official word from Washington. Now that the word has been given, let's get to work.

Spurred by so much micro-power activity, there are now three proposals before the FCC for low power licensed operations. These proposals range from 1- to 3,000W and carry other specifics that cover ownership rules and term of use. Although I believe portions of these proposals have some merit — particularly for special events broadcasts — there are many specific details that must be worked out to make them a success. If a low power service is established, it must complement existing services and be enforced.

Chriss Scherer

**Chriss Scherer, editor**

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# Wiring for the future

**By Kevin McNamara, CNE**

Most radio facilities have some form of digital audio stream running through them. There are even several all-digital stations. Either way, the signals flowing around your facility are becoming more complex.

Most facilities have as many as 10 (or more) different signal requirements, such as those shown in Table 1. Selecting the proper cabling for each of your specific applications is essential for maintaining reliable signal flow throughout the plant.

| DIGITAL | ANALOG |
|---|---|
| • Digital audio (AES/EBU, SPDIF) | • Analog Audio |
| • Local area network (LAN) | • POTS lines |
| • Low-speed communications (serial data, Switched 56, ISDN) | • RF (receive and transmit) |
| • High-speed communications (T1, Fractional T1, ADSL, FireWire) | • "Composite" stereo audio |
| • Digital telephony | |

**Table 1. Various signals in a typical facility.**

The latest generation of digital audio equipment provides one or more digitized audio formats, such as AES/EBU, SPDIF, and the latest bandwidth guzzler, FireWire. In addition, most disk-based storage systems and digital audio workstations are now connected via some form of local area network (LAN) in order to transport entire files or real-time digital audio streams.

## Cable basics

A cable can be a single insulated conductor, a twisted group of insulated conductors, or a cylindrical conductor within a larger cylindrical conductor spaced with some form of dielectric or air insulation.

The specific performance of a cable with two or more conductors is determined by:

- Highest frequency needed to pass;
- Electrical characteristics (rated capacitance between conductors, rated DC resistance of the conductor[s], rated characteristic impedance);
- Load impedance of the system, and;
- Attenuation — How much signal can be lost before performance is affected?

A digital signal requires more bandwidth than its analog counterpart. For example, a mono analog audio signal only uses about 20kHz of bandwidth. An AES/EBU signal occupies a bandwidth of over 3MHz for single-channel and 6MHz for dual-channel audio. LAN and other high-speed data communication protocols operate with bandwidths from 10 to several hundred MHz.

Capacitance is a function of the spacing between parallel conductors. Increased capacitance resulting from excessive cable lengths tends to reduce or "roll off" the maximum frequency that can pass. This is a problem for either analog or digital signals, but digital signals are affected in a more important way. Digital data consists of square waves which rapidly transition between off and on. Introducing significant amounts of capacitance to the digital signal will cause the square waves to round off and will increase the occurrence of jitter (missed timing bits) and bit errors, which translate into interrupted or even total loss of communication.

Excessive cable length will cause a reduction in the overall signal level due to cable conductor resistance. The resistance increases as a function of the highest frequency passed; however, conductor resistance does not generally affect the frequency response.

Characteristic impedance is a specification usually associated with coaxial-type cables or transmission lines, but it can also be applied to paired cables.

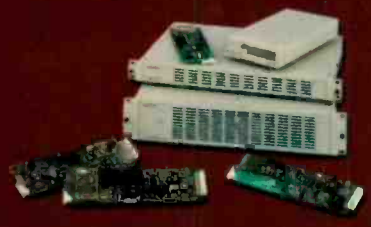
The power loss that an electrical signal experiences as it travels through a cable is called attenuation. Excessive attenuation in a cable will ultimately degrade the signal-to-noise ratio. The effects of the reduced signal-to-noise ratio on an analog audio signal are well known. However, digital signals will experience a more dramatic effect, such as intermittent, or even loss of audio.

Another important cable specification to be aware of when using cables with two or more twisted pairs (particularly pairs that are *not* individually shielded, called unshielded twisted pair or UTP) is Near-End Crosstalk or *NEXT*. NEXT occurs when the signal from one pair crosses to another pair. Certain data communication applications, like Ethernet, are bi-directional and use separate pairs to transmit and receive. When cross talk occurs at the "near-end" of the cable, the potential exists for the signal of one pair to mix with the other, thus causing a jumble of transmit and recieve data. NEXT typically occurs with cable runs of 60 feet or less and can also be caused by improper terminations.

NEXT can also be a factor in specialized cables called "shared sheath," a multipair cable intended to carry a variety of different signals such as telephone, high-speed data, etc.

# Sound Advice for Beautiful Digital Audio

**AES Glue**



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In areas where cables are subject to high levels of electromagnetic interference (EMI), Shielded twisted pair or *STP* cable should be used. STP cable uses a foil or copper braid shield to surround the cables within the sheath. Shielding may be applied to just the sheath or both the individual wire pairs and the sheath. STP cabling is also an effective method to control NEXT.

## Analog audio

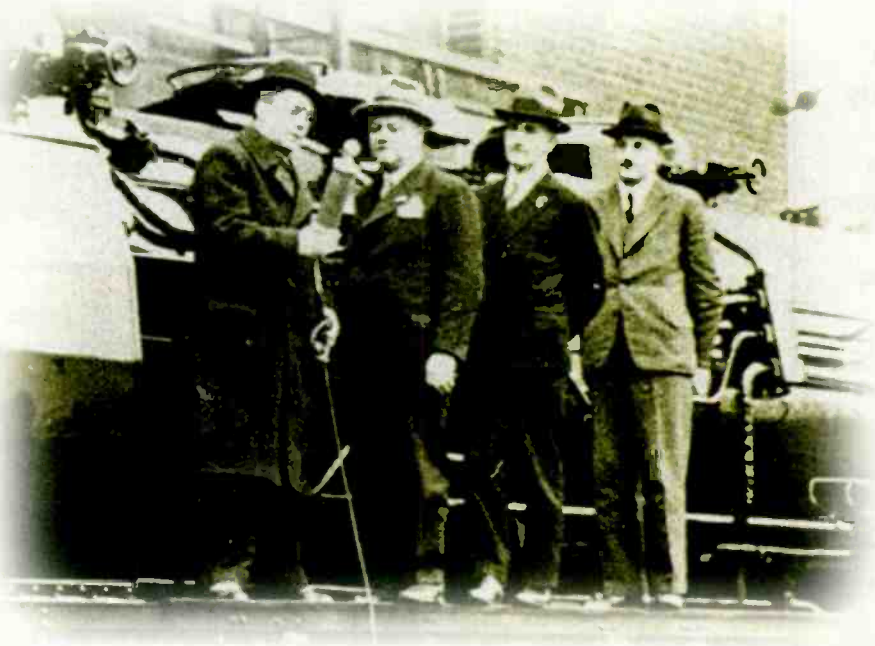
The cable of choice for running an analog audio signal around the station has been 22-gauge twisted pair cable with a foil shield and 22-gauge tinned copper drain wire such as Belden 8451. This cable provides excellent analog audio performance when properly installed and can be used to carry AES/EBU or SPDIF signals for *very* short distances due to the relatively high capacitance between conductors of 34pF/ft and the characteristic impedance of the cable.

## Digital audio

- **AES/EBU:** The AES/EBU digital signal can be carried on either twisted pair or coaxial cable with an impedance of 110Ω, +/-20% and 75Ω respectively. Twisted pair cabling should use foil shielding for permanent installations, or foil plus braided shielding where the cables will likely be flexed. In the case of multipair cable, each pair should be individually shielded. To maintain proper spacing of conductors within the jacket of the cable, a dielectric material such as polyethylene is used, typically as injected foam or rods placed within the jacket.

Coaxial cable used for transmission of AES/EBU signals should have a 100 percent copper *inner* conductor and at least 90 percent coverage of braid shielding.

- **SPDIF:** Although the SPDIF (Sony/Phillips Digital Interface Format) is an unbalanced, consumer version of the AES/EBU standard, it is used in some broadcast applications. The recommended cabling for SPDIF is thin 75Ω coaxial cable terminated with RCA plugs.



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| APPLICATION | | Characteristic Impedance (Ω) | Pairs | Conductor Gauge | Capacitance (pF/ft) | Attenuation |
|---|---|---|---|---|---|---|
| Analog | Twisted Pr | 28 | 1 | 22 AWG | 34.0 | N/A |
| AES/EBU | Twisted Pr | 110 | 1 | 22 AWG | 13.0 | 2.30 Ω/ft |
| Ethernet – TP | UTP | 100 | 4 | 24 AWG | 14.0 | 3.75 dB/100ft |
| | STP | 150 | 2 | 22 AWG | 8.5 | 5.7 dB/100ft |
| Ethernet – Fiber | Single Mode | N/A | N/A | 8.5 µm | N/A | 3.75 dB/km[1] |
| | Multimode | N/A | N/A | 62.5 µm | N/A | 0.5 dB/km[2] |
| Ethernet – Coax | 10Base2 | 50 | N/A | 20 AWG | 25.4 | 1.3 dB/100ft |
| | 10Base5 | 75 | N/A | 12 AWG | 26.0 | 0.52 dB/100ft |

[1]At 850nm wavelength
[2]At 1310- or 1550nm wavelength

**Table 2. Characteristics of network media.**

## Network cabling

• **Twisted Pair:** The ANSI/TIA/EIA-568-A guideline classifies the maximum transmission speed of UTP and STP telecommunications cabling using the five categories as outlined in Table 3. Most current Ethernet networks use Category 5 (Cat 5) UTP cabling. However, if you are planning to install new cable, investigate an enhanced version of Cat 5, usually called Cat 5 EX, denoting extended, which operate reliably with speeds in excess of 300MHz.

| | |
|---|---|
| **Category 1** | No specific performance criteria |
| **Category 2** | Maximum speed of 1MHz (used primarily for telephone wiring) |
| **Category 3** | Maximum speed of 16MHz (used for Ethernet 10baseT networks) |
| **Category 4** | Maximum speed of 20MHz (used for Token-Ring or Ethernet 10baseT networks) |
| **Category 5** | Maximum speed of 100MHz (used for Ethernet 100baseT or 10baseT networks) |

**Table 3. The five cable categories and their characteristics.**

The recent adoption of Ethernet standards that provide speeds of 1000MHz requires the use of this extended response cabling.

The ANSI/TIA/EIA-568-A standard also sets limits on the amount of attenuation and NEXT. Improper installation techniques can quickly cause the attenuation-to-NEXT ratio to drop below acceptable performance. It is critical to select quality cabling which will perform far above the stated minimums in order to achieve sufficient headroom to compensate for imperfections during installation. The current generation of network UTP and STP cabling can provide 10dB or more (at 100MHz) of attenuation-to-NEXT ratio.

• **Optical Fiber Media:** If you need raw bandwidth and absolute immunity to EMI, Optical fiber cabling provides the highest performance of all network media types. Two types of fiber optic media can be used. Multimode fiber provides several paths for light to pass through a cable, while single mode has only a single path. The light source and wavelength used to transmit over these cables also varies.

Fiber cables are constructed either as a *tight* buffer, where the cable is tightly encased in its sheathing, or a *loose tube* design, where the cables are suspended in a moisture resistant gel for outdoor use.

The conductor(s) in optical fiber cable are made from glass, and are sensitive to handling. Exercise extreme care in attaching connectors to, splicing and bending the cable.

• **Coaxial Media:** Coaxial cable is more expensive than twisted pair cable, but because of its increased immunity to outside EMI, can be a good choice for some applications.

That's a summary of just a few of the cables you will need to be aware of in your installation. Remember, choosing the proper cable is not a substitute for proper installation techniques.

*Kevin McNamara, CNE, BE Radio's consultant on computer technology, is president of Exegesis Technologies, a consulting firm in New Market, MD. He can be reached at (888) EXE-GESIS; e-mail: exegesis@unidial.com.*

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# Updating the telephone system

By Barry Thomas, CSRE

Consolidation and station moves have put broadcast engineers in the unique position of selecting and managing the telephone systems. In some cases, these systems are expected to handle multiple stations, voice mail and broadcast interconnections. There are systems and newer options available that can make your lives easier if used properly.

Radio stations need telephone systems that can support the business. The phones are the bottleneck through which all money flows, so attention to this area is critical. Also, badly installed phone systems can be the bane of your existence as the station engineer and a resource/time drain on the station. There are certain rules to apply when selecting a system as shown below.

For the most part, standard phone systems are made up of three components: trunks, extensions, voice mail. Extra features are built around these components.

## Telco trunks

Phone system trunks are spit into three basic groups: dial-in (main business & auto attendant), dial out and private or DID (direct inward dialing). Typically, the number of installed lines is based on current usage and number of potential employees. The phone system vendor can usually offer excellent advice on the number of lines in each group that will serve your needs, especially if he is *not* also selling the phone line contracts. There are other options, however.

ISDN's high-capacity provision, PRI, is gaining popularity with new PBX systems. A properly executed PRI installation can offer dynamic allocation of trunk resources based on need. The 23 lines can beused for incoming service, outgoing service, DID calls or private lines in any combination. The rub, however, is that not many companies do PRI well or inexpensively. Even when the system supports it, the salesperson usually doesn't understand it. Other advantages of PRI are higher data rates for modems run through the system, caller ID pass-through (be careful, though, there's no way to enable Caller ID Block *from* your PRI circuit), and flexible data use for potential teleconferencing, videoconferencing, and shared-workspace applications. Do your homework and you can take advantage of this technology and be ready for the future of telephone interconnection.

The Supertrunk is a more conventional solution of trunk installation. Supertrunk is a Bell name for a special, dedicated T-1 circuit that delivers 24 system trunks. Supertrunks are typically split into dedicated channels to serve the functions, like eight incoming channels, eight outgoing channels, etc. There is work being done on a new Supertrunk that allows dynamic allocation similar to PRI. If a system can handle a standard T-1 line input, it can take a Supertrunk. The standard T-1 installation is a basic 24-channel telephone circuit, typically used for connection to long-distance carriers.

In any case, there will be a break-even point between use of a high-capacity service vs. copper pairs. Your pair count and distance from the CO will determine that point, but if you're using more than 16 lines on a PBX you should consider it. Remember that putting *all* lines on the PRI or standard T-1 means that if the *one* path fails, your system is down. Build in copper backup systems to keep you working during a failure (you never know when the backhoe is going to hit your T-1 circuit).

An aside for the broadcast telco systems: High-capacity delivery methods like Supertrunk or standard T-1 can be used for the old 1A2 systems as well, using demod gear to break out the channels into simulated copper pairs. This greatly improves hybrid and audio performance, usually exceeding copper pairs.

