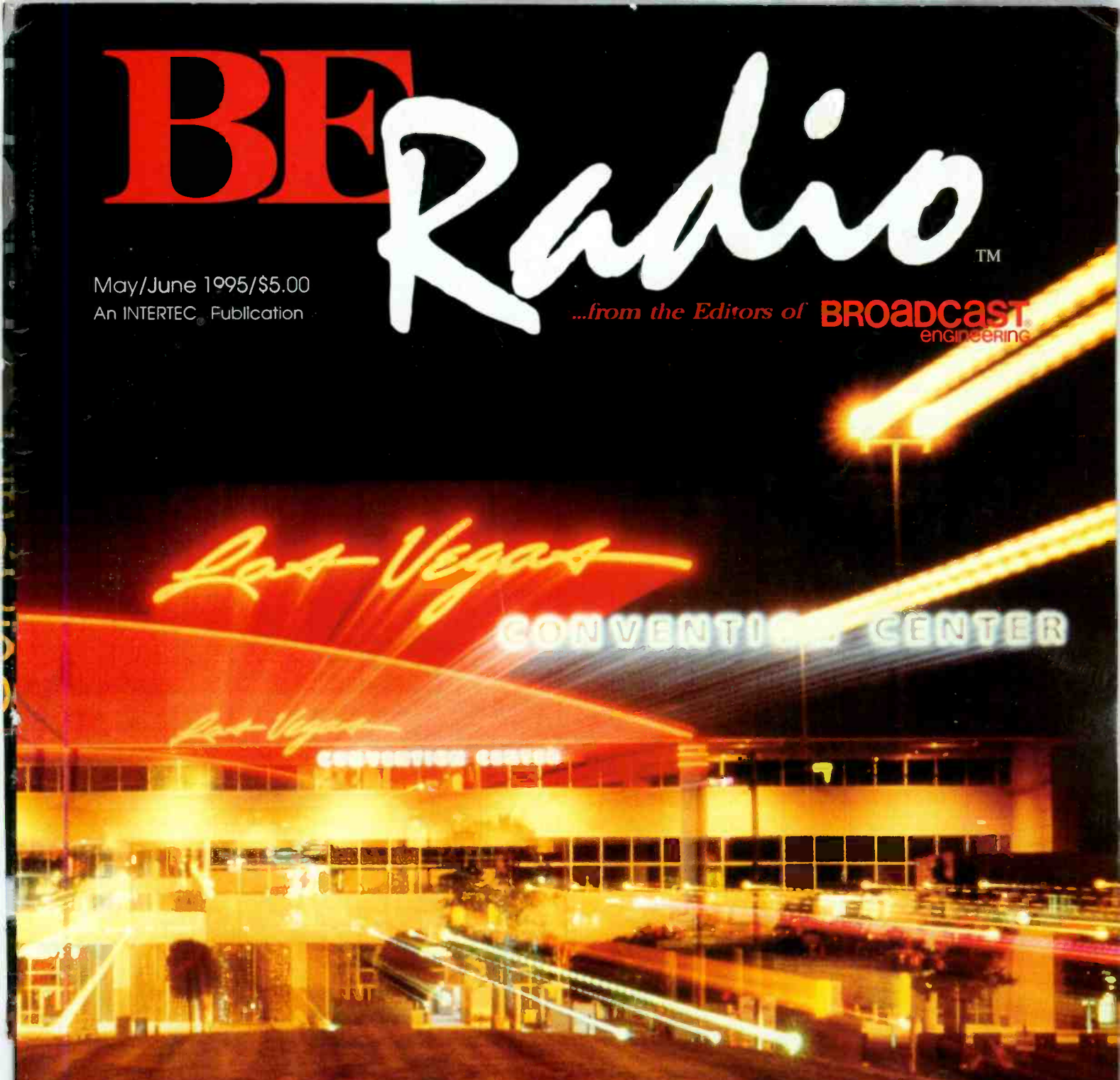
BE Radio™

May/June 1995/$5.00
An INTERTEC Publication

...from the Editors of BROADCAST engineering



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- NAB 95 Review
- Pick Hits of NAB 95
- Counterpoint on EAS

EVERYBODY TELLS US THAT BROADCAST ENGINEERS ARE VERY CONSERVATIVE. OKAY. READ THIS AD NOW AND THEN BUY A CR-1604 IN FIVE YEARS.

We understand why broadcast engineers have a wait-and-see attitude about new products. Your station (and job) depend on rock-solid reliability and performance you can count on.

We'd like to introduce you to Mackie Designs. Over the last six years, we've gained a serious reputation for building high-value, trouble-free mic/line mixers with legendary headroom, ultra-low noise and unique features.

Mixers so good that they're regularly used to create major label compact discs, feature movie soundtracks, and more commercial production work than you can shake an RE 20 at. For example, our CR-1604 16-ch. mic/line mixers are used nightly on the Tonight Show, Conan O'Brian and David Letterman Shows[1].

As for use at broadcast facilities, well, we're not total newcomers. Over 70 U.S. radio stations already have Mackie mic/line mixers in place.

Does that mean you folks aren't quite as conservative as everybody says? If so, call your favorite broadcast supply house, or dial us toll-free for complete information on Mackie's line of mixers.

If you *are* conservative, keep an eye on us, anyway. We want your business even if we have to wait five years.

[1] Mention in this ad denotes documented useage only. Mention is not intended to infer endorsement by any of the television shows listed.

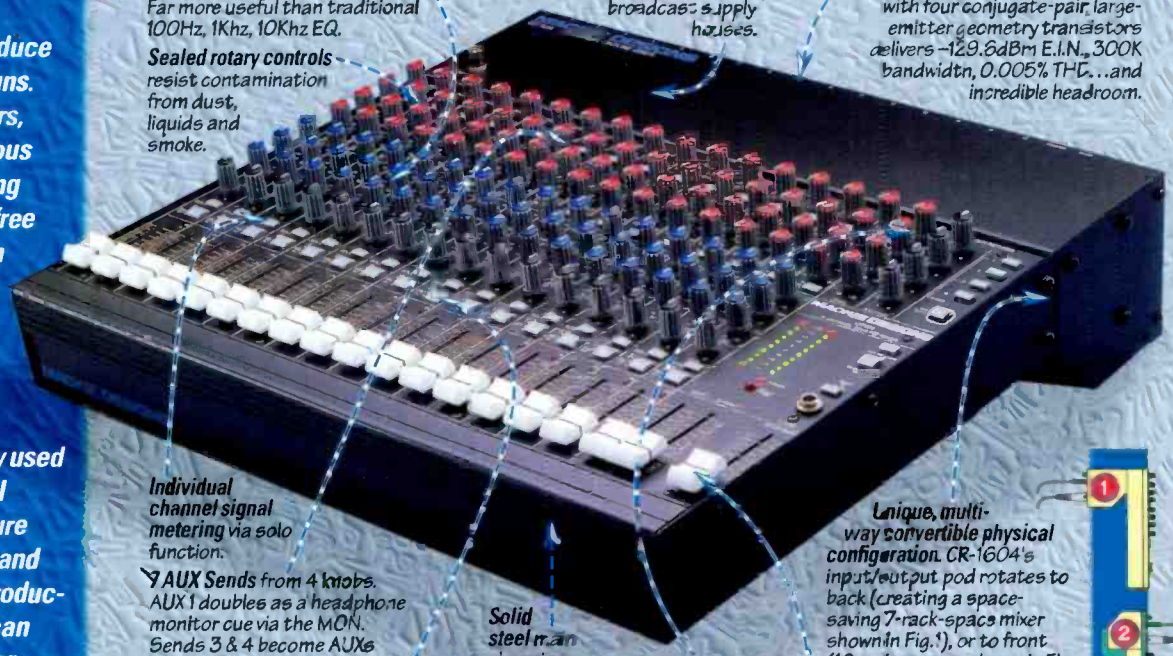
[2] Price is slightly higher in Canada.

3-band equalization done right: ±15dB at 80Hz, ±12dB at 2.5kHz (perfect for voices), ±15dB at 12kHz. Far more useful than traditional 100Hz, 1Khz, 10Khz EQ.

Sealed rotary controls resist contamination from dust, liquids and smoke.

The Mackie Designs 16x2 **CR-1604 Mic/Line Mixer**. Suggested retail price, $1095[2]. Available at America's top broadcast supply houses.

Six recording studio-grade microphone preamps with +48VDC phantom power. Discrete circuitry with four conjugate-pair large-emitter geometry transistors delivers –129.6dBm E.I.N., 300K bandwidth, 0.005% THD...and incredible headroom.



Individual channel signal metering via solo function.

9 AUX Sends from 4 knobs. AUX 1 doubles as a headphone monitor cue via the MON. Sends 3 & 4 become AUXs 5 & 6 via the SHIFT button.

Two extra buses. Mute buttons route the channels' signals to an extra stereo bus called ALT 3/4. Route it to the headphones, for monitoring advance audio cues: Preview a signal that hasn't been brought up in the mix yet... then add it by unmuting the channel.

UnityPlus gain structure gives high headroom and low noise at the same time. Set the fader to center-detent Unity Gain, press channel solo to monitor the channel via the CR-1604's LED meters, adjust the Input trim ONCE, and you're ready. Because there's 20dB MORE gain available on the fader, you won't need to constantly re-adjust the trim.

Maximum RF protection. Both mixers use metal jacks and washers plus a shunting capacitor to de-rail RF before it gets to any circuit traces.

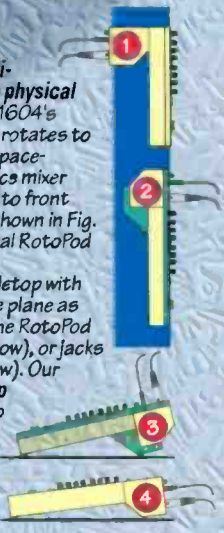
Rugged design and construction. All of our compact mixers have mil-spec, double-sided, thru-hole-plated fiberglass circuit boards (horizontally-mounted on brass stand-offs for impact-resistance), double-parallel-wired faders for 2-times redundancy, and electronic protection against power surges, impedance mis-matches and static discharges.

Solid steel main chassis.

8 mono or 4 stereo AUX Returns with individual level and balance controls, all have 5dB additional gain above Unity to boost weak effects.

Powerful headphone amp (with volume control) drives any phones to head-banging levels even an AOR production person will appreciate.

Unique, multi-way convertible physical configuration. CR-1604's input/output pod rotates to back (creating a space-saving 7-rack-space mixer shown in Fig. 1), or to front (10 rack spaces, shown in Fig. 2) with our optional RotoPod bracket. Use the CR-1604 on a tabletop with jacks on the same plane as the controls via the RotoPod bracket (Fig. 3 below), or jacks to top (Fig. 4 below). Our **XLR10 Mic Preamp Expander** can also be added in any of these configurations.



Better-than-digital specs and headroom. Both the 16-ch. CR-1604 and 12-ch. MS1202 have a dynamic range of 108dB and an internal S/N ratio of –116dB. You're getting a mixer that can handle the output of digital workstations, CDs and DAT tapes without overload.

A chip off the old block. Perfect for remotes, our **MS1202 12x2 Mic/Line Mixer** has 4 of the same superb mic preamps that distinguish our larger CR-1604, plus phantom power, 2 AUX sends/ch., 2 stereo AUX returns, channel patching, 2-band EQ, 3-way 12-LED peak metering, headphone monitor amp with level control, built-in power supply. Suggested retail is just $399[2].

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BE Radio

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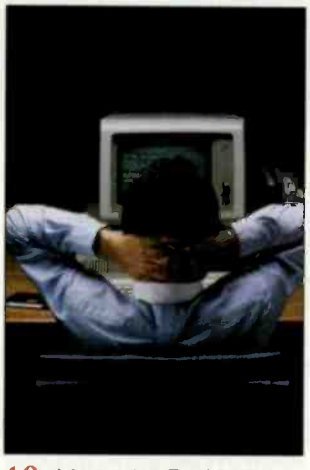

10 *Managing Technology*

ON THE COVER : *Once again, the NAB Convention brought the people, techniques and technology of the industry together in Las Vegas. Photo courtesy Las Vegas Convention and Visitors Center.*

Production Directors. Engineers. Even newsroom people swear by the DSE. Which is probably why these stations with one DSE soon wind up with two. Or even three. Learning is fast. Editing is easier. Everybody is more productive. Because not only do your station's multiple personalities get up to speed faster, they stay up there. To see it in action yourself call 1-800-622-0022 for a demo. The DSE 7000. The New Speed Of Sound.

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Editorial:

Buddy, can you paradigm?

Radio was the buzz at NAB 95, especially in terms of the big picture, new-paradigm issues. Although the TV folks seemed hungry for a major defining concept, there was no shortage of substantial, new service-related topics on the radio side. These included Internet applications of promotional text, graphics and even audio service; a renaissance in datacasting; seriously new backhaul and distribution technologies; and DAB, looking more real than ever, in both terrestrial and satellite flavors.

After a seeming eternity (actually just four years, but that's close enough nowadays) in development, NAB 95 marked the first time that mobile IBOC DAB (both AM and FM) was openly demonstrated. For most people I spoke to, this demo, presented by DAB proponent USA Digital Radio (USADR), was the top story of the show -- at least from a pure technology perspective. But there was more to it than that. Big-time chip maker National Semiconductor showed a small, mocked-up chip (about 3/4" square) that it expects to market as an AM/FM IBOC DAB add-on to standard AM/FM radios. The company also claims the chip should add no more than $10 to $15 to the manufacturing cost of the radios. Coupling this claim with USADR's successful mobile demonstrations seemed to eliminate the last questions about IBOC DAB: How well would it perform in multipath/mobile conditions, and how high would high receiver complexity/cost be?

Respond via the *BE Radio* FAXback line at 913-967-1905 or via E-mail to beradio@intertec.com.

Of course, the National Semiconductor announcement raised a few eyebrows in light of its pre-emptive timing. Not only is the FCC still far from acting on DAB standards, but the ad-hoc advisory EIA and NRSC committees evaluating proponent DAB systems haven't even completed the first stages of their work. It's obviously a bit early for the marketing of DAB receiver components. Nevertheless, USADR scored a slam-dunk in terms of strategy boosting its profile with such a 2-pronged effort at NAB 95.

This is not to say that the mobile demos were flawless. In fact, their occasional glitches made the system seem all the more "real" and confirmed the work-in-progress nature of current development. But as USADR's Tony Masiello commented, "We're ready to turn the rest of the development over to the people who build equipment for a living." This served as a subtle reminder that USADR is a consortium of *broadcasters*, and that final refinements to the system's hardware might be better accomplished by equipment manufacturers -- based on a format designed by and for radio people.

Satellite DAB was also a hot topic at the show. Observant attendees came away from NAB 95 with several important points in this area:

1) Satellite DAB *will* happen, probably before the end of the decade.

2) Terrestrial broadcasters will use this invasion from space as further ammunition for their quest to remove all existing radio station ownership limits. (Argument: If a DBS licensee can put 20 or 30 radio channels into *every* U.S. market, why can't we?)

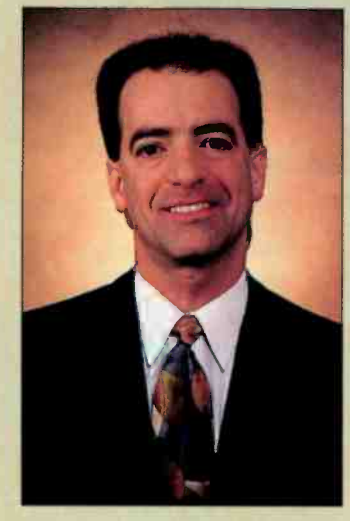
3) The FCC is considering re-opening the satellite DAB proceeding to allow more than the current four proponents into the game.

4) Broadcasters want the FCC to place numerous restrictions on DBS radio services, such as requiring them to be subscription-based (not advertiser-supported), satellite-delivered only (no terrestrial repeaters) and substantially niche-formatted.

5) Broadcasters will ask the FCC to rethink its spectrum allocation plans and *auction* the S-band DAB spectrum to licensees, but only *after* IBOC DAB capability has been granted to existing AM and FM radio stations.

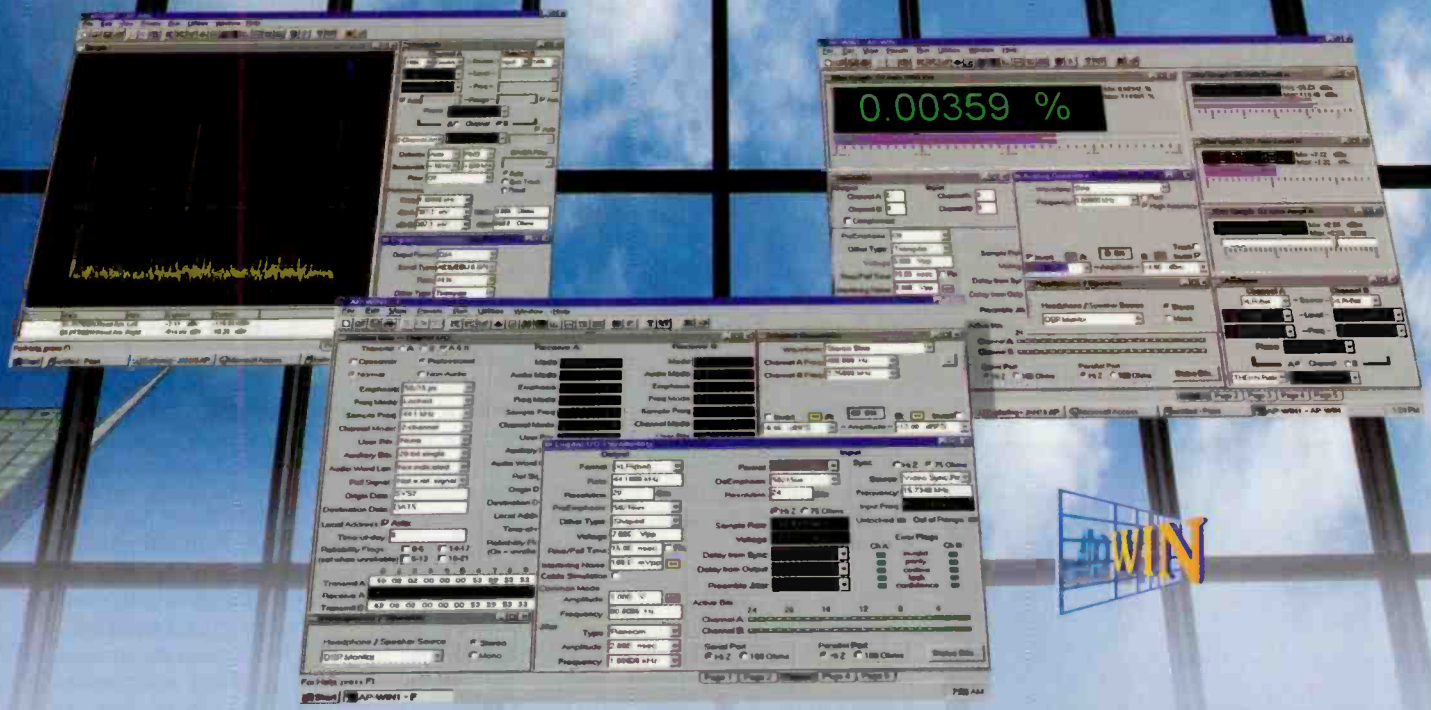
6) The current FCC is likely to rule in favor of the "liberalizing" requests for both satellite and terrestrial radio (fewer ownership restrictions, early IBOC DAB, more DBS players) and less favorably on the restrictive or "protectionist" requests. There also was a hint that they may allow separate services on the analog and digital portions of an IBOC DAB channel.

