

BE

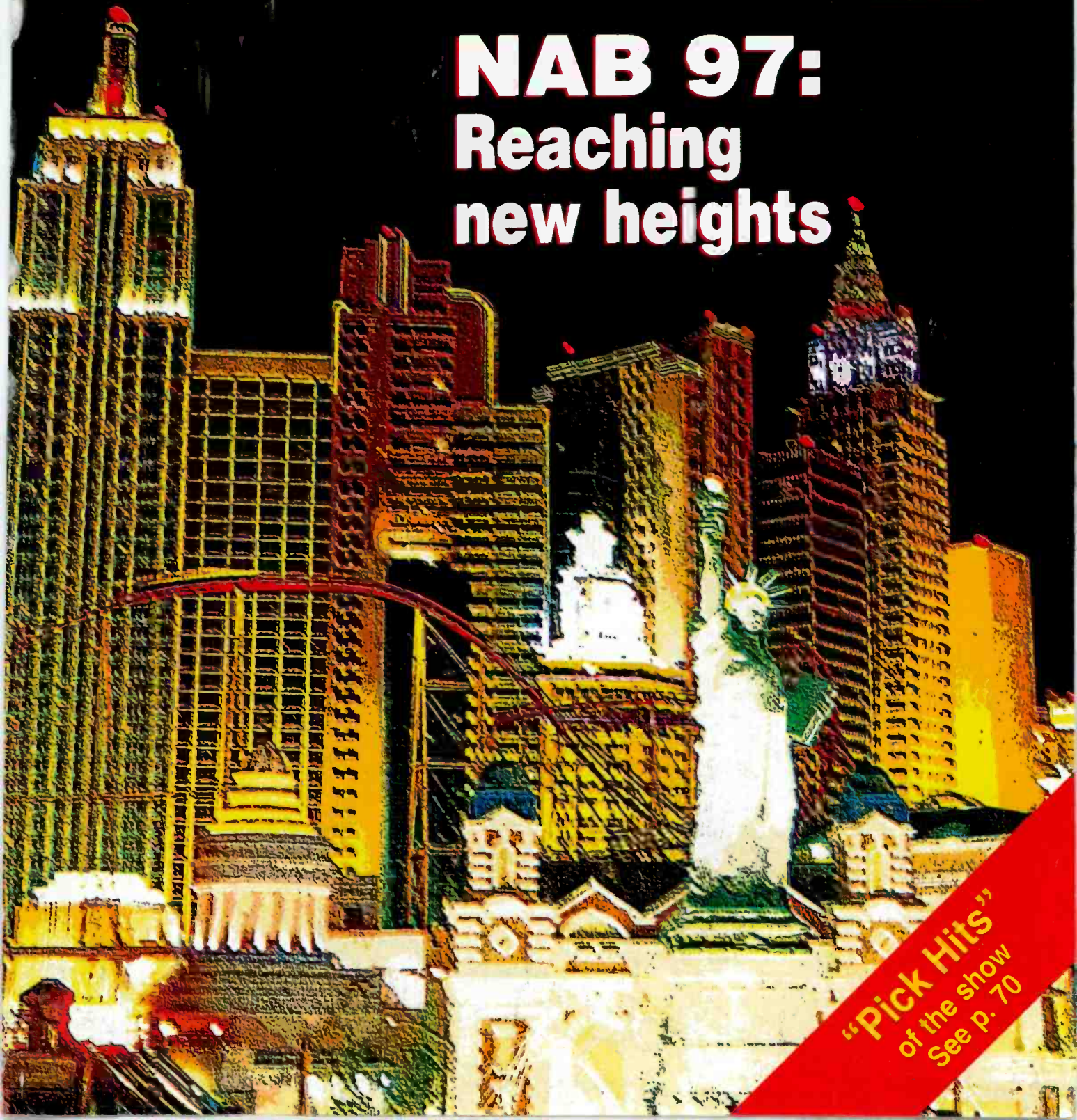
Radio®

May/June 1997 \$10.00
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...from the Editors of **BROADCAST**
ENGINEERING

NAB 97: Reaching new heights


"Pick Hits"
of the show
See p. 70






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
MS1202-VLZ = 12x2 = 4 MIC PREAMPS

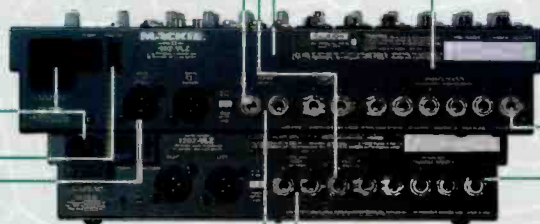


MS1402-VLZ = 14x2 = 6 MIC PREAMPS




 All inputs & outputs are balanced¹ to cut hum & allow extra-long cable runs, but can also be used with unbalanced electronics. ¹except RCA tape jacks, headphone jack & inserts.


 VLZ (Very Low Impedance) circuitry first developed for our 8-Bus console series dramatically reduces thermal noise & crosstalk in critical areas.




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How real is audio on the web?