## System selection tips

- Remember that the office system, like the on-air phones, is mission-critical. Avoid trading a phone system for advertising like the plague. You will seldom get what you really need.
- Treat your studio phone needs separately. There currently is no acceptable means of providing the highest quality broadcast connections using digital office phone systems. Expect to use the tried-and-true 1A2 technology or some of the specialty systems available from broadcast suppliers. There is enormous potential for future developments in this area but, for now, studio systems are best relegated to a segregated specialty system.
- Expect to expand your PBX. Make sure you have an easy expansion path. You *know* you'll need more extensions — you may have to put in another station. Keep your options open. Budget extra extension ports and allocate your punch block real estate for expansion.
- Treat the line service contracts and equipment acquisition separately. Combining the two is like letting the car dealer figure your used car trade-in into the car payment. The numbers might look OK, but you probably won't get the best deal. If your hardware supplier is an agent for a local phone service provider, negotiate the issues separately. Sometimes a vendor will recoup low hardware and installation charges with a less-than-ideal rate for lines and vice-versa.

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# Managing Technology

## Extensions

Broadcast stations will often need single line telephone (SLT) ports to interconnect the studio key system with the PBX, Off Premise Extension (OPX) ports to transmitter sites and provide modem lines. Many major systems do not commit many resources to this function and will often charge a great deal for this capability. Make sure your plans include sufficient ports for this use. However, unless you're using a PRI-capable PBX, you will probably get modem performance less than 28.8kb/s.

## Voice mail

Voice mail will never replace a receptionist, but it can make his or her job more like that of a traffic director than a secretary. This is a good thing. Voice-mail messages provide more information than any written message and are more private. It can be a source of great reliability and an effective business tool or a cause of lost business.

Voice mail is another place where there is a preponderance of features that often obscure the real purpose. The system needs to be easy to use by the untrained first-time caller leaving a message, easy to use by the staff so that messages can be retrieved, saved, and forwarded, easy to administer (add and delete users, reset mailboxes, etc.) and large enough to accommodate the current staff plus 10% (for growth).

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Keep high-traffic uses, like interactive voice response systems separate from your business voice-mail system. You don't want your clients to be hampered when listeners call to register for your new contest. An announce mailbox with contest rules, travelling directions and request phone numbers usually doesn't bog voice-mail systems down, but concert info lines, ski-report lines and school closing announcements will cause a slowdown to your major cash-flow pipeline. There are both elaborate and inexpensive solutions to such applications that can handle this traffic quite effectively. Some produced specifically for broadcasters by some familiar manufacturers.

The selection of new station PBX and telephone updates will be an education in itself. Updating your system with some of the newer features can help office efficiency. We have touched on a few highlights along with some of the more important considerations. Proper research and consideration of the options available will be paid back in less trouble for you and easier cash flow for your station -- a win-win scenario.

*Barry Thomas, CSRE, is director of engineering for KCMG/Chancellor Media, Los Angeles.*

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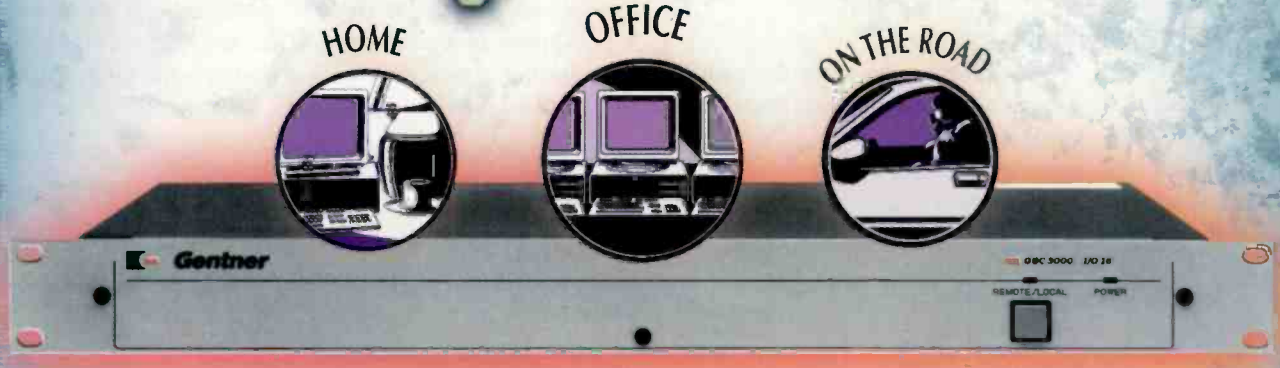


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# Antenna developments

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

Over the last 75 years there have been many changes and improvements in AM and FM antenna design. AM antennas have seen what are probably the greatest changes because radio transmission has come from just about nothing to today's extensive range of transmitting antennas. Of course short-wave or HF transmission was also blossoming, and the shorter physical lengths used made precise element lengths and spacing essential.

## In the beginning

Horizontal, long-wire antennas were the order of the day when Hertz and Marconi made their historic transmissions. The directional properties of long wires were probably not known, but length was the requirement, and the sideways orientations of the major lobe of long wires were not observed. As radio developed, the peculiar properties of vertical antennas were discovered and the value of vertical transmission became apparent.

The flattop antenna, with its center vertical feed, soon gave way to simple quarter-wave vertical towers, either self-supporting or guyed. The quarter-wave antenna proved the most popular because in addition to working very well, the electrical characteristics of the simple 90° stick were the easiest to insert into mathematical formulae.

In pre-WWII days, various antenna heights were used and the FCC issued its *FCC Engineering Rules and Standards of Good Engineering Practice*. This thorough set of rules included the well known Figure 5 of #73.190 (shown here as Figure 1) showing the vertical radiation characteristics of many different heights of transmitting antenna —including the 0.311 wavelength vertical radiator. Many people have asked how this peculiar length happened to be included in the compilation. The answer is very simple — 0.311 was the average height of all vertical antennas in use at that time.

As radio developed and more attention was paid to night operation, the vertical radiation characteristics of the vertical antenna were investigated. The reduced vertical radiation pattern of the 0.625 wavelength radiator was found to be very useful when designing night operations. As broadcasting grew, night service also grew greatly in importance. Tremendous efforts were made to find a way of controlling the vertical radiation that causes interference at great distances.

Attention was paid to the extent of the night service area. It was noted that despite high power at night, interference was found within the theoretical service area where the signal should be strong, and there was no known interfering station. This interference was found to be the desired station interfering with itself. Thus, the effect known as the "fading wall" was discovered.

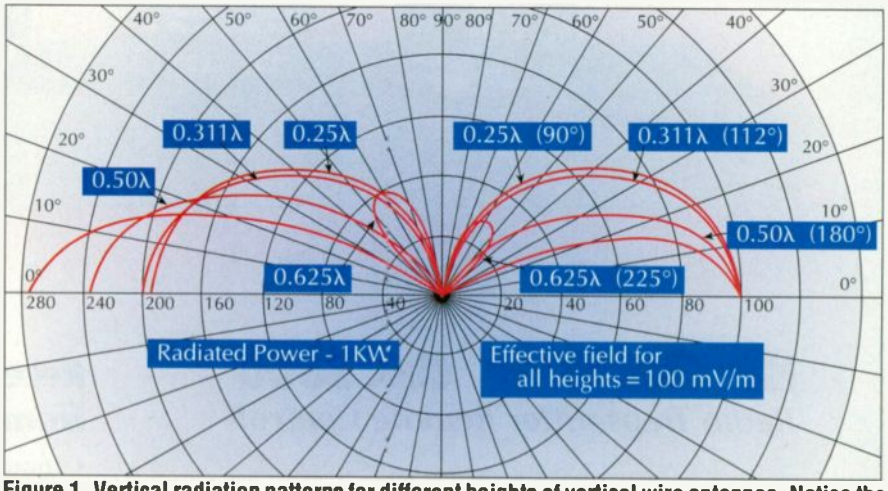
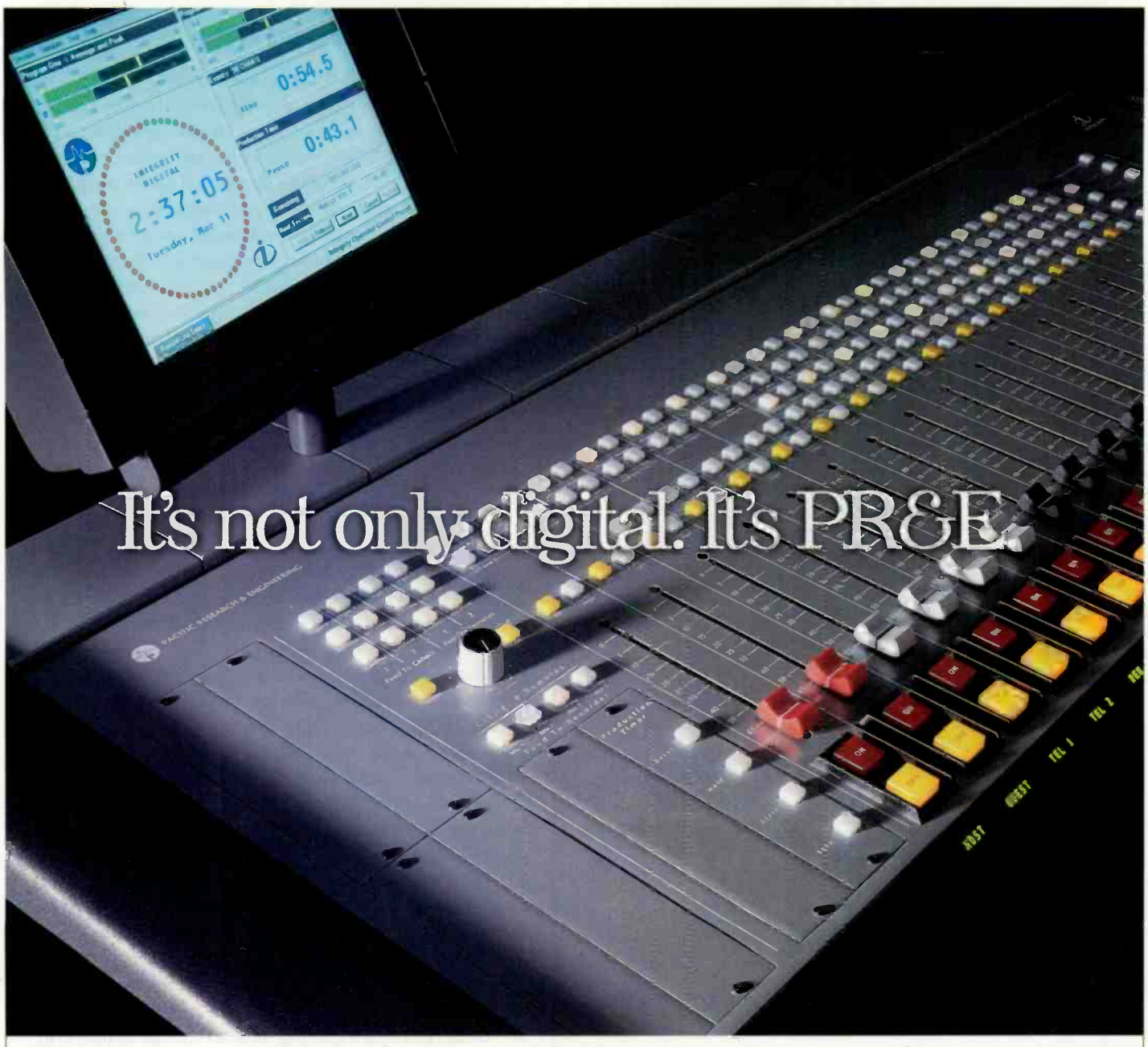



**Figure 1. Vertical radiation patterns for different heights of vertical wire antennas. Notice the high-angle radiation as the antenna height decreases - except for the 5/8 wave radiator.**

Figure 2 shows the generation of a fading wall. The desired station's vertical signal is reflected by the ionosphere and returns to earth before the night limit value is reached. This produces an out-of-phase signal that results in a less than 20 to 1 co-channel interfering signal and causes interference in an area that should be adequately served by the ground wave signal. Hence the term "fading wall." Continuing on past this interference area the desired ground wave signal becomes usable again.

## Beyond the wall

The most successful "anti-fading wall" antenna was the Franklin. This consisted of two half-wave antennas mounted vertically one above the other and fed in phase. This reduced the vertical component and increased the ground wave signal strength. In effect, a directional

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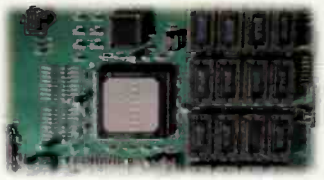

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# RF Engineering

antenna in the vertical plane was formed.

As the demand for new stations grew, the need to use directional antennas to fit them in also grew, and the problem of high angle radiation became more pressing. Originally, the FCC accepted directional antenna patterns that proposed zero radiation, i.e. nulls, in some directions. In practice a complete null could never be obtained because of local reradiation from guys, etc. Several years ago the Commission introduced the "Q" factor into the directional antenna equation so there can never be less than approximately 6mV/m radiation on any radial. This made it more difficult to calculate DAs that provided enough signal reduction on specific azimuths and spurred research efforts into high angle radiation reduction.

Several engineers have attempted to design an antenna with very low vertical radiation. In fact, a number of years ago, Ogden Prestholdt, PE, the former chief RF engineer for CBS (and now retired), performed some development work for NAB on a new, low vertical radiation AM antenna. It basically consisted of a vertical radiator surrounded by a number of shorter antennas designed to suppress vertical signals. As far as I can recall this was not as successful as was hoped.

More recently, Clarence Beverage and Alan Christman described a new AM antenna consisting of a vertical radiator with several slant wires attached part way up. They called it the *Umbrella Plan* in a paper presented nine years ago at the NAB Engineering conference. This antenna does not require the extensive ground system normally involved, and offers improved radiation efficiency with a smaller ground area.

In an attempt to reduce or eliminate the large ground area required by conventional antennas, Tim Cutforth, PE, has done considerable work on ground system elimination. He has presented several papers about antennas using elevated ground radials. The work shows a great deal of promise, but it appears to me that elevating the radials and thus exposing them to vandalism may only result in expense caused by empty headed people. Tim has published several papers recently at professional meetings, and no doubt more will be heard of this system in future papers.

The typical AM antenna is unique in its construction of a single tower surrounded by guy wires, which are not used for transmitting an RF signal. It seems unfortunate that this mass of wire cannot be used to aid transmission. In the past, use has been made of the guy wires to suspend a single wire radiator. One example was at WKYC (now WTAM), Cleveland, where it was necessary to reduce radiation in an azimuth towards Canada. It was originally planned to drive this element, but it was found necessary only to dissipate power in a resistor at its base instead.

Cutforth has also done a lot of work on using the guys and suspended wires as antenna elements, both driven and parasitic. This idea seems to offer considerable assistance when controlling horizontal radiation in areas where ground space is scarce and adequate conventional element spacing is not possible.

