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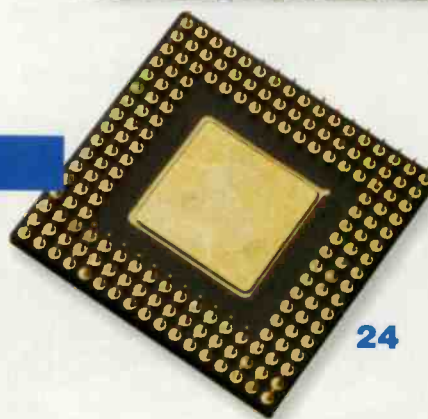
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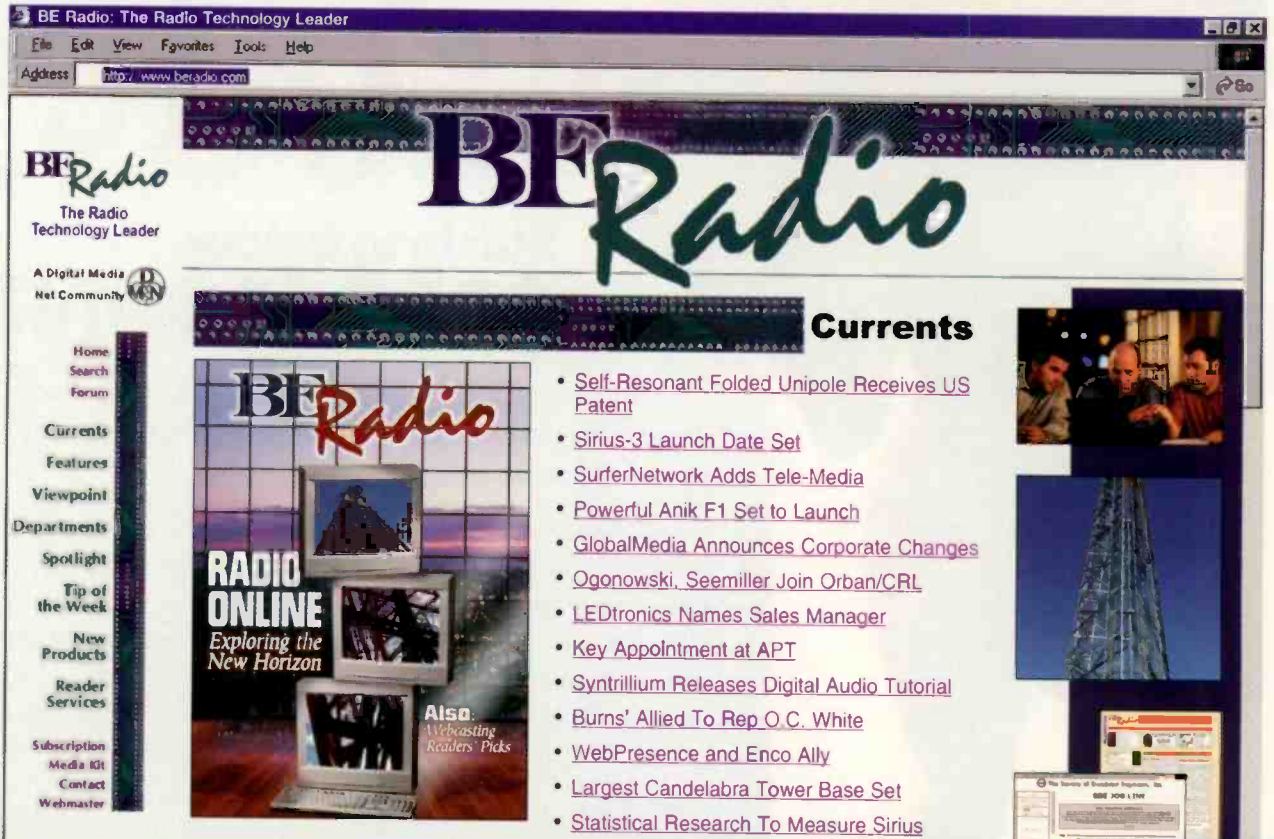
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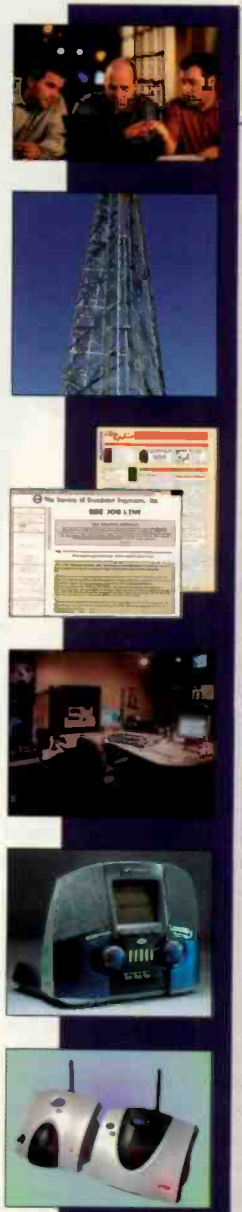
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Facing change

Radio tends to favor a conservative approach. Once the innovator in RF technology and audio, radio now follows the lead of other industries. On the eve of a new millennium (yes, 2001 is the real start), radio is preparing to be an innovator again.

The most recent change for radio was the introduction of digital audio sources and control. The advantages of adopting a digital standard were easy to recognize at first. Eliminating tape hiss and vinyl-record surface rumble were the early prizes in digital audio. Removing noise and distortion from the medium carried over to STLs and phone lines as well.



Our acceptance of digital audio was facilitated by the limited choices available. Nearly everything was PCM. Sources with other encoding formats were not a problem because they were converted to analog; something we were already well prepared to handle. The small variations in available formats were not cumbersome to understand or implement.

We have since grown beyond AES-3, S/PDIF and SEDAT. Now we routinely encounter WAV, BWF, MP3, MP2, ATRAC and other formats with ease. As these new formats were introduced, we accepted them, and in most cases, continued to convert the signal to analog. Now we have advanced beyond the continuous conversion process and maintain a digital signal throughout the system.

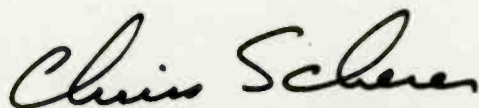
When new technology is introduced, there are some people that jump in head first. Sometimes they get burned. Other times they strike gold. It's a fine line between leading-edge and bleeding-edge. As a whole, radio accepts change slowly. The transition from vinyl to CD, from carts to hard-disk storage and from reel-to-reel editing to DAWs was slow and careful. These technologies were gradually introduced and accepted. Today they are mainstays. Not many people would be happy to return to tape splicing and multiple track bounces to produce a spot.

Yet, as far as we have come from the early Marconi tests to the first broadcasts of stations like KDKA, we continue to evolve. The Internet, a dominant influence in every industry, has already turned its hand to radio. Listening habits have been changed with the introduction of Internet radio, music download sites and portable audio file players. More changes are on the way.

It is interesting that while broadcasters carefully investigate new technology, consumers typically dive right in. Granted, the bottom line plays a major part in this scenario. The marketers have already exploited the word *digital* to the masses. Anything digital must be better than anything analog (or not digital). We know that this is not always the case, especially with initial product introductions.

Several major radio changes are due to be implemented in 2001. Satellite radio (S-DARS) will take its place alongside terrestrial radio and Internet radio. This should be the biggest change to affect radio in some time. In addition, Internet audio appliances will begin shipping, IBOC will continue its development course, and wireless Internet capabilities will increase. All of these changes will require radio to change as well. The basic role of radio – providing spontaneous and interesting content – will continue, but it will grow and evolve even more than it already has.

The new millennium is here – for real this time. 2000 was just a trial run. 2001 will deliver some significant advances. I'm looking forward to what the coming year may offer. Some of it has been previewed, much of it will be a surprise.



Chriss Scherer, editor
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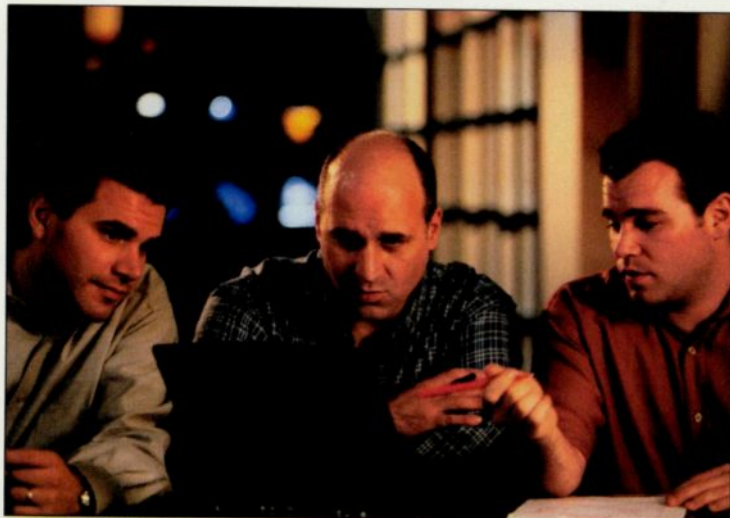
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Contract Engineering

Building your business

By Kirk Harnack

Radio stations need qualified technical help. Most need it right now; many needed it yesterday. Radio stations in more than 100 markets are trying to hire engineers and technicians, and enterprising contract engineers can provide a lot of the expertise needed. Such a large number of stations are actively seeking qualified technical help that contract engineers should have all the business they can handle. It doesn't matter if you're a contractor in a rural area, medium market or a large market; there's work to be done.



Contract engineers must educate their clients about the proper and prudent use of technical tools.

Last year this column discussed how to shed undesirable work from your schedule and concentrate on the engineering tasks you enjoy doing. Since there's no shortage of radio engineering work available, let's examine building your business from the inside. That is, working on your own business, technical and relationship skills, making yourself even more valuable to your regular and prospective clients. We'll highlight a few important qualities of successful contract engineers.

How many technical problems are actually caused by operator errors? Careless handling, misuse, poor operating technique and misapplication of equipment are frequent underlying causes of equipment trouble. However justified we, as engineers, are in pointing out the ignorance of the operators, we're much better served by acting as kind educators. Work to teach your radio co-workers that proper and prudent use of the technical tools we have will make everyone's life easier. Exposing the ignorance of the staff doesn't further your agenda.

Knowing how to answer questions from co-workers is a critical skill that's been mastered by many of the best engineers in our industry. If you've ever avoided asking someone what time it was because you knew he would tell you how to build a watch, then you know how important this skill is. When asked, "Why are we off the air?" or, "Why can't I receive the station in Smithville?" or, "Why are we buying more nitrogen?" be sure to consider who is asking the question. Consider your answer in terms the inquirer can use. Your reply should be formulated to the understanding of the person asking.

Have you ever committed to doing more work than could reasonably be accomplished? Have you seriously underestimated the cost or time required for a project? Have your efforts then been thwarted by unforeseen hurdles or delays? As engineers, we tend to be very good at visualizing a finished project. But, sometimes we don't consider all the steps required in getting to the finish line, nor can we foresee all the difficulties we may encounter along the way. Be careful what you promise to management and other staff members. While we take pride in our own abilities and want to use our knowledge and talent, our efforts are frequently hindered by events or conditions beyond our control. It's usually better to under-promise, then over-deliver if possible.

Sometimes, as contract engineers or consultants, we develop what is called the *savior syndrome*. It's not unusual that self-employed consultants in a variety of fields succumb to this condition. We walk into a client's facility, put them back on the air and are treated to mountains of praise that border on adoration. This is good for the most part, but if allowed to swell the ego, it is bad for relations with other staff members. Keep your ego in check, treat others with the respect you like, and present the attitude that you're there to serve.

Read the manual

Before you complain about some piece of equipment, or mis-adjust it, or call tech support, or open it up and fiddle with the sealed controls, read the manual. Once you've read the manual and followed its instructions, feel free to do all of the above. Once you've actually read the manual, however, you likely will find that the equipment's problem is actually a feature, and the operators will just have to use it that way.

Big capacitors and power supplies, RF fields, blower motors, or any devices using more than 24 volts are serious components. Too many broadcast engineers

Radio Daze

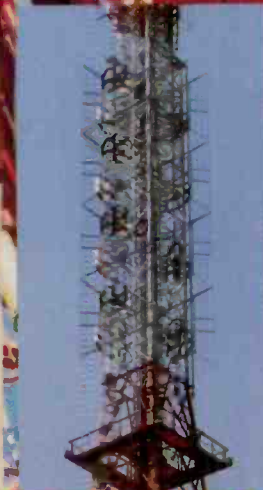
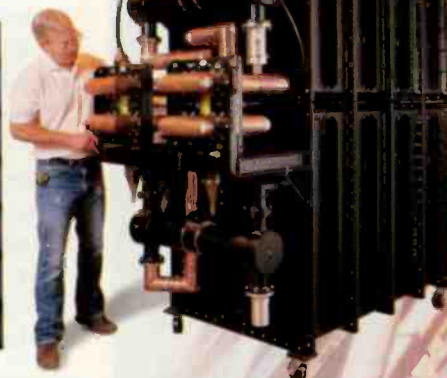
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
repair the problem quickly.

At some point, eventually, someone will be paid to do the job right. It might as well be you, and it might as well be the first time. There certainly are times when a project or repair can't be completed with the best of care. Work diligently to reduce these occurrences. This often involves educating your client on the importance and prudence of not cutting corners. As a contract engi-

neer or consultant, you have a responsibility not only to perform good work, but to inform, protect and educate your clients. Doing a job twice is never cheaper than doing it right.

Know your limitations and work within them. As contract engineers, we're quite often called to perform or consult in areas we may actually know little about. Full-time station engineers suffer this same problem and, perhaps, feel even greater pressure to accomplish tasks outside their expertise. If you're not particularly qualified to consult on a particular issue, recommend or hire someone who is. Internet newsgroups and listservers abound with practical advice and information. Network with other engineers and consultants and use their services whenever the client's best interests are best served.

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New leads to interesting work

The 1990s witnessed an explosion in the number of consultants working for themselves, often from an office at home. Consider the Internet's rise to popularity during the same time period, and the two were bound to cross paths.

Internet sites such as guru.com and freeagent.com can be quite useful to independent consultants and engineers. These sites match your unique talents and expertise with those needing the same. Other sites like monster.com, dice.com, and hotjobs.com are geared more toward those looking for full-time employment. Posting your talents and capabilities on such sites, however, can still lead to interesting and challenging assignments.

The work is out there – and lots of it. As you pursue the work and challenges you desire, be sure to spend some time and effort on yourself. Increasing your skills, learning from other engineers and building your network of experts will all pay off in building your business.

Kirk Harnack, BE Radio's consultant on contract engineering, is president of Harnack Engineering, Cleveland, MS.

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Staffing the station

By Barry Thomas, CSRE

Broadcast engineers are becoming more difficult to find. The demands and requirements for the modern radio engineer are more stringent, and the discipline itself is broader than ever before. Chances are that you have been faced with unfortunate and uncomfortable challenges in qualifying an applicant. There are several issues to consider.

What will it cost?

If you're replacing a person or creating a new technical position, the salary should be set when the budget is cast. If you're budgeting for the position, make sure you're in line with the proper pay scale. Use the *BE Radio* Salary Survey as a reference, but make sure your budget will reflect the prevailing rates in your market.