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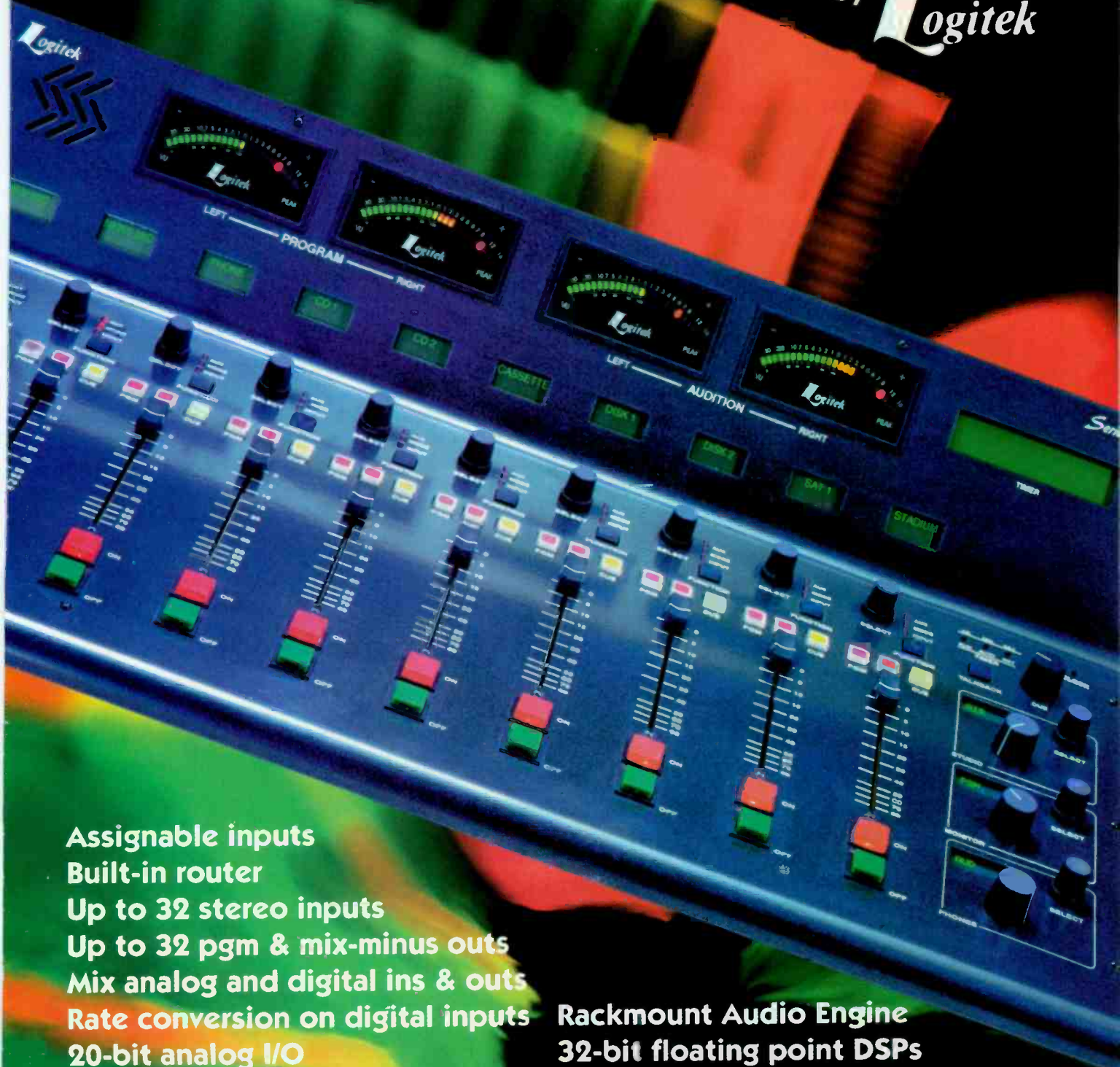


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ON THE COVER: New York, New York, the newest hotel in Las Vegas, drew a lot of attention from NAB 97 attendees. But it couldn't hold a candle, let alone a torch, to the show itself. (Cover design by Stephanie Masterson, art director. Photo by Doug Schwartz.)

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Shrink-wrapping NAB

Sometime around Thanksgiving, one brave soul around the office here mentions that it's not too early to start planning for the following spring's NAB convention. The reaction of everyone else is swift and unanimous: "Forget it!" "Too soon!" "Don't worry about that yet!" "I've got way too much other stuff right now. . ." and so on. Secretly, we're all hoping it will just go away and never actually happen. We're in the initial stages of *NAB denial*.

With the dawning of the new year, the denial starts to fade, and it sinks in that we really are going to have to face it again. This gets us mad. Now, we're into phase two: *NAB anger*. There's a suggestion that instead of a Las Vegas photo on the cover, we use a picture of the nearby Hoover Dam with a banner reading "Another Damn NAB!" plastered across it in large red letters. A less strident colleague suggests that dyslexia might be used as an excuse to cover the NBA playoffs instead.



We know we're all grasping at straws. By Valentine's Day, the reality of the task ahead starts to sink in: The show will be bigger than ever. Our readers will expect more from us. Our competition will be doing more. Our time is already tight. What hotel will we be in? Will there be scheduling conflicts? Will I remember to pack comfortable shoes? Will Wayne Newton make another comeback while we're there? We're deep in phase three: *NAB fear*. Memories of the shuttle bus between convention centers sends a few of us over the edge. It's time for a trip to the nearest bar to settle some nerves.

By the first of March, the pre-show issues are running late, our scheduling calendars are a mess, and we start to regret all that wasted time indulging in the previous phases. Welcome to phase four: *NAB guilt*. A nagging feeling of not having done enough and being inadequately prepared lasts until we sit down on the plane to Las Vegas.

That cloud begins to lift along with the aircraft, and we slide comfortably into phase five: *NAB acceptance*. It's locked in as soon as we see the first familiar face at the baggage claim or the hotel or the convention center. It really isn't so bad. In fact, I think we'd be disappointed if

it didn't get worse — I mean *better* — each year.