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# RF Engineering

## FM antennas

In the FM field there has been more room for innovation, although general principles of radiation are the same for most FM antennas. Much of the work has been for the purpose of reducing downward radiation in the area directly below the antenna with the objective of meeting overly restrictive EPA requirements.

Most of us remember the original FM antenna, the familiar vertical dipole. Its thin radiator diameter was accompanied by limited bandwidth and quickly modified by antenna designers, leading such items as Turnstile, and Superturnstile antennas to the market.

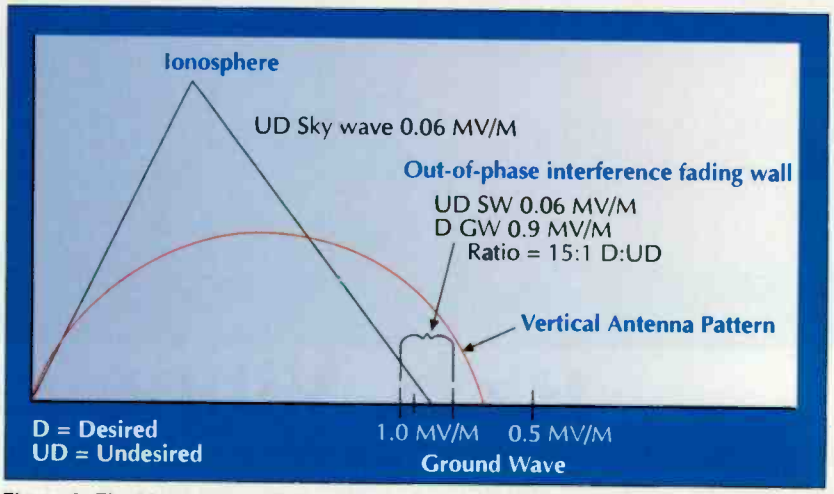


**Figure 2. The high angle radiation returns to earth with a ratio less than 20:1 (desired to undesired), causing the fading wall interference area.**

FM antennas have pretty well passed through panels, dipoles, slot and similar derivations, including the early triangular Federal FM antenna. It's interesting to note that in Ireland where FM commercial broadcasting has only comparatively recently come into being, simple communication-type folded dipole antennas were very popular. At one time, the Irish broadcasting authority refused to allow any antennas except folded dipoles to be used by commercial stations on their towers. At the time, I was attempting to place a licensed FM station on one of their towers using a standard US FM antenna. This was not acceptable to them.

At the recent NAB Engineering Conference held in Las Vegas, Shively Antennas presented their modern version of the Lindenblad antenna that was first developed in 1915. This is a very interesting, but simple, antenna. It consists of a number of dipoles arranged around a center pole with a small face width. These dipoles are slanted at an angle, and the resulting radiation is circularly polarized and broadband.

Because of the small surface area presented by the dipoles, windloading is low while still having the ability to handle large amounts of power. This makes it attractive for operators who have a tower/space problem.

The Model 6017 Lindenblad, as it is known, can be mounted on an 18-inch pole with a bandwidth of 20MHz and a VSWR of only 1.25:1. Bay spacing is handled in the conventional way and vertical radiation problems can be tailored to provide minimum downward radiation by use of half-wave, mixed or varied spacing.

Radio has come a long way from the early coherer detector, spark gap transmitter and long-wire flattop antenna. Some of us may remember the early "portable" receivers with large wooden cases wound with a loop antenna, or the excellent Zenith portable with its "Wave Magnet" antenna. The advent of transistors made small receiving antennas essential to make small pocket receivers possible, so the "ferro stick" antenna was born.

I wonder what the next 50 years will bring forth?


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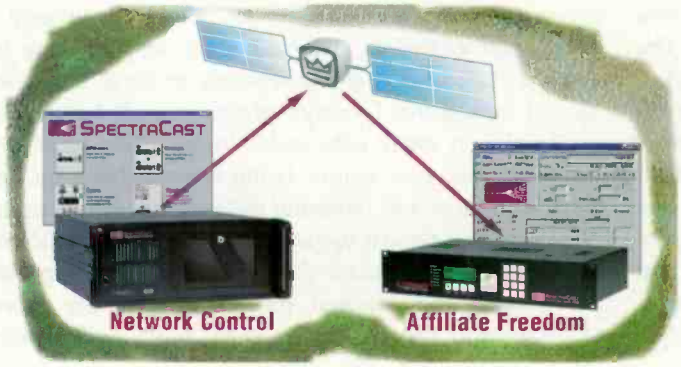


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# Engineering the computer-based radio station

**By Skip Pizzi, editor-in-chief**

Radio production and program assembly are increasingly performed on computers in today's radio environment, just as the administrative and control elements of most facilities have been for some time. Computer networks are now tying these diverse elements into a cohesive whole, and it won't be long before a radio operation's entire course of business takes place within a single large computer system.

A different breed of technical personnel is needed for these kinds of facilities. The job includes expertise that comes from pure computer engineering as well as proficiency in traditional broadcast techniques. Achieving the proper blend will spell the difference between crash and cash in radio's digital future.

The introduction of computers into the station has taken us a long way from the beginnings of program automation.

## The computer engineer

Most businesses today employ or contract with technicians who are specifically skilled in computer maintenance. Many large broadcast firms already have an *Information Services* (IS) director or department whose duties are largely concerned with administrative operations.

As reliance on computers grows into the production side of the radio facility, the need for *application-specific* computer maintenance arises. This is where the hybrid "broadcast engineer of the future" plays a key role. The ideal skill set for this job is still being formulated today, as is the most appropriate delegation scheme for all computer-related duties among a radio facility's staff.

Clearly there are some common areas between broadcast computing and general computing for which any skilled IS person can provide great service. But in other, more specialized computer-based areas of radio and audio operations, general IS staff will be less adequately equipped. It is in these crossover zones where it is often easier and more successful to have the traditional broadcast engineer learn about computer-based systems rather than working the opposite way.

Just how the nexus between IS and broadcast engineering takes shape will vary with each facility and its staff, but there is no doubt that both general and radio-specific computer engineering resources will be required.

## IS vs. RF

Another key element of traditional radio engineering that will continue to require technical expertise is maintenance of the operation's RF side. Naturally, the RF engineer who also has solid computer maintenance skills will be a critical asset on any broadcaster's staff. But the RF field is also developing, albeit at a slower pace.

This gives new meaning to the phrase "continuing education." Although it's often a difficult sell, smart managers will invest in their best technical staff and allow (or encourage) them to improve their skills through organized training. Broadcasters should take advantage of every opportunity to study new technologies. This includes short courses at colleges and universities as well as sessions presented by trade groups and journals or manufacturers. Engineers should bring such opportunities to their management's attention. Management should appropriate funds to this effort and spend them wisely.

Broadcast engineers also bear some responsibility to manage their own ongoing learning in these areas. As "digital immigrants," today's engineers will be largely self-taught on many new technologies. They must develop an immunity against being overwhelmed by the massive volume and blistering pace of new information. A measured approach toward learning in small, efficient and properly sequenced doses is the key to survival. Every new item learned makes an engineer more valuable, and learning never ends. It will still remain

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"I do work as a Senior Executive Producer for [major classical music label]. The MS1402 was highly recommended by several studio engineers." (S.E., NY, NY)

"Great product!" (C.B., San Francisco, CA)

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important to keep the proper balance between improved computer and RF skills. Radio will remain a business equally concerned with production and delivery.

## Software vs. hardware

Perhaps the toughest transition for the broadcast engineer to manage is the shift from hardware to software, or from real to virtual domains. Of course, the computer environment is one where *both* elements apply, and familiarity with hardware-based operations is one skill that can allow broadcast engineers to excel beyond some IS staff. The computer tech's world is often so laden with code that the physical layer is not given adequate attention. The experienced broadcast engineer will recognize the operation's need for reliability, and stressing this will improve the facility's computer systems.

**Many studios have multiple systems running. Hardware and software familiarity is essential.**

This particular issue often becomes a point of contention between IS and broadcast engineers, or between technical and financial managers, so someone might be called upon to make difficult decisions on how much computer hardware reliability is enough.

Beyond this, however, broadcast engineers must become familiar with the process of managing the virtual environment. This includes elements of system design, like making sure that platform and network performances are adequate for the applications, or that workstations are ergonomically, yet robustly, constructed. It also involves the creation of routine maintenance schedules for computer hardware and software. These are judgment calls for which little tradition or resource base exists.

Perhaps most important, the broadcast/computer engineer's work involves the maintenance of the facility's software — a process that can easily become a full-time job in itself. This includes the installation of new software and upgrades (and the subsequent debugging that is often necessary) plus the establishment and upkeep of a *software inventory* for the facility. The latter can be an extremely tedious exercise, but it is a critically important new duty. Only by scrupulously tracking the various versions of software installed throughout a facility can a computer-based operation run smoothly. Simple exchange of files between users via LAN can become a nightmare without such care.

Of course, computer *hardware* upgrades are also part of the job, but these are easier to cope with in that they are physical assets and usually stay in the place and form of their installation by engineers. Software, on the other hand, is subject to all sorts of user intervention, from well-intentioned tweaking to outright vandalism. Aggressive users may also install their own "rogue" software on the facility's platforms, often creating havoc with other applications on the network. A little knowledge is truly a dangerous thing in the computer-based facility.

A final element of concern is virtual security. This refers to the preservation of proprietary data for competitive reasons, as well as the protection of computer-based assets from infection by viruses and other corruption.

## Archival management

Often, the broadcast/computer engineer must also maintain the facility's digital archive. The job description here is part janitor and part librarian. Keeping the servers from becoming permanent file cabinets is the janitorial part. This includes frequent attempts to have users clear out old files or move them to

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offline storage. It is the bane of any IS department's existence, and no less so in broadcasting, where uncompressed media files are typically quite large, and numerous saved versions of a file may accumulate on servers.

On the other hand, the archive must also be useful in terms of its search capabilities. If the facility has no dedicated research staff, engineering may be called upon to install and maintain the system's search engine (or *media asset management* software). If there are dedicated researchers on hand, engineers will need to work closely with them to develop and expand the search software. In either case, engineering will be responsible for keeping close watch on the removable media and drives used for offline storage.

**Broadcast engineers must become familiar with the process of managing the virtual environment.**

A related responsibility is the establishment of the computer system's backup policy — a typical IS management duty. This includes the determination of which files will be backed up, the frequency of backup (hourly, daily, weekly, etc.), what media will be used, and the recycling schedule of this media.

## A team effort

Successful broadcast computer systems require cooperation between specialists in numerous disciplines. Involvement of an experienced broadcast computing specialist is critical at every stage of the process, from initial design through procurement and installation to design and execution of the system's maintenance, support and upgrades.

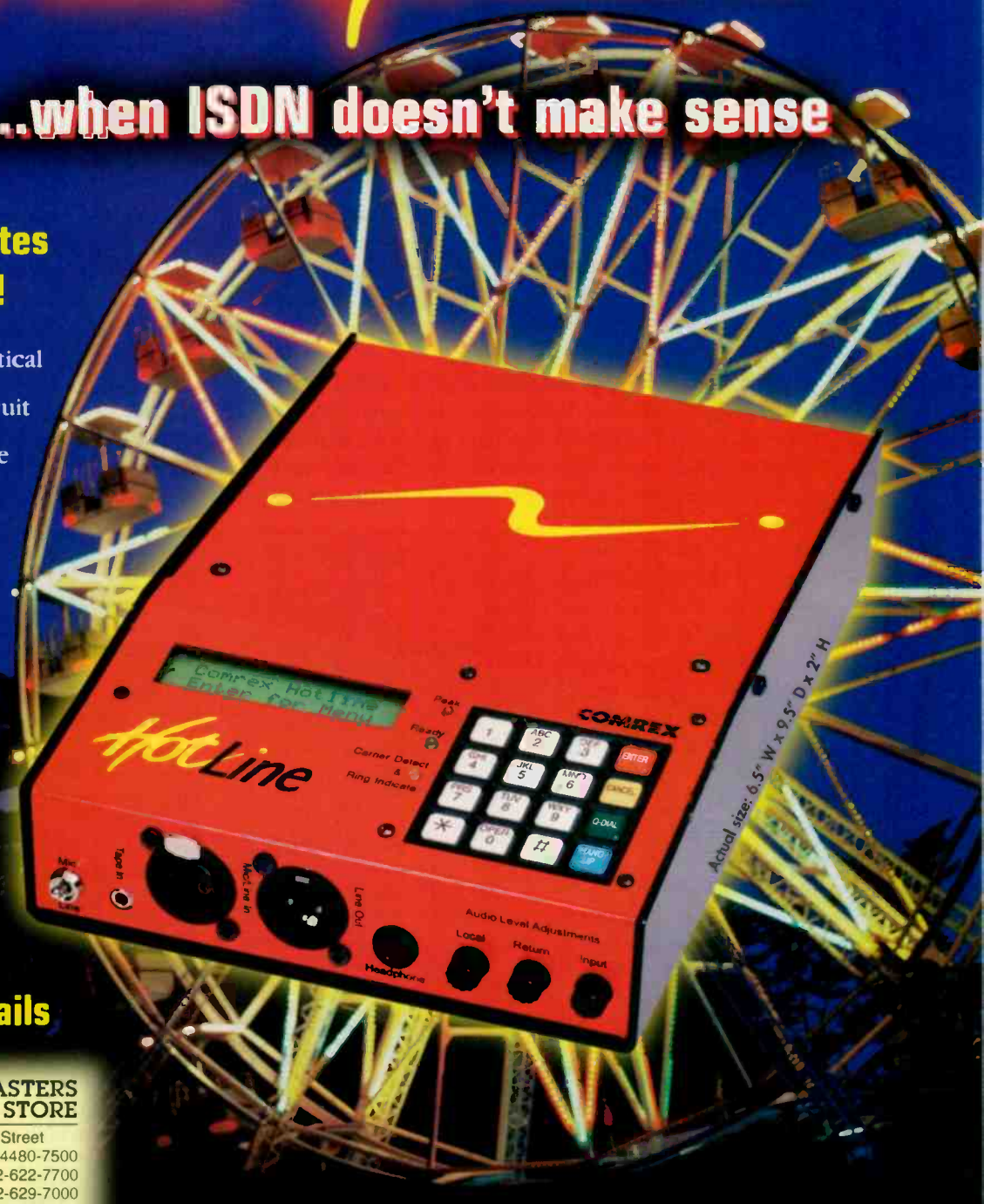
One of the broadcast specialist's most important responsibilities is to emphasize the mission-critical nature of any production and on-air components of the facility's computer system, and the extremely stressful conditions and high duty cycles under which these systems operate. Platforms in these areas should be of industrial design, not off-the-shelf desktop systems. Servers should be particularly robust and implemented with adequate redundancy and hot-swappable drive capability.