NAB 95 showed us (if we didn't already know) that radio has new paradigms to spare on its horizon, each carrying potential benefit or detriment depending on your vantage point. It's only as these developments get closer that we'll learn what their true impact on our industry will be, if any. Meanwhile, fasten your seat belts and hold on to your wallets.



Skip Pizzi,
radio editor

We Do Windows



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Contract Engineering:

Billing and collection

By Kirk Harnack

As a 12-year-old paperboy, I eagerly delivered the *Winfield Courier* six days a week, 52 weeks a year. I got to ride my bike up and down Sixth Street and throw papers at 108 porches every afternoon. Delivering newspapers was a lot of fun, I thought.

The monthly collection process, however, was something else. I dreaded it. The newspaper required the paperboys to go door-to-door collecting from their customers in person. Even though I was paid on collections, once I had collected enough to pay my bill to the newspaper, I really didn't feel like collecting any more. I suppose I wasn't throwing papers for the money, I did it to feel important and to have some responsibility.

Fast forward 20-some years: I'm a contract engineer and still like what I do very much. I'd probably do it for free if I could get away with it. However, I can't and so there's still this matter of collections – and I still don't like that very much.

Because billing and collections are vital to any operating business, it's worthwhile to examine how they can best be handled in contract engineering.

Starting off right

Most of us like to be appreciated. I want my clients to appreciate me and my work, even as they're writing a check to pay for it. I want them to feel as if they're getting professional service and advice at a good price. Part of that professionalism involves appropriate handling of financial matters with clients. From a printed rate card to invoices and statements, the appearance, accuracy and timeliness of your financial documents are of key importance.

Establishing set rates for consulting, labor, travel and incidental expenses is the place to start the process of collecting for your work. Your rate card should set forth the prices you will charge for various aspects of your services. See Figure 1 for an example.

The rate card can be incorporated into an actual contract or agreement form signed by both parties to formalize the client's understanding and recognition of the rates and other charges. (See "Contract Engineering," March/April 1995.) Some contract engineers use formal signed, binding contracts for every job and client. Some reserve such contracts only for larger jobs with substantial money involved. Many contract engineers never or rarely use a formal contract. No matter which legal form your relationship takes with a particular client, a clear understanding of rates and other charges is vital to the subsequent billing and collection processes.

Billing

I have found that *by-the-job billing* is an effective and useful method for accurately charging clients and for receiving payment more quickly. With by-the-job billing, you send the client an invoice within a day or two of any work activity. Some contract engineers choose to invoice clients on a monthly or quarterly basis. Although this is a good option for some contractors, the by-the-job method tends to result in more accurate bills because the invoice is prepared and mailed right after the work is completed. Answering clients' questions about certain charges is easy because the work was recently done. Moreover, cash flow is generally faster than the monthly billing method by an average of 15 days.

One terrific tool in tendering accurate and timely invoices is a computerized bookkeeping system. Using such a system streamlines the process of entering billing information. Codes can be set up for each type of service or billing item that may appear on an invoice. Prices and descriptions as well as the client's billing address can also be set up in advance to make it easy and quick to prepare a detailed and accurate invoice. Some bookkeeping programs allow the printed invoice to show your firm's logo and customized messages.

One of the most popular bookkeeping programs is *QuickBooks* from Intuit. This and other programs allow customization of your invoices and statements, which makes them look sharp. When output on a laser printer, these forms appear just as professional as those from a Fortune 500 company.

The invoice is a good place to record a description of the work that was performed. In fact, a detailed description of problems found and corrected is both comforting and informative to the client as he or she is reviewing the invoice. A computerized bookkeeping program will store these descriptions for later reference and re-use.

Acme Contract Engineering, Inc. -- Schedule of Rates

Engineering Services, Consulting and Labor	$100.00/hr
Travel Time (charged for travel in excess of 1 hour)	$ 50.00/hr
Mileage in company vehicle	$ 0.35/mi
Necessary use of Digital Spectrum Analyzer	$200.00/job

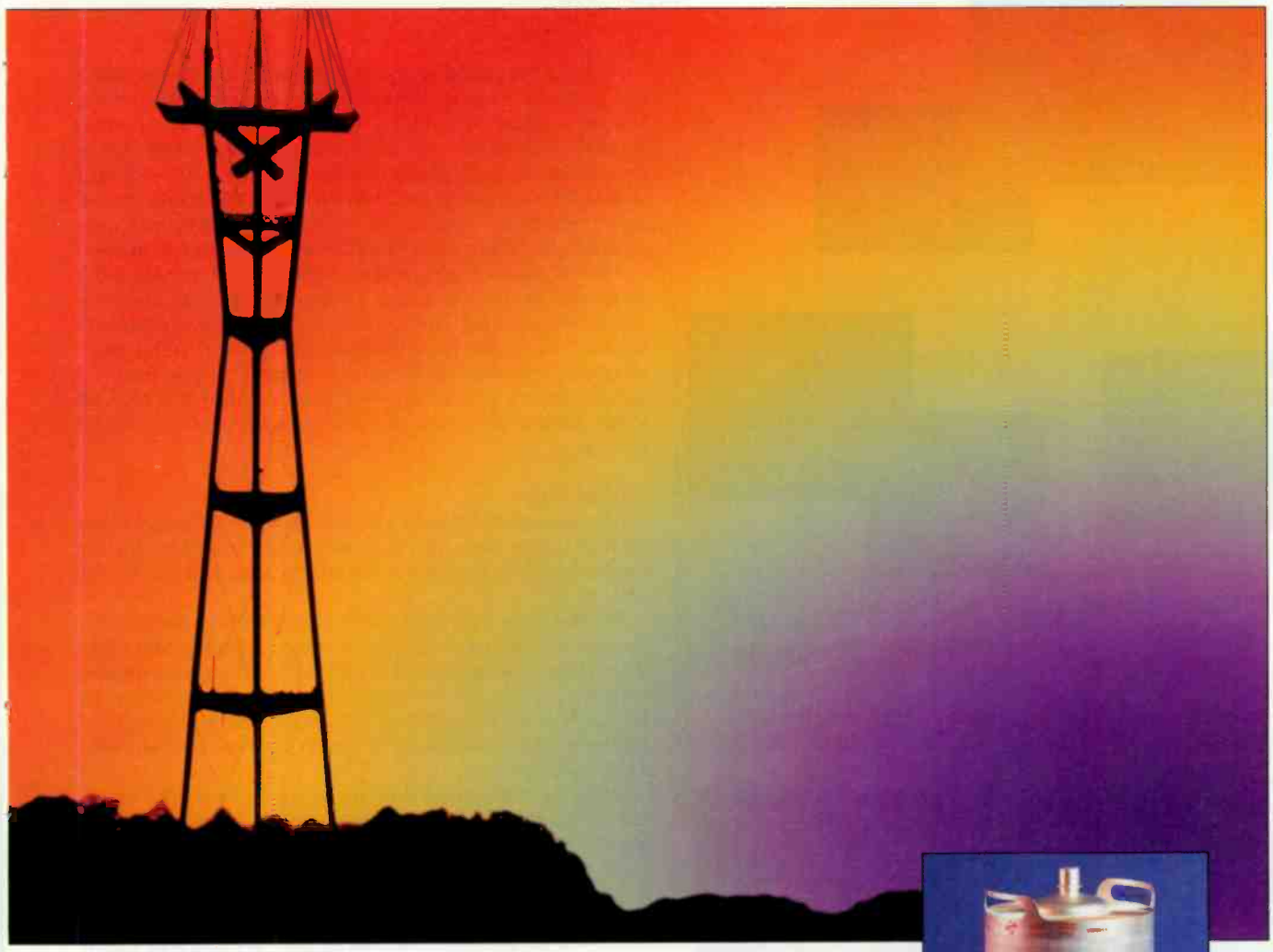
Travel, meals and lodging are billed on a reimbursement basis.

Terms are Net 30 for established accounts; all others are Due On Receipt of services. Any materials or improvements remain the property of Acme Contract Engineering, Inc. until valid payment is received.

Figure 1. A sample rate card for a contract engineering firm.

Kirk Harnack is president of Harnack Engineering, a broadcast contract engineering firm in Memphis, TN. Respond via the *BE Radio* FAXback line at 913-967-1905 or via E-mail to beradio@intertec.com.

Spanning the Spectrum



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From design to final product, we're there for you. EIMAC is flexible enough to handle special orders. And big enough to handle large requirements. Whatever you need, we can provide it now and – we guarantee – for years to come.

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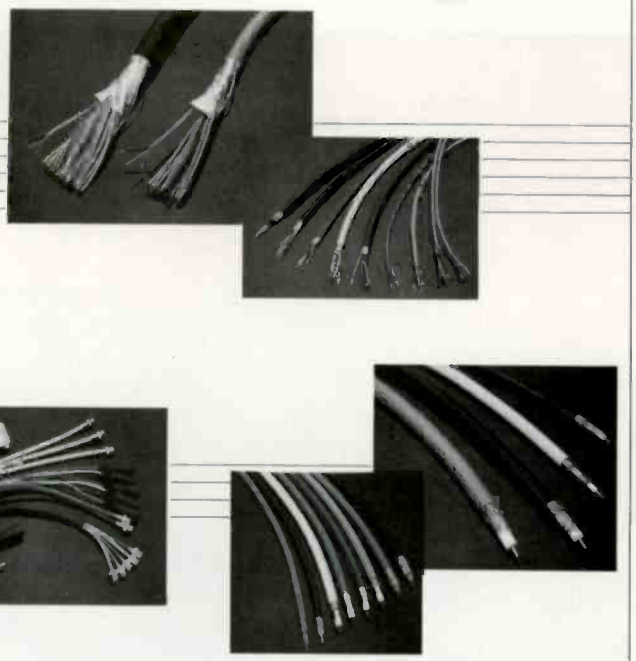

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Statements

Sending out monthly account statements to clients serves two purposes. First, it's a convenient and businesslike way to remind a client that money is owed. Second, an accurate monthly statement – one that properly reflects invoice numbers, dates, amounts, payments, check numbers, etc. – will add to your firm's financial credibility. It shows that you're careful and thorough in your financial dealings and that your records of work and billing for your clients are accurate and timely.

This is another area where computerized bookkeeping programs work well. These programs can print monthly statements showing any invoices issued and any payments received since the last statement was printed. With most programs, any range of dates can be printed to show financial activity over a longer time. This is often helpful when tracking down missed payments or settling disputes over payment history.

Collections

Attorneys and CPAs often say that as an account ages more than 90 days past due, the chances of collecting money diminish rapidly. Experience has proven to me that this is quite true.

So what is the best way to keep accounts from reaching 90-day status? On one hand, using written contracts and other documents can increase a contractor's clout when making collection efforts. Yet contracts and personal guarantees can be nearly worthless against a deadbeat client who absolutely refuses to pay. Some clients still won't pay even after receiving a court judgment.

Often, the best you can do is refuse any further work for past-due clients. But there are some other methods for collecting on past-due accounts. For example, confront the client and appeal to his or her nobler motives. In other words, politely persuade the client that paying the overdue amount is in his best interest and is truly the right thing to do. Writing a firm letter to the client with the notation that your attorney is being sent a copy of the letter is often a persuasive tactic. There also are collection agencies and services that can be highly effective. Often they are less expensive than attorneys and, short of going to court, are about as successful at collecting.

Sometimes it becomes necessary to retain an attorney for collection. Before doing so, consider whether the dollar amount involved justifies this move. Remember that you will spend a certain amount of time and money dealing with the attorney (and, perhaps, in court) which could be spent working for good, paying clients. If the dollar amount involved is less than two or three day's billing, a contract engineer may be better off to write the account off to "bad debt" and take a tax deduction on the amount.

Summary

The most effective tool for collecting from clients is looking and acting as if you expect to be paid in a timely manner. A big part of this appearance is to tender good-looking, accurate invoices and other financial documents. Today's computer and printer technology places this capability within easy reach of any self-employed person or small business.

Additionally, computerized bookkeeping systems will provide the contract engineer with accurate financial information useful in running the business. Today's programs can figure and write payroll checks, perform all general ledger functions, handle accounts receivable and accounts payable, and even project your cash flow and your bank account balance. Best of all, you can know in a few seconds who owes you and how much.

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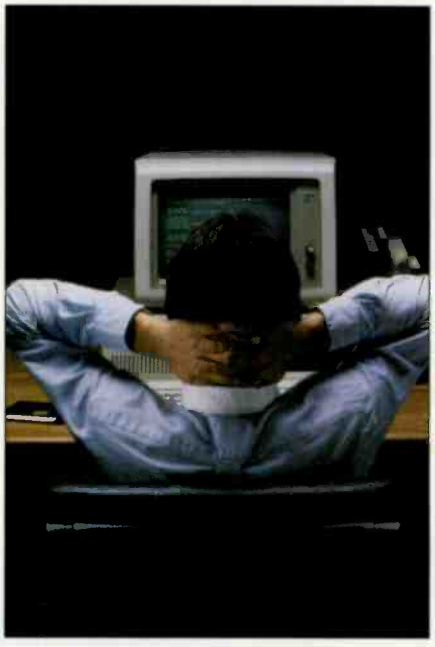
Managing Technology:

Hiring a contractor

By Chip Morgan



Recent trends in downsizing have resulted in fewer staff engineers at radio stations. This is a result of advances in technology that make equipment more reliable, deregulation of FCC rules requiring engineers on staff, and an expectation that radio air talent can handle basic engineering functions such as mixing and recording.

Even though radio is based on technology, efficiencies in technical operations have allowed the average technical department budget to be reduced to about 5% of a station's total cost of operation. (This does not include capital projects or disastrous failures of major equipment.)

Another trend affecting the industry is outsourcing of non-core competencies at the radio station. By outsourcing, stations buy expertise in a specialty that is costly to develop internally. They also get the advantage of bulk equipment purchases and access to specialists who are up to date on the latest technology and practices.

Meanwhile, fundamental changes in the radio business are increasing the need for cost-effective technical solutions even as engineering's role is being diminished. With fewer staff members running more stations, outsourcing frees managers to concentrate on the station's main business – sales and programming.

In order to see where radio engineering is headed today, consider its basic definition: Broadcast engineering is not simply the repair of equipment. It is the technique of designing, constructing and supporting a highly developed communication system by *applying* technology. As an example, manufacturers or specialists on specific equipment can provide more cost-effective repairs, allowing the reduced engineering staff to concentrate on issues critical to the support concept.

But how should a radio station owner or general manager decide who to hire for outsourced engineering, without specialized knowledge of the subject? There are several elements that contribute to this decision.

Costs of contracting

First, understand that it is generally more economical to hire expensive, top-of-the-line engineers. A top-quality engineer helps keep clients from making costly mistakes, saves money on purchases and suggests solutions that can increase income.

Rate is a function of quality of service. If you're paying a high fee, you should expect broad experience and rapid results. If you're paying a low fee, expect things to take longer. Inexperienced managers hire inexperienced contractors in an effort to save money.

Also, you don't have to pay contractors many of the costs of employee labor. There are no Social Security taxes, unemployment insurance taxes, liability insurance, Worker's Compensation insurance, benefits, severance pay or vacations. This creates a potential savings of at least 30%. Of course, a good contractor may still cost more per hour than an average staff engineer, and the costs of these benefits are still being paid by the contractor or the contract engineering firm. But the fees paid to contractors are for "pure" engineering, and the other items often come from the station's administrative overhead. So while the engineering budget line may increase with a contractor, the station usually ends up saving money overall. (It may take some accounting prowess to demonstrate this convincingly.)

Another advantage of contracting: A good contracting firm can provide extra engineers when you need them, and can scale back involvement if things slow down for the station. This no-cost flexibility is one of the keys to the use of contractors.

When you negotiate the deal, make sure it's clear to both parties before you start the services. You should have a written contract that spells out scope of services, costs, purchasing authority, response times, how to handle extra project work and a payment schedule. (See "Contract Engineering," March/April 1995.)

Pitfalls

Depending on outsiders can be rife with problems. Radio stations need to find loyal, reliable contractors they can trust with trade secrets. If the need for engineering suddenly increases due to an LMA, station purchase or other expansion, stations need assurances that the contracting firm will stretch and be prepared to cope with the added workload.

When the Internal Revenue Service reviews independent contractor relationships, they look for various levels of control between the parties. The trick is to carefully balance the role of the station management and the contract engineer so that you don't run afoul of the law. If your station is audited, the IRS will look at 20 factors that determine whether your contract engineer is actually an independent contractor or an employee. In general, if the radio station has the right to control not only the result to be achieved by the worker, but also the means by which it is accomplished, the worker is probably an employee.

If the IRS determines that your engineer is really an employee, the station will have to pay back taxes and penalties that can far exceed the savings you may have realized.

Qualifications of contract engineers

There are currently two major types of contract engineering firms. One type is a single free-lance engineer. This contractor may be an employee of one or more stations and a contractor to others. The other type of firm is comprised of a group of engineers in practice together working for multiple clients. Some of the engineers may be employees of the contract engineering firm and others may be contractors or consultants to it.

In either case, it is important that the independent contractor is set up as a legal business. The scope of services provided by a

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contractor should include systems management and systems analysis. When screening candidates, station managers also should look for good people skills, computer awareness, broad radio experience, logic, purchasing and budgeting experience, and a lot of common sense. In addition, you want people who present a good image to the public. Engineers who have worked in on-the-air positions can also be valuable because they understand programming needs and idiosyncrasies.