For all of us broadcast co-dependents, there's really nothing like the annual NAB convention. Sure, it's a pain and it seems to get more out of control each year. But it's actually a form of pretty-well-organized chaos, and if you get yourself equally well-prepared, you can avail yourself of opportunities you'll find nowhere else. Leave some time for the camaraderie and networking, too. NAB is an unsurpassed occasion for catching up with cohorts and fellow professionals. (How many times have you met up with someone at the show who lives in your home town, but whom you haven't seen since the previous NAB?)

If you've never gone to an NAB convention, you owe it to yourself to do so (if you're serious about broadcasting as a career). And whether you attended this year's show or not, this issue of *BE Radio* is here to help you put it in perspective and give it some closure. Anyway, our time is up for today, so let's get off the couch and get back to work. Our NAB 97 coverage begins on p. 24.

A handwritten signature in black ink that reads "Skip Pizzi".

Skip Pizzi, editor



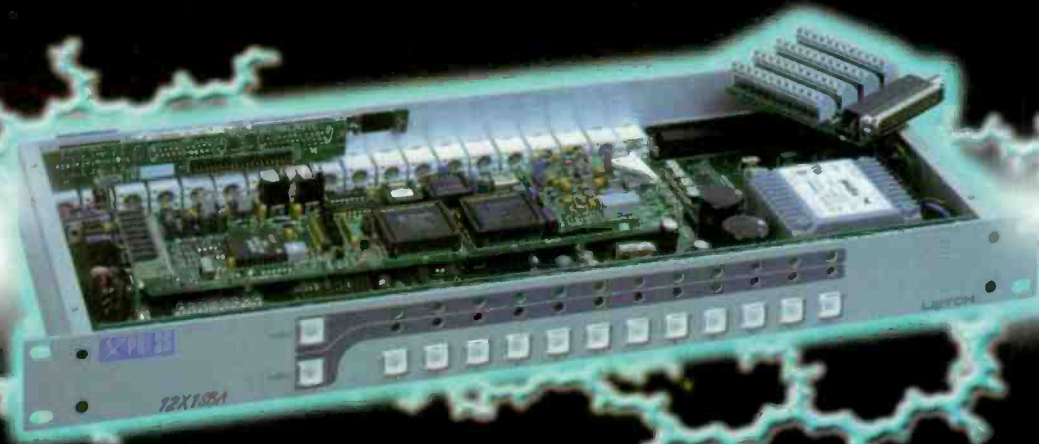
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Tower registration update

By Don Markley

On July 1, 1996, the FCC began its tower registration program, requiring the owners of certain towers (generally those above 200 feet in height or near an airport) to register them with the commission. The process will conclude on June 30, 1998. As the filing period continues, some questions still exist. In addition, the hills seem to be alive with experts, pseudo-experts and outright charlatans who propose to perform tower registration services for stations. A bit of clarification, therefore, seems warranted.

First, the FCC is content to have the tower location specified to the nearest second of latitude and longitude and to have the tower height above ground and the site elevation above sea level stated to the nearest meter. Although the FAA prefers tower heights to be specified to the nearest *foot* and coordinates to the nearest *tenth* of a second, for the purposes of tower registration, it's only necessary to meet the FCC requirements.

Second, the FCC will accept data obtained from a recent topographic quadrangle map. You may experience difficulty in locating the tower(s) on such maps, however. If the tower has been in existence for a long enough time that the map has been updated to show the tower's location, the coordinates can simply be taken directly from the map. If the tower isn't shown, it must be located precisely, preferably by measurement from known markings on the map. The old calibrated eyeball simply will not do here, but a survey or measurement with the proper type of GPS equipment will. If the location can be accurately determined by such means and plotted on the map, it may be possible to accurately determine the elevation.

Remember, the FCC says that elevations from a 7.5-foot topographic map are acceptable as are elevations from a GPS receiver. (See the instructions for FCC Form 854.) The trick here is to use a GPS receiver that has that type of accuracy. The little hand-held unit that you use on your fishing boat probably isn't nearly good enough. Without differential correction, a GPS receiver may be in error by +/- 150 feet horizontally and 1.5 times that value vertically.

Differential correction is accomplished by receiving signals from either a Coast Guard beacon or other correction source. Those signals are used to eliminate the error signal that is purposely introduced into the satellite signals by the Department of Defense to protect us from the terrible Red Menace. (The official terminology for this error signal is *selective availability*, a classic Pentagon euphemism.) Even the differential correction data may be

suspect, however. The correction data is only accurate at the point where it's generated. The system accuracy then is partly a function of how far the differential transmitter is from the point of measurement.

The method of determining the latitude and longitude should be accurate to 0.1 second. To round accurately to the nearest second (as the FCC requires), the measurement method needs to be more accurate than the final result. That is, you need to know if the actual value is greater than 0.5 seconds or less. Otherwise, you may be rounding the wrong way. Again, you can forget about all this if you can find your tower(s) on a 7.5-foot topographic map because the USGS has already provided you with the required accuracy in measurements on that map.

Caveat emptor

With regard to those offering to provide the measurement service, use care in establishing their credentials. Some fine companies have the proper experience and equipment to provide data well within the required accuracy. But watch out when dealing with would-be experts who happen to have a GPS receiver. Just because a device generates numbers doesn't mean that those numbers have value. And even with a reputable firm, don't allow yourself to be overcharged for this service. If the cost becomes more than \$1,000 for a single tower, you are being had.