To justify a salary budget, outline the benefits of this person to the station(s). Station managers are often uncomfortable with technical people and become suspicious of growing numbers, but they understand that it takes people to fulfill the promises that sales and promotions departments make. Explain how the job vacancy will affect the station and the manager's ultimate success. To put it bluntly, many managers don't want to hear what the person will do, but rather what the person will do for them.

Often, engineering salaries are an attractive place for a general manager to cut back, which always amazes me. The entire engineering department makes up no more than five to seven percent of a typical station's budget. Personnel changes will usually affect a small percentage of the typical engineering budget. It seems to me there are much more effective, less damaging places to reduce costs.

Where to look

Finding available, qualified individuals (that haven't defected to cellular and wireless) is most difficult when a specific skill set is needed. If you have attended local SBE chapter meetings or are active with other engineers in town, you probably have a good idea who may be

looking and what talent is available. Be prepared to expand your search if there is no locally available talent.

Post the position and run help-wanted ads to comply with affirmative action, but make these efforts count. A classified ad in *BE Radio* will provide more qualified responses than a newspaper ad. Also announce your opening on e-mail list servers, like the those at Broadcast.Net, and nation-wide e-mail newsletters. Make use of the SBE Jobline (www.sbe.org). These actions will yield many applicants with skill sets closer to your needs. When you post these notices, don't forget the station's

EEO plan. It's not just legally prudent, it's good business and should provide you with a balanced field of applicants.

Look at the mergers, moves, and changes in your area. Ownership changes often modify or eliminate an engineering job. Mine for talent with these changes. With the change of regime, many engineers prefer to start anew. This may seem predatory in nature, but when faced with having to make a new start, many people would rather do so in new surroundings.

If you still don't have the kind of applicant you need, the *SBE Member Directory* lists local chapters and the

chairman in each chapter. Call the chairmen in markets of similar size and ask for their suggestions. Chapter chairmen are often the most-connected engineers in the market. Using this technique, I have found all kinds of job information, made new friends and learned some things in the process.

If you can afford the time investment, do the industry a favor and grow your own engineer. There may be a promotions person or weekend part-timer who has shown some engineering interest.

I've always found that a well-worded, short note posted on community college and university bulletin boards is effective. Younger staff members can provide some insight and may be enlisted to help post notices. This approach has resulted in a surprising number of applicants that include a few real stars. The biggest challenge is focus. Combat this by providing clear instructions and expectations for the job for which a person is being paid.

The image shows two overlapping screenshots. The top one is a webpage titled 'SBE JOB LINE' with a navigation menu on the left including 'Home', 'SBE/AVL Career Data Consolidated', 'Contract Engineer Listing', 'About Careers', 'SBE Jobline', 'Freelance Consultants', 'Membership Information', 'SBE Membership Application', 'Certification Program', 'Youth Mentorship', and 'SBE/AVL Officers and Board of Directors'. The main content area features a 'SBE RESUME SERVICE' advertisement with text about resume assistance for members. The bottom screenshot shows a 'BE Radio' classified ad for a 'Senior Design Engineer' position, listing requirements and contact information.

Many resources are available to ease your search for technical personnel.



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If the person is determined to get on the air, he or she will do it. I've had a few technical people work on the air as well. In these cases, I've enjoyed the benefit of a first-hand account on studio technical problems.

The pro-audio world is another source of technical talent. Music store repair techs can be very sharp. Most stores also have a bulletin board for local postings for

bands and instruments. This is another good spot for a technical person want ad. Sound men, roadies, and repair techs are often some of the best technical discoveries.

On to the interview

You should have a written job description for the position. Be as specific as possible, but keep the description fairly short. This will help you remember all the components of the job and the skill sets you're looking for. Write down the minimum technical requirements. Make a list of questions that need to be asked. Ask questions that are not answered with a

yes or no to draw out more information.

You're looking for experience, interpersonal skills and communications ability. Ask about specific items from the applicant's résumé. The more an applicant discusses his specific experiences, the better. It is important to listen. There will be awkward silence at times, particularly if you don't have enough questions prepared or you've allowed the applicant to get away with a short answer.

SBE certification offers an easy means to qualify the basic skill level of a broadcast engineer. It is also a real-world test. I encourage you to make use of this resource and rely on this certification as an objective indicator of skills. The interview environment is too emotionally charged and tense to expect an applicant to accurately depict his or her ability. Listening to the applicant's answers and following up with the provided references will give you a better overall picture of ability.

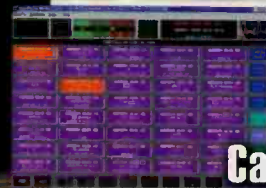
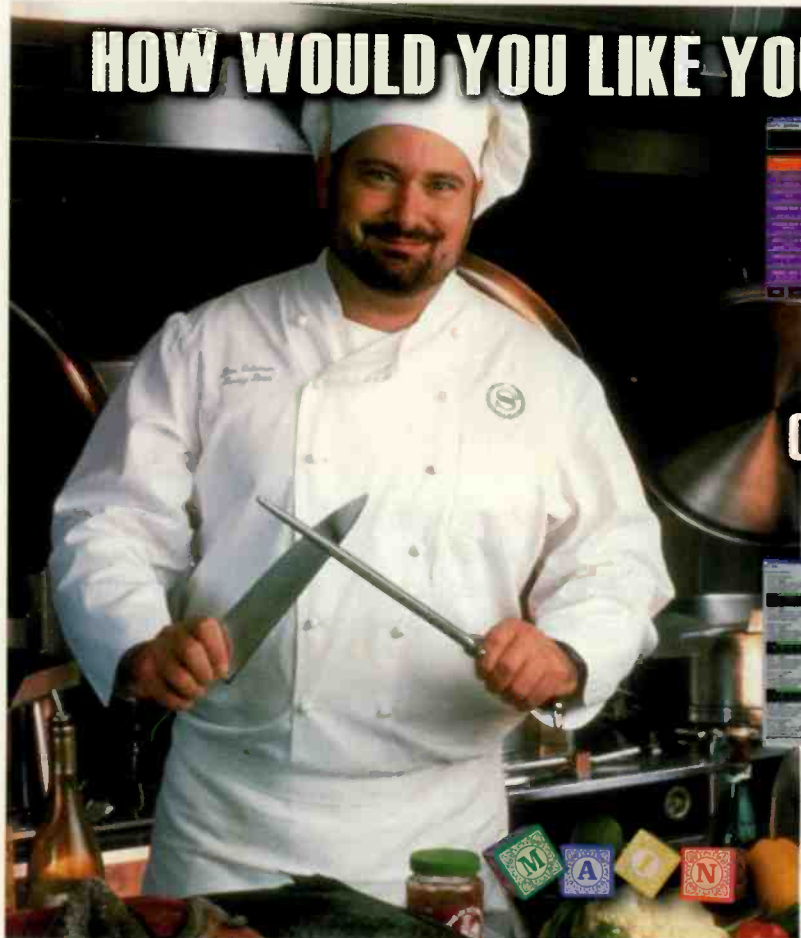
If you are fortunate, you'll have the problem of choosing between several qualified people. This decision often lies more with how you think the person will interact with your environment than with any objective measure. A successful employee is more a result of an environmental fit than technical skill. Good luck building your staff and growing the industry.

Barry Thomas is the director of engineering for Comedy World, Los Angeles.



Local SBE chapters are an excellent source for finding new technical talent.

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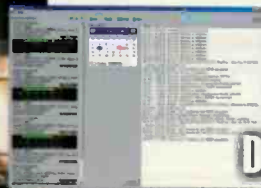


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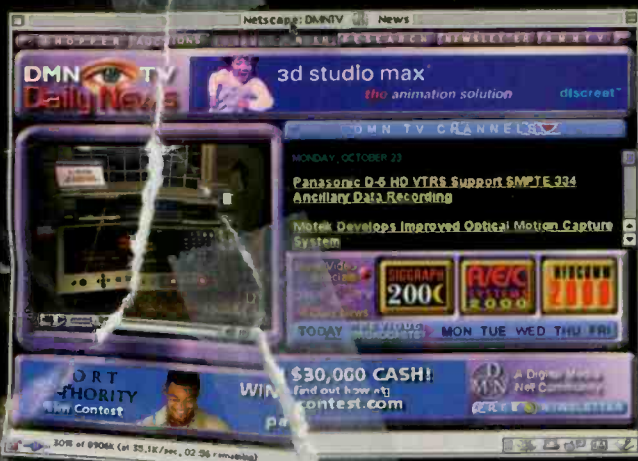
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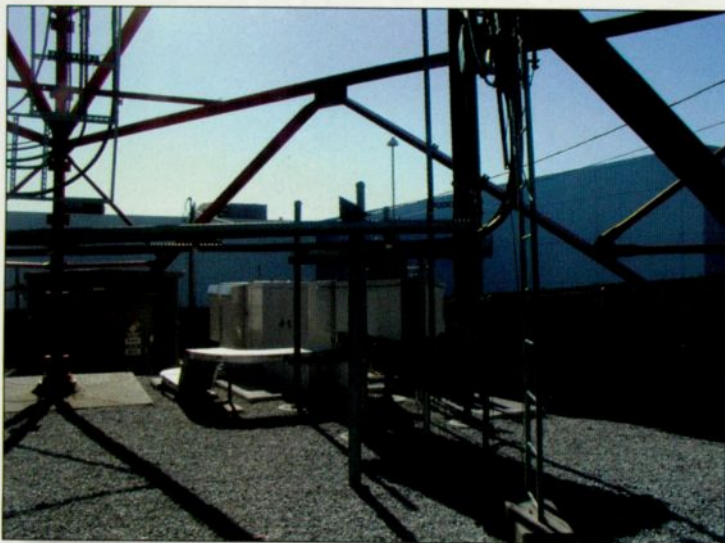


Care of transmission lines

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

Most radio engineers will agree that after the antenna and ground system, transmission lines are probably the most neglected item. For both AM and FM, the towers and their associated components don't appear to do much. Consequently, much of the transmission system receives no attention.

While most of the transmission line installed outdoors is flexible line, rigid line is common for inside installations. Because rigid line rarely has a jacket, damage can be easily seen.



An ice bridge protects lines from falling ice and any other debris.

Most AM stations have several hundred feet of coaxial cable either buried underground or suspended above-ground on a support system. Buried lines make a cleaner-looking antenna site and incur a reduced risk of vandalism. Current practice leans toward buried cables. Maintenance on above-ground cables must include a very careful mechanical inspection for signs of attempted cuts or bullet holes.

Regardless of the distance between the transmitter building and the tower, the condition of any coax run to the ATU needs to be inspected. Sometimes it's under the floor in a trough. Sometimes it runs over the top of the transmitter cabinets.

Under-floor cable has been known to suffer from rodent chewing and occasional flooding or even foundation movement. Over-the-top cables often rest on hot cabinet tops, and even the best materials sometimes suffer heat exhaustion. Chewing, heat and/or mechanical strain can produce a breakdown of insulation with resulting fire-

works. There should not be any sharp bends, but if there are any, be sure to check them for heating.

Ice protection is important for any coaxial cables within the ice fall zone of the tower. This applies to flexible and rigid lines. An ice bridge is cheap protection against falling ice and any other debris from the sky.

It's very important to inspect cable runs regularly when performing the tower/light inspection or maintenance and to note their condition in the log.

Immediately after WWII, RG-17 was popular in AM because there was plenty of it. This solid-dielectric cable may still be found in some of the older and smaller AM stations. It was a good cable, and many hams have used it very successfully. However, it has fairly high loss, and I don't know of many stations still using it.

If you are one of the few still using RG-17, the best check is probably mechanical, looking for damage to the sheathing and possible corrosion in exposed areas. If a TDR is available, and down time is permitted, it's a good idea to check it out for any impedance discontinuities caused by ill treatment over the years.

Long-term care

In the absence of uncontrolled excavations or back-hoe work, buried cable should be reasonably safe for a number of years. Nevertheless, I like to disconnect each end of the line and measure its impedance with the far end shorted. If this is done routinely, and good records are kept, signs of deterioration can often be found sooner.

At the same time, end couplings should be checked for corrosion. Sometimes copper strap has been brazed to the outer conductor at the antenna end. If excessive heat has been used, there is risk of dielectric failure at the brazing point.

Sometimes a strange abrasion is found where cable passes over a concrete or similar opening; any vibration can wear a hole right through the outer casing. There have been cases where vibration was due to an air conditioner or ventilation fan. These effects work slowly, but they can catch up with a system.

For stations using dry air or nitrogen in pressurized lines, good engineering practice involves maintaining a log of gas use or compressor behavior. Regular logging of gas usage can often help catch an incipient line leak. If leaks are suspected, lower work will not always lend itself to finding the leak. Again, a TDR can often

In my opinion, FM station coaxial cables are more



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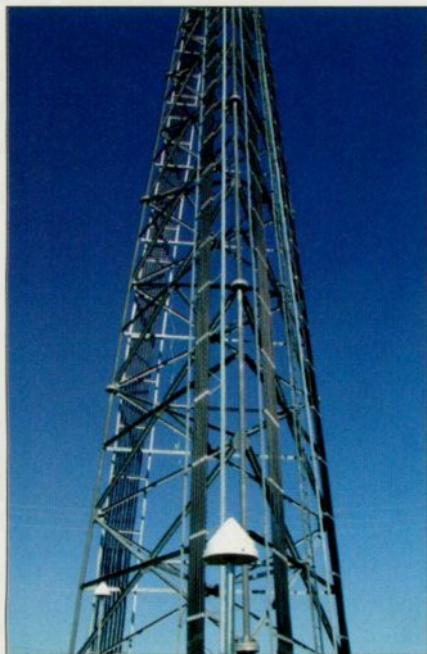
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susceptible to cable damage. I've seen a number of FM installations where the drum of cable was delivered and



Regular cable inspections can prevent small problems from becoming major catastrophes. Cable connectors, ground attachments and mounting hardware all must be checked regularly.

mounted, and installation commenced without proper precautions and raising materials. If a proper cable hoist grip is not used, the cable ends can be damaged. Wild, fast hauling of cable can break it, stretch it or change its diameter enough to produce impedance discontinuities. At the same time, correct, properly-spaced cable supports must be used to prevent stretching of suspended sections.

It is becoming more difficult to make antenna and transmission line measurements at multi-tower antenna or transmitter installations. However, if they can be scheduled, TDR checks are extremely worthwhile. Developing antenna

problems will often be discovered, and poor connections and other discontinuities will be found.

Special attention

Coax that has been spliced should always be suspect if there appears to be a cable problem. Although splicing kits do an excellent job once the cable has been cut and a new piece spliced, there is always the

risk of an air leak or a less-than-perfect metallic splice that can heat up and burn.

If a transmission line to an AM DA has to be spliced, it is essential to be sure the total length is not changed by adding the new piece of cable. A change of only a few feet can produce an antenna monitor reading that is outside acceptable limits.

In the field of DAs, another kind of transmission line should not be forgotten: the antenna sample line. A critical array, or even a regular type approved system using specially tempered sample line, must be inspected regularly. Should a line be damaged, the same type of line must be used for the replacement.

Buried sampling lines require the same care as transmission lines. Unfortunately, damage often occurs to lines and ground systems when trucks are driven through the area. Splicing a new piece of line or repairing a broken line is not a good idea. It can be done, and often seems to work quite well, but splices have a habit of causing trouble after a while.

It is common for all sampling lines to be of the same length and material for ease of adjustment. The FCC even requires it in some installations. This means that a length of standard coax can't replace a piece of special monitor cable. Remember that all of the antenna monitor cables must experience the same environment. If some cables are too long, they have to be buried in the same manner as the remainder and should not be left lying on the ground. Transmission line maintenance pays off in routine operations, but especially on a cold snowy night in winter.