Good contract engineers are self-starters, honest, know their limitations and keep abreast of technical advances in the industry and the market. They have strong product knowledge, know how to manage repair and service activities, and are especially good at juggling time-sensitive, high-pressure work requirements.

A contractor should ask to see your facility before quoting support costs. The contractor should also tell station management about emergency response procedures, day-to-day support capabilities, documentation of work, budget preparation, discrepancy systems, frequency of billing, expense and parts procedures, FCC compliance systems, preventive maintenance plans, training services and project management capabilities.

Ask about references, training and experience, industry contacts, FCC licenses and SBE certification, examples of work they've done in the past, insurance (including workers compensation and liability), a business license and a list of other clients.

> The best engineers combine art and science, and have a great passion for radio.

Above all, get a feeling for their sense of priority and ability to see the big picture. Some people don't understand that it's as important to do the right job as it is to do the job right. The best engineers combine art and science, have a great passion for radio, and have lots of ideas about how to improve your facility.

Qualifications of contracting stations

A station considering the outsourcing of engineering must examine its own situation to see how well it can use contract engineers.

First consider your performance expectations. Do you expect an engineer to be at the studio five days a week during business hours? Do you want preventive maintenance? Do you have project work to be done?

Also consider how well equipped the station is. If there's no backup equipment and the existing equipment is falling apart, you don't need a contractor to maintain it – you need a contractor to *rebuild* it. Day-to-day engineering in a facility with bad or poorly maintained equipment is futile for all involved.

As general manager or program director, you can ensure the quality of the final product (the on-air sound) by providing adequate information for appropriate decisions. Insist on top-quality work and materials. Pay a fair amount for technical work and pay on time.

Engineers are often stereotyped as having poor people skills and being hard to get along with. As manager, you need to support your engineers if you expect them to be motivated. If they know your priorities and feel that their work is appreciated, they'll help you by saving your station money and providing profitable ideas and reliable systems that will pay dividends for years to come.

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RF Engineering:

Tower inspections

By John Battison, P.E.

There are two kinds of tower inspections: One is the required quarterly FCC tower light inspection, and the other is the kind that prudent engineers make about every three months on their towers and the radiating devices mounted on them.

Tower light inspections

Section 17.47 2(b) of the FCC rules requires that every lighted tower be inspected at intervals of not less than three months. This is to ensure that all mechanical lighting devices, automatic alarms and indicating devices associated with the tower lighting system are working correctly. The degree of difficulty that this involves will depend on the height of your tower and the lighting required by your license.

If your tower is less than 200 feet, you normally will have no lighting requirements to worry about. Above that height you will find various lighting arrangements. The appropriate one will be specified in the station's construction permit (CP). Occasionally, short towers in the vicinity of an airport will have to be lit. Again, this will be specified in the CP, so read it carefully -- including all the back pages.

When making your lighting inspection, remember the magic number *40,12*. This refers to the maximum and minimum flashing rates of 40 and 12 times per minute, respectively. If you have an older mechanical flasher, be sure to make a careful count and lubricate and clean the flashing mechanism as required.

The top 300mm beacon for all towers using red lights must have two *lamps* in it, of either 620W or 700W (type PS-40 code beacon). When inspecting the lights at night, it is not always possible to tell if both lamps are burning. It's a good idea to take a clamp-on ammeter and check the lighting current to the beacon to be sure that both are burning.

It is not unusual to find one or more sidelight red globes broken. They seem to attract idiots with rifles. So be sure when performing the night inspection that all lights are red, and not just partly red.

If your tower uses strobe lighting, check that your day/interim/night power change is working properly. It is not uncommon to find faulty power-change switching equipment that continues to run daytime power at night -- much to the displeasure of those living nearby. The opposite effect is far more dangerous, however. Running tower strobes at their reduced nighttime power during the day is a serious violation.

Sometimes the flasher rate for strobe lighting systems changes and creates unusual combinations of lights, so check this component for proper operation. Note that some older systems carry the high strobe voltage to each light via heavily insulated cables. Check these for worn or weakened insulation where shorting might occur. (Most newer strobe systems generate the high voltage at each light fixture, and use only a power pulse from the ground controller to initiate the strobe discharge.)

Gaskets on electrical boxes used by tower lighting systems are a common source of trouble. It is important that their integrity be maintained to prevent water entry. Be sure that gaskets are replaced as necessary, and that gasket material is not caught in a box's lid or cover when it is closed.

Nowadays most stations probably have remote indicating alarms observing tower light operation. Don't forget to check these devices when making the tower inspection, and verify that they are telling the correct story to all control points. Be sure that the current sensors can tell if a single sidelight is out. Sometimes the heavy current of the top beacon is all that is checked. For facilities using strobe daytime and red nighttime lighting, make sure that *both* lighting-monitor systems are working properly.

> The FCC and FAA take a dim view (no pun intended) of incorrect tower-light failure reports.

While checking the tower lighting, be sure to check on the operators or whoever is keeping the operating logs for the lights. (It's not a bad idea to make sure that a tower light log *is* being kept.) Even daytimers may be required to have lit towers, and someone has to oversee their lighting. Be sure also that the "responsible person" at night knows whom to call at the FAA if lights fail. Point out that delays can cost the licensee money.

In fact, it is important to verify at *all* stations that board operators and remote-control personnel are absolutely sure of the correct procedure to follow in the event of tower-light failure. Be sure that the correct FAA number(s) are posted along with the proper instructions. The FCC and FAA take a dim view (no pun intended) of incorrect tower-light failure reports.

After performing the tower lighting inspection, be sure that it is entered in the maintenance log in a visible location. It does not do much good to make an inspection report that can't be found when the inspector comes calling.

Other tower checks

For incandescently lighted towers, when making the light inspection also check the condition of the tower's paint, both for flaking and fading. Also check that the painting configuration conforms with the rules.

John Battison, *BE Radio's* consultant on antennas and radiation, owns John H. Battison and Associates, a consulting engineering company in Loudonville, near Columbus, OH. Respond via the *BE Radio* FAXback line at 913-967-1905 or via E-mail to beradio@intertec.com.

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Make sure that the alternating bands of red and white are properly sized, and check that the top band is a red one – I have come across towers that were reversed.

Guy wires are often left to rust away quietly. If necessary, see about getting them greased. If you've never seen it done, it's interesting to watch someone slide down a guy wire, greasing it as he goes.

Check the guy anchors. Look for unlocked turnbuckles. Watch for ice damage at the anchors themselves, as well as for rising anchors that have heaved with ground freezing. This doesn't often happen, but it's better to be sure.

On series-fed AM towers, check the tower base to be sure that the weep holes in the base insulator are clear. Look for cracks in the base insulator. Fortunately, this also does not seem to happen often, but again it's well worth checking.

Speaking of insulators, check all the guy insulators as best you can with a pair of field glasses. Also make a check of base operating current to be sure that there is no change in operating impedance. One of my clients had a robin family that built a nest in the base insulator of his south tower every year. It did not appear to affect the operating impedance, so we left it there. (We did not receive complaints from the EPA about the RF environment, so I guess that the eggs all hatched properly.)

Don't forget the invisible half of the antenna that lies underground.

If you have a shunt-fed antenna, the same points apply. If the antenna was originally built as a series-fed, make sure that the copper strap bypassing the base insulator is still sound and properly connected. I recommend the use of four straps – one for each side of the footing. Make sure these straps are still adequately brazed to the ground system.

Be sure that the RF-drive copper link is tightly secured at each end. If tower lighting power is fed along the RF transmission line, be sure the insulation is still sound and all connections are tight. If static drain chokes are used, ensure that there is still a DC path through them, and that they are not burned out or corroded into uselessness.

The ATU is part of the antenna system, and it should be cleansed of rodent nests and other animal life that enjoys living in an RF environment. It's a good idea to check the calibration of the base current meter when going over ATU connections, and to clean coil clamps.

FM antennas should also be checked, although there is little that can be visually inspected from the ground. Again, field glasses will give a general idea of antenna condition, but if there are no listener complaints of increased multipath or other transmission anomalies, it is usually best to let sleeping dogs lie.

High-power transmission systems with rigid copper coax should have coax joints inspected where possible for signs of heating or leakage. Nitrogen or dry-air systems also should be inspected. Many engineers keep a small log of gas usage, which gives them a handle on leak development.

Continued on page 19

Continued from page 16

In the case of a dry-air system, excessive dehydrator running time should raise a flag.

Don't forget the invisible half of the AM antenna that lies underground – the ground system, an unappreciated and often neglected part of such systems. Over the years, the ground radials tend to become broken and corroded. It is not at all unusual to find an older station with only about half its nominal radial complement remaining.

Experience has shown that a radial system works best with about 120 radials, each equal in length to the tower height. Shorter radials reduce radiation efficiency.

The number of radials has little effect on the reactance of an antenna system, so losing a few radials over the years will not cause much of a change. But, as the number of active radials decreases, the base resistance increases. This will produce an operating resistance above the optimum operating value. Such a change affects only *ground loss resistance*, however, and antenna resistance includes both ground loss resistance and *radiation resistance* components. As the ground loss resistance increases, the power transmitted decreases, and coverage becomes poorer.

> It may provide comfort to have a grounded tower, but if it is only half-grounded it will be worse than useless.

FM antennas have ground systems, too. FM-only towers are usually grounded – or at least they're supposed to be. It is not sufficient to pour foundations and mount towers on them. Often the grounding of an FM tower is overlooked or done poorly. Therefore, include a check of tower grounding in any FM-tower inspection process. The copper grounding strap should be brazed or properly clamped to the tower base and run to at least four grounding rods. Even better is one of the various special grounding systems and chemical salts that are offered to improve grounding.

It may provide comfort to FM broadcasters to have a grounded tower, but if it is only half-grounded it will be worse than useless. A piece of 18-gauge wire running to a ground rod doesn't truly ground the tower, but it may offer enough impedance to a lightning strike to divert it to the coax and thence to the transmitter. Remember, when lightning hits a tower and goes down to ground, it chooses the *shortest* path and the one of least resistance. Many transmitters are located at the base of the antenna/tower. In such cases, the incredible current of a lightning pulse can encounter an extremely high impedance even in a piece of 4-inch copper strap – high enough to divert the discharge away from a direct ground path, and straight to the final stage.

Regardless of the modulation system (AM or FM), all grounding straps should be in place at the tower base, and they should tie the whole system together. These connections should be checked during inspection and if absent or damaged they should be installed or replaced.

After completing your full tower inspection, be sure to enter it into the maintenance log.

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Everett DeVelde, Chief Engineer, WSAJ-FM, Grove City, PA

"We bought the Fibox primarily for lighting isolation on a 500-foot run between our studio and STL tower. But we also noticed that the audio came through crisper and brighter than on our temporary shielded pair."
Galen Hassinger, Director of Engineering WINK-FM, Ft Myers, FL

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FCC Update:

FCC compliance checkup

By Harry C. Martin

Broadcasters should periodically conduct a self-inspection of all facilities, including their transmission facility and tower, to ensure compliance with applicable FCC rules and regulations. (See "RF Engineering," p. 14.) The first step in reviewing a station's technical operation is to check the areas where FCC inspectors most often issue violations. See the check list below for referencing the pertinent sections of the rules:

- All towers are correctly painted. (17.50)
- AM towers are properly fenced. (73.49)
- All current station authorizations (including auxiliary) are posted. (73.1230(a))
- Chief operator is designated in writing and posted. (73.1230(a) & (b))
- Contract chief operator agreements are on file. (73.1870(b)(3))
- Chief operator's and all duty operators' licenses posted. (73.1230(a) & (b))
- AM monitor point descriptions are correct. (73.158)
- Chief operator is making weekly station log review. (73.1870(c)(3))
- Station logs for the past two years are available and complete. (73.1840)
- All station logs indicate a weekly EBS tests sent and received. (73.961)
- Remote control and metering operational and calibrated. (73.1410)
- Most recent equipment performance measurements available and complete. (73.1590)
- Transmitted signal meets FCC specifications and is in accordance with station license. (73.44/73.317)
- Operators are properly trained. (73.1860)
- EBS receiver working and tuned to proper station. (73.932)
- EBS test transmissions OK
- EBS encoder is FCC type accepted (i.e., no tones on cart). (73.942(a))
- EBS check list with authenticator envelope at operator duty position. (73.908)

"Reinventing" the FCC

The FCC has responded to Vice President Al Gore's mandate to federal agencies for "reinventing government" in a report issued this past February.

The first part of the report describes the agency's efforts over the past year to eliminate backlogs, improve processes and reduce regulatory burdens. More interesting, however, are the report's proposals for administrative and rulemaking actions for further streamlining FCC operations. Among these are the following proposals of interest to radio broadcasters:

1. Simplify and clarify the criteria used in comparative hearings to choose among competing applicants for new broadcast facilities.
2. Streamline and consolidate the equipment authorization process, including shifting to electronic filing.
3. Relax the marketing and certain administrative rules related to equipment authorization.
4. Remove restrictions on the use of frequencies above 40GHz and open up spectrum for licensed and unlicensed services.
5. Authorize the use of electronic mail and electronic filing.
6. Make the effective date for delegated authority items the release date to a public network like Internet.
7. Delegate to the designated frequency coordinators authority to deal with Canada for frequency coordination.
8. Simplify procedures for certification to the requirements of the Anti-Drug Abuse Act of 1988.
9. Simplify or eliminate several filing requirements for microwave stations, including expansion of the types of station modifications that do not require FCC approval.
10. Propose to Congress the following changes in the Communications Act:

- Modify the prohibition against the commission waiving the requirement for a broadcast construction permit. This proposal would give the FCC flexibility to determine when permits are necessary and when construction can be undertaken without prior approval.
- Provide that a license authorization for a station silent for one year automatically cancels. This would save commission resources, eliminate undue protection of non-operational stations, and allow operational stations greater flexibility in changing frequencies and upgrading facilities.
- Legalize the broadcast or cablecast advertising anywhere in the United States of any lottery enterprise that is lawful where conducted.
- Simplify the broadcast license renewal process by establishing a 2-tiered process: First, the incumbent licensee's performance during the preceding license term would be compared only against statutory standards and not against any competing applications. Second, the renewal application would be automatically granted if the statutory standards are met or exceeded or designated for hearing if the standards are not met.
- Authorize the use of private, independent testing labs to test and certify radio equipment to ensure compliance with technical standards for radio frequency (RF) emissions.
- Authorize FCC to: a) retain fees above a certain sum sent to the Treasury, b) amend fee categories, c) change the amounts of fees, and d) create new fees.

Dateline

On June 1, broadcast stations in the following states must file their annual ownership reports: Arizona, Washington, DC, Idaho, Maryland, Michigan, Nevada, Ohio, Oklahoma, New Mexico, Texas, Utah, Virginia, West Virginia and Wyoming.

Harry C. Martin is an attorney with Reddy, Begley, Martin & McCormick, Washington, DC. Respond via the *BE Radio* FAXback line at 913-967-1905 or via E-mail to beradio@intertec.com.

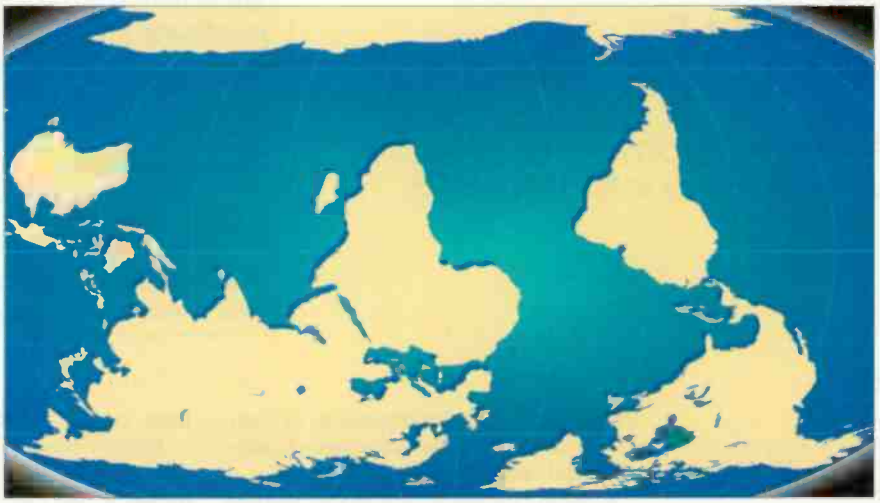
"Radio means the world to us" at Computer Concepts

THE NEW RADIO TIMES

Computer Concepts, serving broadcasters for over 20 years

STUDIOFRAME PRODUCTION IS FAST, EASY.

In the production studio, time equals money. For the fastest, easiest multi-track production for commercials and station promos, Computer Concepts introduces the StudioFrame™ the complete audio workstation, "studio in a box." Every production feature from true 8 track input and output (expandable to 24 tracks) to time compression, digital EQ and filters is built into StudioFrame. Best of all, with its direct integration with DCS, produced spots can be on the air seconds after completion.



COMPUTER CONCEPTS IS TURNING THE WORLD OF RADIO UPSIDE DOWN

LAS VEGAS- Visitors to the 1995 NAB convention were amazed to see no fewer than six new products for radio from Computer Concepts, makers of DCS™, the world's leading hard disk system. For the first time, one company offers proven products for stations of every size — from 100% live major market powerhouses to fully automated local stations — all working together through the DCS architecture. Some of these new products, while new to the US, have been in use for years in international markets... another advantage of Computer Concepts' world-wide scope. With so many products to choose from, Computer Concepts can now custom-tailor a profit-making system for every radio operation.

COMPUTER CONCEPTS - THE POWER BEHIND THE RADIO REVOLUTION.

What makes Computer Concepts stand out of the pack of companies now offering hard disk products for radio? We're customer-driven, and we have been since we started over 20 years ago. We maintain direct contact with our customers before, during and after the sale. We're so proud of our customer relationships that unlike most other vendors, we'll be happy to supply our entire customer list to any prospective purchaser.

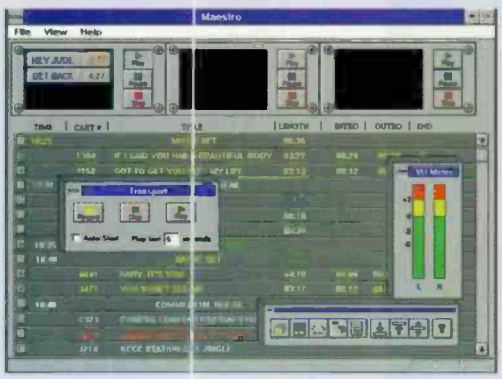
DCS from Computer Concepts has long been the leader in automating commercials and spot insertion for stations of all sizes. But the big news this year is an unprecedented array of new products for every facet of on-air operations, and every kind of radio facility. All are field-proven and backed with the kind of customer service that has been instrumental in the success of Computer Concepts.