Finally, don't simply copy the height and location from an old license document. The purpose of this whole exercise is to attempt to generate an accurate database. Simply resubmitting old data defeats that purpose and opens the station to a fine for submitting false data. This also can be a real problem when it comes time to modify or sell the station in the future. Have the numbers determined accurately and get all of the station paperwork in proper order.

Don Markley is president of D.L. Markley & Associates, Peoria, IL.

For tower registration forms (Form 854) and other information, contact the FCC at:

- ➔ 800-418-3676 (Forms Distribution Center)
- ➔ 202-418-0177 (Fax-on-demand forms)
- ➔ 800-322-1117 (Consumer Assistance)
- ➔ 202-414-1250 (Electronic Filing Assistance)
- ➔ mayday@fcc.gov (E-mail questions)
- ➔ <http://www.fcc.gov/wtb/antstruc.html>

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Managing Technology

Buying new technology

By Chip Morgan

The moment of truth has arrived. You've been given approval for a major facelift at the radio station. You are expected to improve the efficiency of the operation, while making it an even more fun place to work. How do you sift through all the possible systems, new technologies, designs and wish lists to come up with a well-thought-out plan that you can achieve on time and on budget? Most important, if you buy new technology, how do you know which systems really work?

You're already keeping up to date by reading industry trade magazines. That's a great start. If you're attending industry trade shows, you're at the head of the class because you have some face-to-face (or perhaps hands-on) time with the technologies. But what's next?



Attending trade shows is an essential part of new-technology research.

First, consider the *process* ahead of the products. Every major project should have a single person responsible and accountable for the oversight and efficient achievement of the project's goals: a *project manager* (PM). If you're not already an expert at this or don't have time to do it yourself, do you have a staff member who can do it? If so, remember that an in-house PM needs to be fully committed to the project and can't be distracted by day-to-day duties — unless your project doesn't have a critical timetable or budget. If you don't have an in-house candidate, the only choice is an external hire. Check with other stations that have gone through a similar process recently for suggestions.

Project management

The PM must be intimately familiar with all your needs from the front door to the antenna. He or she must be an expert in space planning, technical design, interior design, asset management, refurbishment, construction, installa-

tion and delivery. Another requirement is a clear understanding of audio, RF, architecture, acoustics, wiring, all equipment involved and particular familiarity with the concepts you have in mind for the new configuration of your station(s). Further valuable assets include an ability to provide budgets and plans on short notice, adaptability to change, a sense of humor and a cooperative spirit.

Establish a single point of contact at the station for dealing with the PM (typically the station manager). Be sure to stress the desirable features of your current facilities or facilities that you have seen. You don't want to lose the benefits of a previous design that already works. Include provisions for five to seven years of growth in the system designs. You don't want to have to repeat this kind of project often. To keep your financial people happy, review the impact of any new purchases and construction on your insurance and taxes. Overall, the value of preparation and a clear, singular understanding of the project by all parties involved cannot be overestimated.

Ancillary issues

Any major project tends to "creep" beyond its initial boundaries. Some of this is beneficial due to economies of scale, but beware whenever you hear, "Hey, while we're at it, how about. . ." during the planning process.

A few things that *should* be added to any project include the following: plenty of storage space for files and spare equipment; upgrade of cabling for the whole facility (CAT5 LAN cable, 110Ω AES3 audio cable, high-quality phone cable and perhaps fiber for long runs); backup systems (emergency power, spare STL, studio switching capabilities, backup transmission capabilities); a fireproof safe and other improved security items.

Also, take this time to carefully assess your telephone and communications requirements. Don't forget to allow time for staff training on any new systems, and consider annual maintenance agreements for critical equipment.

Order equipment with an on-site due date and insist on completion deadlines from all contractors. When equipment arrives, inventory all items before placing them in their designated locations.

Questions to ask your vendors

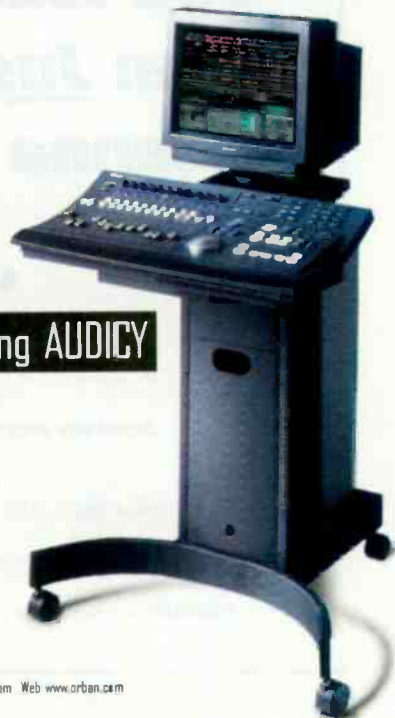
Ask all prospective equipment vendors and system integrators about their track records and get some references. Also, ask how long after purchase are they available for assistance/troubleshooting/consulting and what level(s) of service they provide.

Plug into the smartest audio workstation ever created.

The new AUDICY® was designed from the ground up to do what no other broadcast audio workstation has done: plug directly into the creative mind. Unlike complex workstations, it treats the editing process like an "inspiration with a deadline." If you've ever watched an editor sit down and try to read a manual under pressure, you'll understand why the new AUDICY is a study in "see it, get it, do it."