E-mail John at: batcom@bright.net.

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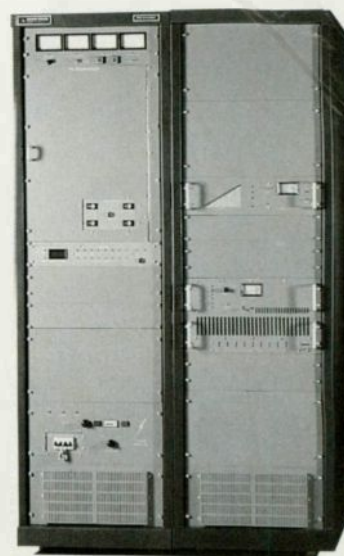
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The computing future

By Kevin McNamara, CNE

It's always fun to write about the future of technology because it permits us to combine reality with imagination. It has been said that the best way to predict the future is to look into the past. To put it into perspective, many of the products you'll use in two years haven't been invented yet.

When I started in this business more than 28 years ago, many transmitter sites were still manned, logs were recorded manually and state-of-the-art automation used multiplayer cart machines along with several reel-to-reel players. Originally, a simple relay-based control ladder operated many of these systems. While solid-state components

CPUs continue their evolution by becoming faster and more efficient.

were found in most devices, the consensus among many engineers was "anything that doesn't use relays can't possibly last." That mindset changed quickly, but the point is that this industry has always been slow to adopt new technology.

Consider that the majority of radio stations jumped on the Internet bandwagon only within the last three to five years, much later than other industries, even newspapers. Radio has consistently lagged behind other industries in its application of new technologies by a factor of five years or more. Given this trend, predicting the future of computing in our industry is easy. Look at what is hot now and, chances are, you'll be using some of it in the next year or two.

It's about the CPU

The good news is that CPUs are getting faster while consuming less power; the bad news is that you can't buy programs to take advantage of that power. In 1965, Gordon Moore predicted the number of transistors on a chip would double each year. That prediction was updated in 1995 to transistors doubling every two years. We know this theory as Moore's axiom, and it has held remarkably true for nearly 40 years. The software guys didn't have such a visionary. In most cases, operating systems are the limiting factor for application perfor-

mance. Don't believe it? Find two PCs with identical hardware and attach them to the same segment of a network. Load one with any of the current flavors of Windows and another with Linux. Using any of the network sniffer analyzer program and a large uncompressed file, measure the network throughput of the file as it transfers from each machine. You'll notice the Linux machine will always perform faster due to the additional overhead required by various operating systems.

As usual, this year's Comdex in Las Vegas became the venue for the Silicon Valley's finest to unveil the latest and greatest technologies. Several manufacturers announced the availability of workstations using the Intel Pentium 4 chip for less than \$2,000. The Pentium 4 chip currently touts operating speeds of 1.4- and 1.5GHz, both of which surpass AMD's Athlon. One drawback of the P4 chip is its inability to support dual processor configurations that are found on high-end workstations and lower-end servers. Currently, the P4 will only work with Rambus memory. It is expected these issues will be worked out with the next generation of the P4.

Not to be outdone, AMD announced a new series of chips with names like Duron, Mustang, Palomino, Morgan, Thoroughbred and Appaloosa. Although the Clydesdale and Quarter Horse are noticeably missing from the series, these chips promise speeds starting at 1.2GHz and will increase to over 2GHz by the first half of 2002.

A new player, Transmeta, introduced the Crusoe series of chips. Although the company's approach is to produce chips that work more efficiently and consume far less power than what is currently available, these chips are considered under-powered at 500MHz. The speed of the chip is expected to increase to 700MHz during the first quarter of 2001. Clearly, these chips are poised to address the next generation of computing appliances, particularly the devices that will combine your mobile phone, Palm-Pilot and laptop computer. It is just a matter of time.

One thing is true: the introduction of any new processor always leads to a significant price drop for current systems. We should see the 1GHz Pentium 3 systems available for less than \$1,000 by January.

I believe we have finally reached a performance plateau with the currently available hardware. At this point, upgrading your system from a Pentium 3 to one of these faster systems would likely not provide any significant speed improvement. The next generation of operating systems and applications will provide that next-level performance, but don't expect to see it soon.



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Next Wave

High-speed Internet access

Rather than the speed of the hardware, the future of computing will be determined by the speed of Internet access. Aside from its rich source of information, the Internet will also provide the applications that we currently purchase at the store. Moreover, high-speed access will finally permit the PC to become a viable multimedia device, allowing playback and delivery of flicker-free audio and video.

The FCC has released statistics about the availability of high-speed Internet access (a minimum of 200kb/s in both directions). The use of high-speed lines connecting small businesses and homes has increased by 57 percent, or 4.3 million lines, since 1999. DSL use increased 157 percent to 1 million lines, with other delivery methods such as wireless, fiber, satellite and wired services increasing at least 18 percent in the first half of this year.



Wireless Internet connectivity is commonly available in many areas.

Although DSL service is available in most large metros, it is physically limited by the cable length from the central office. Cable delivery is limited to those systems that have the proper infrastructure, and many systems are not capable of data delivery.

Several new companies are providing alternative wireless high-speed access for homes and businesses. Wireless systems are easy to deploy and typically cover a large footprint without the expense typically associated with wires. This market is also driven by a combination of falling equipment prices and the availability of carrier-class, designed to operate in the unlicensed ISM and UNII bands.

Teligent and Winstar are providing businesses with wireless voice and high-speed data at costs less than that of the local bell company. Technologies like Bluetooth seamlessly integrate your Palm device with the Internet. E-mail can be checked from your pager. Web access and e-mail are available on your PCS phone. And a new technology called 3G is expected to be deployed in this country in the next 2 years, extending the data capabilities of your mobile phone to allow high-speed connections while driving.

All this amounts to better performance, reliability and lower costs. I look forward to the future.

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

All of the Next Wave articles have been approved by the SBE Certification Committee as suitable study material that may assist your preparation for the SBE Certified Broadcast Networking Technologist exam. Contact the SBE at (317) 253-1640 for more information on SBE Certification.

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12:20:28	M1732	Dance The Night	Van Halen	02:47	:13	F	MUS
12:23:13	V026	Voice Track 26		00:12			VTK
12:23:28	DALIVE	SPOT SET		03:00		I	COM
12:26:25	J011	Jingle / Fast		00:06			Jin
12:26:31	M0713	Listen To Her Heart	Tom Petty	02:48	:11	C	MUS
12:29:19	V027	Voice Track 27		00:15			VTK
12:29:34	M2214	Black Friday	Steely Dan	03:40	:12	F	MUS
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When Salem Los Angeles built its new studios, the talk studio was built to be functional as well as visually attractive. This included large windows for easy viewing in and out of the studio. Unfortunately, this architectural decision resulted in an acoustic problem. The room had a reverberant sound that was obvious when more than one microphone was in use. Since covering the windows was not a practical option, another solution was needed. Mark Pallock, Salem Los Angeles chief engineer, explains.

"We built a huge talk studio with glass on three sides. When we turned all six mics on at one time, a horrendous acoustical feedback resulted from sound bouncing off

the glass. It sounded like everyone was speaking inside a tunnel." The cure to the problem was the downward expander in the 528E. Pallock continues, "The mic processor electronically shuts off the mics that are not being used. It works very well."

The 528E is a self-contained voice processor that performs six separate functions: microphone preamplification, de-essing (sibilance removal), compression/limiting, downward expansion, parametric equalization and voice symmetry alignment. All six processors may be used simultaneously. While the 528E is called a voice processor, it is perfectly suited for any audio signal. The unit includes a mic-level input and a line-level input. A front-panel switch selects the input source.

In all, the Salem facility has eight units installed in its studios including the Symetrix 528, the predecessor to the 528E. The four stations, KKLA-FM,

KEZY-AM, KIEV-AM and KFSF-FM, all use different microphones including the AKG C-647, Electro-Voice RE-20, Neumann TP-103 and Sennheiser MKH-416. The 528E provides just the right amount of processing to make each microphone sound great.

Pallock points out that each station uses each processor differently. "On KKLA we are only using the downward expander. On one AM we are using the equalization. That station has a very narrow antenna bandwidth. The equalization helps us achieve a very punchy sound on the air. The 528E gives us a loud and clean sound."

Each processing section of the 528E features a full complement of controls in an easy-to-use layout. Separate LED meters monitor microphone gain and dynamics gain reduction functions to facilitate quick and accurate adjustment of controls. As a dedicated single-channel voice processor, the 528E delivers the same



KIEV 870 AM

KKLA 99.5 FM



processing power found in a recording studio signal chain. With the 528E you get the control you need, without the cost or complication of separate units.

Each processing function is routed to the next via the rear-panel jacks. A front-panel switch enables a hardware bypass of the section, but the rear panel jacks can be used to setup the processing sections in a different order. While not often used, this does provide another level of flexibility to the 528E.

The 528E works with any professional microphone. The mic preamp's gain is variable up to 60dB, and 48 volt phantom power is provided for condenser mics. A switchable 15dB pad reduces gain in front of the mic preamp to prevent distortion in super close micing situa-

tions. A front panel switch selects between microphone or line input. Both inputs are transformerless and are equipped with filters to prevent radio frequency interference (RFI).

The Symetrix program-controlled *Integrated Dynamics Processing* (IDP) techniques combine the best attributes of compressor/limiters and downward expanders. The compressor/limiter maintains uniform levels while the downward expander eliminates pumping, breathing and noise build-up. Because it is program controlled, the 528E's dynamic range processor responds

quickly to transients and gently to smaller level changes. The controls provided are Expand Threshold, Compress Threshold, and Compression Ratio. The three-band parametric equalizer performs both creative and corrective operations, with bandwidth variable from 0.5 octaves to 4 octaves, 15dB boost/cut and overlapping frequency ranges.

Regardless of your choice in microphones, the 528E can make inexpensive microphones sound great and high-quality microphones sound even better. ■

Focus on enforcement

By Harry Martin

The Chief of the FCC Enforcement Bureau recently reminded all licensees that a renewed rule-enforcement effort has been undertaken in the last 12 months and that the FCC fully intends to continue the aggressive effort. The FCC conducted a bureaucratic shuffle last year that increased the agency's investment in enforcement. In his recent speech, the Chief of the new Enforcement Bureau restated that violators will be subject to "serious" consequences and that enforcement will be speedy.

The Mass Media Bureau Chief admonished licensees who, in the context of an investigation, adopt the tactic of providing incomplete or indirect responses to FCC agents. The Chief advised all stations to respond in a clear and straightforward manner. The FCC has stated clearly that failure to fully cooperate may have more serious consequences than the rule violations themselves.

Main studio rule reprieve. The FCC Commissioners overturned a fine by the Enforcement Bureau under the main studio rule. In January the Bureau assessed a \$7,000 fine against an AM station for failing to have sufficient staff at its studios during normal business hours. The AM station asked the Enforcement Bureau to reconsider its decision, in part because the station was relying upon a checklist it had downloaded from the FCC. The checklist did not mention the main studio staffing standard. The Bureau refused to reconsider its decision and stood by its fine. The station appealed directly to the FCC Commissioners who, in a brief order, noted that the station made a good faith effort, overturned the Bureau's decision, and canceled the fine.

FCC "Knows It When It Hears It." An owner of two FM radio stations was fined \$14,000 (\$7,000 per station) for indecent broadcasts. In the first incident, the station aired a joke which contained no curse words and no description of any excretory or sexual activity, but relied upon innuendo which required the listener to infer what was happening. The FCC stated that innuendo alone may be patently offensive and fined the station because the punch line of the joke inescapably referred to sex. In the other case, a listener wrote to the FCC and, without a tape recording or transcript of the aired segment, described what the listener remembered from the on-air exchange. The on-air exchange involved a certified clinical therapist who described certain sexual activities in clinical terms. However, the FCC noted that the on-air personalities were supplying additional commentary and noises which turned the segment from a clinical discussion into an indecent broadcast.

LPFM reconsideration order

In September the FCC issued an order which dealt with the petitions for reconsideration filed against its new LPFM rules. In its order, the FCC refused to require LPFM stations to provide third-adjacent channel interference protection to full-power stations, and adopted new procedures for handling interference complaints.

The new complaint procedures apply when a full-service station receives complaints of new interference from one percent of listeners in the area most likely to receive interference. Any such interference complaints that cannot be worked out between the LPFM and full-power stations would go into an FCC proceeding to be resolved within 90 days.

Although some broadcasters commended the Commission for adding the interference complaint procedures, others are concerned that the procedures will be slow and ineffective. Other broadcasters complained that the reconsideration order fails to protect public radio translators. The order specifically rejected a request from National Public Radio to allow translators that interfered with the right to have LPFM stations taken off the air.

The reconsideration order also (1) provides an exception to the third-adjacent channel interference rule when necessary to protect radio reading services for the blind, (2) does not modify LPFM power levels, (3) will not alter requirements for noncommercial operations, and (4) refuses to modify the Commission's previous decision denying LPFM licenses to unrepentant pirates. Further, the order revises the Commission's ownership rules to (1) allow one party to own multiple LPFM stations where there are no competing applications, (2) allow public transportation agencies and others to operate a string of LPFM stations, and (3) allow universities with multiple campuses and school districts with multiple high schools to have multiple licenses.

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

Dateline

Unless the new EEO rules are invalidated by the Washington, DC, Circuit Court of Appeals, stations in the following states will be required to place their annual EEO Public File reports in their public files and on their websites on or before February 1, 2000: Arkansas, Kansas, Louisiana, Mississippi, Nebraska, New Jersey, New York and Oklahoma. Biennial ownership reports will be due for the same states, also on February 1.

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RADIO ONLINE

Exploring the New Horizon

The Internet presents many opportunities for radio.

Like the Internet, radio has grown. It has grown to a medium that is more than just audio delivery. Radio in its current form is capable of high-quality stereo audio and (at least for FM) subcarrier services for additional audio or

data. The boom of Internet-related businesses has forced radio to stay competitive in a barrage of multimedia events. The Internet has provided radio with many possibilities that can be used internally as well as for the listeners' benefit.

By **Chriss Scherer**,
editor

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RADIO ONLINE

The Internet is graphically based. Radio has never before enjoyed the possibilities of visual elements. While access via a handheld device such as a PDA limits graphic display, even these interfaces allow a new level of interaction.

Because radio is audio entertainment, it lends itself to doing other things while listening. Offices are finding new listeners thanks to the omnipresent high-bandwidth connections. While most IT departments frown on the use of the bandwidth, Internet radio has given many stations a new path to the office desktop.

While most office listeners are not actively visiting the station's website during the day, the audio element

vide more information onscreen while listening. This information can be program-related information, such as artist and song information, or non-program-related, such as ads.

I won't even ask if your station has a website. The process of registering a domain and creating a basic Internet presence is so easy there is little excuse for not having something online. Before adding any of the enhancements mentioned above, there are some basic elements that every website should have.

but if it cannot be downloaded, it is all lost. If you have the resources to create these complex sites, you should be able to just as easily create

The Web is already being used successfully as a distribution medium to the listener. Internet radio listening continues to increase, as does the number of Internet radio stations.

a site that is friendly for slower connections and even PDAs. If your server cannot automatically detect what capability the user has, start with a splash page that lists the available site options.