As your needs change, so can your DCS-based system. For example, DCS systems can be configured to store music, commercials, jingles and other audio cuts either centrally on an audio server or distributed on individual DCS workstations. A new option, Audio Central+ distributed audio, offers both capabilities plus complete fail-safe redundancy.

Another new DCS option developed in response to customer requests allows the system to start playing back material while it is still being recorded. Perfect for delaying network news-on-the-hour for a few seconds or minutes while giving local headlines first.

All the new and exciting Computer Concepts products integrate seamlessly to DCS. It's your assurance that — whichever components you choose to make up your DCS system today — your system can be expanded tomorrow.

Large stations or small, simple system or very complex, today more than ever, there's one place to call for total expertise and total customer responsiveness in hard disk systems. Call Computer Concepts at 1-800-255-6350 and profit from our experience.



MAESTRO BRINGS MUSIC AND SPOTS TOGETHER.

DCS has always managed commercials and spots flawlessly. Maestro™ now does the same for music, integrating all music and commercial information and control with a Windows™-based on-screen interface. Maestro is the key to accessing music directly from hard disk. It interfaces directly with music scheduling database systems and gives on-air talent total flexibility to execute perfect song-over-jingle-over-song crossfades. Music search by type, artist, etc., intro and outro countdown display and instant access to news and weather info are just a few of the many features which make Maestro the perfect DCS interface for creative on-air control.

Newsroom keeps you up-to-the-minute.

Radio news can be a profit center with Newsroom™, the complete electronic news operation from Computer Concepts. The key word with Newsroom is *efficiency*. The system automatically takes both text and actualities from wire services, networks and other sources. A news person writes and edits copy on screen, linking sound bites to the copy — playing the wrong "cart" is a thing of the past. Editing of audio actualities is fast and precise. On-screen prompting lets talents read final copy right off the screen. Newsroom is fully integrated with DCS and Maestro and can be added to an installed system at anytime.

CARTRACK TAKES THE HASSLES OUT OF LIVE RADIO.

CartRack™ is a field-proven "front-end" to DCS which puts right on the screen all the carts your morning (or other) talent could ever want, for instant, no-hassle access. Individual "racks" of carts can be programmed for each show — there's no limit. Talent uses a touchscreen, trackball or mouse to "point and play" carts to three on-screen graphic "cart machines." Events played from DCS can be controlled by CartRack. It's the easiest way to handle live shows offered by any hard disk system. Let CartRack bring order into your hectic, live, money-maker drivetime shows, and then let DCS automation take over to handle other dayparts.

Computer Concepts CORPORATION

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Circle (6) on Reply Card

NAB 95 Review

BE Radio's exclusive team of reporters uncovers the new products of NAB 95.

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Radio automation

By Kirk Harnack

Harnack is president of Harnack Engineering, a broadcast contract engineering firm in Memphis, TN.

Purveyors of radio automation systems introduced numerous features and capabilities in their systems at the 1995 NAB Convention.

A good example is Computer Concepts, maker of the *DCS (Digital Commercial System)*. Many new elements of this DOS-based system were unveiled, providing improved user interfaces, storage/retrieval access, wire capture and program assembly. Also announced were DCS's support of ISO/MPEG Layer II storage and an interface between DCS and the TimeLine *StudioFrame* workstation.

An addition to the Harris Allied automation product line was the *DDS Digital Delivery System* from Radio Systems. Instead of using a PC screen, it employs multiple control panels that look like cart machines with LCD screens. DDS is UNIX-based, allowing up to 16 simultaneous audio operations from a single file server.

Wizard for Windows is Prophet Systems' radio automation system. It is based on powerful, off-the-shelf computers connected by a Novell network. Features for 1995 include automated time and temperature announcements. The system's version 4.0 software also includes additional fault tolerance and an improved file server interface.

The *Phantom* from Register Data Systems (RDS) is a hard-disk-based automation system designed primarily for satellite automation. For 1995, RDS introduced a special *Macro Keyboard*, which allows pre-programming of commonly used keystroke sequences to simplify and quicken daily tasks.

Enhancements to the Scott Studios radio automation system include *CompuCarts* and a graphic waveform editor. CompuCarts is a "wall-of-carts" system designed for quick and easy access to hundreds of cuts on a touch-screen display. The graphic waveform editor adds stereo cut-and-paste editing as an integral part of the Scott Studios system.

Radio Computing Services (RCS) showed the *ProSonix* digital editor/workstation addition to its growing line of PC-based modules in the RCS *Works* package. Available in stereo or 8-track form, ProSonix includes ISO-MPEG Layer II coding and a dedicated control surface with familiar, assignable controls. Based on the Motorola 56000 DSP, ProSonix includes AES/EBU I/O, waveform editing, automated mixing and time compression/expansion.

Arrakis has officially rolled out the *Gemini* software and hardware enhancements to its *DigiLink* automation system. Gemini gives an announcer instant access to hundreds of audio cuts, and up to three cuts can play simultaneously. DigiLink *News Text* is a software module for entering and editing news, commercial tags, weather scripts, E-mail and more, while *Remote Control* allows complete control of a DigiLink workstation over a LAN or via modem.

Broadcast Electronics (BE) introduced *NewsBoss*, a Windows-based newsroom automation system that integrates with new or existing *AudioVAULT* automation systems. It includes wire-capture and a complete text editor, along with a TV-style teleprompter on the computer screen. Working with its subsidiary, Broadcast Programming, BE is able to supply radio automation systems with music already on hard disk plus ongoing music support.

Dalet is a Windows-based radio automation system that works in a stand-alone or network configuration, using standard PC hardware and LANs. New features include a 4-track digital editor and ISDN, satellite or POTS connectivity for wide-area networking.

Features introduced by ENCO Systems for its *DAD486x* DOS-based system included advanced automated program-transition options, comprehensive assembly editing, transparent links to third-party audio and text editors, an interactive interface with a major music scheduling system, and the availability of music libraries pre-recorded on hard disk.

ITC added several features to its radio automation system, *DigiCenter*, including one-touch playback of up to 256 audio cuts and log editing/merging software. Also introduced was *CD Digital Transfer*, which allows digital dubbing of CD audio into DigiCenter at 4x real time.

LPB showed some enhancements to its *Salsa* automation system, including a Pentium platform option that provides a noticeable speed increase.

The Management also showed updates to its *AXS* system and TM Century presented the latest on its *Ultimate Digital Studio (UDS)*. Finally, on the international scene, some interesting systems and upgrades were shown by ABC Digital of Australia (showing *D-RADIO*), AEQ of Spain (now with a U.S. office, showing the *MAR* system) and Radiomation of Ireland.

Circle (75) on Reply Card

Digital audio workstations

By Tom McCarthy

McCarthy is a systems engineer for National Public Radio, Washington, DC.

NAB 95 was massive in terms of digital audio workstation products. Almost all DAW manufacturers introduced software upgrades and some vendors released redesigned or new workstations.

Fostex Corporation of America released *TimeFlex* time compression/expansion capability and Version 4 software for the line of *Foundation 2000* digital audio workstations.

Orban presented Version 5.0 software for the *DSE-7000* workstation, adding pitch-shift, time compression/expansion, vari-speed, reverse audio, improved screen display and an expanded help package. The DSE-7000 now interfaces with ENCO Systems' *DAD486x* and Broadcast Electronics' *AudioVAULT* systems.

The *DM-800* was introduced by Roland. Its most striking feature is its size, especially considering the number of features that the 26" x 11.25," 12-pound package contains. The DM-800 includes eight tracks of hard-disk recording with 100 layers per track, full dynamic automation and eight dedicated faders. Up to 3.5 track hours of recording at 48kHz can be stored inside the unit, and an additional 24 track hours can be accessed outboard via SCSI ports.

Studer Editech introduced the *Dyaxis IIbv* digital audio workstation, essentially a Dyaxis II minus its synchronization and expansion capabilities. It is specifically geared for the broadcast radio production market, and features a built-in automated digital mixer with dynamic level control, panning, metering and 5-band parametric equalization. Also new was the *Edit Controller*, a dedicated transport and edit control panel, and the *Dyaxis IIi InterMix* processor, a self-contained digital studio that includes all the basic requirements for recording, editing and automated digital mixing.

Avid Technology demonstrated Version 3.1 software for its *AudioStation* and *AudioVision* digital audio workstations. Features include enhanced compatibility with Avid's *Media Composer* and *Film Composer* non-linear editing systems. The 3.1 upgrade also includes enhanced hardware and software integration between Audiovision and AudioStation and the Yamaha *DMC 1000* digital mixing console.

Nagra Lysis introduced an array of digital audio workstations and an integrated approach for the formation of an entire digital network. Three workstation models are offered: a consultation/news editing unit, a pre-production workstation and an on-air unit specifically tailored for broadcast control room use. The workstations run UNIX on 486 and Pentium platforms to achieve true multitasking.

Studio Audio & Video demonstrated the latest *SADiE* software release, Version 2.2. Upgrades include *The Speech Editor*, which has the ability to automatically find, mark and remove areas of silence based on user-definable level-threshold and duration settings, providing high-quality time-compression for speech recordings.

Digidesign presented an upgrade of *Pro Tools III* to version 3.1, which includes punch-on-the-fly and improvements to its ADAT interface, including external synchronization and support for the Fostex *RD-8*. Another release from Digidesign was a product for the Power Mac platform called *Session Software 2.0*. Using the native audio capabilities of the platform, this inexpensive software package adds numerous production, synchronization and import/export features.

Meanwhile, several of Digidesign's third-party developers (now numbering more than 60) produced an array of plug-in modules, including Lexicon's *NuVerb*, Steinberg's *Virtual FX Rack* and products from Waves, Jupiter Systems, QSound Labs and Gray Matter.

A software update was announced by Lexicon for *Opus* that takes the system to Version 5. Enhancements include support for standard SCSI hard drives (including low-cost 2.2GB removable drives) and an overall increase in system performance and reliability.

Sonic Solutions introduced the *Journalist/News System*, to accommodate basic editing and sequencing of news clips and short programs cost-effectively. The company also introduced its *Radio Workgroup Architecture*, which enables broadcasters to configure scalable networks of radio production systems. Multiple DAWs with varying degrees of capability can be linked together so users can share common soundfiles and access them simultaneously in real time.

Timeline Vista announced that effective immediately all of its TimeLine *DAW-80* digital audio workstations will contain upgraded Intel Pentium processing power without a price increase.

ABC Digital introduced a Graphic User Interface (GUI) for its *D-CART* system, which now allows it to be accessed on a standard Windows-based PC.

Circle (76) on Reply Card

Microphones, accessories, telephone interfacing, and audio mixers

By Chip Morgan

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

New digital systems notwithstanding, there is still plenty of need for microphones, mixers and related products in radio – as evidenced by the number of new products in this category, and the number of people in these exhibitors' booths at NAB 95.

Microphones

Electro-Voice showed a studio con-

denser microphone called the *RE2000*. It's a short-D, high-efficiency unit with the high output of a large diaphragm mic, but the tighter polar pattern and faster transient response associated with small-diaphragm designs. The RE2000 features a true balanced-output transformer designed for the microphone by Jensen.

Shure Brothers announced the *VP Wireless System*, a low-cost VHF line comprised of three different battery-operated receiver/transmitter combinations. The units run on 9V batteries, up to seven hours on a single battery. All operate in 10 frequency designations between 169 and 216MHz.

Sennheiser introduced the *MD431 II*, an update of its MD431 supercardioid dynamic shock-mounted microphone, featuring improved frequency and polar response. A UHF diversity wireless microphone receiver, the *EM2004-UHF* was also presented. It can be tuned to any one of 16 preprogrammed channels, and has a total bandwidth of 24MHz, allowing it to be used anywhere in the world. Another product was the *ME67*, a long-shotgun addition to the *K6* modular condenser line.

Sony introduced a UHF synthesized transmitter for wireless microphone bodypack applications, the *WRT-860A*. It's physically the smallest unit Sony makes in the 800 series, yet it supplies 20mW of power and offers a broad spectrum of operating frequencies.

Telex Communications introduced the *ENG-500* wireless microphone. It combines the low-noise performance of crystal control with much of the frequency agility of synthesized PLL designs. An interchangeable module holds crystals for three different UHF frequencies selected for their compatibility with each other. A similarly configured VHF version, the *FMR-150*, was also shown.

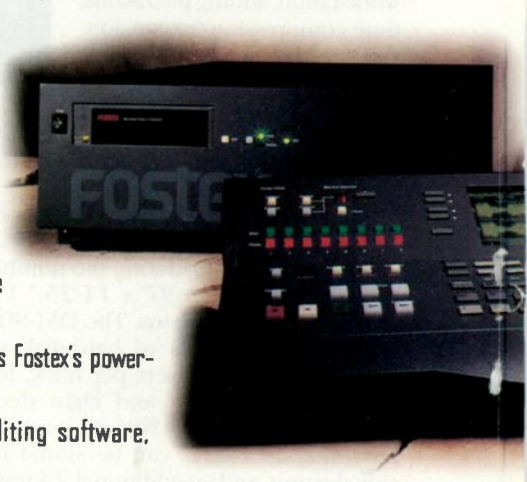
Lectrosonics demonstrated the *195* series of wireless microphone systems. These units are designed for maximum battery life, feature dual-band companding, ratio-diversity reception with dynamic audio combining, wide deviation with no pre-emphasis or de-emphasis and rugged machined aluminum construction. The series has extensive metering and control capabilities and is designed for critical applications.

Vega introduced the *T-678* synthesized miniature bodypack transmitter with internal dip switches for 1,600 frequencies in 25kHz steps over a 42MHz range (seven UHF-TV channels). Vega also showed the *SU-620* series of synthesized wireless mics with cost effectiveness designed for a variety of applications.

Audio-Technica (AT) presented the *AT873R*, a small hypercardioid vocal

It's Sleek.
It's Reliable.
It's Ergonomic.
It's Dead.

Presenting Foundation 2000RE. The ultimate recording/editing platform, and a darn good mousetrap for just $9,000. Foundation is the fastest, most intuitive non-linear audio platform on Earth. No cursor. No mouse. Just an amazing array of delightfully direct controls, including a solid brass jog wheel and touch-sensitive screen. The 2000RE features Fostex's powerful event-based audio editing software, Timeflex™ time expansion/compression, LTC/VITC synchronization, and superb 16-channel audio quality.



FOUNDATION

Need more tracks? Cascade multiple

mic that is phantom-powered and includes internal shock-mounting. The high-SPL capsule can be replaced with available omni, cardioid and subcardioid capsules. AT also showed the *ATR65*, a unidirectional electret mic that can be used as a lavalier or slip into its silver-dollar-sized base for attachment almost anywhere, and the *AT858*, a wide-range cardioid on a slim gooseneck with dip switches in its tabletop base to mate its output with almost anything.

Posthorn was showing a Schoeps "Compact" condenser mic, the *CCM-U*, which looks like the company's Colette series without the amplifier. Also new was the *WMS*, a windscreen built to slip over two mics for M-S coincident use.

Crown showed two unique announcer headset mics with brackets made to mount on the Sony *MDR-V6* and *MDR-7506* headsets. The *CM-312HS* has a hypercardioid pattern and the *CM311HS* uses Crown's *Differoid* noise-cancelling technology.

Circle (77) on Reply Card

Microphone accessories

Benchmark Media System presented its *MicMan Jr.*, a high-quality stereo mic pre-amp that can be powered by internal batteries or AC. Also on hand was the *IMSO1* daughterboard, which plugs onto the MDA101 mic-pre-amp/DA card to provide a switchable, separate communications channel output.

Studer International introduced the first of a range of digital mic/line pre-amps, the *D19 series*. One of these, the *MicAD*, features a high-quality 8-channel mic/line pre-amp system with 20-bit conversion. It's 2RU high, has four AES/EBU outputs, plus optional ADAT optical, S/PDIF or TDIF outputs.

Aphex Systems introduced the *Model 107* dual-channel thermionic microphone pre-amp, featuring a transformerless solid-state front end followed by a tube circuit that provides the sonic characteristics of tube amplification without the high voltages, heat, fragility and short life span of conventional tube circuitry.

Circle (78) on Reply Card

Telephone interfacing

Gentner Communications showed its latest refinement for telephone interfacing, the *TeleHybrid*. (See "NAB 95 Pick Hits," p. 36.) In addition, Gentner debuted several enhancements to the *TS612* digital telephone system, including PC call-screening software, a network interface that allows up to 10 TS612s to share a set of telephone lines, a 1A2 key-system interface, and TS612 control panels configured as drop-in modules that fit into on-air consoles.

Telos Systems showed its line of digital hybrids, including the *ONE-x-Six Talk Show System*, the *ONE plus ONE* dual-hybrid and the *100 Delta* interface with dynamic equalization. *Call Screen Manager* talk-show software was also demonstrated.

Circle (79) on Reply Card

Audio mixers

Wheatstone Broadcast Group showed the D-500, a digital on-air console that looks like a traditional analog unit. (See "NAB 95 Pick Hits," p. 36.)

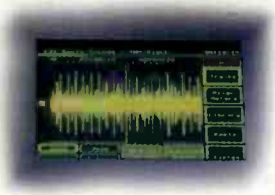
Otari Corporation introduced the *Status* family of digitally controlled analog mixing consoles. The consoles feature flexible on-board automation and status-recall. Options include moving faders, dynamics-processing software and patchbays.

Ramsa debuted the *WR-C4500* series of portable mixing consoles, featuring 12-input and 20-input mainframes. Each includes four stereo line inputs, four bus-outs plus a stereo mix output and four aux buses. A larger console, the *WR-SX1*, was also shown. Available in 44- or 52-input versions, this mixer includes 20 subgroups and VCA con-

2000REs together. Got another session? The RPE™ removable disk system loads your next project in seconds. Need machine control? Use the Sony 9-pin, MIDI or ADAT Sync—the 2000RE does it all. With Foundation's bulletproof software and rugged Fostex hardware, each job gets done simply, quickly and reliably. And of course, your total investment is backed by our worldwide service and support. Why not build your next project on a solid Foundation? Call 1-800-7-FOSTEX or 1-212-529-2069 for a demo or free video tape. Discover for yourself what makes the Foundation 2000RE such a killer system.

One wheel everyone can get behind.

Grab hold of the solid brass jog wheel and feel the track. Foundation's unsurpassed audio scrubbing resolution sounds and feels like magnetic analog, so you'll park at exactly the right point—without circling the block.