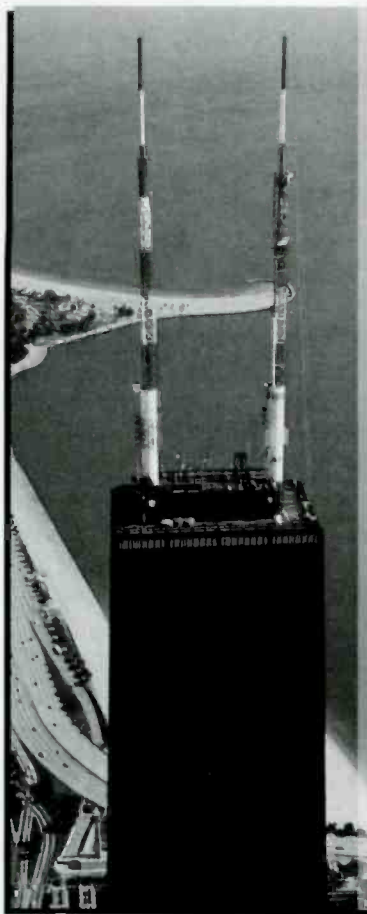
The clean, uncluttered control surface was specifically designed to look smart, feel good, and be instantly productive. The screen interface combines simplicity with a brilliant use of "virtual hardware" graphics. And to keep pace with the endless rush of ideas and deadlines, AUDICY offers unrivaled speed and power. With RAM-based editing and mixing, you edit in real time—by ear—working on up to 24 tracks. Access to audio is instantaneous, even when using the complete suite of built-in effects including compression, EQ, and reverb. AUDICY even lets video people plug into advanced audio production with flexible SMPTE features. All of which means that creative minds can spend less time learning, more time creating, and still get on-air, on time. The genius of AUDICY is in making power simple.

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Managing Technology

Other revealing questions include the following: What kind of technology are other stations like mine using? How do I decide whether to upgrade or replace? How do I get my money's worth when technology changes so fast?

Dealers and integrators may have an inside track to help you compare various manufacturers. Ask them about a company's attitude toward customization, its longevity, its products' reliability and the quality of its support.

Project timing

Time and budget management is critical in any project. If you trust your design team, you can leave the details to them. Managers should concentrate on the big picture — assuring good information flow, proper funding and meeting deadlines.

In general, a project will usually proceed faster (and cheaper) if it employs proven technology platforms and off-the-shelf solutions. Don't use custom or proprietary designs unless they give you a strong competitive edge and you're convinced that development is complete with adequate support available.

Ideally, you should start about a year in advance of your desired completion date with a management meeting to discuss the facility's needs. Then establish initial contact with designers and get proposals. Contracts from designers for initial space programming should be completed within 90 to 120 days after this meeting.

Hold another major meeting to discuss project recommendations and budgets about six months ahead of completion date. Approve plans and put all designs out to bid for construction at that time. All construction and installation bids should be approved by 120 days ahead of completion, with equipment ordered and installation scheduled shortly thereafter.

Schedule construction to begin 90 days from the completion target. Create and review a punch list with all installers at about two weeks from completion, and schedule training to begin about 10 days out. Finally, plan a project review with all parties for 30 days after completion.

Many projects don't have this kind of time, however. Although it's dangerous to rely on it, the schedule can be fast-tracked by using experienced radio architects and good general contractors. Systems integrators can design, assemble and test your facility off site, so that it can be installed at the last minute. But even with an accelerated schedule you should still leave about 10 days for training, practice and punch-list corrections.

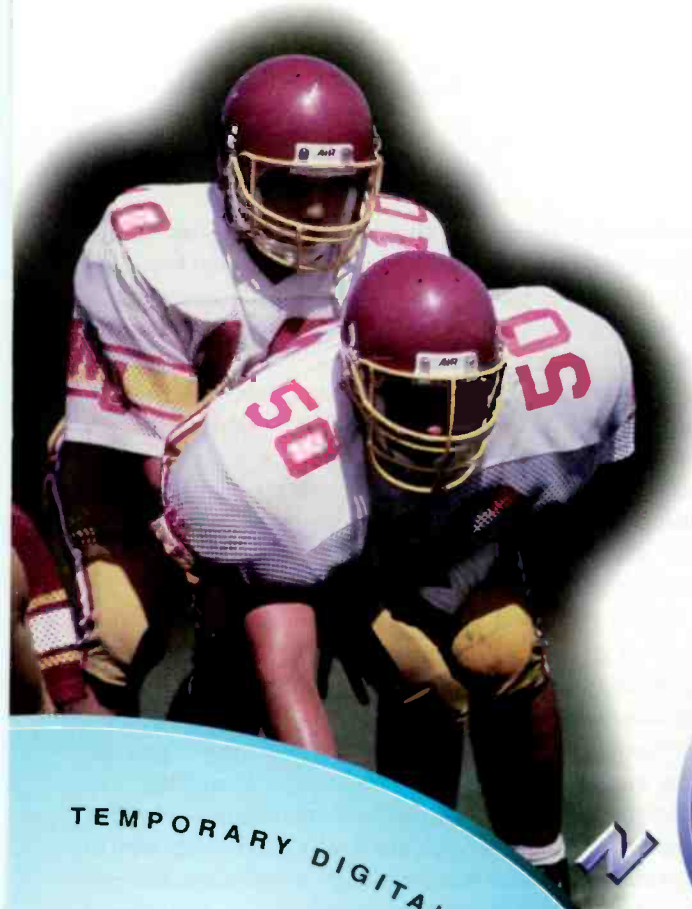
Remember, radio stations have unique construction and system-design requirements — including 24-hour operation, high-tech growth paths and critical performance issues — that cannot be mastered by anyone the first time around. It comes down to the professionals involved, so it's critical to work with a good team, including architects and engineers who specialize in radio. You'll benefit from all the experience you can find and afford.