Other points worth stressing during the design phase are the need for scalability and a smart migration path for future development, along with plenty of storage for large media files (including redundancy).

With the right balance of computer and broadcast engineering, the radio facility of tomorrow will run circles around the best of today. Without such technical teamwork, however, the facility's users will long for the days of vinyl and tape.

# Use the HotLine

## ...when ISDN doesn't make sense

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# FCC revokes radio license

By Harry Martin

The FCC revoked the license of a Texas station after finding that the licensee made numerous misrepresentations and lacked candor in requesting special temporary authority (STA) to operate from a different site. The misrepresentations involved two different aspects of the STA request.

First, in the STA request, the licensee asserted that it had lost its licensed site, while, at the license revocation hearing, the licensee admitted that the change in site was purely voluntary.

Second, the licensee lacked candor about facts regarding the proposed STA site. Although the new site was so far from the community of license that the station would no longer provide local service and would serve a nearby larger market for the first time, the STA request provided the coordinates of the licensed site. In addition, when the FCC's staff advised that it would not grant the STA's request to construct a new tower, the licensee quickly arranged for a business associate to construct a new 180-foot tower adjacent to the site proposed in the STA request and then amended the STA request to specify use of the "existing" tower. Further, when providing coordinates for the "existing" tower in the amendment, the licensee referred to the coordinates specified in the initial STA request instead of the licensed coordinates, leading the FCC to infer that the "existing" tower was only 0.25 km from the licensed site. In granting the STA the FCC relied on the small (0.25KM) variance, but the licensee did not tell the FCC that it was incorrect.

When the FCC discovered the errors and rescinded the STA, the licensee made further deceptive and evasive responses.

In revoking the license, the FCC held that neither the station's meritorious programming nor the licensee's prior unblemished record could mitigate serious deliberate misconduct such as misrepresentation, emphasizing that honesty and trustworthiness are fundamental obligations of Commission licensees.

## Filing fees to increase September 21

Increased FCC filing fees for many applications and other filings are scheduled to go into effect September 21, 1998. The filing fee for annual ownership reports has not changed ($45/station). Most other fees have increased. Filing fees for the more common filings by broadcasters are listed at left.

### NEW FILING FEE SCHEDULE

| | |
|---|---|
| Minor change | $725 |
| **New or major change:** | |
| TV | $3,245 |
| AM | $2,885 |
| FM | $2,600 |
| Translators/LPTV | $545 |
| **License Application:** | |
| TV | $220 |
| AM | $475 |
| FM | $150 |
| **Directional antenna** | |
| AM | $545 |
| FM | $455 |
| Translators/LPTV | $110 |
| Auxiliaries | $110 |
| **Assignment/Transfer:** | |
| Long Form | $725 |
| Short Form: | $105 |
| STA | $130 |
| CP Extension | $260 |
| **Renewal:** | |
| TV/AM/FM | $130 |
| Translator/LPTV | $45 |
| Call Sign Change | $75 |
| Ownership Report | $45 |

## FCC proposes negotiated interference agreements

The FCC has proposed to permit FM stations to enter into negotiated interference agreements under which stations could accept new or increased interference within their protected contours in connection with proposals to expand service. The Commission would permit such agreements where:

(1) total service gains are at least five times as great as the increase in total interference;

(2) total interference received by any station does not exceed 5% of the area and population within its

# "I Won the Marconi with Scott"

"I do like to give credit where credit is due and acknowledge Scott Studios as a major player in my daily broadcasting battle. The time I now have to devote to preparation, and the ease of operation of the Scott System, has helped me increase show professionalism."

**Bill O'Brian - KRKT, Albany, Oregon**
**Marconi Small Market Personality of the Year - 1997**

# "We Won the Marconi with Scott"

The 1996 winner of the Marconi Major Market Air Personality of the Year Award *also* uses Scott Studios' touchscreen digital audio system! Still another Scott Studios user won the Country Music Association "Station of the Year" award in 1997! The Scott System can help *your* stations sound better!

**Mac Hudson & Irv Harrigan - KILT FM, Houston, Texas**
**Marconi Major Market Personality of the Year - 1996**

# "Scott has Improved our Product"


"We were very eager to 'go digital' last Fall, and compared different systems. Our decision to go with the Scott System was one we *all* felt good about. I'm confident knowing the comfort level of our different departments who use the system is high. Our Scott System has improved our efficiency and the quality of our product."

**Michelle Mercer, PD - KPWR FM, Los Angeles**

*Tom Koza, Chief Engineer, top rated afternoon personalities "The Baka Boys" surround Program Director Michelle Mercer*

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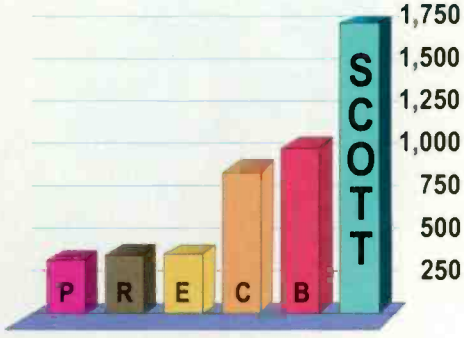


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protected contour;

(3) no interference occurs in the community of license; and,

(4) areas of new interference continue to receive five services.

In the same proceeding the FCC is proposing to amend its contingent application rule to permit FM stations to file interrelated facility modification proposals.

## NCE station fined for "commercials"

The FCC has fined a noncommercial educational (NCE) station $5,000 for broadcasting promotional announcements. Noncommercial stations are permitted to broadcast acknowledgments of donor contributions to the station and include in the acknowledgments a brief statement of the products and services the donors sell. However, the acknowledgment may not be promotional in nature or include qualitative descriptions of the donors' products or services or any price information.

The FCC found that the station's announcements were promotional for the following reasons:

- Qualitative descriptions ("food's great," "atmosphere is unparalleled," "warm service, great employees," "holds 1,800 people," "big theater video screen," "state of the art lights and sound");
- Price information ("ladies' and men's night," "mention the station and receive a 10% discount," "all you can eat catfish on Sundays"); and,
- Call to action ("Why shop around? Try..." "Fax us at...").

The FCC also advised that fairly extensive descriptions of a music club's offerings on a night-by-night basis could be promotional due to their length and scope. The Commission agreed with the station that use of the word "only" was not promotional when used in the factual context of the only store to offer a particular product in an area.

As public funding for noncommercial stations continues to wane, commercialization by NCE stations is expected to become a more common problem.

*Harry Martin is an attorney with Fletcher, Heald & Hildreth, PLC., Arlington, VA. E-mail:* martin@fhh-telcomlaw.com.

**dateline**

On or before August 3, 1998 commercial radio stations in North Carolina, South Carolina, Illinois, Wisconsin and California must file their annual ownership reports.

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## EDUCATIONAL CIRCULAR SERIES

| Model | Bays | Power | Gain | Price |
|---|---|---|---|---|
| MP-1 | 1 | 600W | -3.3 | $250 |
| MP-2 | 2 | 800W | 0 | $680 |
| MP-3 | 3 | 800W | 1.4 | $980 |
| MP-4 | 4 | 800W | 3.3 | $1,280 |
| MP-2-4 | 4 | 2,000W | 3.3 | $1,820 |
| MP-3-5 | 5 | 3,000W | 4.1 | $2,270 |
| MP-3-6 | 6 | 3,000W | 5.2 | $2,740 |

## LOW POWER CIRCULAR SERIES

| Model | Bays | Power | Gain | Price |
|---|---|---|---|---|
| GP-1 | 1 | 2,000W | -3.1 | $350 |
| GP-2 | 2 | 4,000W | 0 | $1,350 |
| GP-3 | 3 | 6,000W | 1.5 | $1,900 |
| GP-4 | 4 | 6,000W | 3.4 | $2,600 |
| GP-5 | 5 | 6,000W | 4.3 | $3,150 |
| GP-6 | 6 | 6,000W | 5.5 | $3,700 |

## MEDIUM POWER CIRCULAR SERIES

| Model | Bays | Power | Gain | Price |
|---|---|---|---|---|
| SGP-1 | 1 | 4,000W | -3.3 | $690 |
| SGP-2 | 2 | 8,000W | 0 | $2,690 |
| SGP-3 | 3 | 10,000W | 1.4 | $3,595 |
| SGP-4 | 4 | 10,000W | 3.3 | $4,500 |
| SGP-5 | 5 | 10,000W | 4.1 | $5,300 |
| SGP-6 | 6 | 10,000W | 5.2 | $6,100 |

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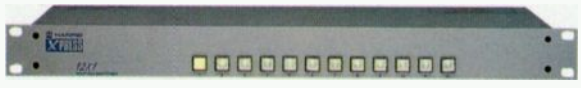

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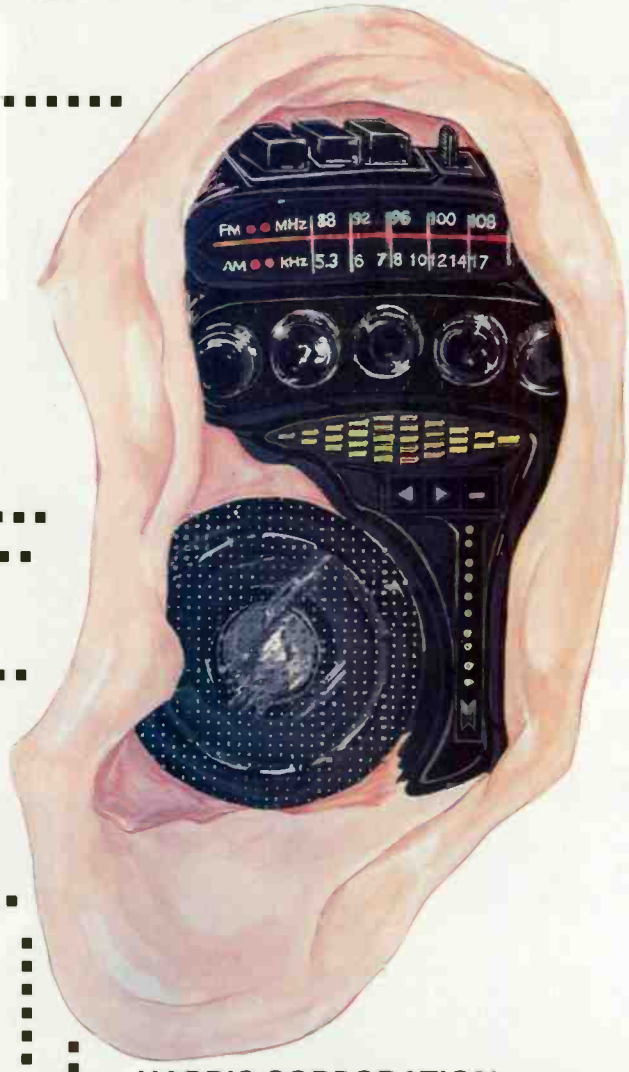


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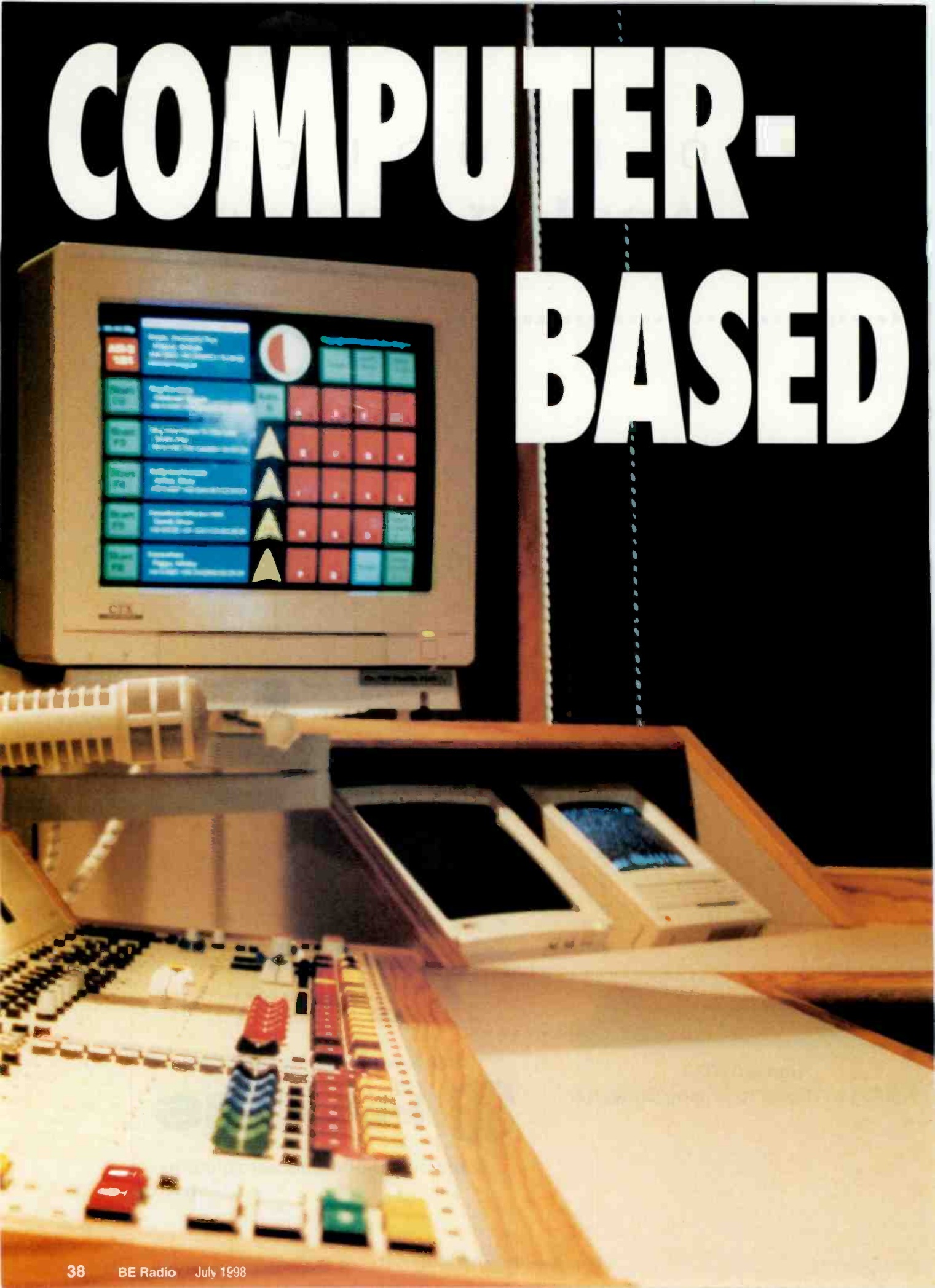
# COMPUTER-BASED



***Computers used to be simple tools. Now they're the foundation of operation throughout many radio stations. How are computers helping your stations? The skills for many jobs have changed because of them, and the expected level of productivity has also increased.***

# OPERATIONS

**By Kirk Harnack**

To really understand how great an effect computers have made on radio operations, all one has to do is take a walk through a facility. I recently did that with my daughters on Take-Your-Daughter-to-Work Day. Taking the tour with children gave a whole new perspective the important role that computers play and the value we place in them.