The Web is already being used successfully as a distribution medium to the listener. Internet radio listening continues to increase, as does the number of Internet radio stations. Arbitron now routinely publishes Internet radio ratings. The Internet listening audience is different from the terrestrial listening audience. Stations that simulcast their air signal online can resell the same advertising time by using ad insertion technology. This allows a station to create an additional revenue stream. This idea can be taken one step further with targeted ad insertion. Both of these concepts are explained in *Webcasting* on page 46.

I use the Web quite often for getting general information about a company or a product, and I am always amazed at the number of sites that do not make it easy for me to contact the company. An online form is handy, but complete contact information is essential. Most station sites have a page with contact information for the air talent. Be sure to include a page with contact information for the entire staff. If nothing else, provide the phone number for the front desk. Some of your site visitors may be interested in more than photos of the morning show.



Stations can use wireless Internet connectivity to provide listeners with additional information even if they are not listening online.

alone creates an opportunity for stations. Other Internet listeners may be actively online conducting other business (or non-business) activity.

The online aspect of radio can change traditional listening habits by bringing the station forward from a background source. For this audience, there are many new technologies and services available to pro-

Not everyone has a high-speed connection. DSL, cable modems and other high-speed connections are becoming more common, but there are those users that can only obtain a 28.8kb/s connection reliably. Typically, these users will also have a slower processor. Creating a website with hundreds of images and Flash animation can be visually stunning,



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RADIO ONLINE

Look at other sites, and see what other stations are doing. Because the Web is global, be sure to look outside your own market for ideas. Other items that can be considered for inclusion on your site are an events calendar, station information such as history and coverage area, the station's current playlist, local information such as weather and news, and information on current promotions and contests.

More than just air

Creating additional content for the Web can be a challenge. If you are streaming audio, consider airing additional material and not just recycling (or repurposing) the air signal. With voice tracking so common in most on-air playback systems, special features can be



More information on the Virtual Public File can be found at www.beradio.com/html/2000/June/features/virtualPublic/06virtualPublic.htm.

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Regardless of what you are doing online, update the site often. Nothing is worse than a stale website except a perpetual under construction page. If you post a link that says "coming soon," the anticipated feature should be waiting in the wings. If it's more than a day or so away, remove the link. Also, try to redesign the look of the site frequently. Regular content updates will help keep the site fresh, but changing some of the static elements will also keep it interesting.

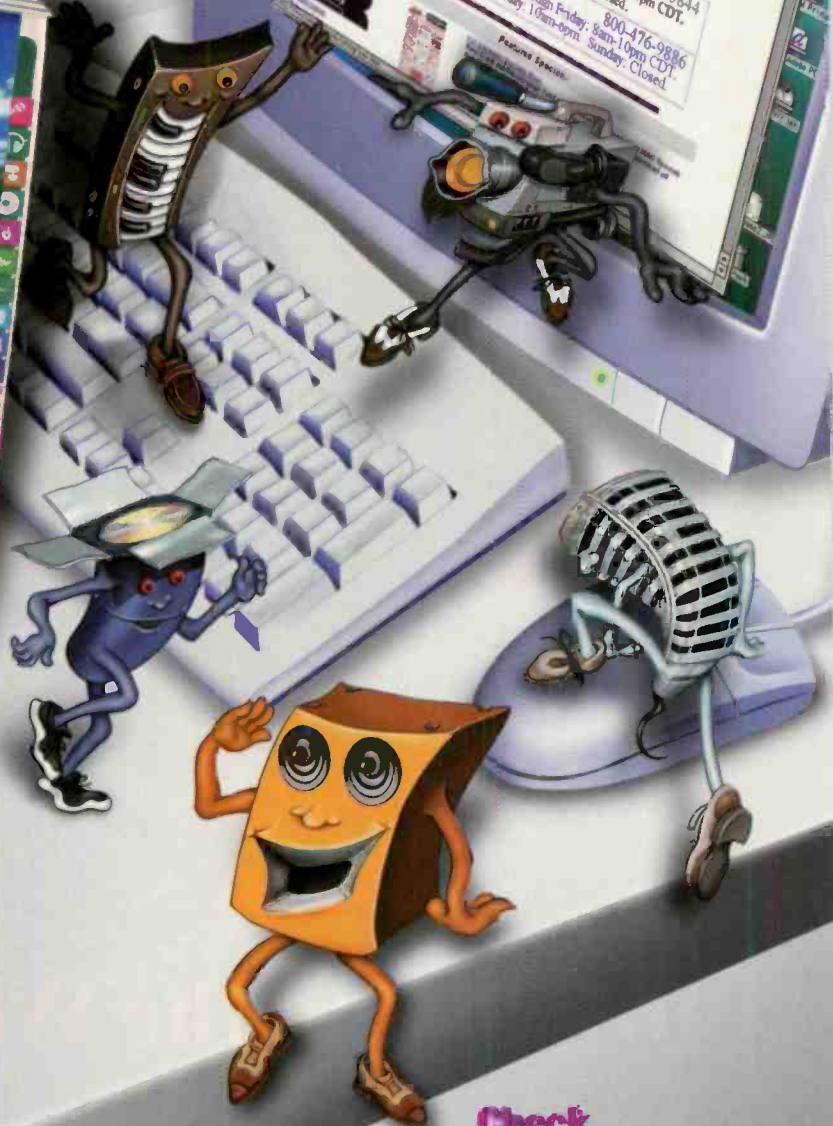
Earlier I mentioned having content available for a variety of user connection rates. Creating three complete sites is not an efficient use of available resources. If possible, do not rely on static HTML for everything posted. Database-driven sites can reduce the workload and eliminate posting errors. By updating a database, information can be posted once and recalled many times without the need to list and update the same information repeatedly.

A new use for a station's website is posting parts of the station's Public File. The June 2000 issue of *BE Radio* covered the details of the changes in the FCC rules. (Read the story online

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RADIO ONLINE

at www.beradio.com/html/2000/June/features/virtualPublic/06virtualPublic.htm.)

Maintaining a station's website can be a full-time job. It should be trusted to someone who understands the station's image and can carry it into the Web presence. It may not be practical for a station to maintain its own site completely. There are plenty of hosting services that can assist in keeping the site up-to-date.

Most of these providers offer tiered service plans that can be tailored to your station's needs. If this route is chosen, be sure that any content rights are covered. If you decide to cancel the contract with

Direct station uses

The Web has many uses beyond directly serving the listening audience. Real-time Internet audio delivery is not the most reliable service, but there have been cases over the past year where a program provider has lost its main distribution means, and the Web has been pressed into service as a backup system.

Since radio is an aural medium, *some* audio is certainly better than no audio at all.

Other station uses involve file sharing and distribution over the Web. Many larger groups have intranets set up to handle this, but not every group can justify this step. The

Web is not a completely secure system, so any sensitive files should be kept clear of it. In most cases, there is enough security to transfer files between facilities through one of several methods. (To see how Clear Channel is doing it, see *Managing Technology*,



Internet audio appliances such as the Kerbango tuner and Akoo Kima help simplify Internet radio listening.

the provider, don't be caught with the provider holding your site hostage pending any contractual settlements.



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RADIO ONLINE

September 2000.) E-mail and FTP servers can be used for many station needs. Even some of the Internet storage sites can be used in a pinch.

If building it yourself is not economical, services like those from AudioSonix, InterMax and SpotTaxi can make the file transfer load easier. These services provide one-to-one and one-to-many file distribution and other features. One advantage is that the upload/download process can

be automated to occur at off-peak, or any other, times. In the case of commercial files, traffic data can also be attached to the packet.

Choices for listeners

The listening audience is presented with many different sources of entertainment. The Napster sce-

Dedicated appliances take the function of a table-top radio or boom box, add an Internet connection and provide a simple way of receiving Internet radio broadcasts.

One Question, Three Answers

An actual email thread, June 8-11, 2000 on broadcast.net.

Thursday, June 8, 2000
To: bsi-@broadcast.net
Subject: BSI Experiences?

We are a small AM station considering implementing BSI software to automate our station. It seems to have all the functionality that we would need. Is this a good solution? Thanks for your input.

Friday, June 09, 2000 1:03 PM
To: bsi-@broadcast.net
Subject: Re: BSI Experiences?

John,

We've used BSI's WaveStation for about four months. I attended their training session June 1-3. That was great. We are also very pleased with the capability of the BSI software. The power of WaveStation is amazing. If you follow BSI's recommendations for your hardware you will be happy. Now this helps you. BSI will do all the expensive system will do and your bank account will look better.

Sunday, June 11, 2000 4:30 AM
To: bsi-@broadcast.net
Subject: Re: BSI Experiences?

John,

We started using WaveStation in January and are extremely pleased with it. It's been running glitch free. We use it weekdays in live assist to play our spots, PSA's, etc. and on weekends in live assist. At 11pm, both days, we lock the show and have WaveStation play programs recorded earlier, picks top score programs live from satellite sports news live at the top of the hour... records a couple of sports updates for playback a few minutes later. Jades programs out. some fill music... Jades fill music, etc.

We currently have only one computer set up for WaveStation. We will probably purchase a second one in the not too distant future.

Perhaps it's a sad commentary on life, but WaveStation is much more reliable and dependable than the human beings we used to use and "Wave Station" as we call the systems here. doesn't ask for technicians in pay raises.

Monday, June 12, 2000 10:00 AM
To: bsi-@broadcast.net
Subject: Re: BSI Experiences?

John,

We're running WaveStation on 2 stations, one is live-aided the other fully auto. While there have been bugs, most of ours have been PC related. WaveStation is a GOOD program to consider. I give it 2 thumbs up.

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nario opened the door to many legal debates, but the system itself has shown that the public has an interest in immediate audio delivery. Finding songs online and downloading them to a personal audio player has an appeal. Routinely creating song compilations keeps the selection fresh to the listener. Networks are designed for file storage and sharing, and the Internet is doing just that.

Having identified a potential service, companies like Echo.com and PCDJ.com have created an interface for the listener to find, download and sort the songs they want to hear. These services can be seen as a threat to conventional radio, since they provide an alternate means to obtain audio entertainment. However, an effort is still required to obtain or program the material. Radio stations could also use similar services to provide an on-demand radio product.

Internet audio appliances also provide a bright promise for Internet radio. Computers are good for many tasks, but are overkill when used as an audio receiver. Dedicated appliances take the function of a table-top radio or boom box, add an Internet connection and provide a simple way of receiving Internet radio broadcasts.

Regardless of the medium, creating, storing and transmitting audio content is a complex operation. Radio has provided a continuous audio stream since its inception. The Internet provides a new transmission medium that offers the opportunity to supplement the presentation. At the same time, the Web offers radio a chance to create new sources of revenue and new services for its listeners.

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Telos Systems, makers of industry-standard digital telephone systems for radio and TV, has provided a Series 2101 telephone system that will manage callers for 55 newly-built studios and 120 Omnia-3 digital audio processors that will help shape the sound of XM Satellite Radio's sound. XM Satellite

phone segments and talk shows through the use of sophisticated Digital Signal Processing (pioneered for broadcast phone systems by Telos in 1985). In addition, the use of digital telephone lines maintains a true four-wire path from the caller's Central Office to the radio studios for unmatched send/receive separation. Control of talk shows is also enhanced with faster, more precise call setup and line status reporting, Caller ID support, and the ability to screen talk shows from remote locations using LAN or WAN connections.

Radio recently completed its state-of-the-art multi-studio broadcast center in the Tech Corridor in Washington, DC.

"Many broadcasters understand the benefits of digital phone lines," comments Michael Dosch, Telos Systems' managing director. "The Series 2101 helps them exploit those benefits, giving them access to large numbers of incoming phone lines, and lets them administer and share those lines between multiple studios. It's the world's first telephone system designed specifically for large facilities."

The Telos Series 2101 Multi-Studio Talkshow System uses digital telephone lines (ISDN FRI, T-1 or E-1) to control and distribute up to 120 incoming callers dynamically across the many studios found in today's large broadcast facilities. The Series 2101 delivers exceptional audio clarity for on-air tele-

XM has also taken delivery of 120 new Omnia-3fm Digital Audio Processors made by Omnia, a Telos company. XM will use the Omnia-3fm to process the 100 channels of live satellite radio it will deliver to subscribers. Omnia digital audio processors have become the choice of leading broadcasters in top markets worldwide because of their ability to deliver clear, loud audio without the digital aliasing artifacts found in other, less sophisticated audio processors. The all-digital Omnia-3fm provides superior 48kHz sampling, three-band processing, AES/EBU inputs and outputs, integrated clipper and composite filter, and a digital stereo generator.

In early 2001, XM Satellite Radio will begin beaming digital music, news, sports, talk and children's programming directly from its two satellites to vehicle, home and portable XM-ready radios coast-to-coast. ■

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Webcasting

Establishing a multimedia presence on the Web

By Kevin Nosé and Ken Nosé

There are a number of decisions you need to make when establishing a streaming audio presence on the Web, and there are several options for what you can do and how you can do it. Do you build it yourself or outsource it? What sort of revenue models are out there – how can you make money, and how much will it cost? What technologies are out there for getting you on the air; how are they different and what makes sense for you? The answer to these questions will depend on what your expectations are and what you want to accomplish. Fortunately, even though there are more decisions to make, the process of

getting online is getting easier as the number of more complete services increases.

Different types of streaming media

While there are many vendors who provide streaming media networks and systems, they often refer to drastically different ideas, such as on-demand file delivery, which may or may not be appropriate for broad-

casters looking to establish a streaming audio presence. For our purposes, we'll describe streaming media as anything that provides continuous audio programming to listeners over the Internet. In practical terms, all streaming media technologies can be broken down into two basic approaches and a third approach that is a combination of those two. The two basic approaches can be described as live

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Webcasting

real-time streaming, where the audio is encoded in real-time from a live source and delivered directly to the listener's player, and file streaming, where listeners are sent a series of pre-encoded files back to back, allowing the listener to hear continuous programming.

content that you want to make available in the first place. Because you are streaming your on-air signal, the benefits of this approach are that you have your signature station sound and identity, and no additional effort in programming or production work is required for your Internet presence.

able to you and can be used to tailor content or advertisements.

The next level in complexity includes systems that use a mixed approach, where you have a live real-time stream that can be interrupted at key points to insert audio ads or special Internet-only content. The main motivation behind the development of mixed systems has been for ad insertion into live radio broadcasts, which opens up new opportunities for selling ads on your Internet presence. There are two ways in which this sort of ad insertion is accomplished. Some systems allow you to do ad insertion at the encoder, which means that an ad server works in conjunction with your station automation software to insert Internet-only ads on the fly into the encoded bitstream of your station's audio. At the same time a local ad is playing over the air, your Internet feed plays an Internet-only ad. Since the ad insertion is done at the encoder, all the Internet listeners will re-

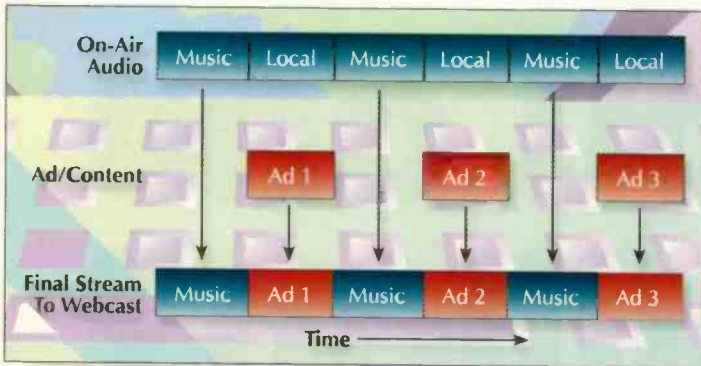


Figure 1. Basic ad insertion allows the Internet radio audience to hear a different commercial than the terrestrial radio audience.