Chip Morgan is president of CMBE, Inc., a systems design and integration firm based in Sacramento, CA.

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Digital audio links

for broadcasters



SWITCHED DIGITAL AUDIO LINKS



BCF256

Over fixed or ISDN links such as those used for studio networking, STLs and temporary outside broadcasts, this full duplex Broadcast Communications Frame facilitates FM quality stereo digital audio up to 20kHz. The new BCF256 provides a host of features including auxiliary data and integral fail-safe ISDN back-up. An optional digital I/O is available.



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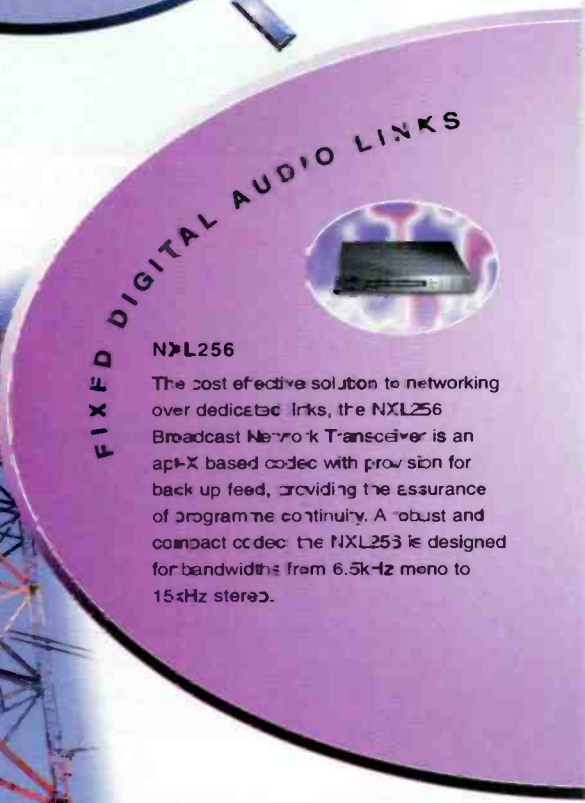


TEMPORARY DIGITAL AUDIO LINKS



DRT128

Designed for the reporter on the move, the DRT128 Digital Reporter Terminal enables speedy direct dial connection to the ISDN through an integral terminal adapter for the simultaneous transmission and reception of broadcast quality audio. Robust and lightweight, the DRT128 provides a variety of transmission options - including stereo.



FIXED DIGITAL AUDIO LINKS



NXL256

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Lightning protection

By John Battison, P.E.

Ben Franklin had the first "ball gap" on a "tower" when he flew his kite with its dangling metal key and discovered that lightning was an electrical discharge.

Today, for many small stations, the good old ball gap across the base insulator is the only protection they have from the ravages of celestial power surges. But times are changing. As the venerable, dependable and rugged tube gives way to black boxes containing hundreds of tiny and



Research indicates that lightning causes damage averaging more than \$1 billion per year in the United States.

vulnerable pieces of contaminated exotic metals (i.e., microprocessors), protection from Franklin's discovery becomes far more complicated and demanding. The old saying is pertinent: "If you're going to beat 'em, you've got to know 'em."

The value of proper grounding

The days are long gone when a ball gap across a tower base provided adequate lightning protection, as well as sustained RF-arc suppression (when properly adjusted). It is now known that when a lightning strike occurs, there are many entrances available to its enormously destructive power. In fact, the tower itself may be one of your lesser worries.

Certain basic engineering designs are normally used today, such as adequate and proper grounding. If a series-

fed tower is used, there should be a copper strap at least four inches wide from the tower base/ground system to the transmitter ground in the building. I have seen many AM transmitters that relied on the outer coaxial cable shielding for this connection.

Either an RF choke or a suitable high-value resistor should ground the tower and act as a static drain. Guy wire anchors also should be tied into the ground system. It is often advisable to connect resistors across guy insulators to drain charged guy sections to ground. In dry air, guy wires frequently become charged, and you'll occasionally hear sparks cracking across insulators.

With a grounded, folded-unipole antenna or any other type of grounded antenna, it is essential to have a good ground and ensure that all tower sections are properly bonded together.

Non-radiating FM and TV towers require proper grounding just as much as AM towers. Too frequently, I've observed FM towers with nothing more than a couple of eight-foot ground rods connected by thin copper wire to tower bases. These wires will have a high impedance to a lightning strike and can contribute to widespread damage.

When lightning strikes, the current can run as high as 200,000 amperes and the heat in the bolt's core can reach 30,000°K. When currents of this magnitude go through a tower with inadequate bonding and grounding — and hence a high impedance — the current will try to find other paths to ground. These may involve the transmission line, wiring for the tower's lighting, other devices on the tower or even jumping from the tower to another nearby metallic object (often a power or telephone line).

When lightning strikes

There is little that an engineer can do when lightning is approaching. Several companies make lightning detectors that work well and can give up to several hours warning.

These devices typically use two techniques to search out lightning strikes. First, an optical detector makes use of a sensitive photocell, allowing it to pick up distant lightning flashes that the human eye would not notice in daytime ambient light. Second, an e-field RF device responds to electrical perturbations produced by distant intracloud discharges. Remember, that each lightning strike resembles the dreaded "EMP" of a nuclear explosion, with a distinct radiated signature that travels great distances. (AM broadcasters and listeners need no reminder of this

No manual required

but we'll send you one anyway



If traditional audio production is analogous to walking, a digital audio workstation is the equivalent to flying.