## A station tour

While driving to the station, a question was raised as to the number of computers we have at the station. My mind drifted from the road as I contemplated the question. I counted out loud how many there were — 15 — no, 16, 17, 18 — no 20 computers, one Novell server, an NT server on the way, two routers and CSU's, two frame relay drops, a couple of hubs and a fax server. I'm sure I missed several in there as well. It's amazing how many computers are actually involved in the station operation.

Where are computers being used? Continue the tour and see.

The Sales staff was watching a CD-ROM presentation. The presentation was rather generic, but we plan to do similar presentations in-house which will include charts and comparisons drawn from local data sources to show the value of our advertising space. Some of these will be put into a CD-ROM media kit that can be given to potential advertisers. Later in that same meeting, an incoming message box popped-up on the sales presentation computer from our other sales office. They were calling-in for the morning video conference.

Our stations' headquarters and our remote sales office are in two towns about 40 miles apart. Both offices have 10BaseT Ethernet LAN's and both are connected by frame relay service to each other and to the Internet. A router and CSU/DSU connect each location's LAN to its frame relay circuit. Each frame relay circuit, in turn, has virtual connections to both the Internet (through our ISP's router) and to the other office. We just got the two-way video conferencing running a week ago and it needs some tweaking.

For many stations, ISDN service works well for video conferencing. In our case, ISDN service is too expensive. Our local central office switch won't handle ISDN, so one must pay mileage charges from another city. The bottom line — $250 per month for BRI (2B+D) ISDN service. Frame relay was almost half that cost.

There are 11 computers in use in the control room. They are tied to only three monitors. We switch between any of the computers using special keyboard commands. This economy of monitors saves drastic amounts of space within the control room and also helps to reduce the amount of EMI that CRT displays can cause. The morning show

# COMPUTER-BASED OPERATIONS


alone relies on six of the computers for its entire show. (See the equipment list for the station, p. 44)

In one of the offices, one member of the morning show, who is also the music director, uses his computer for show prep, e-mail, updating the web page playlist and pulling audio clips from the Internet. He also schedules music for two stations and exports the finished music logs to the traffic department for merging with the commercial logs.

In traffic and billing, the dependence on computers has been in place for some time. All the commercial orders, log editing, log reconciliation, co-op and monthly billing are done on one system.

Amazingly, we're able to use only one skilled employee to perform all of the day-to-day traffic and billing functions for five separate radio stations. Fast PC's, networking and streamlined business forms and procedures make it possible. We don't "sneakernet" logs anymore, and we've never had a printed log — ever — in our building. During the monthly billing process, two employees handle the workload so the bills get printed quickly and the daily traffic process continues normally.

In engineering, there are several computers. Unfortunately, many of them are not working. (Why do we keep 40MB hard drives and 1200 baud modems?) The main desktop machine gives me access to many things including the transmitter sites. I can check all the transmitter readings, the air conditioner, the security system, and even the tower lights. This will be automated so the computer will dial out to all five of our sites and check on things every few hours.

After checking on the transmitter, I open a web browser and surf over to the flagship station's audio processor. That's right — I surf to the audio processor. More and more equipment, devices and even appliances will be available with communications ports (Ethernet, FireWire, etc.) and dedicated HTML servers built-in. One manufacturer is offering a PC-based digital FM exciter that's already network-ready.

Another device beginning to find uses in radio stations is a LAN to RS-232 interface. Several are available right now. They allow RS-232-controlled devices to appear as nodes on a LAN. Using a web browser or telnet client, one can select and communicate with any number of serial-controlled devices. One application I have planned for this is programming and maintaining satellite switching interfaces. This is certainly better than balancing a laptop computer on my knee behind the equipment rack.

Through the network connection, the engineering computer is also tied into the on-air playback system. I can take a look at the logs and see what is going to play next. This integrated operation also allows me to watch the system in action — especially useful for troubleshooting. I don't have to hover over the jock in the air studio.

## PC integration

In less than two decades the PC has come into common usage for almost every aspect of station operation. I covered some of these areas in the tour, but let's look a bit closer.

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# United we stand: The open system advantage

By Ron Wilson

Log onto the Internet and the days when you could access only AOL or CompuServe content seem remote. Pull up to an ATM and know you can get cash even if it isn't your bank. Your long distance carrier of choice is easy to access no matter whose logo is on the pay phone.

In these wired days, we don't put up with proprietary or closed systems for long. With good reason — when systems work together, we gain a broader spectrum of choice and efficiencies that save time and money. That may be why the most-heard words at this spring's NAB were "open systems" and "interoperability." Implementation is the challenge. What are the issues to consider when looking for an open software or hardware system, and what levels of interoperability should you realistically expect?

## Front office functions

When the software in question involves business office functions such as traffic, accounting, and sales analysis, the openness of the system is largely determined by how it allows you to manipulate the data. Whatever built-in formats and reports exist in the system, there will be something you want to change or adjust, so it makes sense to look for user-definable report capabilities. Where they exist, ensure that those capabilities address your operation's level of complexity and offer you more than simple cosmetic changes. A large group of stations, for instance, would find it desirable to generate a top-level report covering all of the stations and showing combined totals instead of printing a separate report for each station and re-keying the data manually. Accessing those reports from multiple locations and in multiple ways is also helpful: if a sales manager can pull up avails information on his own PC screen without having to wait for a printout or the traffic manager's time to generate what he needs, you'll have avoided an information bottleneck.

You'll also want to be able to import and export the data, whether it's to pull a proposal in as a contract, perform detailed queries in a separate database program, or simply generate graphs and charts for your management slideshow. Microsoft's ODBC (Open Database Connectivity) format is becoming a *de facto* standard, and systems that support ODBC import/export — rather than some other, perhaps proprietary, standard — will give you the greatest flexibility.

## End-to-end efficiencies

In the engineering realm, the measure of openness is more in the area of interoperability: to what extent are the elements of your air chain "plug-and-play" with one another and with other key pieces of gear? This isn't an issue only of compatible connectors or analog vs. digital: it has to do with facilitating the continuous evolution of your systems.

Unless you're equipping a facility from the ground up, your systems are continually in flux as equipment gets upgraded or replaced. You want to minimize the need for those upgrades when they do occur, and minimize their ripple effect on other equipment you may be using. The gradual introduction of digital audio into the facility is a vivid example.

You can significantly smooth your system's evolutionary path by avoiding the proprietary wherever possible. In the area of computer hardware, systems that can run on off-the-shelf PCs without special modifications will streamline maintenance and hold down costs. Extending the same principle, look for systems that can use virtually any audio card. Besides saving you money (do you need to put a top-of-the-line sound card in a workstation meant only for auditioning?), such systems don't require you to irrevocably commit to a particular compression scheme or set of specifications. In software, start with a standard, current operating system like Windows NT as a baseline for compatibility, and look for interfaces with other key functions in your station. Tying together automation and traffic, for instance, can allow you to automate the reconciliation process and save hours of work each week. However, the two programs must communicate effectively. If the compatibility of either is limited to a handful of products or suppliers, keep looking. There are choices available that will keep more options open.

## The human component

Nothing is perfect. ISPs dump connections, ATMs shut down and POTS lines can be noisy. Even the most open of open systems can include interface challenges and unexpected surprises.

When that happens, there's no substitute for the human element in the form of the support offered by your suppliers, whether at the dealer or the manufacturer level. Service policies and marketing descriptions alone don't tell you everything you need to know about this critical area, so don't be afraid to ask. Find out about how the company's customer service reps are trained and what the depth of their experience in radio is. If it's a software company, are they also knowledgeable enough in issues that depend on hardware to help you diagnose a problem accurately? Is the reverse true for a hardware company? How do they test their products? Pose what-if scenarios. Poll your colleagues. And don't settle for a level of service which leaves you less rather than more confident about your equipment choice. Interoperability applies as much to people as to systems in the end, and partnering with suppliers who are ready and willing — as well as simply able — to help you put all the pieces together may give you the biggest open systems advantage of all.

*Ron Wilson is Customer Service Manager for CBSI, Reedsport, OR.*

• **Traffic & billing:** This is where most radio stations installed their first computer. Remember WANG computers with 8-inch floppy drives? Most broadcasters now use PC's in traffic and billing, although some minicomputers, like AS/400s, remain. Station groups are installing Wide Area Networks (WANs) to consolidate billing and accounting for many stations. Even large station groups are getting daily sales and forecasting data.

• **Sales tools:** Many sales departments obtained their first PC earlier this decade. The demographic analysis software available then didn't require much horsepower. However, today's graphic-intensive sales presentations demand PCs with plenty of power. Networking helps, too, so that sales people at related group stations can share common presentation templates and data. The day of the nationwide corporate radio sales videoconference is approaching.

• **Audio storage and automation:** The first PC-based digital storage and playback systems didn't sound very good. Early data reduction schemes were brutal on broadcast quality audio. Besides, only a few stereo commercials would fit onto a 40Mb hard drive. Current audio storage and automation systems deliver truly spectacular audio quality. Hard drive storage has become almost inexpensive, and powerful motherboards and processors are allowing software designers to incorporate many worthwhile features and functionality into newer systems.

The battle over audio compression algorithms is quieting as digital audio systems offer uncompressed recording and storage.

LANs, WANs and connectivity are today's buzzwords as consolidation continues within the industry. Commercials, jingles and even songs are recorded in one production center and transferred to all the stations needing it — even those in remote locations.

• **Research and marketing:** Song call-out research, newsletter faxing and telemarketing each have several computer-based solutions available.

While call-out research and telemarketing software is used mostly in top 20 market stations, broadcast fax is conveniently available in free and inexpensive shareware packages. A well produced, informative fax is usually welcomed by the recipient. However, it's a good idea to make it easy for any recipient to be removed from a station's fax list.

## The Next Step

Producing and maintaining an interactive website for techno-listeners to enjoy is probably beyond the scope of a chief engineer's job description. However, the engineering department can certainly contribute to the content of a station's web presence.

Setting up web cameras in control rooms, transmitter sites and prize closets can make for interesting web browsing.

If streaming audio is going to be available through a station's website, consideration for separate audio pro-

# COMPUTER-BASED OPERATIONS

cessing is in order. Audio processing requirements for extreme bit rate-reduced channels is going to be different than that used for a transmitter feed — not to mention the allowances made for on-air pre-emphasis. Optimal audio performance through the coding and decoding process depends not on high average "modulation" levels, but on careful level control without large increases in the audio's RMS value.

Interesting results may also be obtained from online surveys. In addition to "Tell-us-what-song-you-like" questions, the engineering department might want to inquire

## The computer compliment at Delta Radio, based in Cleveland, MS:

### On-air and programming

The morning show uses an ON AIR UDS II and a Computer Concepts DCS, both networked to a Novell server, a 486 for multi-track editing, web browsing and e-mail, a DTN weather terminal and a Win95 workstation running WireReady. Other stations in the group use Computer Concepts DCS computers and audio routing switchers interconnected via a Novell 3.12 server. The control/production room also contains audio terminal computers from Digital Courier International (DCI) and Digital Generation Systems (DGS). The stations' EAS system is PC-based and made by MTS.

### General Manager

The GM has a 133MHz Pentium with 64MB RAM and two hard drives (including a new 11.5GB IDE drive), a flatbed scanner for getting photos and printed sales materials onto the network.

### Sales

The sales manager works with a Pentium 200 MMX PC with CD-ROM, 64MB of RAM and a 2.1GB hard drive.

Each AE has a 100MHz Pentium with sound card, parallel port camera and fax/modem.

### Traffic and Billing

A 75MHz Pentium with two separate hard drives, data is backed up daily to both drives and also across the network to the continuity department's PC.

### Engineering

A basic 100MHz Pentium PC with fax/modem.

### Network

All business computers are networked using an inexpensive 10BaseT Ethernet hub and 10BaseT UTP wiring (see *Contract Engineering*, p. 10). The audio servers are located near each other and networked with Thin Ethernet (coax).

The business computers and the audio computers often transfer large files between themselves. Rarely, however, does a business computer need to connect to an audio computer. Therefore, to reduce the amount of data on each "side" of the network, the Novell server is equipped with two *Network Interface Cards* (NIC). One NIC connects to the audio computers while the other NIC connects to the business hub. This lets the Novell server decide whether data needs to pass from one NIC to the other in a simple and effective way.

Each office uses a Lucent Technologies Portmaster Synchronous Office Router and an Adtran DSU 56/64 to connect to the telco-provided frame relay connection.

about listening locations and what lengths remotely-located listeners will go to in order to receive a good signal.

Early attempts at transmitter site supervision with PCs were not very fruitful. The market size for PC-based remote monitoring is small compared with office applications. Sophisticated software and hardware solutions are just now becoming commonplace in the radio industry. Imagine monitoring 10, 20 or even 600 transmitter sites from one, central location. The variety and accuracy of data sources that may be monitored is truly limited only by the imagination.

## Intranet and extranet

Even smaller radio groups are benefiting from Intranet communications. Intranets can allow employees to locate company information easily and on their own schedule. Employee handbooks, guidelines, memo archives, and even birthday lists can be posted on Intranet web pages. Insurance policy texts, vacation schedules and directions to the next remote are also possibilities.

A web-literate employee can make quick work of putting such information on a company Intranet. Plus, the free and low-cost HTML publishing tools available can make it easy to get existing company documents into a webbed environment.

Extranets offer real growth potential for large and web savvy radio groups. Using your station group's extranet, ad agencies can examine spot avails for the coming weekend and determine if the price and timing are appropriate for their clients. Orders can be entered online and commercials forwarded via DCI, DGS or other providers.

## Internet presence

Radio stations debut web presences every day. More stations are also getting their audio on the net. Music and program licensing issues must be tended to prior to putting one's programming on the Internet, however.