The ultimate screen test.

Simply use your finger to select a waveform, edit envelopes, library information, and much more while you're recording or playing back. Foundation even lets you output your display to any video monitor.

The keys to your success.

Don't wait, do it now. Ergonomic controls unlock your creative power. Dedicated editing buttons give you fast single stroke cut, paste, fade and trim functions.

Work with the biggest names in the business.

Keep it digital as you control and transfer from the most popular multitrack formats to Foundation, the ultimate front end editing system. Foundation speaks to all the right stuff.

FOSTEX

Circle (23) on Reply Card

Fostex Corporation of America 15431 Blackburn Avenue, Norwalk, California 90650, U.S.A. Telephone: (310) 921-1112 Fax: (310) 802-1964

trol, with 4-band parametric EQ and automation capability.

Studer showed the *980* series of analog broadcast consoles, an upgrade of the 900 series that includes a redesigned input section and snapshot automation using PCMCIA storage cards for personal set-up memory.

Sony presented the *MXP-700* series of cost-effective analog audio mixing consoles. Features include extensive talkback functions, mix-minus, four mono and two stereo clean feeds, multiple aux sends, fader start control, reverse talkback, up to eight group modules with 3-band EQ, assignable dynamics and VCA grouping.

DDA showed the *Network 7* console, the company's first dedicated broadcast mixing console, which is designed specifically for 1-person on-air studios. It includes audio limiters built into mono and telephone inputs, a separate record bus and an automatic ducking system.

In automatic mixers, Shure Brothers took a good product, the *Model 410*, and turned it into a great product by doubling the number of mic inputs to eight, adding insert points, EQ and some features from its AMS automatic mixer line – all without increasing the price. The *SCM810* will operate with any professional microphone and can be ganged to handle up to 400 mics.

Circle (80) on Reply Card

Audio processing and storage

By Christopher H. Scherer

Scherer is chief engineer of WMMS-FM, Cleveland.

Analog and digital recorders and audio processors were, as always, found in high numbers at NAB 95. The quality of new products in this area was particularly impressive this year.

On-air audio processing

Orban showed its *PC Remote Software* for the *Optimod 8200*. Running under Windows, it provides remote control, storage and up/downloading of all settings on the 8200 and full metering on the remote PC's screen.

Cutting Edge Technologies showed Version 4 software for the *Unity 2000i* FM processor and the *Unity AM* processor, which enhances both devices' dial-up access features. A hardware upgrade improves mid-range and low-frequency performance.

Aphex displayed a version of the Compellor, the *320A*, with improved low-frequency performance. The *722 Dominator II* adds control (internal or external) and selection of pre- and de-emphasis (50µs, 75µs or none).

Circuit Research Labs (CRL) introduced the *DP-100*, a digital audio processor for FM with touch-screen control. It includes analog and digital inputs, 5-band compressor, 3-band limiter, CRL stereo enhancement and DynaFex noise reduction.

AEV introduced the *Mirage* FM audio processor, a 3-band unit with a digital stereo generator. Other additions to the AEV line are the *Luxor* stereo enhancer and the *Thunder* composite processor.

Circle (81) on Reply Card.

Studio audio processing

Eventide presented the *DSP4000B* Broadcast/Production Ultra-Harmonizer, containing a set of processing programs created especially for radio and post-production. The hundreds of presets include high-quality reverb, pitch-shift and time compression/expansion programs, along with digitally sampled sound effects and background ambiences. The unit, therefore, functions as a unique, combined processor/sampler/sound-effects library. User settings can be stored internally or on PCMCIA cards.

Ramsa/Panasonic offered the *WZ-DE40*, a digital multiprocessor with compression, limiting, graphic EQ, parametric EQ, spectrum analyzer and an automatic notch filter for feedback suppression. Also displayed was the similar *WZ-DM30*, a 1-input/4-output version that adds 4-way crossover.

Roland showed the *AP-700* advanced equalizing processor, designed for extensive equalization and feedback elimination. It also provides a spectrum analyzer.

Sony introduced the *DPS-V77* multi-effects processor, which offers EQ, delay and reverb effects. It includes AES/EBU and S/PDIF digital I/O.

Symetrix has updated its popular mic processor to the *528E*, refining its performance and adding a few features. Other introductions included the *488 Dyna-Squeeze*, an 8-channel compressor, and the *610 Broadcast Delay*. (See "NAB 95 Pick Hits," p. 36.)

Alesis introduced the *Quadraverb 2*, a multi-effects processor with high-quality reverb effects in a 1RU package.

Yamaha introduced the *REV1000*, a digital reverb with 99 presets and a wide range of controls.

Circle (82) on Reply Card

Audio recording and playback systems

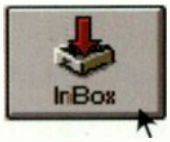
Denon has debuted the *DN-80R*, the first professional MD recorder designed for portable use. Special features include a 40-second RAM input buffer, battery operation and built-in speaker. Also new were the *DN-790R* professional studio cassette deck and *DN-740R* double-well cassette deck.

Fostex displayed the *PD-4* portable time-code DAT recorder, featuring a 3-input mixer, phantom power, confidence monitoring and a 2-hour battery.

Henry Engineering premiered the *Telestor* digital actuality recorder. It automatically answers a phone call and, after password detection, begins recording the phone line audio for up to 80 seconds (or up to 5.5 minutes in the *XM* version). The message can then be played back manually or automatically. The unit includes end-of-message signalling and an insert point for audio processing.

Otari announced *RADAR View*, a graphics software package for the *RADAR* hard-disk multitrack recorder. It provides a workstation-like display of track contents, levels, time-code and other data to an SVGA computer monitor. Also shown was *ADAT Link*, which enables direct digital porting of ADAT audio tracks to RADAR.

Pioneer New Media Technologies exhibited its line of computer-controllable CD jukeboxes, which ranges from a small 18-CD unit to a 300-CD system.



The Old Way.

Digital Courier's Way.

Say Goodbye To Couriers And Dubs.

This is supposed to be the digital age. So why are you still waiting around for couriers, analog dubs or satellite feeds?

Join the Digital Courier International network. It's a fast, digital solution for audio delivery.

With DCI you can ship and receive CD quality audio spots over phone lines. In fact, commercials can be delivered to you from across the continent in as little as two hours. With traffic instructions attached.

This will cut down on the missed air dates and make-goods that you get all too often using couriers, satellite feeds and any other digital delivery system.

DCI is the only two-way audio distribution network in the world that connects radio stations, production studios and distribution houses too.

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Circle (24) on Reply Card

Digital Courier INTERNATIONAL

Eventide introduced a "Hi-Fi" audio board for its *VR240* DAT logger. It offers extension of high-frequency response from the standard 3.4kHz cutoff to 7.2, 12.4, 14.4 or 21.6kHz, and it upgrades the converters from 8-bit to 16-bit design.

Roland showed the *AR-2000*, a 1RU digital audio recorder/player that is well-suited for any dedicated phrase-playback situation. Also on display was the *MS-1*, a small sampler capable of storing 32 samples internally, with more on optional flash-ROM cards.

The *Instant Replay* was unveiled by 360 Systems, featuring immediate access to 500 individual audio cuts of any length. (See "NAB 95 Pick Hits," p. 36.) The company also presented several enhancements to its premiere product, the *DigiCart/II*, including improved Windows software for control/display of up to three DigiCarts. Also new was the *D-NET* high-speed file transfer network, which allows transfer of digital audio between 360 Systems products at 8x real time.

Sony introduced the *PCM-800* digital multitrack recorder, using the Hi8-based DTRS format, and the *PCM-2600* DAT recorder, with a 4-motor transport, Super Bit Mapping and parallel remote control. The new, lower-cost *DTC-A8* DAT recorder features unbalanced analog I/O and remote footswitch control.

Nagra has developed the *ARES-C*, a solid-state recorder built in the familiar fashion of Nagra machines, but recording to PCMCIA cards (which can be changed while recording). On-board, non-destructive editing is also possible, and a built-in ISDN interface allows data-compressed transmission.

HHB showed its time-code portable DAT recorder, the *PDR1000TC*. A time-code back-up feature allows the internal time-code generator to continue running while the user changes batteries. A 4-bay battery charger for the Portadat line was also shown.

Marantz presented two new rackmount cassette decks, the *PMD501* and *PMD502*. The PMD502 features pitch control, automatic level control, Dolby-C and HX-Pro, and balanced XLR I/O.

Tascam premiered the *DA-20*, a rackmount DAT with multiple sampling rates, S/PDIF I/O and wireless remote control. The *DA-P1* is a new portable DAT with a 2-hour battery pack, balanced XLR mic/line inputs, S/PDIF I/O, RCA analog I/O and a built-in speaker. The new *RA-30M* stereo MiniDisc recorder offers editing, a jog wheel and a link capability for extended recording. Tascam also unveiled two rackmount CD players, the *CD-201* and *CD 301 MkII*.

Circle (83) on Reply Card

Audio recording media

Ampex premiered the *489 EP*, an S-VHS cassette designed for use in the ADAT-format recorders that features extended (60-minute) length. The *488* Hi8 tape is designed for use in the DTRS-format audio recorders, and is available in 30-, 60- and 113-minute lengths. Ampex also introduced a recordable CD and a Data DAT, the *DDS*.

Maxell showed its CD-R media, the *CW-63* and *CW-74*, with 63 minutes/580MB and 74 minutes/680MB of storage capacity, respectively. Also on display was a 3.5-inch magneto-optical disc and a T-160 VHS cassette in two different formulations. Denon and HHB also added CD-R blanks to their lines of recording media.

Sony showed the *DARS 116* Hi8 cassette optimized for use with DTRS-format digital multitrack recorders, and the *DASV-40* S-VHS cassette for use with ADAT-format decks.

Apogee showed the *AD* series of DAT tapes, which feature extended archival life, a special hub clamp to minimize end-of-tape damage and a lubrication sheet to reduce friction.

Circle (84) on Reply Card

Backhaul and distribution

By Steve Kirsch

Kirsch is president of Silver Lake Audio, a remote engineering and equipment rental firm in Baldwin, NY.

ISDN has stepped to the forefront of the audio backhaul business. It has become the focal point for new product development, and was a hot topic of conversation on the floor at NAB 95.

Codecs

Telos Systems announced that it will now incorporate ISO/MPEG Layer II coding into its *Zephyr* digital transceiver. Telos still recommends Layer III coding at lower bit rates (56 or 64kb/s). Layer II software upgrades will be supplied at no charge to Zephyr owners. (At the BSW booth, the morning drive jocks from a popular Hong Kong radio station used a Zephyr and ISDN lines to feed their show home live each day.) Telos also introduced *Zephyrnet*, an ISDN multipoint audio distribution system. (See "NAB 95 Pick Hits," p. 36.)

Corporate Computer Systems (CCS) introduced its third-generation codecs, the *Prima*. It is designed as a codec "platform," allowing the user to configure a codec to a given application and budget. Prima supports earlier CCS codecs (both Musicam and G.722), standard Layer II codecs, and CCS's latest, *MUSICAM '95*. A wide array of options are available, including modification of coding parameters via Windows software. CCS also unveiled its *Fieldfone*, a MUSICAM-based codec that operates over POTS lines. (See "NAB 95 Pick Hits," p. 36.)

Intraplex unveiled a compact and lightweight portable ISO/MPEG Layer II codec. The *Series 4400* weighs in at less than 10 pounds and contains a built-in ISDN TA. Nine ISDN configurations can be stored in memory and activated via a front-panel selector. An optional external keypad is used to program the unit.

MPR Teltech showed its *Capella* codec, an ISO/MPEG Layer II device designed as a PC-expansion board. The unit is also featured in MPR Teltech's *Polaris* reporter terminal, which includes I/O hardware and digital editing software for a notebook computer. (See "NAB 95 Pick Hits," p. 36.)

Comrex presented its Layer II codec, the *DX200*. It includes a built-in BONDING inverse multiplexer (IMUX), enabling the user to create channels of up to 256kb/s. Comrex also announced that its G.722 codecs have been upgraded to provide audio bandwidth of 15kHz mono over a 112 or 128kb/s line. This unique application retains G.722's advantage of low delay time and low cost. For use in the field with any codec, Comrex introduced a field mixer, the *Codec*

Buddy. (See "NAB 95 Pick Hits," p. 36.)

Audio Processing Technology (APT) featured the *DRT 128*, a codec/reporter terminal that includes mic, line and data inputs and headphone output. The *DSM 100* uses three ISDN lines for 20kHz stereo on 336 or 384kb/s. Also new were the *RMC 240*, which adds machine-control capability to APT codecs, and the *MCE/MCD 800*, which allows transmission of up to eight channels of full-bandwidth audio on a T1 circuit.

Dolby Laboratories' versatile *520* series codecs support the company's AC-2 and AC-3 algorithms. (AC-3 operates with up to 5.1 channels for surround-sound applications, but these codecs handle only its 1- or 2-channel modes.) Between the two algorithms, these codecs will support transmission data rates from 56 to 384kb/s and digital audio sampling rates of 32, 44.1 or 48kHz, plus auxiliary data rates of 600, 1,200 and 9,600b/s.

One product *not* intended for ISDN came from Lightwave Systems, which showed the FIBOX digital fiber-optic audio transmission system. (See "NAB 95 Pick Hits," p. 36.) This system puts up to 12 channels of uncompressed 20-bit digital audio on a fiber-optic cable of up to 2.5mi length.

Circle (85) on Reply Card

Store and forward systems

Digital Courier International (DCI, a subsidiary of MPR Teltech) is a private digital network that provides Windows software and Layer II codecs to accomplish its interconnection with affiliates. Any subscriber can initiate point-to-point or point-to-multipoint distribution for non-real-time transmissions through the network.

Another private network operator is DG Systems, which specializes in distributing commercials to radio stations. It announced that it has added its 2,000th affiliate.

Circle (86) on Reply Card

Satellite distribution

LNR Communications was promoting its *DAVSAT* system, a flexible, modular design capable of being expanded and configured for the specific needs of a user's network. The system is currently in use by the RCN Radio network in Colombia.

On a global scale, Orion Atlantic is distributing SCPC audio through its *Orion 1* satellite to subscribers in Europe and North America, via a high-performance, small-antenna package. The company specializes in turn-key systems, handling all hardware, licensing and installation.

Antenna Technology Corporation, Inc. (ATCi) solves the space (and zoning) problems many stations face with its *Simulsat Five* and *Simulsat Seven* multibeam antennas. These can cover 35 or more satellites with a ground requirement of only 1.5 times that of a standard parabolic antenna. To control satellite dish position, the ATC *PL4100/4200* Antenna Tracking Controller stores up to 70 sets of satellite accession data.

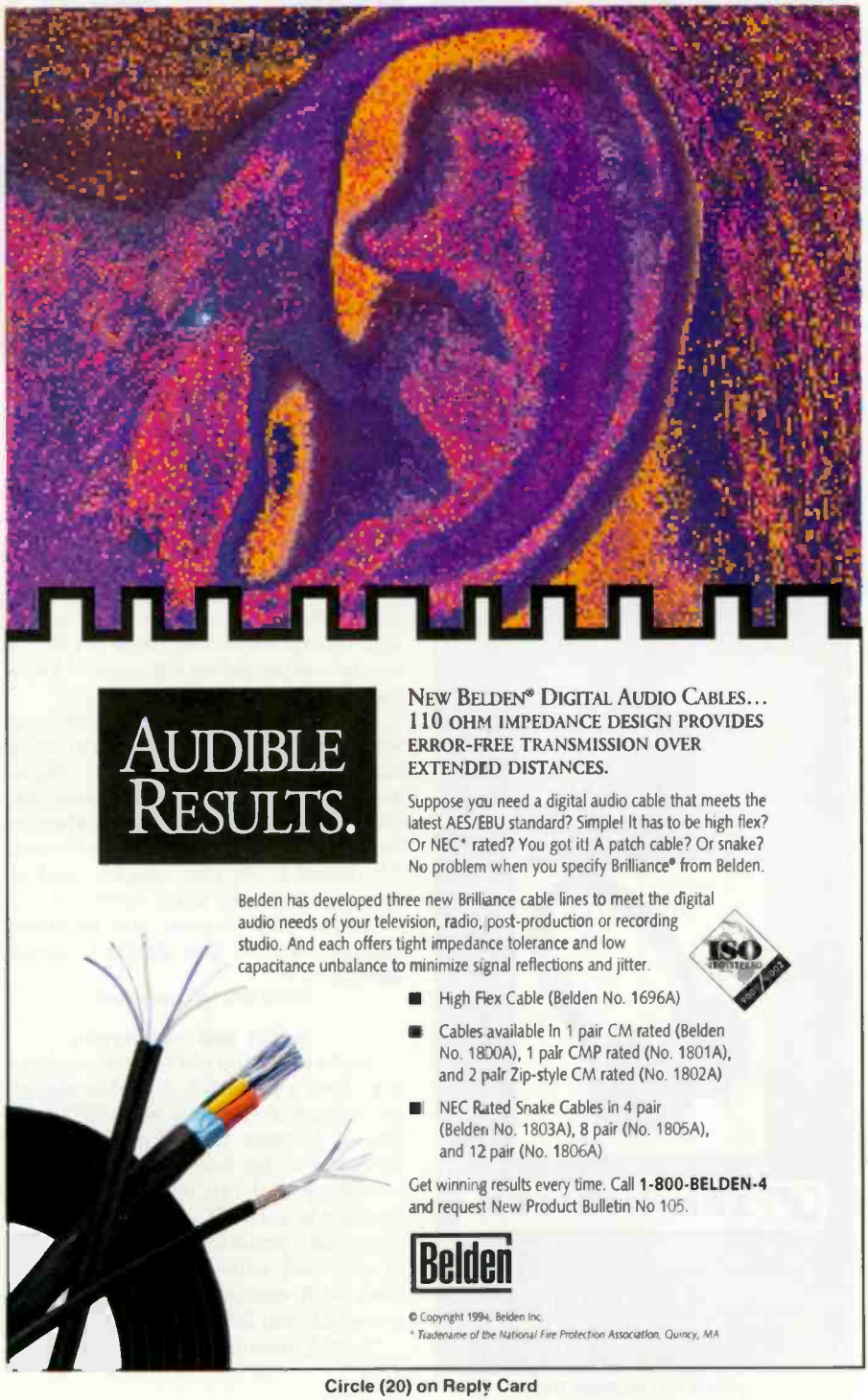
Circle (87) on Reply Card

Routing switchers, wire/cable and test equipment

By Terry Baun

Baun is president of Criterion Broadcast Services, a broadcast contract engineering firm in Milwaukee.