Live real-time streaming is an approach that makes sense for radio broadcasters, as the on-air signal for your radio station is typically the

additional degree of interactivity that is possible on the Internet, where information about your individual listeners and their preferences is avail-

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Webcasting

ceive the same Internet-only ad. Two examples of this are Real Broadcast Network's live ad insertion system and RCS' InSert, which both provide a mechanism for substituting Internet-only ads. An illustration of this approach is shown in Figure 1.

Other mixed systems use an approach where the system uses knowledge about the listener's geographical location and other demographic information to drop in audio ads that

are specifically targeted for each listener. These systems require additional software on the network side to determine information about the listener and select the appropriate ads (See Figure 2). To play the ads, the player temporarily disconnects from the live audio stream to download and play the inserted ad files. It then reconnects to the live stream when the ads are done. From the listener's perspective, the audio for

the inserted ads is continuous with the live stream. The biggest technical hurdle to overcome with this type of solution is synchronization, as different network latencies make it difficult to predict exactly where you will drop back in to the live stream when you reconnect. Because some of the major server and player architectures weren't designed with this type of synchronization in mind, companies like SurferNet have worked around these limitations by coming up with a custom network and their own player.

Since they don't make use of live content from your on-air signal, systems that use file streaming are probably the most radical departure for radio broadcasters. File streaming systems use pre-encoded files for all of the program material, and typically make use of playlists to instruct the player on which files to download and



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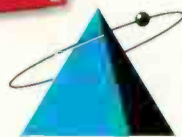
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To play the ads, the player temporarily disconnects from the live audio stream to download and play the inserted ad files.

play and in what order. Because the files are played back to back, the listener experiences essentially continuous audio. Listeners can drop in at arbitrary times and have the same experience and can potentially skip material they don't like. Programming can still be tailored for different regions and times of the day based on how the playlists are generated. An illustration of this is shown in Figure 3.

One advantage to file streaming systems is that they make it easier for you to support multiple channels or program formats. Adding a new channel is as simple as encoding additional audio files and coming up with new playlists, potentially using some of the same stored files in common with other channels. Contrast this with real-time streaming, which re-

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Webcasting

quires a separate encoder with continuous audio streams fed to your servers for each audio source you wish to provide. It is interesting to note that an increasing number of Web-only broadcasters are using the file streaming approach because it

can be done more in the computer domain and requires less in the way of on-air studio facilities and out-board audio gear.

On the network delivery side, file-streaming systems have one significant advantage over live real-time

streaming – they can take advantage of networks built for streaming multimedia files. Because a live stream is continuously generated in real-time, you can't take advantage of caching at edge servers and some of the other tricks and distribution schemes that multimedia networks use to ensure fast delivery of files. On the downside, the user experience with file streaming systems is less refined than a typical radio broadcast, as there may be gaps between audio files, and you lose the ability for different types of segues.

Build it yourself, or outsource?

It wasn't long ago that to get your station's audio on the Internet you had to purchase and set up encoders, pay for bandwidth at an ISP, and set up your own servers. Now there are a growing number of providers who will take care of all of that for you, typically offering complete turnkey solutions. Because there are so many

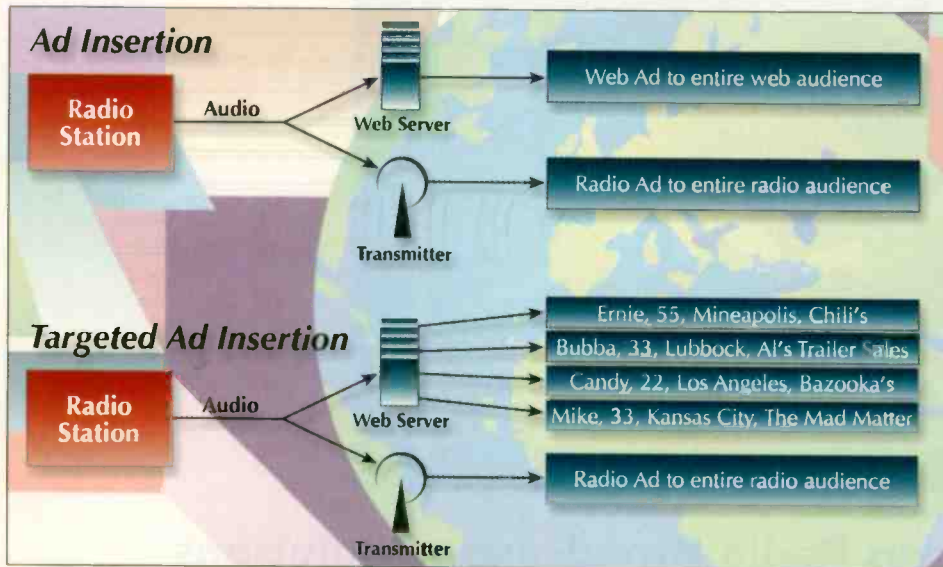


Figure 2. The basic concept behind targeted ad insertion. Demographic info is used to send specific ads to specific listeners. Graphic concept courtesy of RCS.

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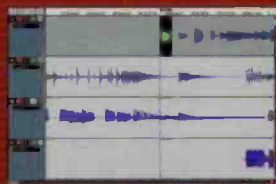
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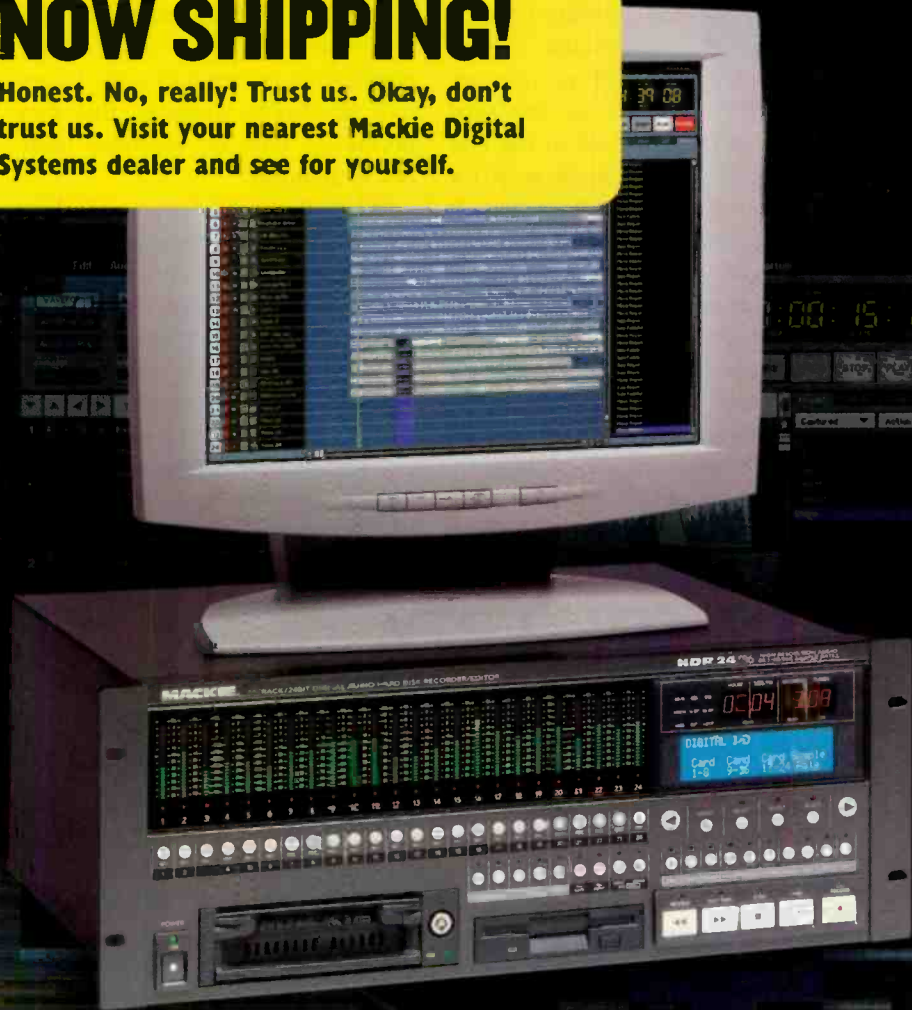
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Webcasting

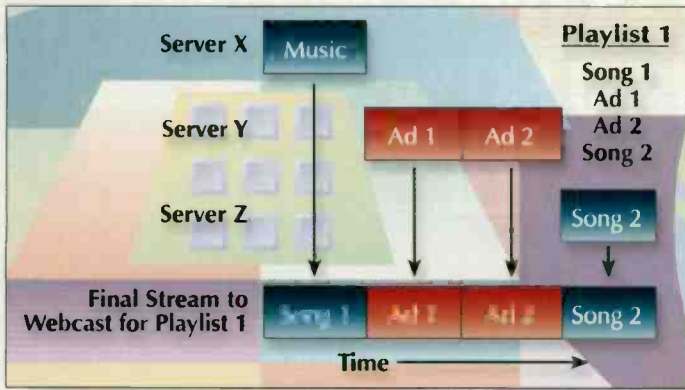


Figure 3. An Internet stream can be created by streaming files into a playlist. The audio source files can originate from different audio servers.

different types of services available now, some of which are cheaper than what it would cost to build it yourself or available for free, you need to look at several factors in deciding which one might make sense for you. The main areas you need to take into account when comparing services are the revenue model or cost of service, number of simultaneous listeners supported, coverage of publishing fees, and specialized features or services offered that affect the

number of bytes moved to the end user, which might not make sense for continuous streaming radio stations. It is worth shopping around, as the model in use in the industry is moving towards cheaper or zero-cost solutions where you are expected to make money from sharing profits on Internet ads.

It is important to find out up front the maximum number of listeners supported, as this can vary wildly from provider to provider. In some

listener experience.

The cost for a complete system can range from expensive monthly fees to zero cost (in exchange for airtime ad bartering, revenue share on the Internet audio and/or banner ad insertion). Some multimedia service providers charge based on the total

cases, there is an additional cost if you wish to support a larger number of listeners. Companies like Real Networks charge more for server packages as the number of listeners supported increases. Because of the economies of scale that come with the size of the larger providers, often they can provide access to bandwidth that would be difficult or completely cost prohibitive for you to build yourself. Some providers have such a large network of servers and such a massive bandwidth available that they promise a virtually unlimited number of listeners.

An area that is still being worked out in the courts is publishing rights and fees for Internet audio broadcasts. It is worthwhile to find out exactly what relationship or arrangements a solution provider has made with the RIAA, ASCAP, and BMI, if any. The last thing you want to happen is to find out that you retroactively owe expensive fees for the material that you've been broadcasting on the Internet.

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On-Air 2	Can't Take That Away... Mariah Carey :17/4:13/F HIT DA5204 7:43	Happiness Vanessa Williams L 7:9 4p N 7:12 7a	Happy Girl Beth N. Chapman L 7:9 11a N 7:18 6p	Harbor Lights Bruce Hornsby L 7:4 2a N 7:12 7p
Start 3	Mariah Carey Backseat Eric Phillips :00/0:13/C VT JU 8094 7:52	Harvest Moon Neil Young L 7:7 4p N 7:10 2a	Have I Told You L Rod Stewart L 7:2 7p N 7:13 8a	Have You Ever Re Bryan Adams L 7:1 5a N 7:8 10p
Start 3	Dodge Trucks Q: Your Dodge Dealer 800-687 COM CA2215 7:33	Have You Ever Brandy L 0:30 5a N 7:13 9a	Having A Party Rod Stewart/R. W L 7:2 8p	He'll Never Leave Kathy Troccoli L 7:4 3a N 7:11 5p
Start 3	Coca Cola Q: The Real Thing :00/0:40/C COM DA1234 7:54	Healing Wynona Judd/M. E L 7:2 5p N 7:15 4p	Hear Me In The Hi Harry Connick Jr. L 7:2 10a N 7:15 3p	Heart Don't Fall M Rita Coolidge/Lee L 7:1 3p N 7:13 7a
Start 3	Radio Voyager Fast - Jingle Q: Radio Voyager 800-131C JIN DA4315 7:52	Heaven And Earth Al Jarama L 7:4 10a N 7:12 11	Heaven Knows Luther Vandross L 7:1 9p N 7:20 10	Here In My Heart Chicago L 7:2 2a N 7:14 3p
Start 3		Here There & Ever Collins Dion L 7:5 5p N 7:13 5a	Here To Love You Melissa Manchester L 7:5 12m N 7:9 11	Here David Crosby/Phil L 7:5 7p N 7:18 8a
		Hero Mariah Carey L 7:3 1p N 7:17 9p	Hero's Dream Jim Brickman L 7:3 7p N 7:12 5p	Hey Girl Billy Joel L 7:1 11p N 7:12 3p
		High Sierra Trio (Harris, Romat L 7:8 1p N 7:14 6a	Higher Ground Barbra Streisand L 7:4 12n N 7:13 6p	Hold On My Heart Genesis L 8:27 1p N None
		Holdin' On George Benson L 7:9 2a N 7:10 7p	Home Sheryl Crow L 7:2 3p N 7:16 6p	Hooked on a Mem N. Diamond/Kim C L 7:1 10a N 7:15 6p
		A B C D E F G H I J K L M N O P Q R S T U V W X Y Z		

One of SS32 touchscreens is shown above. The log is at the left. Instant access Cart Walls are at the right. Visit scottstudios.com or call 800 SCOTT 77 for info.

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Webcasting

Another reason that it may be worthwhile to go with a solution provider is that they can provide you with technologies and special features that don't exist off the shelf right now. Ad insertion technologies are a new area, where providers can not only supply custom technologies, but can also give you the benefit of a large sales force and a national network of advertisers. Other specialized features include player branding for your sta-

tion, where the listener experience is customized for your station with a distinctive look. This is typically done without requiring the listener to download a custom application.

On the farthest extreme away from broadcasting your on-air signal, there are companies that offer pure file-streaming services that essentially allow you to create a customized Internet radio station without the need for a live audio feed. Companies like



Live365 offer file streaming services where all you have to do is encode and upload audio files to set up your own streaming Internet radio station. Other solution providers take care of everything including content, programming and ads. Everstream, a company that is marketing its services to newspaper and print media websites, offers continuous audio programming in multiple formats with customized content so that a particular site can offer several different channels of music and news, each featuring its own IDs and ads. While these types of services may not be directly applicable to radio broadcasters interested in getting their on-air signal on the Internet, they are worth noting as websites become more multimedia enabled and compete for the Internet listener's attention.

There are many issues to think about beyond getting your station's audio on the Internet. Are you creating a marketing presence for your station, an alternate revenue source, or a fundamentally new broadcast service with its own revenue model? Your expectations will have a major effect on what kind of Web presence you will need. Depending upon your goals, you may benefit from new services and technologies like targeted ad insertion and alternate content, or by offering multiple channels of content. As many of these technologies are relatively new and still in the development stages, it's worth doing some comparison shopping to see what is out there and how well it works for you.

Kevin Nosé is president and director of engineering, and Ken Nosé is chief software architect of NeoSonic Industries, Cleveland.