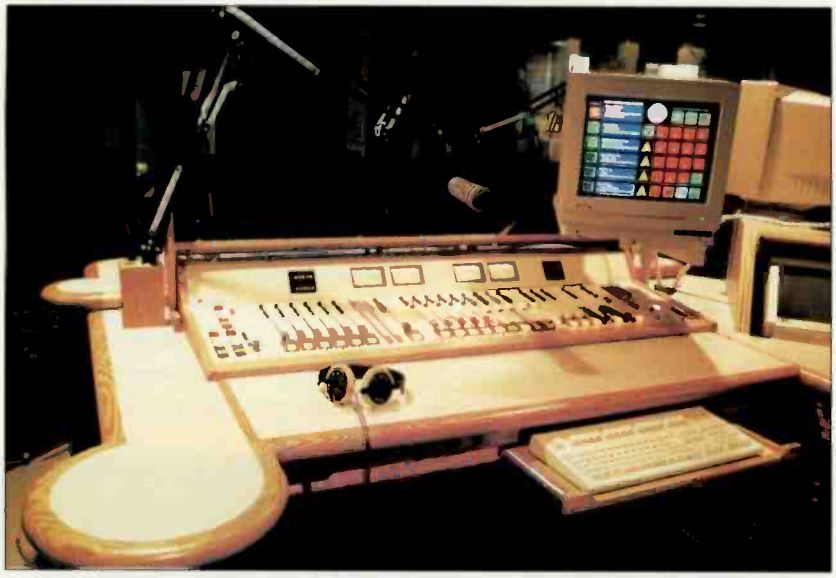
A well-designed website certainly increases listeners' interaction with your radio stations. Surveys, preferences, music testing and online registration for station events are examples of building an effective web presence by radio stations.

Some firms are making updated content available to broadcasters for inclusion on stations' web pages. These same firms offer complete web hosting and design services as well.

## Y2K compliance

What will happen to your radio station when the computer's date reads *01-01-00*? Many computer programs will behave as though they have gone back in time unless they are Y2K compliant. Several broadcast industry manufacturers are indicating readiness for the change to the year 2000. Traffic and billing software and digital automation systems are obvious candidates for Ensuring Y2K compliance. Other programs to verify and update if necessary are Personal Information Managers, wire capture programs, music scheduling systems and music/traffic merge programs.

# COMPUTER-BASED OPERATIONS



Some banks and other lenders are inquiring as to their debtors' readiness for Y2K problems and requiring that preparations be made now to avoid business (and debt servicing) interruptions.

## LANs and WANs

Surveys reveal that over half of the nation's radio stations have some form of Local Area Network (LAN). The overwhelming majority of those are 10Mb/s Ethernet systems. Newer installations — especially those transporting uncompressed audio files — are often 100Mb/s systems.

Engineers charged with installing or maintaining network wiring and equipment can conveniently educate themselves in the field. Many instructional resources are available on the Internet and in books.

Another worthwhile technique for learning networks is to hire a local firm to start the installation with the understanding that they will allow the station engineer to assist and then take over. Whether a cabling firm is hired or LAN installation is done in-house, be sure to test (with a Category 5 tester) and document each segment of cable. This can save many hours of frustrating trouble-shooting later.

What's in a WAN? Connect LANs together with routers and a data line to form a WAN. Routers decide which LAN traffic goes to the WAN and translates addresses in each direction. Routing is required to deliver data between any two systems that are not directly connected by the same physical network.

A variety of wired services are available to connect nearby and remote LAN's together. The options range from wireless RF-based links to frame relay, fractional T1 and higher speed services.

Wireless and dedicated data circuits like T1 are point-to-point services. If a station group wants to connect Boston, Berkley, Bakersfield and Brownsville together, then one site is chosen as the hub (Brownsville, for example) and data circuits are placed from each remote site to the hub. All data traffic must pass through Brownsville, even traffic going from Berkley to Bakersfield. Redundancy is available by adding additional circuits between non-hub sites and creating mini-hubs through which traffic may be routed.

Frame relay service involves a hardware connection to the service provider's "frame cloud." Virtual connections may be specified to other users' frame relay connections. Nationwide and worldwide networking becomes feasible when a frame relay connection is specified to the Internet via an Internet Service Provider (ISP).

A network connection accomplished via frame relay is called a "Private Virtual Connection" or PVC. Some firms are now providing hardware

## Online resources

***More information can be found online:***

- **LAN to RS-232**
  **Dawning Secure Network Interface**
  www.dawning.com/snipage.htm.
  **Lantronix**
  www.lantronix.com/htmfiles/prodinfo/category/msscat.ltx.
- **Remote Site Management**
  **Western Telematic**
  www.wti.com/rsm.htm.
- **LAN Extension and Connectivity**
  **Omnitron Systems Technology**
  www.omnitron-systems.com
- **Wireless LAN**
  www.wlana.com
- **Extranets**
  www.techweb.com/netbiz/extracontent.htm
- **Transmitter Monitoring**
  **WZPX-TV, Battle Creek, MI transmitter readings**
  www.wjue.com/engineering.html
  **Transmitter camera**
  www.wjue.com/snagit.html
- **Y2K**
  www.year2000.com
- **Internet Services**
  **Electric Village**
  www.electricvillage.com
  **Free Range Media**
  www.freerange.com
  **Radio Data Group**
  www.rdgcom.com

and software to encrypt data for PVCs, making the connection truly "private," even if the data is traversing the public Internet.

Computers are everywhere and utilizing them in new and creative functions can consolidate tasks and eliminate repeated work. As more networking and access possibilities are introduced, along with faster transmission methods and heavier data compression or reduction schemes, completely computer-based operations of the station will become a reality.

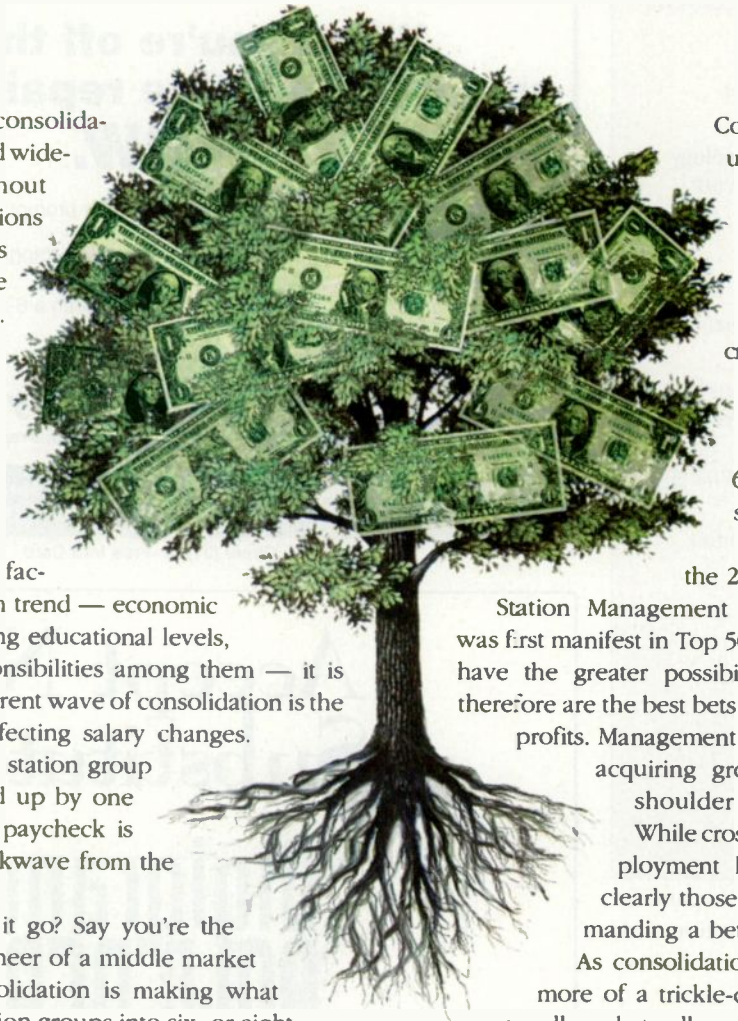
*Photos of KCBI, Dallas, courtesy of Scott Studios.*

*Kirk Harnack is president of Harnack Engineering, Inc. and director of engineering for Delta Radio, Inc., Cleveland, MS.*

# BE Radio's 1998 salary survey:

# ARE YOU KEEPING UP?

**By Jim Saladin, associate editor**



The effects of consolidation are deep and widespread throughout radio broadcast operations today. So say the results of this year's exclusive *BE Radio* salary survey.

The explicit objective of the survey is to determine compensation levels in the radio industry, but implicit is an examination of salary trends. While there are several factors that form any such trend — economic health, locality, differing educational levels, and specific job responsibilities among them — it is undeniable that the current wave of consolidation is the predominant factor affecting salary changes. Even if your station or station group hasn't been swallowed up by one of the big guys, your paycheck is going to feel the shockwave from the rest of the industry.

But which way will it go? Say you're the prospective chief engineer of a middle market station. Because consolidation is making what were two- or three-station groups into six- or eight-station groups, CEs across the nation are being asked to do more. Does that translate to higher pay for higher function or lower pay due to a glut of newly available qualified applicants? Our survey and analysis provides some surprising results.

## Salary level

No other segment of the survey shows a greater disparity than responses for the estimated salaries of station management. Respondents qualified as Station Management in the top 50 domestic markets continued to command larger median salaries than their counterparts in smaller markets. Salaries in the Top 50 increased by nearly 13% to $49,999, while those in markets below the top 50 actually decreased by almost 11% to $29,375 (figure 1).

Contract engineers continued to see a healthy upswing in their salary levels. Salaries for the Top 50 increased 8% while those in the rest of the markets saw a more sizeable increase at 21% (figure 2).

The margin was much less for large and small market staff engineers, 6% and 9% increases respectively (figure 3).

It's easy to understand the 24-point swing among the Station Management segment. Consolidation was first manifest in Top 50 markets. Those markets have the greater possibility of listenership, and therefore are the best bets for meaningful corporate profits. Management in the newly acquired or acquiring groups is being asked to shoulder greater responsibility. While cross-survey numbers on employment levels were unavailable, clearly those who have jobs are commanding a better wage.

As consolidation has exhibited itself as more of a trickle-down phenomenon than an all-market, all-at-once one, small markets are, relatively, just beginning to feel its effects. Mom-and-Pop stations, in efforts to either pretty themselves for sale or hone themselves for battle, are watching their pennies. Part of those efforts might be a greater reliance on contract engineers, thereby accounting for the larger upswing in that area.

## Certification

Another surprising aspect of the survey results is that professional certification, specifically Society of Broadcast Engineers certification, dropped among respondents.

Reported certification among staff engineers fell from 41% to 35%. The level among contract engineers dropped a lesser degree, from 41% to 39%. Combined levels show

a 12% overall drop, from 41% to 36%.

But salary numbers for certified versus non-certified respondents continued to argue for certification. Certified staff engineers garnered a salary edge of $46,650 to $44, 999 over non-certified counterparts, while the gap among contract engineers is even greater at $42,500 for certified and $34,999 for non-certified (figure 4).

Figure 1. Station management salaries.

A closer examination of the numbers argues even more stringently for certification. Certified contract engineers saw a 21% increase in salary, but wages for those who were non-certified remained flat from 1997's survey results.

Figure 2. Contract engineer salaries.

## Increase distribution

Despite the myriad changes in the industry, it's clear from the earlier numbers that salary levels continue to climb. So who's really seeing the increases?

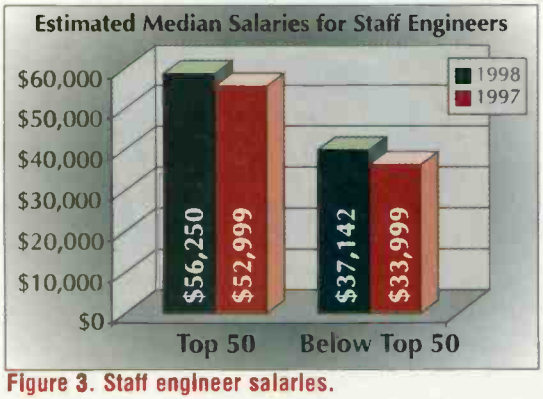


Figure 3. Staff engineer salaries.

Of all respondents in Top 50 markets, 66% reported salary increases over the last year (figure 5).

A disproportionate number of respondents in the Station Management category, — 79% of them — reported increasess, while 70% of Staff Engineer respondents also saw increases reported a raise. However, only 33% of those in the Contract Engineer category reported an increase.

In the Below Top 50 category, a similar, though less dramatic, disparity appears. Station management and staff engineers were still more likely to see a salary increase, with 59% and 58% reporting raises respectively. Contract engineers were about half as likely to see and increase, reporting at 32%.

So why were contract engineers less likely to see a raise? Station management and staff engineers are inherently part of a corporate structure. Despite all of the evils being pinned on corporate entities — everything from future mass unemployment to format homogenization — one benefit they bestow is relative financial security. If you survive attrition and navigate your altered responsibilities, you almost assured of at least a nominal cost-of-living increase. Credit centralized and standardized Human Resources policies.

Contract engineers, by their nature, exist outside of that corporate structure. They are most likely single practitioners. Some might belong to larger companies, but very few of those organizations approach anything like

# 1998 Salary Survey

a corporate environment. Salaries for this segment are based almost solely on what the broadcast radio market will bear in a given region.

Several factors will affect what the contract engineer brings home. Market forces lead to gross changes in the rates an isolated contractor will demand. However, those changes do not necessarily spell a shift in salary (due to adjustments in workload, overhead, etc.) or a change occurring industry-wide.

Today, as in years past and years to come, industry's buzzword is "change." Despite the uncertainty felt by so many members of our community, the results of this year's survey indicate a relatively rosy glow overall. What remains to be seen is what direction industry salary levels will take tomorrow, and what, if any, new trends will be realized as consolidation continues in its trickle-down path.