As the hardware and programming of radio becomes increasingly digitized, so to must the in-house distribution and monitoring capabilities. NAB 95 provided giant steps toward this end.



Circle (20) on Reply Card

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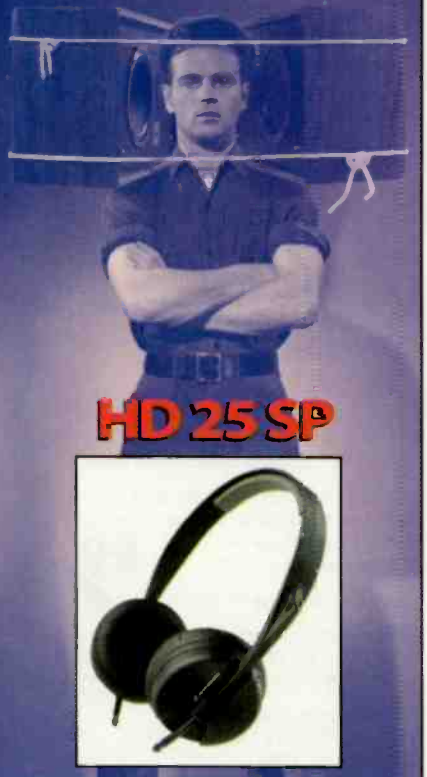

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Circle (21) on Reply Card

NAB 95 Review

Audio routing

The *AM16/B* crosspoint switcher presented by 360 Systems expands out to 16x16x4 and features a remote-control panel, serial bus control and 100 programmable presets.

ADC Telecommunications provided significant tools for integrated digital routing with the *LightSwitch* router and *LightLink* converter products, which handle all digital signals regardless of format. Also shown was the *FL2000* fiber cable management system, providing a convenient and logical system for termination, connection and splicing of optical cabling networks. ADC also showed a fiber-optic transmission system called *Sigma Net*, which handles two data channels and up to 64 audio signals with 20-bit quality.

Dynair Electronics introduced the *Series 36* stereo audio router, featuring high crosspoint density (864 per RU). It can be connected via Ethernet to DOS-based system controllers.

NVISION displayed the enhanced version of its *Digital Audio Processing Suite (DAPS)*, which provides digital audio interface, conversion and synchronization solutions for production facilities. *DAPS II* allows a user to route 16 digital I/Os; mix, amplify, and attenuate channels; delay audio to correct sync; and convert any incoming sample rate to the desired output sample rate.

Circle (88) on Reply Card

Audio test equipment

Audio Precision (AP) introduced *System Two*, a powerful, dual-domain audio testing system. As with AP's well-known System One, System Two is designed to be used with an external computer, and can be connected to a laptop via a PCMCIA card. The company also announced *APWIN* Windows-based software for the System One, with versions available for Windows 3.1 and Windows 95.

Neutrik Instrumentation USA featured the *A2/A2-D* audio measurements system for analog and digital audio analysis. This portable, self-contained unit features an LCD screen, a 4-graph memory and a printer port. The A2-D also offers analysis of AES/EBU, consumer and optical digital formats.

Tektronix presented the *764* digital audio monitor, which operates as an audio phase and level meter as well as a digital data monitor. The self-contained unit features a built-in CRT display and a VGA port. Data can be stored and errors can be time-stamped with the 764's internal clock or external time code.

Circle (89) on Reply Card

Audio cabling

Gepco International added to its lineup a dual-channel, low-profile, shielded-pair cable *(D72401EZ)* and a 2-pair supplement to the existing *GA724M* series of audio cables *(GA724302M)*. Also on hand were some examples of the company's custom-built and engraved panels, fabricated in 1/16- and 1/8-inch aluminum, anodized or laminate, in a variety of colors.

New from Canare Cable was a series of impedance transformers that convert AES/EBU 110W XLR-type inputs to 75W BNC outputs. The devices also come in a 1V p-p version with a built-in attenuation pad.

Nemal Electronics highlighted its specialty of supplying short runs (<1,000') of specialized cables, either with or without terminations. Custom audio/video patch panels were also exhibited.

Switchcraft showed new TT jack panels and TT plugs *(Model TT253N)*. Also new was the *3502* series of heavy-duty RCA phono plugs, in both nickel and gold, with nickel-plated or black epoxy handles.

Circle (90) on Reply Card

Continued on page 33

Continued from page 30

RF equipment

By John Battison

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

New RF products blossomed all over the exhibit halls and outside in the mobile exhibits. While it isn't possible to describe every product shown, there were many new items that deserve mention.

Broadcast transmission

The top story at the show in this category was USA Digital Radio's mobile AM and FM in-band/on-channel (IBOC) DAB demonstration. A small bus equipped with headphones and A-B switches at each seat was used to transport listeners around the Las Vegas area for listening and comparing the analog and digital signals. Although no actual products were exhibited, National Semiconductor presented a small "dummy" chip that could contain both the AM and FM IBOC-DAB receiver electronics. (See "Editorial," p. 4.)

Harris Allied provided transmission equipment for both the AM and FM IBOC DAB systems, as well as studio origination equipment for the AM system. The AM analog and DAB signals were broadcast on experimentally licensed KUSA-AM at 1,660kHz, while the FM DAB signal was a high-level-combined (15kW FM, 1kW DAB) simulcast on KUNV, 91.5MHz (licensed to the University of Nevada, Las Vegas).

Elsewhere in the Harris Allied booth it was announced that the *DIGIT* digital FM exciter is now standard in all Harris FM transmitters above 1kW. Another display showed the new *Expanded Power Amplifier Cabinet* (EPAC) technology that makes it possible to build 2,000kW transmitters. Harris also handed out a worthwhile booklet entitled, "Everything You Wanted to Know about DAB, But Were Afraid to Ask."

Continental announced the co-development with Sine Systems of a "smart" transmitter using *Embedded Diagnostic Unit (EDU)* technology on the 816R series FM transmitter. EDU is a microprocessor-based diagnostic device installed inside the transmitter that monitors and stores data on critical operating parameters. It includes an internal modem and RS-232 port for connection to a local or remote PC running the companion *EDUchat* (Windows-based) software. The data storage feature allows the station's or manufacturer's service personnel (at their home facilities) to review the transmitter's readings at the exact moment of a failure, or track operating conditions over a long period. EDU can also serve as a transmitter remote-control system.

Jampro had its usual, interesting display of FM antennas on hand. Emphasis seemed to be on directional FM antennas, where much of the company's recent development has been focused.

Larcan/TTC highlighted its line of solid-state FM transmitters, which range from 1kW to 8kW. TTC also presented its well-established FM translator products.

Phasetek displayed its phasing and dog-house equipment, among which was an overcurrent detector for AM stations. This device keeps power within legal limits or shuts down the transmitter.

Broadcast Electronics showed its *FM-5C* 5kW solid-state FM transmitter. With redundant power supplies and PAs, the unit provides its own backup in emergencies. It can operate into VSWRs as poor as 3:1 and can handle wide input-voltage swings.

Marti unveiled the *ME-40*, a 40W FM exciter that combines high specifications with low cost. Also new was the *SR-10*, a frequency-agile RPU receiver with full remote-control capability and six preset, scannable channels.

Nautel presented an impressive 60kW, fully solid-state, frequency-agile transmitter and its growing line of FM solid-state transmitters. Also displayed was the *NE50*, a digital FM exciter with composite or AES/EBU input.

Circle (91) on Reply Card

Other RF equipment

Belar Electronics Laboratory showed the *FMSA-1* FM digital stereo monitor, the *RBDS-1* RBDS monitor, *DSD-1* digital stereo demodulator and the *Sentry 16* audio and status alarm system. The RBDS monitor should be especially useful for FM stations moving into RBDS service.

Moseley showed the latest on *Starlink 9000*, an all-digital, modular system for high-quality point-to-point audio transmission. Its modular design allows customized configurations for a variety of applications.

SCA Data Systems presented its *9600* system, which includes a generator and compatible receivers that produce essentially error-free subcarrier service at 9,600b/s for better than a 30-mile radius (10-6 BER at 5μV).

At the TFT booth, a short program explaining the Emergency Alert System (EAS) was presented continuously throughout the convention. Prototypes of TFT's EAS equipment were also demonstrated, but prices and availability could not be quoted because final FCC type-acceptance had not yet been received. Some handy printed material on EAS was also distributed.

DB Elettronica showed two frequency-agile composite STLs, the *STL-1* and *STL-2*. They operate in the 890-960, 400-480, 280-340 and 200-260MHz bands, at 10kHz steps, with power outputs of 5 to 20W. Also on display was the *PM-300*, a combined FM exciter, stereo generator, audio processor and PA with an output of 0 to 250W.

Users with a C-band uplink will be interested in the Varian *VKC2936R24* fast-tune klystron. This device makes it possible to retune a transmitter in seconds.

On the Ku-band side, EEV featured *Stellar*, a range of Ku-band satellite communications amplifiers.

Burk Technology presented the *BDT-115*, which adds RF linking to its ARC-16 remote-control system. (See "NAB 95 Pick Hits," p. 36.)

With the increased emphasis on RF radiation, the Loral Microwave-Narda *8718* survey meter will come in handy. The company also presented a catalog of RF-environment data.

Bird Electronics showed its familiar power meters, but took pains to point out that it also makes a varied line of RF filters.

QEI premiered a digital stereo generator, the *Model 710*, featuring true 24-bit processing. The company also presented AES/EBU capability and integral stereo generation for its *CAT-Link* digital STL.

Circle (92) on Reply Card

Broadcast towers

In these days of tight money, it was refreshing to hear Stainless Towers offer its own leasing plan. This is easier than dealing with a financial company that does not understand why a radio station needs an expensive tower. Stainless Towers also offers tower insurance inspections.

Flash Technology presented the *ElectroFlash FTB 312* series for use on towers of 500 feet AGL or less. This cost-effective system uses a moveable red/clear color shade for red nighttime and white daytime operation from a single flashtube. In event of primary power failure, the system automatically switches to 24VDC operation.

Magnum Towers offered a useful, fact-filled tower book that should be in every engineer's library. It is not lengthy, but it contains good, basic data on tower usage.

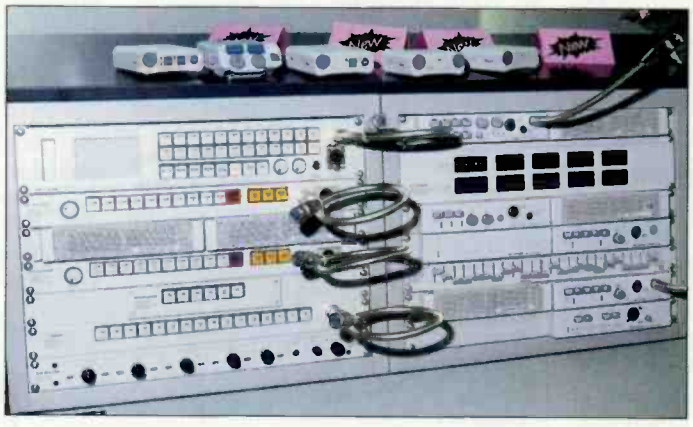
Circle (93) on Reply Card

Studio support equipment and field accessories

By Terry Skelton

Skelton is an audio consultant and trainer based in Bucks County, PA.

The NAB convention is always a good place to hunt for those hard-to-find but extremely helpful little products that can best be classified as "miscellaneous." Following is a look at what turned up new in this wide-ranging category.



Communications products

Telex introduced 14 RTS intercom products, two Audiocom intercom products and one Radiocom wireless IFB system. Most noteworthy among the new RTS products were the *Adam* and *Adam CS* intercom systems, digital audio matrixes that provide CD-quality audio, level adjustment on each channel at each intercom panel and backward compatibility to work with CS9000 components. ADAM is also expandable to more than 1,000 ports.

Clear-Com expanded its product line for the successful *Matrix Plus II* computerized intercom system by showing the *ICS52* and *ICS-92*, 1RU intercom stations with bright, easy-to-read LED labels over every key. Also on hand was the *AP-22* assignment panel providing push-button routing of any audio source to any IFB destination. Other new products were the *AB-100* on-air announcer's console and several additions to the *PL-Pro* line of intercom stations.

Digital audio workstation users can get routing, monitoring and communications in a 1RU package from Studio Technologies' *Model 60* and *Model 61 Studio Comm* products. The company also demonstrated *IFB Plus*, a versatile, 2-channel IFB system for mobile units.

Circle (94) on Reply Card

Interfaces and adapters

The *Matchbox* got an update to *Matchbox II* by Henry Engineering. The improvements include more gain, level adjustment on unbalanced outputs, gold-plated isolated RCA jacks, a 3-wire AC cord and reduced noise.

Radio Design Labs showed the connectorized line of *Rack-Up* problem-solving products, ranging from meters to DAs to mic pre-amps. These provide the utility of the Radio Design Labs *Stick-On* products with rack-mount versatility. The *TX* series offers four stick-on transformers for connecting almost anything, including a line-level input from a 70V or 25V speaker line.

Sescom added two XLR barrel-adapters. The *ISO-5* has a row of DIP switches on top to allow you to change pin connections on the spot. The *ISO-6* is a 3-position switchable pad (6, 12 or 18dB attenuation) designed to approximate a bridging load for low-impedance microphones.

Circle (95) on Reply Card

Audio distribution and monitoring

Wheatstone showed the Audioarts *8400* high-quality audio DAs with a 2x8 or 4x4 configuration, 15-turn pots, separate 3-conductor connectors for each input and output and frequency response from 20Hz to 20kHz ±0.1dB. A rack-mount intercom panel also was offered for interfacing to Wheatstone consoles.

Up to 80 channels of audio may be automatically monitored for loss of sig-

nal or polarity inversions on Wohler's *ACM1*, which requires only 1RU. An audible alarm and LED tell you which channel has gone bad. Wohler also showed *ARS-series* AES/EBU digital routing switchers and the *SDAE-1*, a serial digital audio extractor option for Wohler audio monitors. The *DLM-1* and *DLM-2* LED meter panels provide accurate AES/EBU level indication in 10- or 20-segment displays, respectively.

ESE showed the *ES-217/XLR*, a 1x4 audio DA in a small metal box with XLR connectors, balanced or unbalanced operation and separate level controls on each output.

Press distribution boxes occupied center stage at the Opamp Labs booth, but other problem solvers included the *VA-14/SUM6*, a 6x1 active combining audio amp with RCA connectors.

Crown International presented the *D-75A* and *D-45* audio power amplifiers, both 1RU devices with detented front-panel level controls and barrier-block output connections.

Circle (96) on Reply Card

Digital audio conversion

Fostex introduced the *FSC-1* sample-rate converter. Accepting AES/EBU, S/PDIF and optical inputs, the 1RU device can convert any signal with a sampling frequency from 22kHz to 55kHz, and can provide output frequencies of 32, 44.056, 44.1 and 48kHz.

Otari presented the *UFC-24* universal digital audio format converter, which can convert up to 24 channels at once. It supports five different formats (AES/EBU, ADAT, TDIF-I, RD and SDIF-II).

Apogee offered the *AD-1000* 20-bit A-to-D converter with flexible synchronization and a variety of digital output formats, including ADAT. Also shown was the *DA1000E-20*, a D-to-A converter with similar characteristics, and the *UV-1000*, a CD mastering encoder that provides effective 20-bit performance using the 16-bit CD format.

The staff at the Yamaha booth recommended the *Z-link* sample-rate converter from Z-Systems Audio Engineering for use with Yamaha's *ProMix 01* digital programmable mixer. The ProMix's digital output is 48kHz only, and the reasonably priced Z-link converter provides 44.1kHz for CD work.

Circle (97) on Reply Card

Other products

Superior Electric presented some additions to its *Stabiline* power-treatment products, including the *SP series* of standby power supplies for PCs and workstations. The *SL series* regulates voltage and shuts off its battery if no load is present. The *UPSY series* generates clean power continuously and only draws on the battery when utility voltage drops below 96V.

Winsted showed the *Digital Desks*, designed for digital workstations. These curved desks are finished in black granite laminate and are available in five different models and two desktop heights, with adjustable monitor shelves.

ESE introduced the *ES185* GPS master clock that is continuously locked to the GPS satellites, but also has a 4-hour battery backup and an internal crystal. The *ES-181* is a master clock that automatically receives time information four times a day via an internal modem, backed up by a crystal.

Since January 1995, Illbruck's *Sonex* acoustic foam has been made of a substance called *Willtec*, which no longer gives off poisonous gas when burned. The product is virtually fireproof and contains no fibers. Also displayed were fabric-covered foam panels in six colors that can be thinner than standard Sonex for the same performance.

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NAB 95 Pick Hits

Once again, BE Radio assigned its band of roving judges to scour the floor at NAB 95 for the top 10 new radio products. The judges were selected from diverse backgrounds and experience, including senior engineering and technical management from network, group, station and consulting/contracting organizations. (See "NAB 95 Pick Hits Judges," p. 39). After some tough deliberations, they came up with the following products.

Symetrix: 610 broadcast audio delay

Talk radio's increasing popularity has motivated another manufacturer to move into the field of on-air delay. This unit adds a few new wrinkles, yet remains competitively priced. First, the speed at which the automatic delay build-up occurs can be adjusted by the user – slower delay growth retains higher audio fidelity. Second, the "dump" function can be set to operate in two stages, such that only half of the system's 7.5-second delay is lost when dumping a caller. This allows you to go immediately to another caller instead of having to wait for delay to build up again before taking another call. The system also offers a "shrinking" of delay, providing a dynamic exit from the delay mode as a show ends – just the opposite of what happens at the beginning of the show. Finally, a "cough" function allows you to momentarily mute the input to the delay buffer, while the buffer's output continues to feed the air. This gives you a few seconds to say or do something that won't be heard on the air, without any noticeable pause or glitch. The *610* is a true stereo delay, and includes a remote-control/status port.

For more information, circle (62) on Reply Card.

Comrex: Codec Buddy remote audio console

Doing live remotes via ISDN has become popular, but it can still be inconvenient to interface all the necessary hardware to the codec at the remote site. Fueled by this experience, the designers at Comrex have put together a single, compact and highly cost-effective device that handles nearly everything you'll need to have around your codec on a remote. It starts out as a 4x1 mixer (two mic inputs, two mic/line inputs), then adds a flexible 4-output IFB and a telephone interface. The latter can be used either for communications or for backup program transmission (in which case an internal single-line frequency extender can be switched in). Two additional IFB inputs are provided for feeding the codec return and/or local mic/line input(s) – such as a spotter, director or intercom audio – to the remote crew's headphones. A separate mix output is provided for feeding a local PA system, especially useful on a codec remote because of the high-quality ISDN return signal at the remote site.