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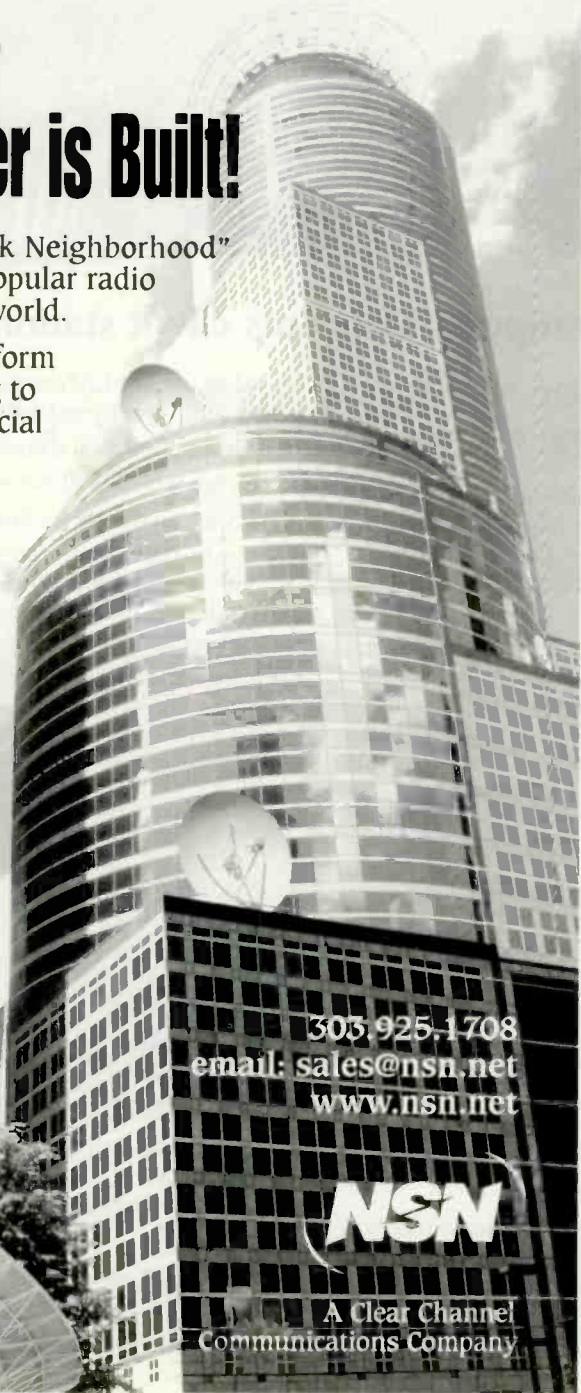
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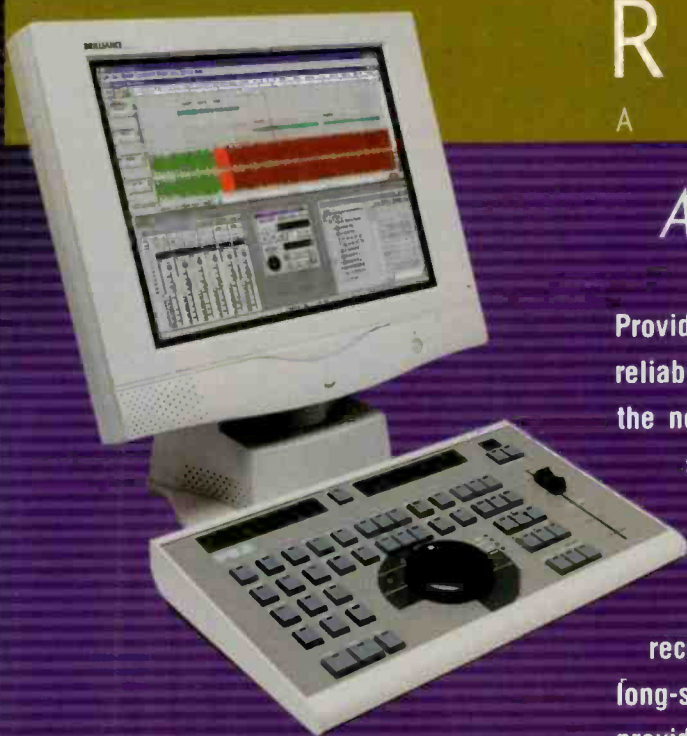


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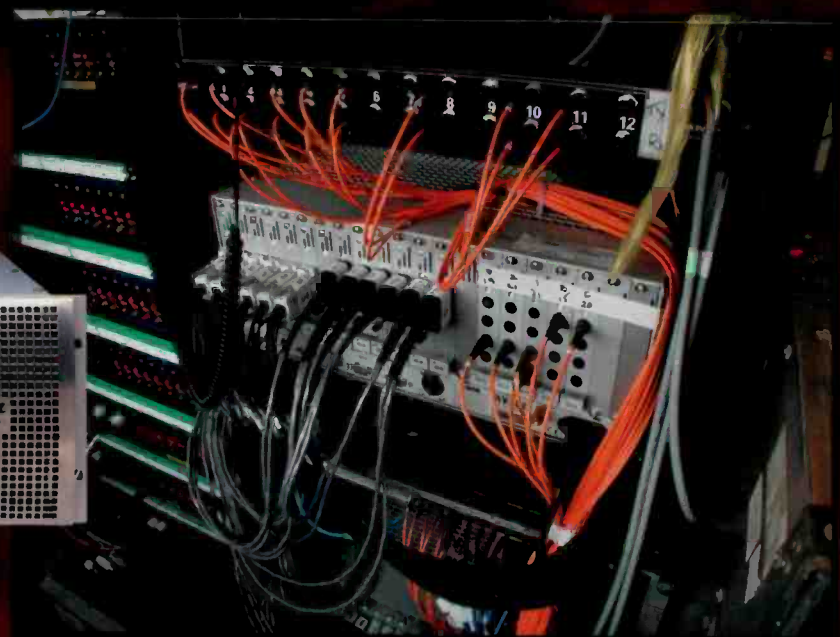
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Installation Profile



VADIS Platform Solution For Olympics

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The 2000 Olympic games offered the perfect opportunity for Klotz Digital AG to showcase its fiber optic based VADIS platform. "We had this great big infrastructure of sound from various sources and locations that had to come up to our mix position," says Bruce Jackson, Audio Director of

Ceremonies. Thirteen VADIS mainframes were distributed throughout Stadium Australia and the International Broadcast Center located approximately one mile away. The mainframes served as a collection distribution, routing and format conversion network for audio signals distributed to or sent from the Ceremonies Audio Control Room (CAR).

Multiple ceremonies incorporating multiple stages meant having to reconfigure the system to comply with the demands of each show. Recall presets, a standard control feature of the VADIS platform, enabled operators to switch effortlessly from one set of configurations to the next, allowing signals to be interfaced through the platform and routed anywhere else on the network through the touch of one button.

For ultimate safety, two transmit and two receive fiber rings were installed between all locations and the CAR. Fitting each fiber transmit and receive card with two transmit and receive diodes enabled each VADIS frame to provide for fiber core redundancy. Frames could seamlessly switch to receive signals from a clockwise and

counter-clockwise direction.

Using the VADIS fiber optic based platform offered all users digital and analog format conversion as well as digital sample rate conversion. VADIS also distributes the master digital audio sync, the single most important feature of any digital system. Multiple Fairlight digital audio playout channels were connected digitally via AES.

"As Bruce understands, and broadcasters are realizing, the global VADIS platform is key to the technical side of a consolidated broadcast facility, whether it's a large, technically advanced project such as the Olympics or a typical radio station," says Thomas Klotz, President of Klotz Digital AG. "Our broadcast customers see that fitting their facility with a media platform rather than traditional stand-alone mixing consoles, routers and such, will be required for success in the near future." ■



Bruce Jackson, Audio Director of Ceremonies, Sydney 2000 Olympics.

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DIGITAL

Readers' Picks

Weighed in the balance
and found wanting . . .
more information.

Compiled by Cindy Holst, associate editor

In each issue of *BE Radio*, the Free Info card allows you to request more information from manufacturers of products featured in that issue. Each month, a report is generated detailing the number of requests for each product. Based on data gathered from the reports for January through September 2000, *BE Radio* has determined the ten products that garnered the most reader response from editorial coverage (not advertisements) during this time span. Our research included responses gathered from both the paper and online sources.

The products featured here represent a broad range of radio applications. Each product fills a

recognized need within the industry and incorporates the ingenuity our readers depend on to help them accomplish their jobs.

You can request more information on these, and any, products by returning the Free Info card, by responding online at www.beradio.com, or by contacting the manufacturers via their websites. Reader comments and suggestions are always appreciated. Let us know what you think of this end-of-year special feature.

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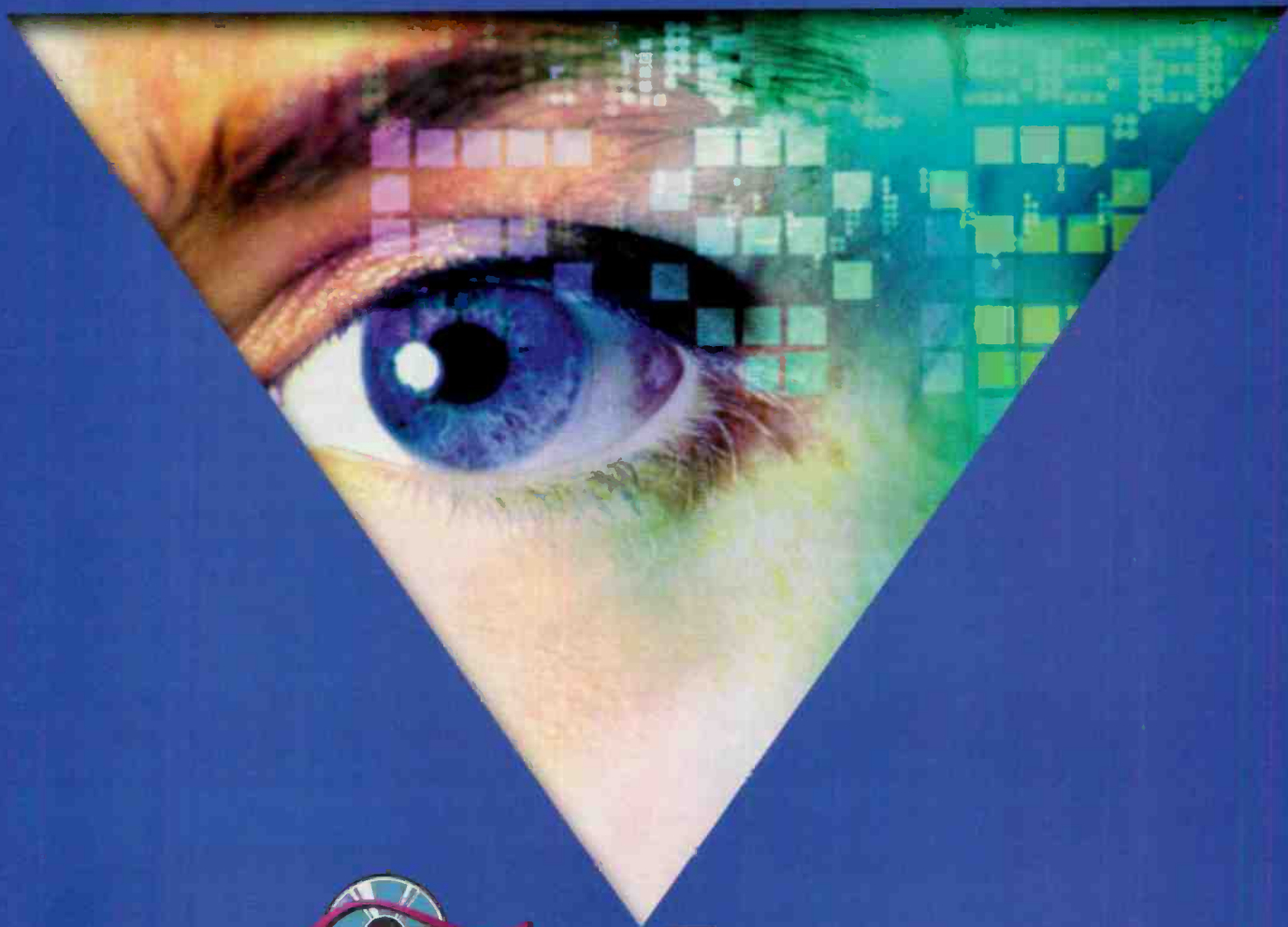
Streaming Media Solution Broadcast Electronics Inc

eSTREAM: This streaming audio hardware/software processing product gives streaming media producers on-air quality over the Internet. It enables radio stations, professional media producers and corporate webmasters to convert analog content into the digital medium for broadcasting through a streaming media server of their choice without sacrificing sound quality or taxing CPU power. The product's seamless, simultaneous integration with several streaming media servers allows streaming media producers to do live webcasts without sacrificing the content's sound quality.

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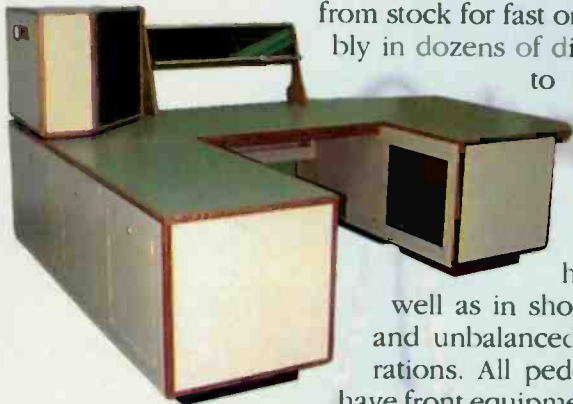


Readers' Picks

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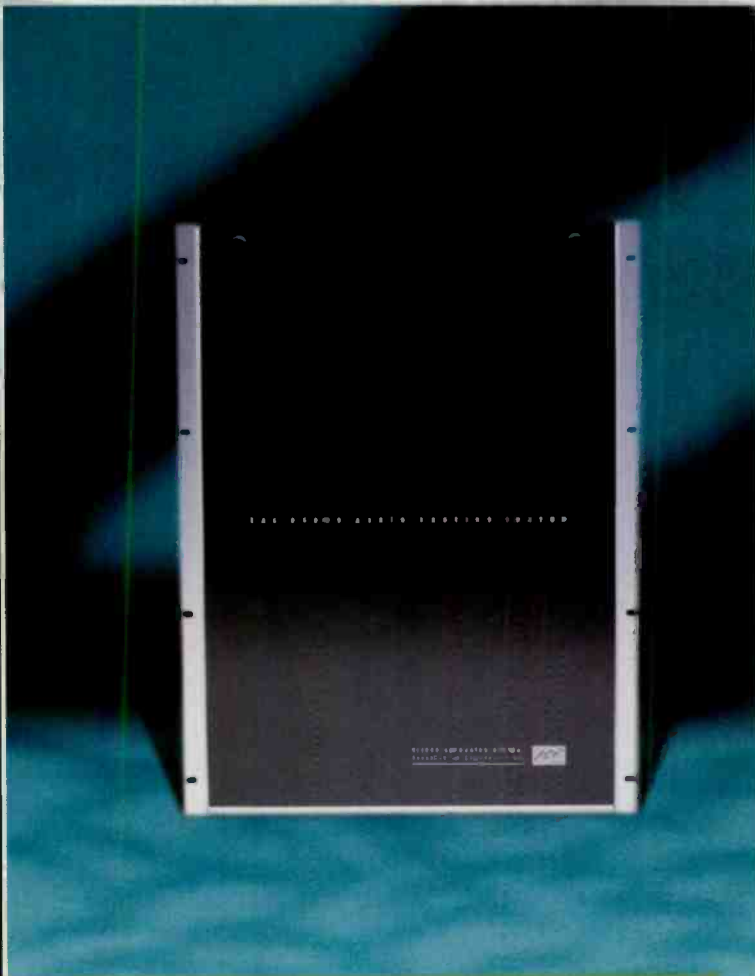