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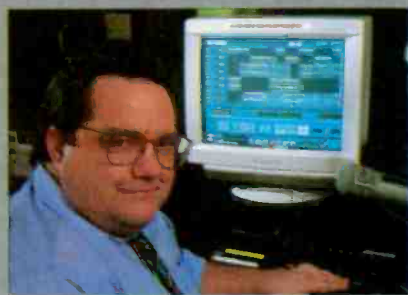
Not that we cut out any feature you might *need*; we just took out all the stuff you *hate* about digital workstation software. Like nested menus, tricky hardware set-up, and way too many screens piled up on top of each other.

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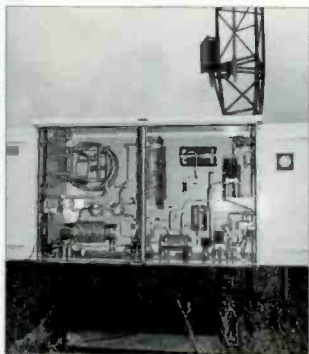


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RF Engineering

phenomenon.) E-field lightning detectors can perceive storms up to 200 miles away. Many times, it is also possible to predetermine the potential severity of an approaching electric storm condition from the detector's indications. Airports and outdoor amusement facilities, like golf courses and theme parks, make considerable use of these devices.

Because it is not practical to lower a tower during a storm (as our friend Ben did), all the station engineer can do is start the standby generator (if one exists), hope the tower's grounds are good and prepare for emergency operation. The real preparatory work to counter a lightning storm should have been done when the station was built.

As civilization has grown and increasingly taller objects have reached into the static-charged atmosphere, experience has shown that some buildings fare better than others. This has led to the development of collected engineering knowledge, such as the National Electric Code

(NEC) for general construction, along with more specific recommendations for broadcast facilities.

The physics of lightning

As a thunderstorm develops, lightning first begins inside the storm cloud. Everyone has seen this phenomenon in which dark clouds are illuminated by internal flashes. They are often followed in about half an hour by strikes to ground. The intra-cloud lightning is the result of discharges between positively and negatively charged regions within the cloud (thought to be caused by the friction of strong vertical winds inside the cloud, which "strip" electrons from water molecules).

Normally, as the storm cloud matures, its top will extend higher into the atmosphere (reaching as high as 75,000 feet in some cases), and lightning activity will increase within it. Soon, the cloud may grow to the point at which some charged regions

near the bottom of the cloud are closer to the earth than they are to a region of opposite charge within the cloud above them. When this occurs, the air dielectric between cloud and earth becomes ionized to a point at which it breaks down and a lightning



This cellular tower is equipped with lightning-protection products placed at areas of maximum curvature — on each vertex of the cantilebra structure and atop each antenna stake. (Courtesy of Lightning Master Corporation.)

strike occurs. The actual process involves small "streamers" of electricity that drop from the cloud's underside and reach out for opposites from the ground. Eventually, a streamer from the cloud will "pull up" a streamer produced by the induced opposite charge on the ground. The two streamers meet, usually at a point only a few feet above the ground.

The areas of high potential charge within the cloud are similar to the phenomenon that causes St. Elmo's fire — the strange luminescence experienced by aircraft and ships that travel through such regions. (I can remember flying one night over Kiel during WW II when the whole of the inside of the bomber was ablaze with blue glows that emanated from every metallic object inside the plane. Radios were useless because of static. My recent research has shown that St. Elmo was, in fact, a distant ancestor of Edsel Murphy.)

The small, ropelike metallic strands

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RF Engineering

you may have noticed on the trailing edges of some aircraft are static discharge devices that are used to drain electric charges from the aircraft during flight. Similar devices claim to reduce the likelihood of a tower or tall building being struck by lightning. They employ strips of metal that sometimes look like barbed wire, with numerous spikes sticking up into the air.

Again referring to basic physics, as a tower or building becomes charged, the potential increases most at the points of maximum curvature, ionizing the air around them. The theory behind these lightning-abatement devices states that they will drain away and dissipate the charge before the potential difference between the charged cloud and the grounded object becomes great enough to break down the air dielectric and result in a strike. Incidentally, most strikes are caused by negatively charged clouds discharging to a positive ground — the reverse of the usual charge condition.

Taking a strike's pulse

Many of us think of a lightning strike at the transmitter site as an immense discharge of power into a tower with resulting unwanted distribution of electrical energy throughout the transmission facility. In fact, the strike consists of a number of individual *pulses*. There may be more than 20 pulses of 0.001 seconds "on" and 0.002 seconds "off" until the voltage drops to a point at which

it no longer breaks down the air dielectric.

Another interesting phenomenon explains why lightning can do so much damage. As noted earlier, a charged storm cloud induces an opposite charge on the ground beneath it. The storm "drags" this charge along the ground as it moves. When a strike occurs, there is little ground charge left in that particular area, but all around it a high charge still exists from the cloud overhead. This creates a high-voltage gradient across the area, and when subsequent strikes occur, strong ground currents flow to the strike target. This flowing charge can jump gaps, incinerate wires and cause fires with its enormous current.

Now consider that when lightning strikes, an enormous pulsed charge with a high repetition rate induces currents in adjacent metallic objects. It is, in effect, an enormous and powerful electric field in motion. The typical transmitter site has a number of conductors entering the transmitter building from various directions. Often, some are buried and others are elevated, and they usually enter the transmitter building at different places, with individual grounds at each entrance point. When a heavy strike occurs, an extremely high potential difference (gradient) is produced as the ground charge rushes to the area around the hit. It is this large potential difference that damages broadcast equipment.