***Editor's note:*** *The complete results of the 1998 Salary Survey are available for $50 each. Contact Amy Katz at 913-967-1946, or e-mail beradio@intertec.com*

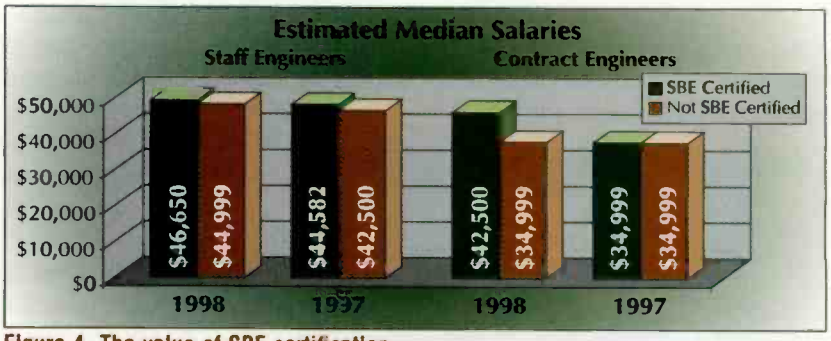



**Figure 4. The value of SBE certification.**

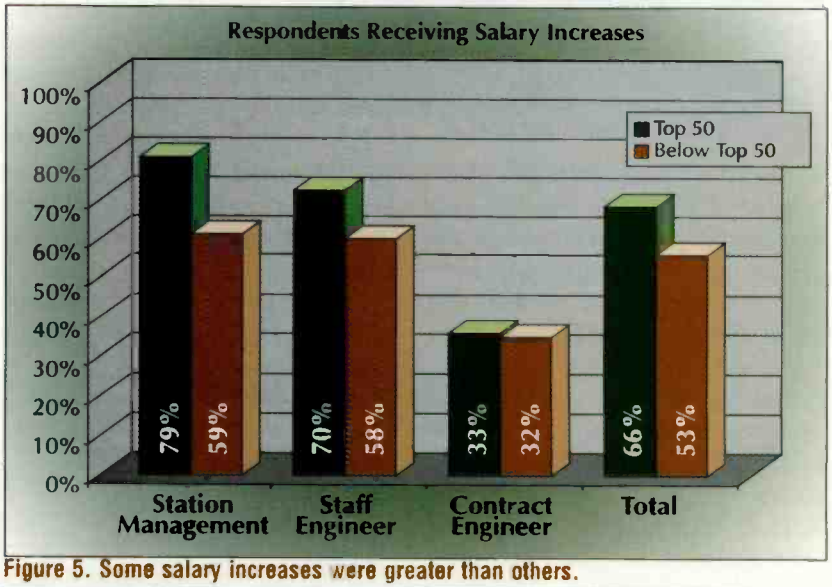



**Figure 5. Some salary increases were greater than others.**

*Cover letters and questionnaires were sent to a total of 1047 domestic BE Radio subscribers selected on an nth name basis among radio station and network subscribers. The survey was split into title and MSA market rank groups as follows:*

- **Station Management:** general manager, other corporate/financial official (including corporate sales), vice president operations, operations manager/director, station manager, production manager, program director, news director.
- **Staff Engineer:** vice president engineering/director of engineering, technical director/manager, chief engineer.
- **Contract Engineer:** work by contract and not staff employment.

# 1998 Salary Survey

## The write-ins

*Peripheral to the quantifiable survey questions, we request information on a couple of topics of the day and provide space for our respondents to give us their opinions. However, because space for answers is limited, and because the forms are anonymous, the replies we receive are more often painfully direct than diplomatic. Their comments range from astute to cryptic to hilarious. Provided here is a sampling of the best.*

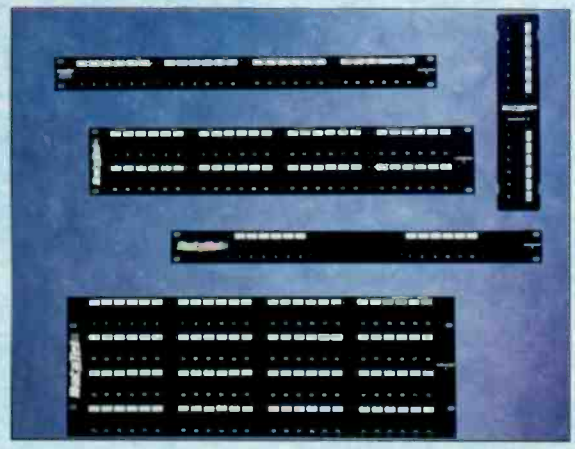
**What effect do you think the emerging radio delivery technologies (such as DAB or Internet radio) will have on employment trends in the industry?**

- Create more specialized fields, perhaps increase entry-level salaries.
- Cut staff to the bone to compete.
- I'm not smart enough to figure that out.
- Minimal. Increases offset by consolidation.
- Satellite DAB will end up carrying several nationally syndicated morning shows as simulcasts of the parent station.
- We are going to lose the ability to communicate on a one-to-one basis.
- Computer literacy will become as important as RF knowledge.
- DAB & DBS are coming to stay – only the strong survive.
- It was said best at the Madison Broadcaster's Clinic: There will not be job security but always work security. Always work to be done.
- None. They are not a part of the radio industry. Trendy stuff for fluff magazine articles.
- Not much effect for five years. After that my crystal ball gets fuzzy.
- Our days are numbered. Probably one person will take care of every station in the market.
- The above modes will further dilute the audience for radio qua radio.
- Blow everyone out of the water, hopefully.
- Engineers better get smarter or get out.
- Little if industry gets local. If they don't – oh well, it's too easy to get a jukebox now.

**Please comment on the most important issue facing you in your career.**

- Finding work in South Florida.
- Competition for spectrum space.
- Four major radio conglomerates own the majority of stations in St. Louis. Independently owned stations must be damned good to survive.
- Looking for a better paying station to manage.
- Retirement...actually figured out how to live on the small retirement program offered.
- Should I stay or should I go!!
- The callous, unappreciative attitude of management. Everyone and everything is a commodity & taken for granted.
- Consolidation of stations by mega-groups is destroying radio as I know & love it.
- Converting a large, complex facility from analog formats to digital formats without having to re-train entire staff.
- Fewer and fewer broadcast engineers. There are simply not enough of us to go around.
- Handling the increased workload of added stations while preparing for the conversion to digital studios and transmission systems.
- Huge and increasing job demands – no time for a life.
- Dealing with frickin' idiots.

# New Products



## Patch panels
DataTel

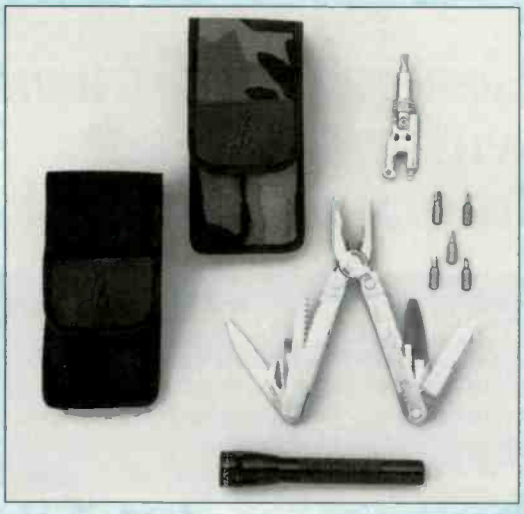
◀ **Category 5 Panels:** available in 12-, 24-, 48-, or 96-port versions; incorporates proprietary designs that eliminate circuit board deflection on punch down; fitted with a rear tool slip shield which protects circuit boards from accidental damage; units are compliant with Category 5 and TIA/EIA 568 standards; units occupy between one (12- and 24-port), two (48-port), and four (96-port) rack spaces; a 12-port horizontal wall-mount version is also available.

973-839-1011; fax 973-839-1976
Circle (201) on Free Info Card


## Multitone audio analyzer
Neutrik

▶ **Rapid-Test RT-2X:** features analog and digital I/O for ultrafast audio quality control in a production line; remote-controlled instrument may be operated in analog, digital or mixed mode, thus making the unit ideally suited for audio testing of ISDN phones or ISDN transmission lines; additional eight-bit/8kHz digital PCM interface allows adaption of the system to non-standardized interfaces of any digital DUT.

732-901-9488; fax 732-901-9608; e-mail: neutrikusa@aol.com; www.neutrikusa.com
Circle (202) on Free Info Card



## Multi-tool
Jensen

◀ **Multi-tool Kit III:** lightweight kit features Leatherman Super Tool with needle- nose pliers, regular pliers with wire cutter, clip point and serrated knife blades, wood/bone saw, metal/wood file, nine-inch ruler, can/bottle opener, four screwdriver blades, wire stripper and awl punch; includes tool adapter for ¼" drive bits, six hex drive bits, and a Mini Maglite flashlight.

800-426-1194; fax 800-366-9662; e-mail: jensen@stanleyworks.com; www.jensen.com
Circle (203) on Free Info Card

## Nearfield monitors
Tannoy

▶ **Reveal:** two-way discrete system provides extremely detailed, dynamic sound with wide, flat frequency response; for use in project studios, mobiles, and audio post, as well as broadcast applications; curved front baffle has been designed to minimize defraction; thick panel provides massive non-resonant mounting platform for the drive units; soft-dome tweeter is matched with a long throw bass unit using a hard-wired, low-loss crossover; both drivers are magnetically shielded allowing operation close to computer monitors.

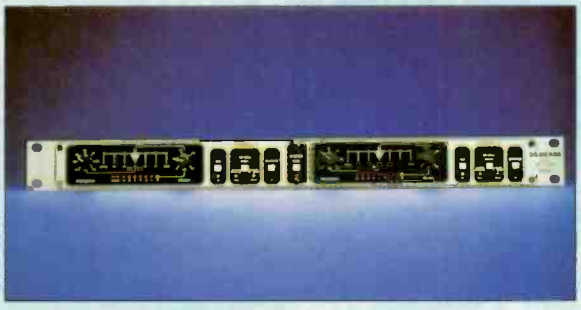
519-745-1158; fax 519-745-2364; www.tannoy.com
Circle (204) on Free Info Card

### Power amplifiers
QSC Audio

◀ **PowerLight 9.0 PFC:** delivers 1800W/channel at 8Ω, 3200W/channel at 4Ω, and 4500W/channel at 2Ω; incorporates power faction correction (PFC) that eliminates the poor power factor and low efficiency of traditional mega-power supplies; features line and load regulation, making the unit's peak power capacity insensitive to drops in incoming AC voltage; features high-speed components and large-die, N-channel MOSFETs combined with a four-tiered DC supply yield efficiency comparable to Class D designs.

714-754-6175; fax 714-754-6174; e-mail: info@qscaudio.com; www.qscaudio.com
Circle (205) on Free Info Card

### Dual de-esser
Drawmer



▶ **MX50:** variable frequency range (800Hz to 8KHz) targets the full sibilant range, including hard-sounding harmonics and related side effects that rise significantly above the average program level; full or split band de-essing is available via a front panel push button; an air switch restores relative level of frequencies above the sibilant band during the de-essing process, thus enabling de-ess capability without the typical significant loss of high frequency; option of +4dB or -10dB operation, so interface to a wide range of applications is possible.

+44 (0) 1924 378669; fax +44 (0) 1924 290460; e-mail: sales@drawmer.co.uk; www.proaudio.co.uk/drhome.htm
Circle (206) on Free Info Card

### RF cable entry and grounding system
Andrew Corporation

▲ **Arrestorport II:** integrates transmission line building entry, grounding and surge suppression into a single, unified system facilitating reduced installation costs and improved lightning protection; fits most common shelter openings; uses standard 4" cable entry boots for elliptical waveguide entry and features sturdy all-metal construction; accommodates microwave, GPS and other common wireless applications.

708-349-3300; fax 708-349-9222;
www.andrew.com
Circle (207) on Free Info Card

## Lucent enters DAB fray

Lucent Technologies recently announced a venture to develop In-Band, On-Channel (IBOC) DAB systems, a digital enhancement to current analog radio broadcasting. Lucent Digital Radio joins USA Digital Radio and Digital Radio Express as the newest player in the DAB arena.

Pai

Lucent and its research and development partner, Bell Laboratories, aren't newcomers to DAB technology. Bell Labs has developed a number of patented technologies for the DAB market, including the Perceptual Audio Coding (PAC) algorithm. The PAC encoder converts AM or FM radio signals into high-quality digital signals.

"Lucent Technologies is making a significant commitment to digital radio broadcasting through the formation of this Digital Radio venture," said Suren Pai, president of Lucent Digital Radio. "Lucent has the resources and the expertise to develop a successful IBOC DAB system for both AM and FM, and we will work with individual stations and radio network groups to achieve this goal on behalf of the radio broadcast industry. IBOC DAB is the most significant innovation in terrestrial radio broadcasting since the introduction of the FM band."

The new venture will be based in Murray Hill, NJ. For more information, check out the company's Web site at www.lucent.com.

## Galaxy IV bird goes down

When the Galaxy IV communications satellite lost attitude control on May 20, it not only stopped relaying pager messages, but media feeds too, including content for several public radio stations.

National Public Radio lost feeds to its network of 600 stations nationwide. NPR set up a live Real Audio Internet feed as a stopgap measure and was assisted by offers of transponder space from ABC, PBS and the Canadian Broadcasting Corporation. Member stations also had the option of picking up programs through an ISDN line.

NPR programming continued overseas without interruption because NPR Worldwide 24-hour international feeds are distributed via the ASTRA satellite.

PanAmSat Corporation, which owns and operates the 17 Galaxy satellites, shifted operations to Galaxy VI, the orbit of which was shifted so that it can permanently assume the duties of the crippled satellite. Galaxy VI was launched originally as a backup satellite.

Galaxy IV was launched in 1993 and was expected to have a 12 year lifespan.

## ARMA holds first show

The American Radio Manufacturers Association (A.R.M.A.) held its first convention June 4-5 in Atlantic City. Harrah's Atlantic City Casino Resort was the site of the activities, which attracted manufacturers from the United States and Canada. Attendees were predominantly from the immediate region of New Jersey, New York and Pennsylvania, but some came from as far away as Cleveland, OH, and Hillsboro, NC.

The organization, set up by Ernie Bellanger, then of Energy-Onix, Dan Braverman of Radio Systems, Jeff Detweiler of QEI, David Strode of Fidelipac, and Vince Fiola of Studio Technology, worked with other manufacturers to put the show together. The scope of the organization is to help encourage and promote the advancement of radio technology by North American manufacturers. During the convention, members formed a steering committee, composed of Vince Fiola, Elaine Jones and François Robitaille of Davicom Technologies, and John Davis of Media Touch. The next step for the organization is to finalize goals and a charter.

A.R.M.A

"We are not here to compete with the NAB and other groups, but rather to complement them and their efforts," said Fiola in a press conference on the second day of the show. Comments and suggestions are welcome and can be directed to Donna Detweiler, administrative coordinator, A.R.M.A.

The group is looking to hold its next event in early 1999 and it is also interested in working with regional shows, such as state organizations and SBE chapters.

Contact A.R.M.A. at 10 Princeton Ave., Egg Harbor Township, NJ 08234-7107; 609-653-6130; e-mail: mail@armagroup.org; www.armagroup.org.

# Online survey: Consolidation

## *With the frenzy of stations being bought and sold, consolidation has almost come to be expected.*

**By Chriss Scherer, editor**

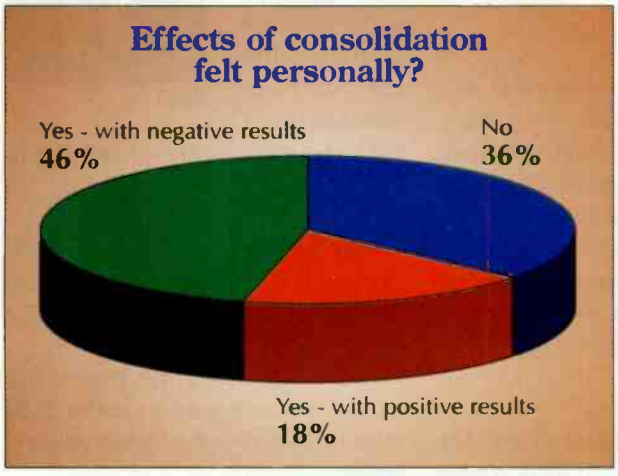
*Combined station facilities are commonplace today. Where fierce competitors once ruled the airwaves, the same stations are now co-tenants.*

The spectacle of consolidation began with a few group owners getting bigger by buying out or merging with other groups. Then these large groups turned to the medium sized groups. Markets once had almost as many owners as frequencies. Now, it's hard to find more than five or six owners in some markets. The reaction to all the activity ranged from bad to okay — but not great.