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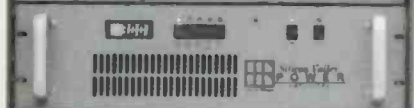
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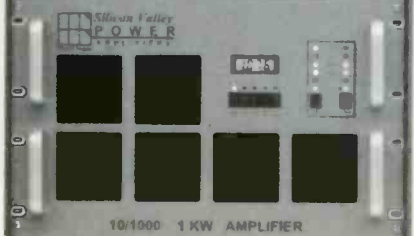
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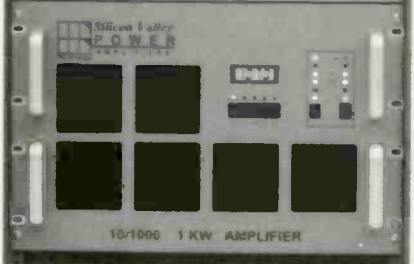
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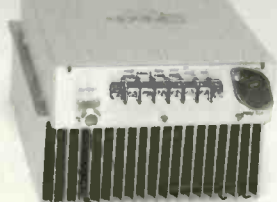


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rackmount

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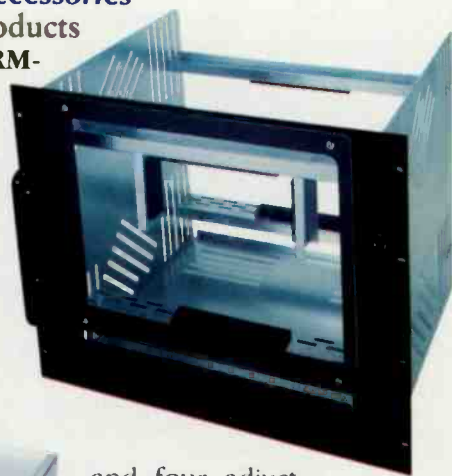
inches wide

by 15.75 inches

high. Includes integral

rolled steel rack handles, an

access door for monitor controls



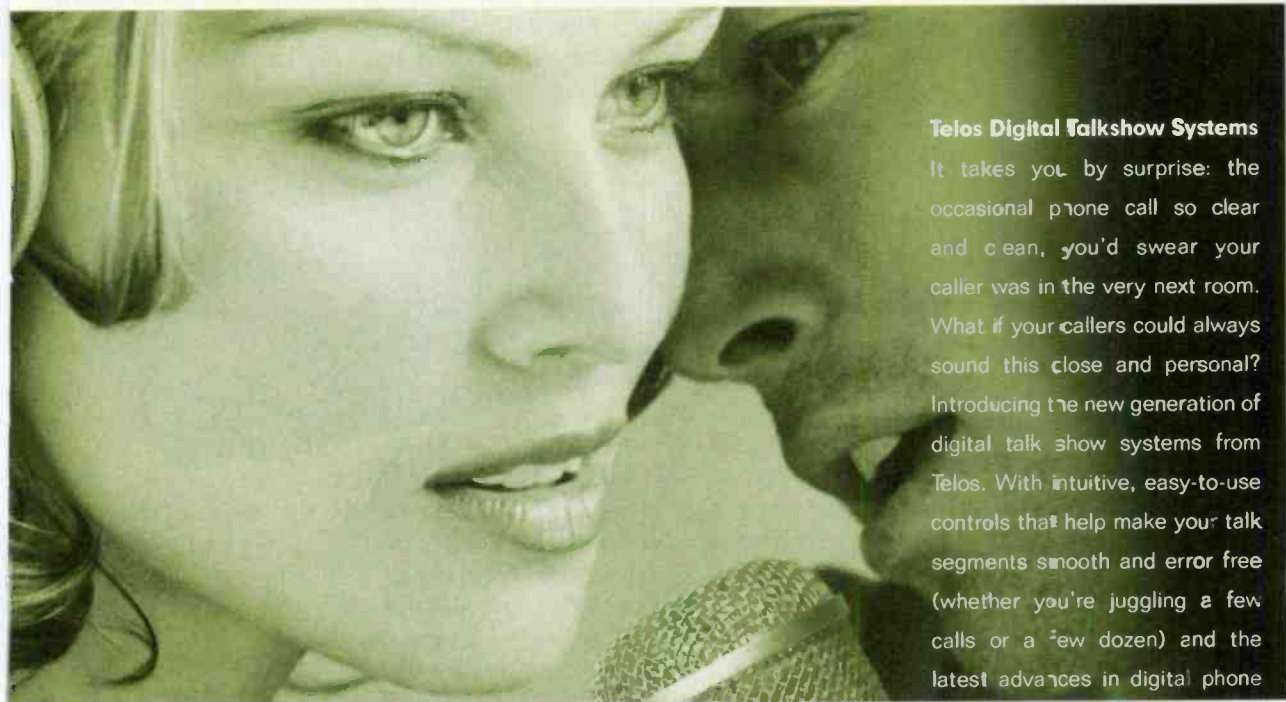
and four adjustable crossbars that secure the monitor in place. The model RM-CPU-ATX is tapped for the company's optional rack slides. Includes a 300W, UL-listed ATX power supply. Front-panel features include a hard-drive bay capable of housing a trio of disk drives behind a latching front door, a removable front grill

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MP-3	\$980	0.8Kw
MP-4	\$1,280	0.8Kw
MP2-4	\$1,820	2Kw
MP3-5	\$2,270	3Kw
MP3-6	\$2,740	3kw

FM Antennas

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GP-4	\$2,600	6Kw
GP-5	\$3,150	6Kw
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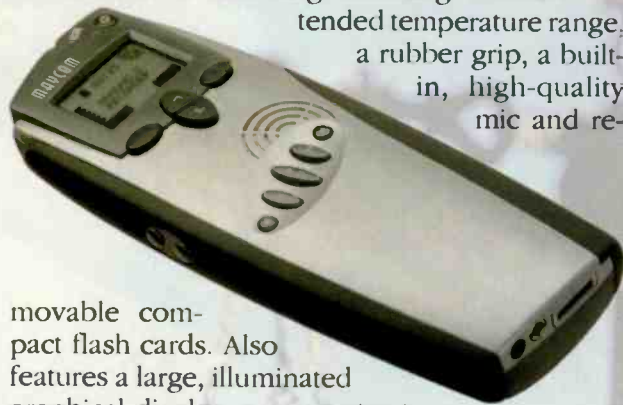
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Clear Channel Denver

By
Chriss Scherer,
editor

Moving seven stations into a new facility is no small task. When Jacor decided to move KOA-AM, KHOW-AM, KTLK-AM, KHIH-FM, KRFX-FM, WPI-FM, and KTCL-FM into a new facility, station management and engineering knew that outside help would be needed. Planning for the new facility began in October 1998. A strict timetable was established and had to be maintained because the lease for the old studio building expired in September 1999. During the facility construction, the station ownership was transferred to Clear Channel Communications.

When the facility was completed, it was the largest radio facility built in the United States. It retained this honor until recently, when the studios for XM Satellite Radio were completed in Washington, DC.

The new building, located in the Denver Tech Center, has five floors. The main rack room is in the basement and has 46 racks. There is enough room to add four more




The 46 racks in the main rack room were prewired off-site by RDA Systems of St. Louis.

racks if necessary. The FM studios are on the third floor, and the AM studios are on the fourth floor. The third and fourth floors also have rack rooms, with six racks on the third floor and five racks on the fourth floor. The penthouse has a rack room with eight racks for microwave and satellite equipment. All four rack rooms house audio router frames, which are interconnected via fiber, RS-422, Ethernet, and a wordclock signal on RG-58 cable.

The entire building has 87,145 square feet of gross space. There are 3,370 square feet of storage in the basement, 5,100 square feet of internal parking and 5,500 square feet of extra space that can be leased to a tenant.

Going live

The first station, KHIH-FM, went on the air from the new studios on October 9, 1999. The other three FMs, KRFX, KBPI and KTCL, moved in over the following days. Once the



The KTLK control room uses the same basic layout as all the other control rooms, but each has slight differences to work with the individual format of each station.

FM stations were moved, the AM stations began their transition. KTLK-AM was the first AM to move. All seven stations were on the air by mid-November 1999. The entire installation process took 14 weeks.

Because of the complexity of routing so many audio sources, an integrated router/console design was chosen. For this installation, the Klotz VADIS was picked. Each studio has access to any audio source in the facility. For added backup, any studio can become an air studio or production studio by recalling a preset, and all the necessary audio and control logic is routed to the corresponding

room. The VADIS serves as the digital-audio, fiber-optic backbone for 20 news/sports workstations, 24 control rooms and a news command center.

By using fiber-optic cable to interconnect all the audio router frames, the installation time was dramatically reduced. The entire control layer of the routing system (mixing consoles, logic interface, PCs) lives on a single LAN. The use of fiber-optic cable also saved a considerable amount of room. Copper wiring would have occupied substantially more space.

Because most of the router frames are installed in the basement rack room, all of the shared audio sources,

such as the on-air playback system, codecs and tuners, are located there. All audio is recorded and played back from a Prophet Systems Audio Wizard system running on a Novell network. There is one file server and 12 audio servers. The system includes four digital reel-to-reels and 29 ACU-1 audio switchers.

The total system storage capacity is 160GB, which is handled by twelve 18GB RAID drives. There are 63 workstations on the system. On the AM side there are three for the control rooms, three for screener positions,

See more online

More photos and information about the Clear Channel Denver installation can be found online at www.beradio.com. Click on Spotlight.



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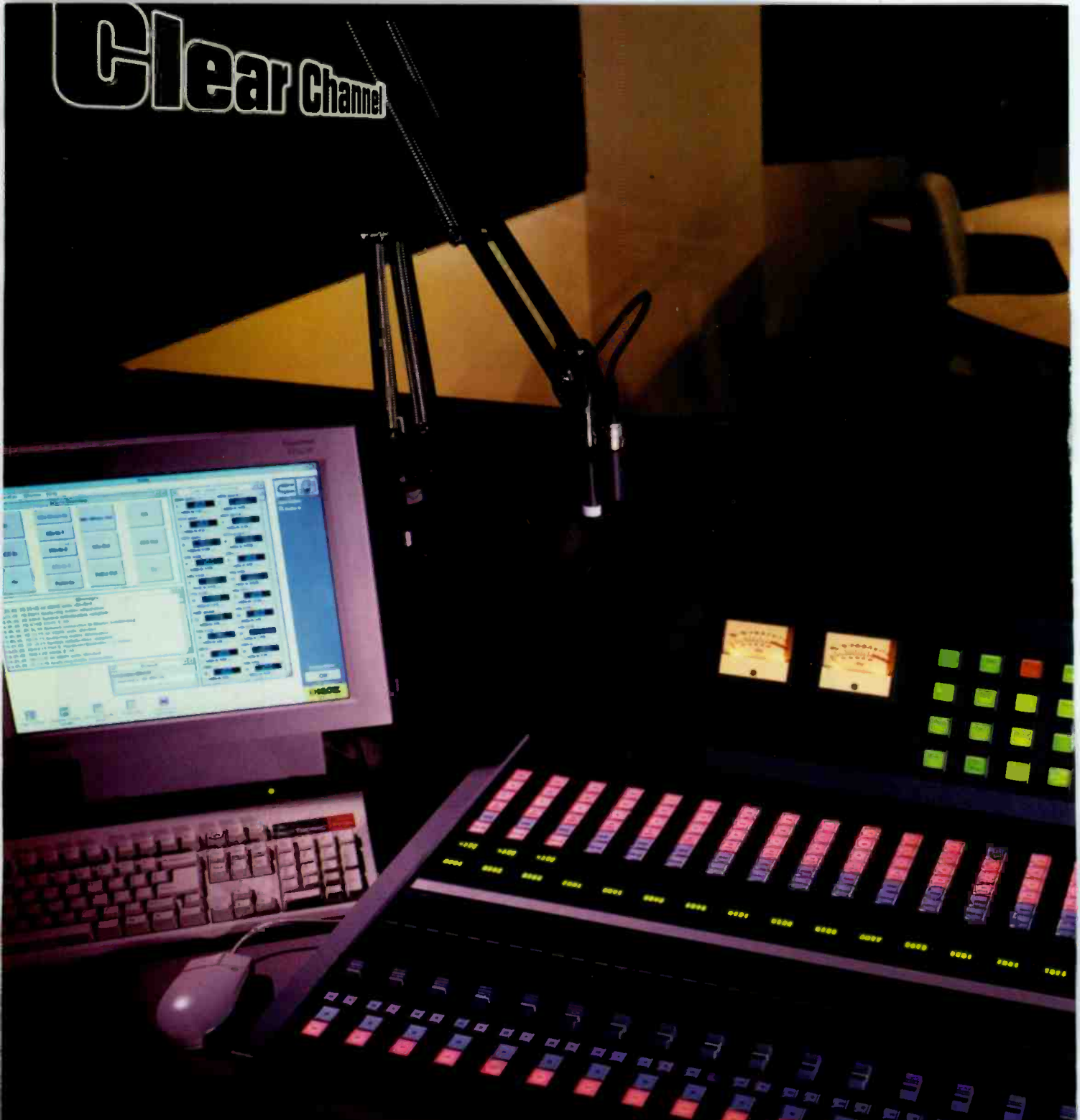
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six for air/talk, three for news and three for the creative production studios. For the FM stations there are four for the control rooms, four for the auxiliary control rooms, four for creative production and four for the



music directors. Several workstations are shared by both the AMs and FMs: two in news command, three for commercial production, seven for program directors, nine for traffic, three for continuity, one for sales promotions, two for engineering, one for dial-up, and one for overnight use.

All the computers are kept in the rack rooms. The monitors, keyboards and mice are connected through Cybex PC extenders.

Making connections

A project of this magnitude needs a considerable amount of wire and cable. For this project, 100, AES-3-compliant Gepco 5526 was used throughout the facility. For interconnections between studios and rack rooms, the eight-pair version 552608 was used. This cable is very flexible, which was important to the installers

in pulling cable and preparing it for termination on the punch blocks. Four cables can be installed in the punch block cradles.

Instead of traditional Siemens 66M punch blocks, German-made Krone 25-pair punch blocks were used. The biggest advantage to this block is that



A closer look at the KTLK operator position. The talk studio can be seen through the studio window.



it has twice the capacity of the 66M block (up to 32 wire pairs) but fits into the same mounting cradle. The design of the fork in which each wire is placed also bites

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Clear Channel

into the wire better than the traditional style. This is important because the insulation of the digital cable is thicker than standard analog wire types.

The Krone blocks have an added advantage with a built-in patch capability. A special clip can be inserted into the block to interrupt the signal. There are 625 Krone blocks in the

entire facility, attesting to its size. The only distribution amplifiers being used in the facility are for analog audio feeds that do not need to be digitally routed, such as EAS monitor inputs and feeds from off-air monitors.

All seven stations use Harris Intraplex T1 STLs. Both T1 landlines and Glenayre 5.4GHz spread spectrum links are used for primary

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communication. For added backup, analog equalized telephone circuits and 950MHz STLs are also installed.