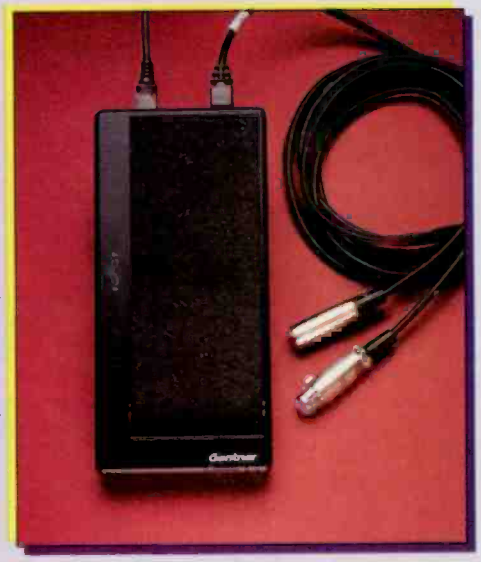
For more information, circle (58) on Reply Card.

CCS Audio Products: Fieldfone codec system for POTS lines

New ground is broken by this handy unit, the world's first self-contained POTS (Plain Old Telephone Service) codec. It provides approximately 7kHz bidirectional audio on a single standard dial-up telephone line, using a variant of MUSICAM coding with V.34 (28.8kb/s) modems. The unit includes an internal telephone keypad and hybrid with function and speed-dial memory and display (2-line LCD). Also on board are mic-level (balanced XLR) and line-level (balanced XLR or unbalanced mini-jack) inputs, plus mic/line mixing and local/return monitor mixing to 1/4" or mini-stereo headphone jacks. Another useful feature is the Fieldfone's *record output* (on mini-jack), which offers an independent level control and a "balance" knob to set the relative levels of local and return audio for recordings made directly from the unit. The Fieldfone is packaged in a rugged, portable case.

For more information, circle (57) on Reply Card.

Gentner: Telehybrid digital telephone interface



Adding to the growing line of user-friendly telephone interfaces from this manufacturer, the *Telehybrid* reaches new levels of simplicity and value. This digital hybrid connects to your existing studio phone between the handset and the phone instrument (via RJ-11 connectors), thus retaining all of your house phone system's functional attributes. Audio connections to your mixing console's line input and mix-minus output are made via XLRs. Physically, the *Telehybrid* is a black box somewhat reminiscent of the old acoustic-coupling modems, which sits next to the studio or control-room phone. When you want to put a call on the air, you simply place the telephone's handset on top of this box. Contrary to its appearance, the black box isn't a coupler – it's only a *switch*. The weight of the handset on the top surface of the black box directs the call in progress away from the handset and into the digital hybrid for interface to the mixing console. You can pick up the handset at any time and talk to the caller privately, then put the handset back down on the black box and the caller is back on the air.

For more information, circle (59) on Reply Card.

MPR Teltech: Polaris reporter terminal

This unique device combines a portable digital audio workstation with a data compression codec and telco terminal equipment to provide a complete field recording and production package for radio reporters. The *Polaris* system includes both hardware and software, for use with most notebook PCs. The hardware unit is designed to sit under the notebook PC and connect to it via a PCMCIA type II/III interface. Also on the hardware unit are analog mic and line inputs, digital (AES/EBU and S/PDIF) inputs and outputs, a headphone output and an MPR Teltech *Capella* codec card, offering ISO/MPEG Layer II and CCITT G.722 algorithms. The codec supports input sampling rates ranging from 16 to 48kHz, and transmission data rates from 8 to 384kb/s, for both real-time and non-real-time transmission. The hardware unit also contains the user's choice of an ISDN terminal adapter or a high-speed POTS modem. Users can also choose the type of digital audio editing software they wish to have included with the system – operating either in linear PCM form (.WAV file format), or on Layer II compressed files (using an editor developed by the Dutch firm, Arbor Integrated BV).

For more information, circle (61) on Reply Card.

Burk Technology: BDT-115 RF data link

Another broadcast-industry use for the unlicensed 902-928MHz band has been launched with this unique product, which provides a new pathway for control and status indication of remote transmitters and other devices. It provides a bidirectional data link of up to 115kb/s, using frequency-hopping spread-spectrum transmission. The link is designed to connect the studio and remote units of Burk's popular ARC-16 remote-control system in "plug-and-play" fashion, replacing the dedicated telco data lines, TSL telemetry returns or FM-subcarrier channels currently used for this purpose. A number of different antennas are available for the BDT-115, permitting line-of-sight use on paths of up to 20 miles, and perhaps significantly further under some conditions. The manufacturer will perform a free RF path analysis to determine a facility's exact system requirements. The spread-spectrum coding used allows up to 100 units to be operated at the same location, so the use of several systems at a multistation transmission site will not pose a problem.

For more information, circle (56) on Reply Card.

Wheatstone: D-500 digital on-air console

Looking like a perfectly normal on-air console, this ground-breaking unit heralds a new era in radio broadcasting. The D-500 makes it possible – even easy – to interface both digital and analog sources to digital and analog output buses. This is just what the doctor ordered for the end of the analog epoch, making the final transition to digital a relatively painless process. The console handles 48, 44.1 and 32kHz-sampled signals simultaneously, and provides 18-bit conversion for analog inputs and outputs. Its deceptively tame exterior houses four 40-bit DSPs and 25 microcomputers to accomplish this, providing users with a familiar control surface for the functionality that is normally associated with integrated PC-based systems. Each input has its own RS-232 output for intelligent control of its source device (along with traditional closures), and console setups can be stored. The D-500 can be slaved to the control of an external computer, and software upgrades, data transfers, diagnostics or remote control can be handled via the computer's internal modem. Talk radio users will enjoy the console's automatic, adaptive digital mix-minus busing. The system's open architecture allows easy software and hardware upgrades in the future.

For more information, circle (64) on Reply Card.

Telos Systems: ZephyrNet ISDN multipoint audio distribution system

Designed for use as a programmable audio distribution system or as an automatic satellite-network backup system, this clever device is actually a PC with ISDN and control interface cards, plus Windows software. You connect the *Zephyrnet* to an ISDN Primary Rate Interface (PRI) line, by which it can feed up to 23 separate sites with 64kb/s connectivity to each. (Each site requires ISDN Basic Rate Interface [BRI] or Switched-56 service and a Telos *Zephyr* codec/terminal adapter.) Additional ISDN PRI lines and expansion boards can be added to feed up to 200 sites. Using ISO/MPEG Layer III coding, the *Zephyrnet* sends high-quality (15kHz mono) audio plus 9.6kb/s auxiliary data to each site. Alternatively, ISO/MPEG Layer II or G.722 coding can be used. (The originating program-source location[s] must also have a *Zephyr* to encode the audio – there are no codecs in the *Zephyrnet* itself.) The *Zephyrnet* software can be configured to automatically call all or any subset of its distribution sites upon local or remote command or at pre-programmed times. Multiple source programs can be managed by a single *Zephyrnet*, so different distribution sites can receive different programs simultaneously.

For more information, circle (63) on Reply Card.

Lightwave Systems: Fibox digital fiber-optic audio transmission system

Useful for both permanent and temporary applications, the Fibox system brings unprecedented cost-effectiveness to digital fiber-optic audio transmission. The system's 1/3-rack modules combine simple, compact operation with top-notch audio quality. On the transmit end, the FBAI-M module offers two XLR mic/line inputs (with high-quality mic-pre-amp, gain trim, overload LED and phantom power), 20-bit delta-sigma A/D converters (48kHz sampling and 64x oversampling) and a 1,310nm fiber-optic output driver. At the receive end, the FBAO-M module includes a fiber-optic receiver, 20-bit co-linear D/A converters and +4dBu balanced analog outputs on XLRs. Overall dynamic range is specified at 108dB through the system, and transmission distances of up to 4km are possible using multimode fiber. Up to five 2-channel slave modules can be added to each end and linked via multipair cable to the master modules, allowing a single fiber to carry up to 12 channels of 20-bit digital audio. Alternative output modules offer AES/EBU digital output (on XLR or BNC), with front-panel selectable output sampling rates of 32, 44.056, 44.1 and 48kHz, or synchronization to an external source.

For more information, circle (60) on Reply Card.

360 Systems: Instant Replay hard disk audio player

This fully self-contained, simple-to-use digital audio storage system can hold up to 1,000 cuts of variable lengths. Total storage capacity is four hours (model DR-550) or eight hours (model DR-580) of stereo, 48kHz-sampled and Dolby AC-2 coded audio. Up to 500 cuts at a time can be assigned to 50 control-panel "hot keys" for instant playback access using 10 different storage registers for button-assignment mappings. Balanced analog (+4dBu or -10dBV) and digital (AES/EBU or IEC 958 Type II) I/O are provided, along with an internal sampling-rate converter, which supports incoming rates ranging from 24kHz to 56kHz. Cut libraries are displayed on a 2-line fluorescent screen, and a parallel printer port allows sorted, hard-copy lists to be printed on computer printers. Cuts (audio plus data) can be transferred between multiple *Instant Replay* and/or *DigiCart/II* units via their RCA digital jacks at 8x real-time. A separate preview output allows headphone monitoring off-line, and the "hot keys" double as an alphanumeric keypad for titling and searching functions.

For more information, circle (55) on Reply Card.

NAB 95 Pick Hits Judges

John Battison, F.E.
Consulting Engineer
Battison & Associates,
Loudonville, OH

Margaret Bryant
Director of Engineering and
Technical Operations
ABC Radio Networks, Dallas, TX

Kirk Harnack
President
Harnack Engineering, Memphis, TN

Andy Laird
Vice President Engineering,
Radio Group
Heritage Media, Santa Clarita, CA

Richard Rudman
Engineering Manager
KFWB/KTWV — Group W Radio,
Los Angeles, CA

Chriss Scherer
Engineering Manager
WMMS-FM, Cleveland, OH

Milford Smith
Vice President/Radio Engineering
Greater Media, East Brunswick, NJ

Mike Starling
Director of Technical Operations
National Public Radio,
Washington, DC

Ellis Terry, Jr.
Regional Operations Director
Douglas Broadcasting,
Pasadena, CA

Andy Vallon
Manager, Technical Services
CBS Radio Networks, New York, NY

BE Radio Pick Hits rules

BE Radio's Pick Hits judges operate anonymously. Each year they look for new products that meet the following criteria:

1. **Products must be new and not shown at a previous NAB Convention.** In some cases, distinguishing a new product from a modified older one is difficult. For Pick Hits purposes, a new product is one with a new model number or designation.

2. **Products must have some positive impact on the intended user's everyday work.** Judges search for equipment to be used on a regular basis. Products should provide new solutions to common problems.

3. **Products must offer substantial improvement over previous technology.** Unique circuit architecture need not be included, but some new approach or application must be involved in the product's design.

4. **The prices of the products must be within reach of their intended users.** The judges seek products appropriate to a wide range of facilities.

5. **The products must be available for purchase within calendar 1995.** Equipment must be on display on the show floor and currently (or imminently) in production. Judges take the exhibitor's word on availability dates. Products demonstrated in private showings do not qualify.

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Circle (9) on Reply Card

Analysis:

Counterpoint on EAS

By William Fawcett

What will the real cost of implementing EAS be, and who will pay it?

{By now you've probably heard about the new Emergency Alert System and its advantages, but how much do you really know about it? While its predecessor, EBS, can certainly stand the update, close inspection shows that EAS may also have its problems. Among these are the cost of new equipment, the optional nature of several key features and the inclusion of some burdensome requirements. Finally, will EAS actually help the public be better informed?}

The new climate in Washington may be calling for reinvention and downsizing of government, but in the opinion of some observers, the sweeping revision of the EBS system that is about to take place is anything but less intrusive. Broadcasters should take heart – it's the cable operators who are in for a *real* shock. An appended Further Notice of Proposed Rulemaking (NPRM) may in some instances require cablecasters to provide bed-shakers for handicapped customers.

On balance, the new system will probably provide some necessary improvements to the country's emergency alerting procedures. In certain situations, it also may enable true walk-away operation for stations. But nothing comes without a cost.

Compared to what?

The commission calculates that the entire cost of the new EAS equipment to the broadcast industry could be as low as $8.7 million. But this is based on estimated costs of hardware that may be lower than what the eventual products actually cost.

The EAS Report & Order (R&O) also estimates that the new EAS could save 10% of weather-related deaths and injuries, and 1% of weather-related property loss and damage. In 1992, this would have meant that 31 lives could have been saved, and 324 injuries and $384 million in property damage could have been avoided.

Even if you accept that estimate, this public service at the expense of broadcasters must be considered either an indirect tax or a mandated contribution. But elsewhere in the R&O, the commission figures it will come out in the wash: One commenter estimates that the new system would provide a median annual operating savings of $5,280 per station. Thus, operating savings alone may pay for all or most of a broadcaster's cost to install and operate the new EAS.

This commenter is unidentified in the R&O, but from other sources, it has become clear that the figures are based on lost commercial airtime and the cost of record-keeping, staff training and maintenance required by EBS that will not occur under EAS. This makes several assumptions, including that the newly available airtime under EAS will actually be sold by stations and that the other costs will actually be so significantly reduced. In terms of actual cash outlay, no station spends more than a few hundred dollars a year on average for EBS operations, and ongoing EBS equipment costs are negligible, so many stations may be hard pressed to balance their ledgers using the commission's reasoning.

The costs of complexity

To prevent bogus transmissions (which are a federal crime) the EAS's FSK keying scheme uses nonstandard keying and data rates. They are just complicated enough to prevent off-the-shelf modem software and hardware from being used (although not presenting much of a challenge to a ham operator experienced in packet communications).

The complexity of the system approaches that of one of the integrated wire service/computer services, or a satellite/computer weather service, where a station's hardware cost typically runs around $3,500. Will the quantity of production really drop costs far below this, as the commission expects? It could also be argued that the complexity of the system (and the limited market size) will keep some potential manufacturers out of the market. Such a small number of vendors could keep the price artificially high.

Because no product has been type-approved by the FCC as of this writing, manufacturers are not yet quoting firm prices. However, their estimates for complete encoder/decoder systems, which most stations will require, run around $2,500. Your mileage may vary. Other hidden costs are also involved:

• The commission requires equipment manufacturers

REQUIREMENT	11/10/94	7/1/95	7/1/96	7/1/97
2-tone encoder timing	20-25 seconds	8-25 seconds	8-25 seconds	8-25 seconds
2-tone decoder timing	begin changing timing from 8-16 to 3-4 sec.	all decoders at 3-4 sec.	3-4 sec.	2-tone decoders no longer used
EAS decoder and encoder	use is optional	use is optional	use is required	use is required

Table 1. The EAS conversion timetable for broadcast stations.

to include a videocassette training course with EAS hardware. Some radio stations may have to purchase a TV and VCR to take advantage of this feature.

• The new system requires at least two monitoring assignments instead of one. Low-end encoder/decoders will require additional receiver(s) and, in many cases, additional yagi antennas. Stations operating distant repeater-type stations by remote control may have to locate this equipment at the transmitter site. The tower rent for installing a yagi could easily be another $300 a month.

• A UPS-type power supply is probably warranted for the EAS hardware, along with a PC and modem (if one is not already on hand) to access the EBS database for copies of statewide plans. (You could get these by mail, but the PC will likely be necessary anyway because the NPRM on unattended operation proposes a computer bulletin board to keep your contact person registration current.)

The EAS also allows optional automation, which can solve the common EBS problem of operators not hearing alerts (or not knowing what to do). Unfortunately, the stations that can only afford entry-level operators – which need this feature the most – are likely to purchase the cheapest systems with the fewest automatic features.

How to shorten EBS decoder timing:

Gorman-Redlich:
All models: Change the summing point time-constant capacitor (47µf tantalum) at the junction of two diodes feeding IC8 pin 2 to a 10µf tantalum. You may need to hand-select the exact value.

McMartin EBS-2.
Replace R37 (470kΩ) with a 500kΩ pot (wiper and one end). Adjust to approximately 255kΩ. Alternatively, parallel R37 with a 560kΩ resistor. Absolute value may vary, because timing is dependent on actual value of C24, which is a 200µf capacitor.

Multitechnical Services:
All units: Replace microprocessor chip, available from factory for $125.00.

TFT 760 series:
Replace C13 with a 22µf 5% 25V tantalum capacitor. Replace R26 with a 182kΩ 1% 1/4W resistor. Contact TFT to request "A Primer: Guide to the new Emergency Alert System."

TFT 886/887 series:
Locate SW10 on the main PCB. Turn all switches OFF, then turn SW10-2 ON. Contact TFT to request "A Primer: Guide to the new Emergency Alert System."

Table 2. Manufacturers' recommended modifications for EBS decoders, to conform to shortened 2-tone alert signals. After July 1, 1995, all EBS decoders must be set to respond to these shorter tones.

You can obtain the FCC's EAS *Report and Order* electronically via World Wide Web, Gopher or anonymous FTP:

http://www.fcc.gov
<select>Check out our files!
<select>Reports
<select>rpts4004.txt

Gopher fcc.gov
Daily_Business
December 8, 1994
FCC94289NPRM.....

FTP FCC.gov
login: anonymous
password: <your E-mail address>
cd pub
cd Reports
get rpts4004.txt

Impact on AM daytimers

The EAS disproportionally burdens daytimers. The new system schedules half the monthly state system tests when many AM stations are off the air: "Tests in even-numbered months should occur at times other than between 8:30 a.m. and local sunset."

How will AM stations know when they have to keep someone on late just to run a test? How will listeners react to (or benefit from) stations coming on in the middle of the night, running a test and signing off? What will the additional expense to AM stations be?

How fast a track?

The FCC is on a fast track toward EAS, as Table 1 indicates. Will the date(s) be delayed like the STL bandwidth restrictions? Possibly. The NAB has already asked the commission to do so. Astute managers will wait until early next year to order equipment, just to give the market time to react. But massive back orders could occur during those last six months before the July 1, 1996 deadline if it holds. Given the complexity of the system, it could take a year beyond that until the system's bugs are worked out.

Will the EAS accomplish what it sets out to do? Will consumers, as the FCC envisions, buy hardware that will wake them up in the middle of the night when an EAS alert is received? Consumers can presently purchase NOAA weather receivers and tabletop radios with dual-tone decoders, but they have not been big sellers. Unless mandated, demand for such items will probably not increase. If a radio station tones-out in the middle of the night and nobody hears it, will "$384 million in property damage" be avoided?