**Survey question ▶**
***What is your feeling about consolidation in radio to date?***


With changes happening all over, consolidation can easily affect all our lives. The comments from the second question shows that the effects can be good or bad. Some have lost their jobs as a result, others have gained more work — at least short term — by building new facilities.

**Survey question ▼**
***Have you personally felt any effects of consolidation?***




## Next month's survey:

***Pirate and micro-power radio.***

# Business/People

## BUSINESS

**Broadcast Electronics**, Quincy, IL, announced the acquisition of on-air console manufacturer **Auditronics**, Memphis, TN. Specifics of the stock deal were not made available. However, Auditronics will continue to operate as a separate entity with its product lines being assumed under the BE banner.

Also from Broadcast Electronics comes news that the company has been tapped by Chancellor Media's Washington, DC, stations WMZO, WBIG, WASH and WGAY for supply of a 256x256 analog routing switch with hardware and software control panel options. In addition, BE will supply a 17-workstation and three-server AudioVault system to handle all four stations.

**USA Digital Radio**, Columbia, MD, has awarded development contracts to Fraunhofer Institut für Integrierte Schaltungen (IIS) for advanced audio coding (AAC) compression technology and BittWare Research Systems, Concorde, NH, for hardware. Fraunhofer's AAC will provide CD-quality audio for USA Digital's IBOC system, while BittWare's custom processor hardware will be integrated into prototype exciters and receivers for extensive lab and field tests of the USA Digital system.

**Analog Devices**, Norwood, MA, has established an exclusive partnership with **The Harman Professional Group**, Herts, UK, to supply SHARC digital signal processors for the company's high performance product portfolio. The Harman Pro Group will choose from a wide range of 32-bit SCHARC DSPs for use in its products.

In an ongoing collaboration in the DAW environment, **Studio Audio & Video Ltd.** (SADiE), Cambridgeshire, England, and **Apogee Electronics**, Santa Monica, CA, announced the development of a new digital conversion system designed to fully integrate with SADiE's digital audio production systems. The new system will be derived from Apogee's AD-8000 eight-channel, 24-bit converter, with I/O and other system features fully integrated into the SADiE environment. In addition, UV22 and SoftLimit will be available on each channel without eating up any DSP power.

**Aphex Systems Ltd.**, Sun Valley, CA, announced an agreement to develop its Aural Exciter Type III and Big Bottom Pro DSP Plug-ins for the SSHDR1-Plus DAWs and new Mixtreme 16-channel PCI cards from **Soundscape Digital Technology**, Ventura, CA. The plug-ins are scheduled to begin shipping in September, and pricing will be similar to the price for Aphex plug-ins on other DAW platforms.

## PEOPLE

**Stephen Ely** has been appointed as the new vice president of North American sales and marketing for Broadcast Electronics, Quincy, IL.


Onan

Also from Broadcast Electronics, **Criss Onan** will be returning to the company and will assume responsibility for account management throughout the Northeast and North-central US.

**Walt Lowery** has joined Harris Corporation, Quincy, IL, as radio field sales manager for the Pacific Northwest.

Also from Harris, **John Bissett** has joined the company as radio field sales manager for the Middle Atlantic states.

**C.J. Foster** has joined International Datacasting Corporation, Ottawa, Canada, as sales manager for the company's US western region.

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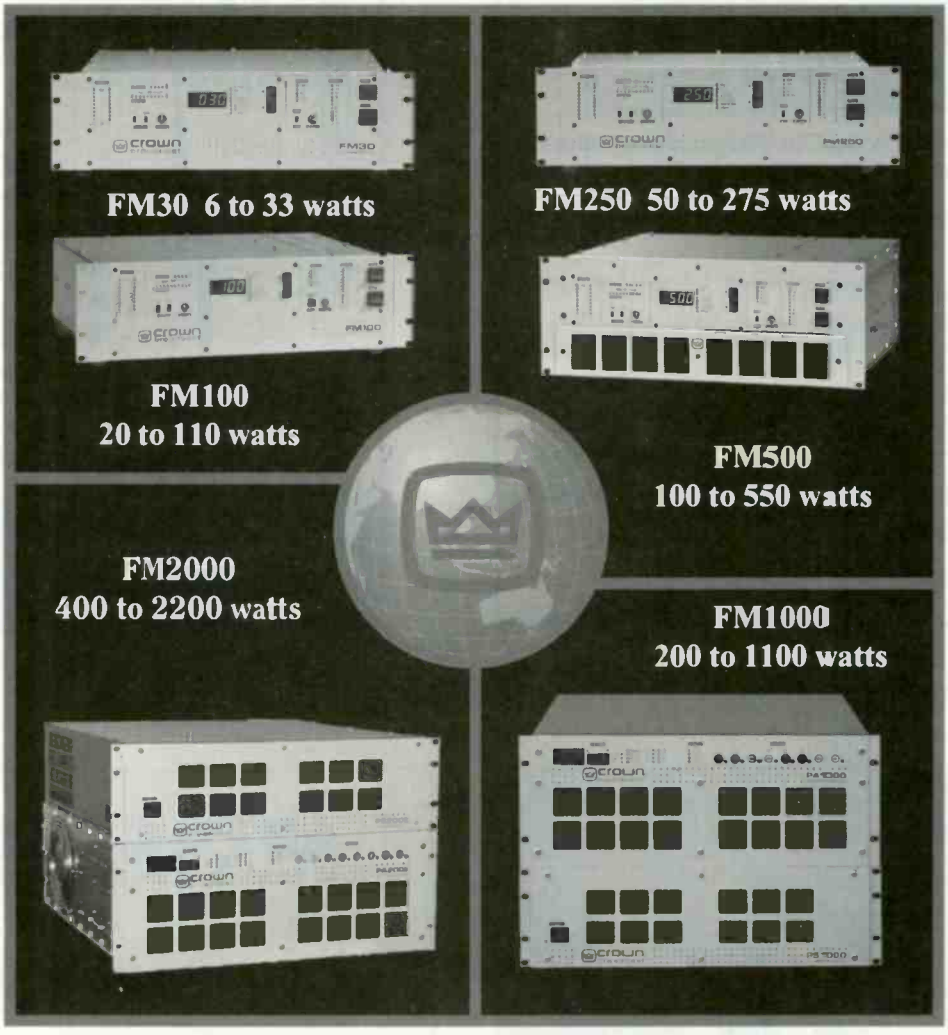


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# What's ahead in BE Radio®

## AUGUST

**• *The annual Product Source guide.***

We look at the hottest new products around, many of which debuted at NAB98.

## SEPTEMBER

**• *All about audio.***

The cover story looks at the needs of station production, and the feature story goes behind the doors of some studios around the country in the facility design special report.

## ALSO:

***• Audio levels • The monitoring environment***

***• Consolidating station group production***

***Plus News, Business/People, FCC Update, RF Engineering, New Products and the results of the online survey covering pirate and micro-power radio.***

## CORRECTION:

*"The Last Byte" in the June 1998 issue ("The LEO's are Coming," p. 106) contained an error regarding the investors in Teledesic Corporation. Microsoft CEO Bill Gates has a personal investment in Teledesic, but Microsoft Corporation is not an investor in the company.*

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PRIMEDIA Intertec

# PCs unplugged

**By Skip Pizzi, editor-in-chief**

The current hot-button issue of "convergence" concerns the merging of personal computers with television. Meanwhile, a quieter convergence has been taking place between the PC and consumer *audio* systems. Recent surveys have shown that a surprising number of US homes have their first (or only) CD players as CD-ROM drives in their PCs. Could this same transition happen to radio receivers of the future?

It hardly seems likely. While most all computers today have audio capacity, they're nowhere near as convenient or mobile as personal stereos, car radios or boomboxes, and few computers include a radio tuner — yet.

## Going mobile

This summer will see the introduction of the first personal computers for the car – the *AutoPC*. Marketed by several mobile electronics firms, these devices will look like car radios, but will actually be PCs running a modified version of the Windows CE operating system. The AutoPC will act as an integrated controller for all of the car's audio/communications systems (radio, CD changer, hands-free cell phone, GPS). Future systems will include DVD movie playback or gaming for backseat passengers (a great way to keep the kids quiet on those summer roadtrips) and direct integration to the car's instrumentation.


**Clarion's AutoPC will be among the first to hit the market.**

While this isn't all that different from the creeping microprocessor invasion that most recent-model cars have exhibited, the ability for the user to load standard OS software and customize the operation of a car-based, open-architecture computer will be a major departure. Adding hardware via USB ports will also be a change, along with infrared remote control capability. Perhaps most interesting are the speech recognition and text-to-speech conversion features that will be included.

## Distracted driving

There's been plenty of discussion lately about the use of cell-phones in the car causing a rise in accidents. Some have already voiced concern that a PC in the car will cause more problems of a similar nature. For this reason, the makers of car computers are emphasizing sound, rather than vision as the primary user interface (UI).

For example, speech recognition will allow the car PC to change radio stations for you by calling the preset number (e.g., "FM one" for your first preset button in the FM band). This will allow drivers to keep their eyes on the road more than they do now, rather than less. Conversely, text-to-speech conversion allows the PC to dial your Internet service provider via its cellular modem (via voice commands), download your e-mail, and read it to you with fairly convincing synthesized speech.

To further reduce driver distraction, the AutoPC relies on sound "icons" for communicating information non-verbally. Development in this area has come from a relatively new (and fascinating) discipline called *sonification* or *auralization* – the study of non-verbal sonic communication. Some simple examples of this are the fire alarm or the telephone, and the science of sonification explores why one sounds more urgent than the other to humans. In the case of the PC, sonification can help software engineers design sound icons that tell the user simple things (e.g., low fuel, nearing destination, an important just arrived, etc.) in self-explanatory ways that require little or no learning – just as a good visual icon would.

Sound icons can also be a far less annoying way of communicating frequently repeated messages, as early users of cars with voice alerts quickly learned. (A little "ping" is a lot more tolerable than the voice of Battlestar Galactica telling you "Your door is ajar.")

## Extrapolation

The big picture view indicates that radio will have significant additional competition in the near future. On-line and S-DARS radio may be strong players in this market. A wider range of services and some degree of interactivity may be expected by future consumers who use a computer as their standard receiver platform, wherever they are (car, home, office or in between). Broadcasters will need to observe market trends for early indicators of this movement, and react appropriately with enhanced services that continue to satisfy a new breed of customers.


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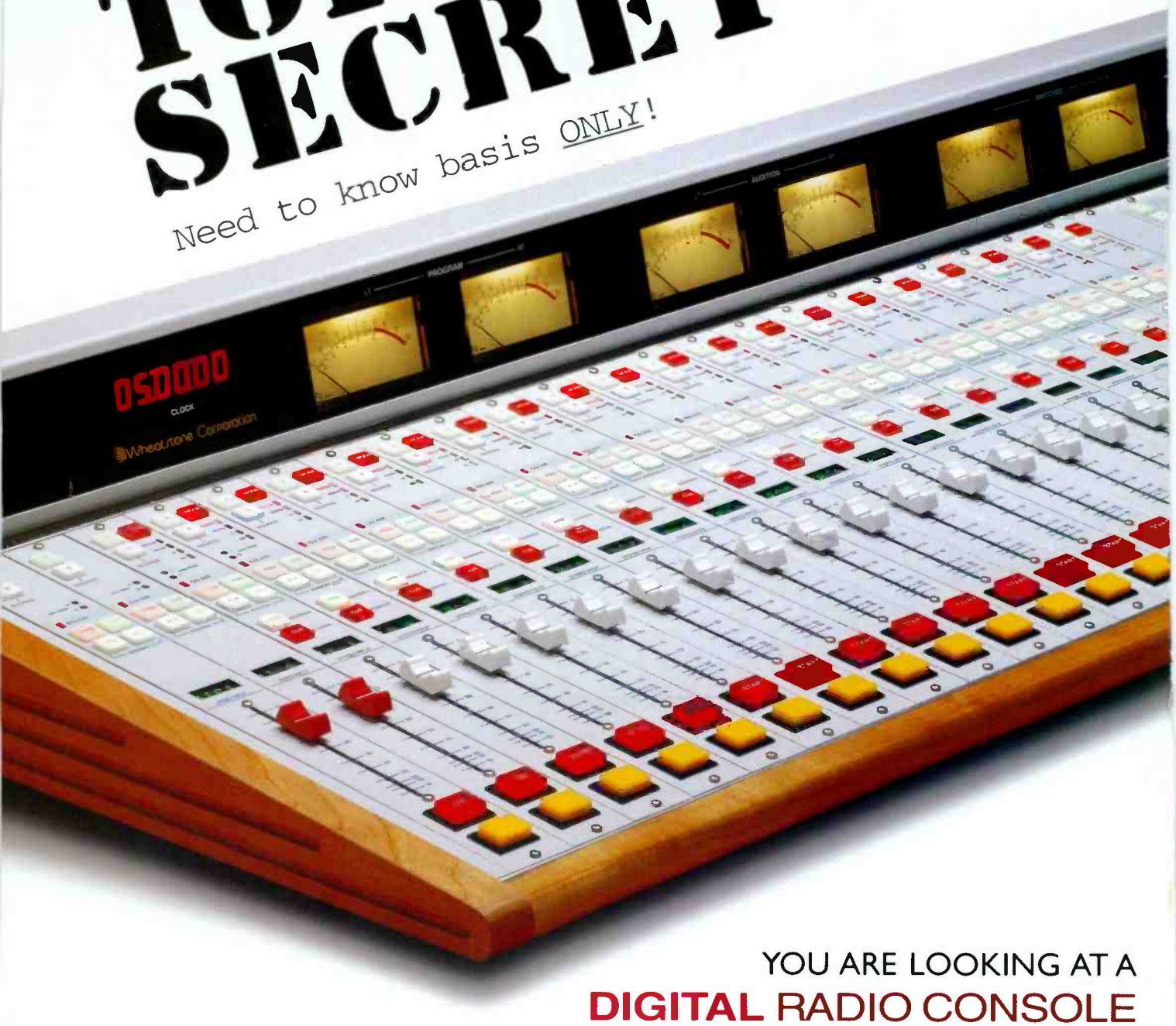


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