The newsroom is built around a WireReady system, which is used throughout the Clear Channel stations. This installation has 60 workstations for news, sports and the AM air talent. The stations receive news feeds from the Associated Press, Sportsticker, ABC and CBS. WireReady is used for text; ControlReady is used for audio capture and storage; and StormReady handles school and business closings. The audio capture machines have two sound cards to handle the ABC and CBS feeds. The Clear Channel intranet allows text and audio files to be shared with

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Windows to the Web



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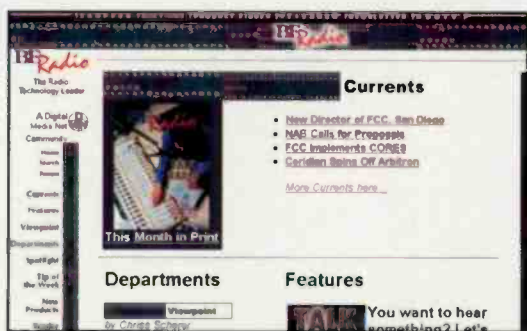
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Arrakis: Manufacturers of studio systems including the popular DigiLink computer-based audio storage and playback systems, Arrakis analog consoles, Colorado Revolution digital and analog audio consoles, and broadcast studio furniture. The website features an online interactive catalog, station equipment calculator, an equipment list price generator and a section to download the latest software versions and patches.



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BE Radio magazine: BE Radio gives radio station managers and engineers the information they need to make critical equipment purchase decisions. The magazine is published 12 times a year and distributed to over 14,000 qualified subscribers in North America. The website features Currents (all the news updated daily), The Studio Spotlight and the Tip of the Week in addition to the quality information available in each issue.



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Clear Channel

The wall behind the racks holds the Krone blocks and interstudio wiring. There are 625 punch blocks in the entire facility.

other Clear Channel stations. (See Managing Technology, September 2000 for more on the Clear Channel intranet.)

Backup power for the facility is provided by a 750kW, 480 volt Cummins diesel generator with a 3,000 gallon fuel tank and a 240kW, 480 volt APC UPS. The penthouse rack room houses the satellite equipment. There is a Ku-band uplink and three C-band downlink dishes. C-band receivers include units from Starguide Digital, Scientific Atlanta and Fairchild.

Since there was only one year to complete the project once the design plans were approved, a considerable amount of work was completed off-site before any part of the new building was ready for occupancy. RDA Systems prewired all the racks and punch blocks in its St. Louis facility. This allowed the studio construction to proceed while the building was being constructed.

Thanks to Rick Dearborn of RDA Systems, Rey Esparolini of Klotz Digital and Jeff Gulick of Clear Channel Denver for their assistance preparing this article. All photos by John Robledo, Timrata, CO.

www.beradlio.com

Project at a glance

Stations: Seven

Number of studios:

28, plus 60 news/sports workstations

System integrator: RDA Systems, St. Louis

Interior building, studio architect:

Lawrence Group, St. Louis

Roof and ground satellite dish architect:

T-Rex Architects, Denver

Architectural coordinator:

Michael Loia, Atlanta

Cable and fiber installer:

National Network Systems, Denver

General Contractor: Constructors, Denver

Project began: October 1998

Designs approved: April 1999

First station on air: October 1999

Last station on air: November 1999

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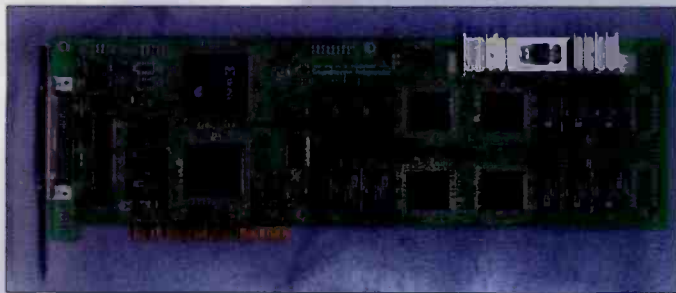
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an extended frequency response of 20 Hz to 20 kHz, the KSM44 contains Class A, transformerless preamplifier circuitry. Its dual one-inch, gold-layered, Mylar diaphragms provide added low frequency response, while improving environmental stability. In addition, the diaphragms' thin design reproduces any sound source, while achieving a self-noise of 7dB.

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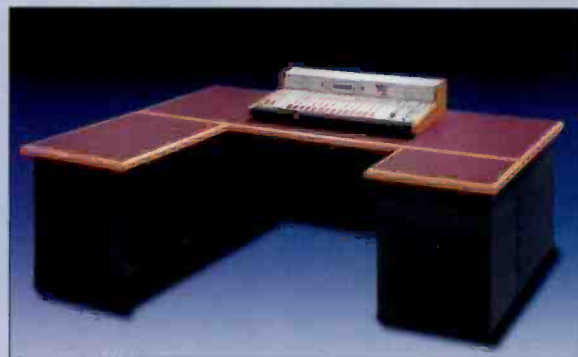
Furniture Wheatstone Corp

▶ **Eclipse:** The line features wood-trimmed flush laminated countertops, steel equipment racks with built-in ventilation grilles, generous wire passages, removable swing-down doors, oversized access

doors and a large wire-management area with removable concealment door. The Eclipse line is pre-engineered and integrated and is designed for easy reach and comfortable angles of sight. A line of accessories, including talent control consoles, undercounter jacks and flushmount control panels, is available. Various configurations are available, and Eclipse furniture is compatible with Wheatstone's line of audio consoles and pre-wiring assemblies.

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◀ **CD-302:** This unit is housed in a 2 RU enclosure. The remote is housed in a 3 RU enclosure, which can also be mounted flat in a DJ coffin case. The unit's two CD players act independently—one CD can be cued up while the

second is playing. The CD-302 incorporates a built-in sampler that can loop a section of audio in either Play or Cue mode. Samples can also be reversed. Pitch and tempo can be changed independently and can be adjusted over a ± 32 percent range. A built-in RAM buffer allows for a 10-second shock buffer and instant start. Preset and cue memory locations may be stored and recalled using a 10-key pad.

323-726-0303; fax 323-727-7635
www.tascam.com; tascamlit@tascam.com

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Broadcast Tools**

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www.broadcasttools.com; bti@broadcasttools.com

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Digital mixing system Studer

▼ **D950 M2:** This unit comes standard with a central assign section, color 8-channel surround meter, and a 15-inch TFT color display monitor. The channel sections feature a top-surface plastic laminate. The knob sections contain rotary encoders with a 21-LED ring for display of knob values. Each knob is flanked by an alpha-numeric readout that can display the function or value of each rotary controller in the system. The channel strips of the D950 M2 feature a graphic design language that



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416-510-1347; fax 416-510-1294
www.studer.ca; studer@mail.studer.ca

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CD recorder HHB Communications



▲ **CDR830 BurnIT:** This audio CD recorder from HHB Communications features a 24-bit A-D converter and a 24-bit multi-level Delta Sigma D-A converter. The CDR830 records on pro-type CD-R and CD-RW discs and is SCMS free. Analog and digital connectivity ensure that the CDR830 BurnIT integrates into most recording applications. RCA Phono analog line inputs and outputs are complemented by coaxial and optical SPDIF digital I/Os, with an on-board sample rate converter accepting frequencies from 32 to 48kHz. The HHB CDR830 BurnIT includes digital record gain and balance control, input monitoring with track increment rehearsal, fade in/out adjustable from 1 to 12 seconds, five CD-RW erase modes, track skip ID recording, track index search on playback and program, random and repeat playback modes.

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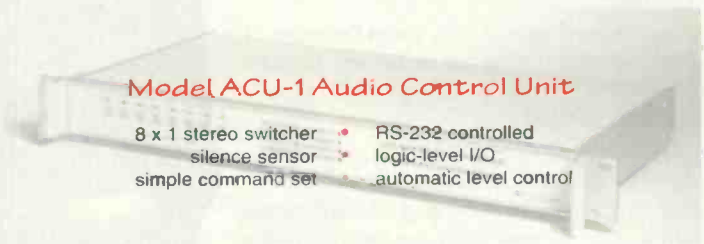
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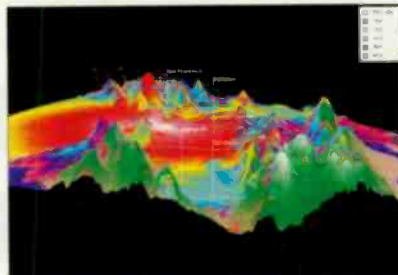
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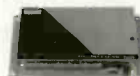
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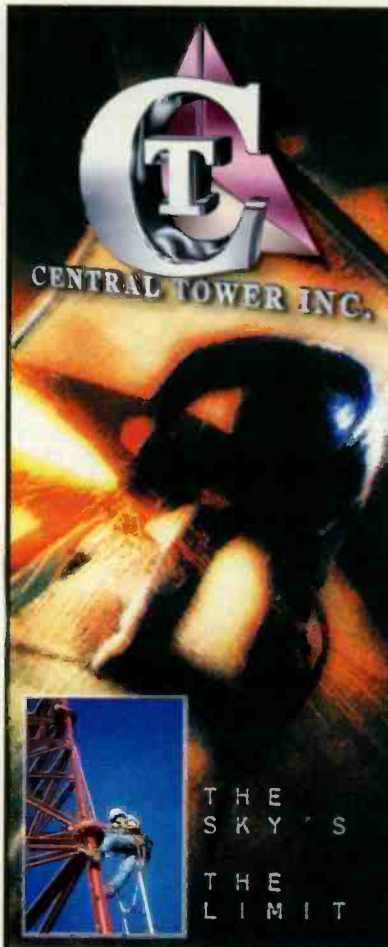
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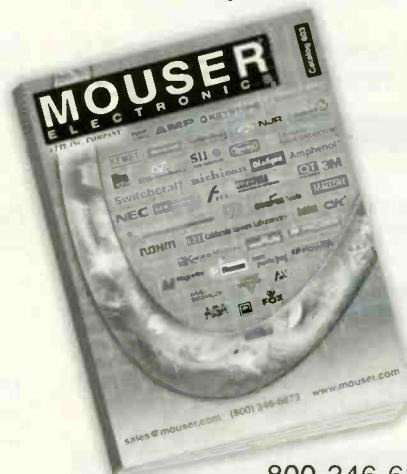
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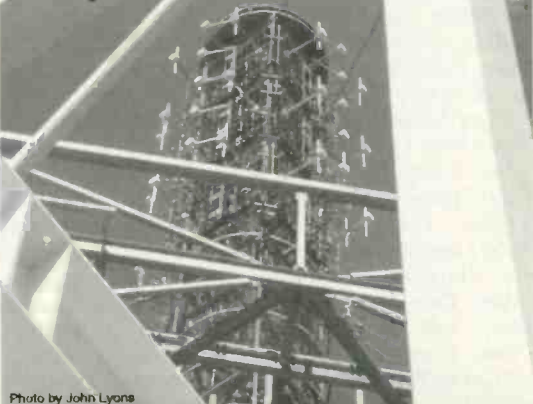


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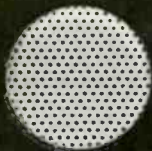
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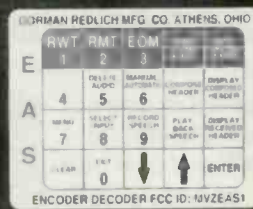
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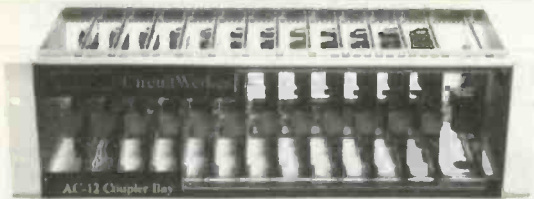
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Service with a smile

By Skip Pizzi, Executive Editor

The adage of the new media age is "content is king," and such content attracts audiences. While this truth is undeniable, it's high time that the service side of the equation receives its due. The value of a robust and efficient delivery system is fundamentally important, independent of the content it carries.

Radio has been a successful service throughout its history. Once thought of as an upstart that would never last, radio has proven to be a viable, popular and resilient medium. It established itself as a pioneer of electronic media, and then survived the

competition by reinventing its content to adapt to shifting audience preferences. During these changes, the service has remained essentially the same, with only incremental improvements. (The move to FM must be considered a substantial change in this respect, but its service and business models are essentially the same as that of the original AM band.)

This leads to a statement of the service-value argument: A good delivery system offers content that makes good

business sense and is popular. Service is the real king, the anchor of the business. Content is fickle and adaptable. Popular content combined with effective delivery service is the true killer application in the broadcast domain.

In an environment of scarcity, such service has another attraction: It is the searchlight in the sky that attracts everyone's attention. This natural attraction stimulates advertisers to place their messages there, thus creating the business engine that fuels the broadcast industry.

Looking ahead

Now consider the emerging competition and how it compares in terms of service. Streaming media on the Internet offers a wide range of content and increasingly hi-fi audio quality, but its accessibility is limited to the computer platform or Internet browsing appliance. On another front, satellite radio (S-DARS) will be limited, at least in the early going, to a new, mobile-only receiver. This implies that terrestrial radio will remain the only aural medium that reaches equally well into all listening venues (home, car and workplace) for the near- to mid-term.

It remains to be seen what quality of service S-DARS will provide to the automotive environment. The amount of

reliance on terrestrial repeaters is unknown. The uniformity of reception among vehicles, and between factory-installed vs. aftermarket units, is also questionable. Another variable involves the use of substantially different satellite technologies by the two service providers (Sirius Satellite Radio will use a highly elliptical orbit [HEO]

system while XM will use the geostationary [GEO] approach).

Assuming that S-DARS provides a viable service for the mobile

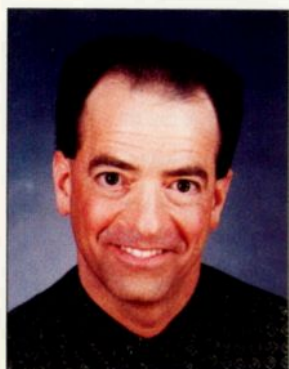
Terrestrial radio will remain the only aural medium that reaches equally well into all listening venues: home, car and workplace.

platform, its future for fixed receivers remains in doubt. Building penetration will likely not be like FM radio's, although in markets with terrestrial repeaters, it may have some reasonable abilities in this respect. Otherwise, external or interior window-mounted antennas will be required for S-DARS reception in buildings.

On the Internet side, migration from the computer-based receiver with dial-up access is almost assured in the next several years, with dedicated Internet radios already in production and broadband Internet access advancing quickly in many areas. This could allow high-fidelity wired service (superior to FM) for Internet radio content soon. Meanwhile, wireless and broadband wireless Internet access could conceivably extend on-line radio to mobile and portable receivers, eventually with high-fidelity audio. The cost and possible metered pricing of such service could be an obstacle to long-term radio listening via wireless Internet, but some observers believe that so-called 3G (third-generation) wireless systems will someday provide a delivery method that allows streaming on-line media to become fully competitive with today's terrestrial broadcast media.

If this proves true, wireless Internet is more of a future threat to service superiority than is S-DARS. Of course, there is no real barrier to entry for terrestrial broadcasters to offer their content stream(s) via the Internet, while continuing terrestrial broadcast service in parallel.

Terrestrial radio service, therefore, seems destined to continue largely unchallenged as a viable, universally accessible and cost-effective content-delivery method for some time. This assumes that the content delivered on these services offers significant value to listeners. If that is challenged by other media (such as S-DARS), terrestrial radio may need to adjust its content, as it has in the past. However you slice it, it's hard to keep a good service down.



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