Typically, after such sweeping regulation as this, the FCC later clarifies its intent by memorandum. (NRSC is a recent example.) This will likely be the case again with EAS. But just as with NRSC, PCBs, STLs and so on, the expense of this experiment will sit squarely on the shoulders of the broadcasters.

William Fawcett is president of Mountain Valley Broadcast Service, a contract engineering firm, and director of engineering for the Center for Public Broadcasting at James Madison University, both in Harrisonburg, VA.

Contrasting views? Respond via the BE Radio FAXback line at 913-967-1905 or via E-mail to beradio@intertec.com.

For more information on EAS equipment, circle (65) on Reply Card.

News:

Survey shows how broadcasters lose their audience during EBS alert

According to a survey conducted for TFT, approximately 44% of all radio listeners turn off or change radio stations when the weekly Emergency Broadcast System (EBS) test comes on.

Four hundred car radio listeners, both men and women, ages 25-54, showed that listeners are well aware of the EBS announcements and the 22-second tones that follow it. About 97% recalled hearing the announcement while listening to their car radios, while 98% say they remember the tones following EBS announcements.

When the listeners were asked if they change stations or turn the radio off upon hearing the test, 23% responded that they "always" do, while another 21% said they "sometimes" do. The 44% tune-out factor is large enough to be of serious concern to broadcasters. Radio stations may avoid that 44% tune-out when they switch to the new EAS system authorized this year by the FCC. The new EAS system does away with the tones in the once-a-week on-air test and tests can be aired any time of the day.

Broadcasters can avoid the tune-out factor sooner by switching emergency equipment over to new EAS equipment as quickly as possible and by getting other broadcasters in their area to do the same.

. . . . . .

RE America jumps on RBDS campaign bandwagon

The EIA/CEG has kicked off its up to $3.5 million campaign in Philadelphia to make radio broadcast data systems (RBDS) accessible to the listening public. Through a $500,000 matching grant campaign, EIA plans to provide 500 radio data system (RDS) encoders and 500 RDS radios to 500 FM broadcasters. EIA/CEG has selected RE America to supply its RE533 encoders for the first year of the campaign. Plans call for reaching the top 25 markets within the next 12 months.

To support the transition to RBDS, RE America will provide technical training to radio station staff members on the use of RBDS equipment. EIA will work with each station's sales staff on RBDS' promotional opportunities. The encoders and radio are given to each station in exchange for $5,000 in advertising credit to promote the benefits of RBDS.

The RE533 encoder allows for flexible installation at either the studio or transmitter sites and operates as a stand-alone unit without a PC. The radio text feature allows 64-character messages to be transmitted. The RE533 takes up only one rack space. Vital information is displayed on LED indicators on the unit's front panel.

RBDS was developed for the United States and Canada by the National Radio Systems Committee (NRSC), an inter-industry panel including representatives of EIA and the National Association of Broadcasters (NAB). The NRSC is charged with developing standards for technologies affecting both transmitting stations and radio receivers.

The RBDS technology was standardized by the NRSC in January of 1993. It allows broadcasters to transmit radio text and commands as digital data on an inaudible subcarrier. The data are organized into groups that make up the value-added feature set. Broadcasters can add new services and programs that will increase listening enjoyment and station profits, such as displaying station call letters, song titles, artist names, paging messages, sports scores, stock quotes, advertisers' phone numbers and other information, interrupting in-car CD and cassette players for traffic or emergency alerts and synchronizing clocks.

In December 1994, the FCC announced its support for using RBDS technology to transmit Emergency Alert System (EAS) alerts.

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Survey reveals that national awareness of RBDS is increasing

Public awareness of the Radio Broadcast Data Systems (RBDS) has grown from 10% of adult consumers to 16% in the last 12 months, according to a survey commissioned by the Electronic Industries Association's Consumer Electronics Group (EIA/CEG). Twenty percent of the survey respondents said they were interested in owning RBDS audio equipment compared with 18% in 1994. Of those expressing interest in owning RBDS, 22% said they would like to purchase it as an option on a new car; 20% would like to own it as part of their home systems.

Overall consumer interest in specific RBDS features also rose from a previous survey in that the RBDS features respondents want most are station call letters, station format and advertising to be displayed on their equipment. Some RBDS features saw large increases in interest including station call letter and format display as well as built-in messaging and paging.

Arbitron joins CouponRadio test

David Alwadish, founder of CouponRadio, has found a new supporter in his quest to get CouponRadio off the ground. Arbitron joins Interep and seven Miami stations in supporting the 6-month test of CouponRadio in Miami. Arbitron will provide research and statistical services for CouponRadio, a technology that uses a station's RBDS signal to transmit paperless coupons direct to smart cards inserted in specially-equipped car radios. Originally scheduled for the last quarter of this year, the test has been pushed back to the first quarter of 1996.

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WWU campus radio station is on-line

Western Washington University's campus/community radio station, KUGS, 89.3 FM, opened a window to the world at <http://pacificrim.net/kugs>. KUGS started broadcasting live on the Internet in January.

Computer users with a direct connection to the Internet can listen to modern rock music while peering into the KUGS Fishtank, which is a live picture of the official KUGS aquarium.

To reach KUGS on the internet, users need to run a World Wide Web client (like NCSA's Mosaic or Mosaic Communication Corporation's NetScape. Interested parties can send KUGS E-mail at kugs@pacificrim.net.

KUGS is one of a growing number of radio stations that have put their air signal on-line.

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ABC and NPR programs available in real time via PC

Computer users with a modem and access to the Internet will soon have the ability to listen to programs from the ABC Radio Networks and National Public Radio. Progressive Networks has developed a software program called RealAudio that will allow PC users to listen to programs in real time. This will eliminate the need to download the audio to a PC that must then decode the file before playback. Also, the PC user will have the ability to rewind or fast-forward throughout the Internet-fed programs.

ABC plans to provide hourly newscasts, *Peter Jennings' Journal* commentaries and other selected 1-minute newscasts. NPR will provide its *All Things Considered* and *Morning Edition* programs.

Although the programs will be available on a delayed basis initially, Progressive Networks plans to offer live network feeds in the future.

BUSINESS

VirteX and **Infinity Broadcasting** have formed a digital delivery joint venture for a digital programming delivery system called MUSICAM Express. The system will deliver CD-quality audio to all Infinity-owned and Westwood-affiliated stations using high-speed digital phone circuits, digital satellite delivery and computer file servers.

AddieTech, LaGrange Park, IL, is offering low-cost EBS equipment modifications to all broadcast stations. The FCC has mandated that all current EBS tone decoders be modified for operation with the new 8-second tone by July 1, 1995. The AddieTech "Short-Tone" package includes decoder and generator modifications for proper 8-second operation, and a generator tone-duration switch so stations may operate with the current long tone until July 1, then switch to the short tone, reserving the long tone for actual emergency attention signaling. The package also includes a power supply check, unit performance check, documentation and a 90-day guarantee.

Jampro RF Systems, Sacramento, CA, has been awarded a contract by **Sentech** for a 7-station FM combiner system. Sentech is the signal distribution company for the South African Broadcasting Company.

Sypha, London, has published the fourth edition of "The Tapeless Audio Directory." The $25 directory provides information on target markets, hardware and software specifications, operational features, networking and file translation capabilities. Other topics covered include archiving and backup facilities, future development plans, training and customer support, typical configurations, costs and supplies details for the United States, Europe, and the Far East. Contact Sypha, 216A Gipsy Road, London SE27 9RB, UK; phone +44 181 761 1042; fax +44 181 244 8758.

DCI has relocated to 10121 Miller Ave., Suite 201, Cupertino, CA 95014; phone 408-446-8350 or 800-446-0015; fax 408-446-8383.

RE America, Westlake, OH, has been selected by **SW Networks** to supply audio codecs for its satellite and terrestrial links.

Telex Communications, Minneapolis, MN, has appointed **Southeastern Communications System, Inc.**, d/b/a **Secom**, as a manufacturer's representative for the southeastern United States. The territory includes South Carolina, Georgia, Alabama and Tennessee.

Harris Allied has been selected to integrate and install a turnkey radio studio for **KERA-FM's** new production and broadcast facility in Dallas.

International Datacasting has plans to provide the **Chinese Ministry of Radio, Film, and Television (MRFT)**, Beijing, with a FlexRoute satellite digital audio system.

ComStream, San Diego, CA, is installing satellite audio broadcast products for Vietnam's first digital network at **Voice of Vietnam (VOV)**.

Orban, San Leandro, CA, has reported sales of the OPTIMOD-FM 8200 digital audio processor to **RAI Radiotelevisione Italiana**, **Canal Sur de Television – RIVA**, **the Government of Thailand's Public Relations Department** and **Swedish Radio**. Also, Orban has sold the DSE digital audio workstation to **American Radio Systems** and **Radio Hamburg**.

International Tapetronics Corporation (ITC), Bloomington, IL, is establishing additional distribution channels for its audio management products. **Dan Viles' Northeast Broadcast Consultants** firm, Red Hook, NY, has been appointed as representative for ITC customers in the Atlantic Northeast. Viles can be reached by phone at 914-758-2623. Other developments include the commissioning of **Technical Services Group (TSG)**, Baton Rouge, LA, as a Value Adding Resaler for ITC's DigiCenter digital audio management system. TSG will configure, assemble, test and install DigiCenter systems in addition to providing customer support. The phone number for TSG is 504-751-9800.

360 Systems, Westlake Village, CA, has expanded and moved to larger quarters. The address is 5321 Sterling Center Dr., Westlake Village, CA 91361; phone 818-991-0360; fax 818-991-1360.

PEOPLE

Edward J. Parker has been appointed as chief financial officer at ASC Audio Video Corporation, Burbank, CA.

Shannon T. Celia has been appointed public relations manager at JBL Professional, Northbridge, CA. Celia can be reached by phone at 818-895-3426.

Robert A. Orban, founder and chief engineer of Orban, was presented with the 1995 Radio Engineering Achievement Award. Winners of the Engineering Achievement Awards are selected by the NAB Executive Committee.

Business/People:

Chris Holt has been appointed product engineering specialist at Orban, San Leandro, CA.

Gary Crowder has been appointed broadcast sales manager at Gentner Communications, Salt Lake City.

John E. Leonard Jr. has been appointed business development manager for Gentner Communications Site Control product group.

Steve Gordoni has joined 360 Systems, Tarzana, CA, as a sales engineer.

Bob Groome has assumed the position of senior technical sales for Worldwide Sales of Arrakis Systems, Fort Collins, CO.

COMING IN THE NEXT ISSUE...

Cover Story: Radio Automation

Computer-based automation and audio management is today's hottest technology at stations, but moving to this new paradigm leaves many radio managers and engineers with a lot of questions. Find the answers in this comprehensive and up-to-the-minute survey of the radio automation marketplace.

DAB Update

Slowly but surely, DAB continues its arduous path toward reality. Learn where things stand on both the terrestrial and satellite fronts in this fact-filled feature.

Managing Technology: Owner Maintenance

What can a radio station staff do to maintain high technical performance between visits of the station's contract engineer?

Contract Engineering: Insurance & Indemnification

Contractors need some measure of protection in today's highly litigious environment.

RF Engineering: Folded Unipoles

An old idea has new merit in today's AM transmission systems.

New Products

FM digital processor
Circuit Research Labs

➤ DP-100: an all-digital FM audio processor based on a 32-bit floating point DSP

processor arranged in a multidimensional parallel architecture, a wide dynamic range, 5th order 18-bit A/D converter and AES digital inputs and outputs; processor includes a digital stereo multiplex generator, AGC, 5-band compressor and 3-band limiter; processor features touchscreen graphical user interface operation, CRL's exclusive stereo sound enhancement and improved digital version of CRL's patented dynafex noise reduction system.

Circle (150) on Reply Card

Digital reporter terminal
Audio Processing Technology

➤ DRT128: a compact portable unit designed to deliver high-quality audio commentary in outside broadcast and limited bandwidth applications; a 2-channel ISDN terminal adapter is incorporated with internal IMUX; unit employs the apt X-100 digital audio coding algorithm.

Circle (151) on Reply Card

Wireless bridge
Cylink

➤ AirLink Bridge: a remote Ethernet wireless bridge based on spread spectrum radio technology; the bridge is designed specifically for outdoor, interbuilding connectivity and provides simultaneous bidirectional transmission of Ethernet packets over a robust link that maintains full throughput at maximum range; the range is over 15 miles at 1,872 64-byte packets per second wireless link capacity and can reach up to 20 miles at other capacities; all Cylink bridges support all networking operating systems and protocols including Novell (IPX), TCP/IP, DECnet, XNS, SNA, IBM LAN Server, Microsoft LAN Manager, Banyan VINES and 3Com 3+ Open.

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Digital actuality recorder
Henry Engineering

➤ TeleStor: a specialized digital audio recorder for automatically recording broadcast station "audio actualities;" TeleStor records the feed from a regular dial-up telephone line, storing it in digital memory for instant on-the-air playback; the system operates unattended and stores up to 5 1/2 minutes of audio; the actuality is played on the air like any other audio source; a DTMF password prevents unauthorized recording into the TeleStor.

Circle (155) on Reply Card

Modules for Seeport
Seem Audio

➤ Studio modules for Seeport portable mixer: modules feature the same form factor as the standard modules and are designed for small on-air studios or film and video editing suites; input modules are mono mic/line and stereo line.

Circle (156) on Reply Card

Digital audio recording system
Digidesign

➤ Pro Tools III: a digital audio workstation that provides up to 48 tracks of record/play, up to 64 analog or digital channels of I/O and the Digidesign TDM virtual digital mixing and Plug-In environment; also includes DAE, the Digidesign audio operating system, and a new version of the Pro Tools application software.

Circle (152) on Reply Card

Amplifiers
Electro-Voice

➤ Precision series: line of dynamic power amplifiers including models P3000, P2000, P1250 and P1200; all models offer state-of-the-art audio performance and bulletproof design; the frequency response of 10-30,000Hz/-1dB incorporates a mirror front-end bridge circuitry that limits thermal harmonic distortion to less than 0.05%; signal-to-noise ratio is less than 105dB and the dynamic distortion, measured with DIM 100 tests, is less than 0.01%; output devices are mounted directly to a large extruded-aluminum heat sink designed to minimize thermal gradients and allow the amplifiers to operate safely into low-impedance loads; built-in limiters guard against the negative impact of amplifier clipping.

Circle (157) on Reply Card

ADAT cassettes

3M

➤ **ASD audio S-VHS mastering cassette:** developed for use on all ADAT recorders and especially designed for digital audio multitrack applications; tape provides up to 42 minutes of record time at the 48kHz sampling rate; an exclusive binder system and a stabilized polyester backing ensure fewer data errors and increased durability in the editing process.

Circle (158) on Reply Card

Macintosh utility

The Synclavier Company

➤ **S/LINK 2.0:** a batch audio file transfer and conversion utility for the Macintosh; allows users to share and translate incompatible digital audio formats between a wide variety of production systems and multimedia authoring stations; users can batch transfer sounds directly from CD-ROM or CD-Audio sound libraries; during a transfer, on-the-fly sample rate conversion is also available allowing users to mix and match materials originally recorded at different sampling frequencies up to 100kHz. the S/LINK 2.0 can be used with any off-the-shelf Macintosh computer with a 68020 processor or higher.

Circle (159) on Reply Card

Portable MiniDisc recorder

Denon

➤ **DN80R:** a portable MiniDisc recorder built for the rigors of location recording; features a RAM buffer with capacity for 40 seconds of stereo audio; the optical pickup incorporates a proprietary vibration-absorbing suspension; features include balanced mic inputs with limiting, AES digital output, headphone output, and cue speaker; the mono recording capability allows 148 minutes of uninterrupted recording when stereo is not required.

Circle (160) on Reply Card

Receiver modules

Lightwave Systems

➤ **FBDO-M master 2-channel Fibox:** a master receiver unit that accepts the fiber-optic signal from a Fibox transmitter, demultiplexes the digital input signal, and provides two channels of 20-bit AES/EBU digital output on both XLR and BNC connectors; a front panel rotary switch selects sampling rates of 32, 44.056, 44.1 or 48kHz, or sync to external reference; the master unit also receives and multiplexes signals for up to five additional Fibox slave output units allowing up to 12 channels of full-bandwidth digital audio transmission on a single fiber-optic cable.

➤ **FBDO-SL AES/EBU slave unit:** also features 20-bit AES/EBU digital output capability; unit must be used in conjunction with the master unit because it does not contain the fiber-optic receiver and demultiplexer circuits; connects to the master unit with available linking cables and up to three master or slave units may be mounted in a single rack space using the optional rack-mount kit; a complete 12-channel system fits in three rack spaces.

Circle (161) on Reply Card

DAT recorder

Sony Electronics

➤ **PCM-2600:** a digital audiotape recorder offering a 4-motor tape-drive transport; recorder features high-resolution digital conversion, switchable super bit mapping processing, balanced (+4dBm, XLR) analog and AES/EBU digital inputs and outputs.

Circle (162) on Reply Card

Digital audio workstation

Spectral

➤ **Prisma Music:** a new application-specific user interface that runs on Spectral's global hardware platform; the hardware plugs into a standard personal computer and employs full-screen control panels that can be instantly switched; the edit panel displays from two to 16 tracks, each four layers deep; features include "smart functions" such as audio zoom, EQ and spot-on metering, object-oriented editing, free form editing and spline-fit algorithms.

Circle (164) on Reply Card

AES/EBU digital metering module

Wohler Technologies

➤ **LVDIG-1:** a metering module that provides accurate level indication of AES/EBU digital audio signals; designed for mounting in Wohler's MSM-1 single rack space multiple source metering unit; each module includes a pair of 10-segment LED level indicators and user-accessible DIP switches for selecting indication modes; up to 10 modules can be placed in one MSM-1 unit and both analog and digital modules can be mixed and matched in the same MSM-1 housing.

Circle (165) on Reply Card

Studioframe upgrade

TimeLine

➤ **24-track upgrade for the Studioframe workstation:** upgrade that extends the Studioframe's recording configuration capability to include 8-tracks, 16-tracks or 24-tracks; the upgrade integrates with the entire Studioframe system, including the on-board mixer.

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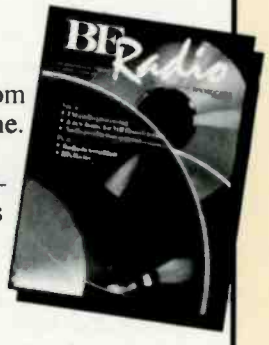

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