When subjected to these high-power pulses, it is not surprising that phone lines die, power lines go down, semiconductor devices like microprocessors collapse and transmission lines burn out. All of these conductors are in the strike zone and because they all have different potentials across them, something is likely to break down. The solution, in brief, is to have only one ground bus and connect every entering cable to it. This implies a need for thorough engineering planning of lightning-protection programs *before* construction of a transmission facility is started.

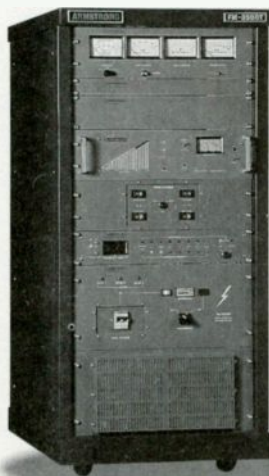
Because our understanding of lightning is still growing, the science of lightning protection remains one of occasional dispute among its practitioners. Moreover, the power of a direct lightning strike on a transmission site is so vast that some damage may be unavoidable, regardless of the facility's design or equipment. Nevertheless, several excellent sources exist for techniques and products that can mitigate damage from many lightning occurrences, which in turn, can provide significant savings for broadcasters in lightning-prone areas.

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

Editor's note: Thanks to Airborne Research Associates, Ron Nott of Nott, Ltd., Bruce Kaiser of Lightning Master Corporation and Jerry Kerr of Lightning Eliminators and Consultants, Inc. for their input to this article.

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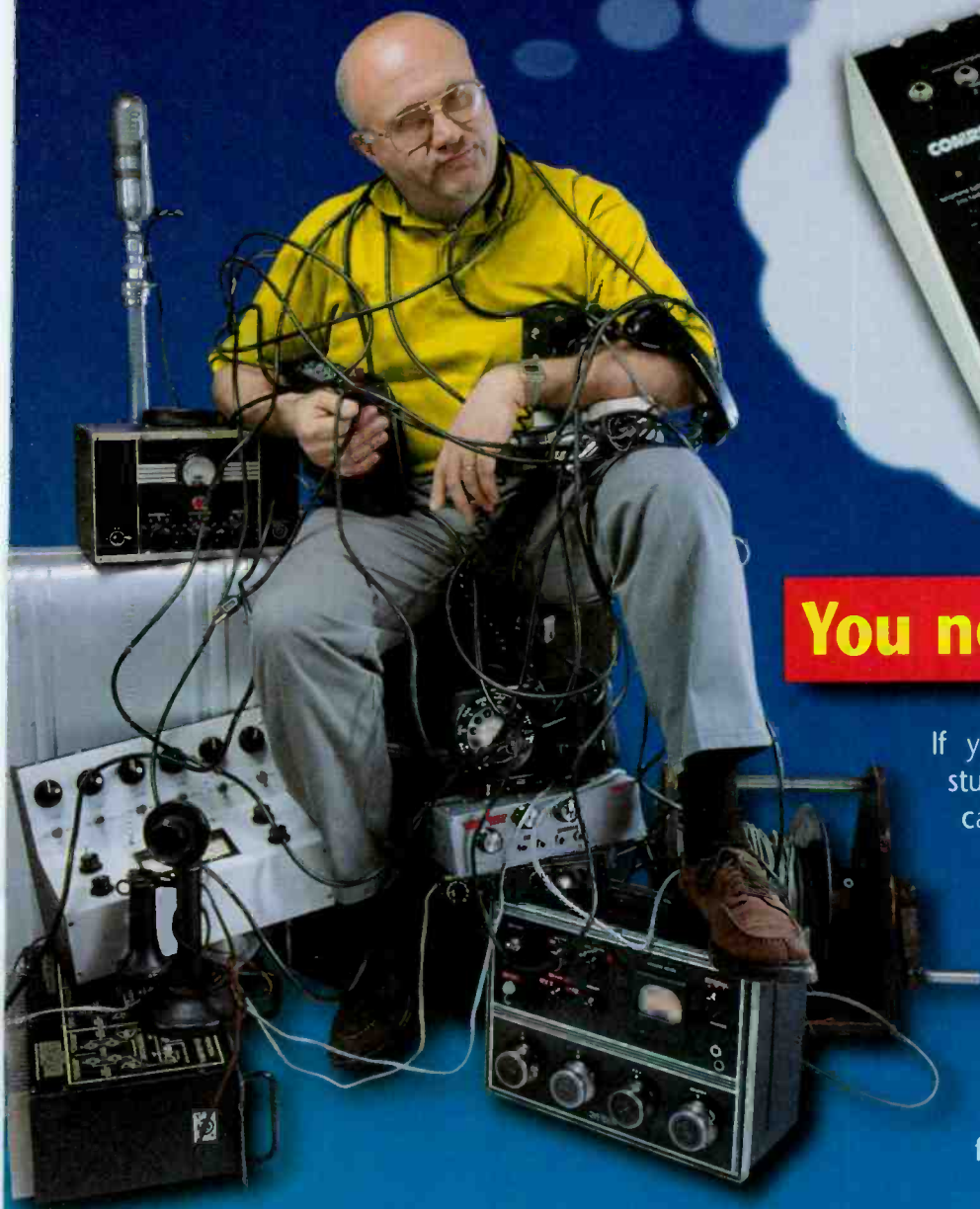
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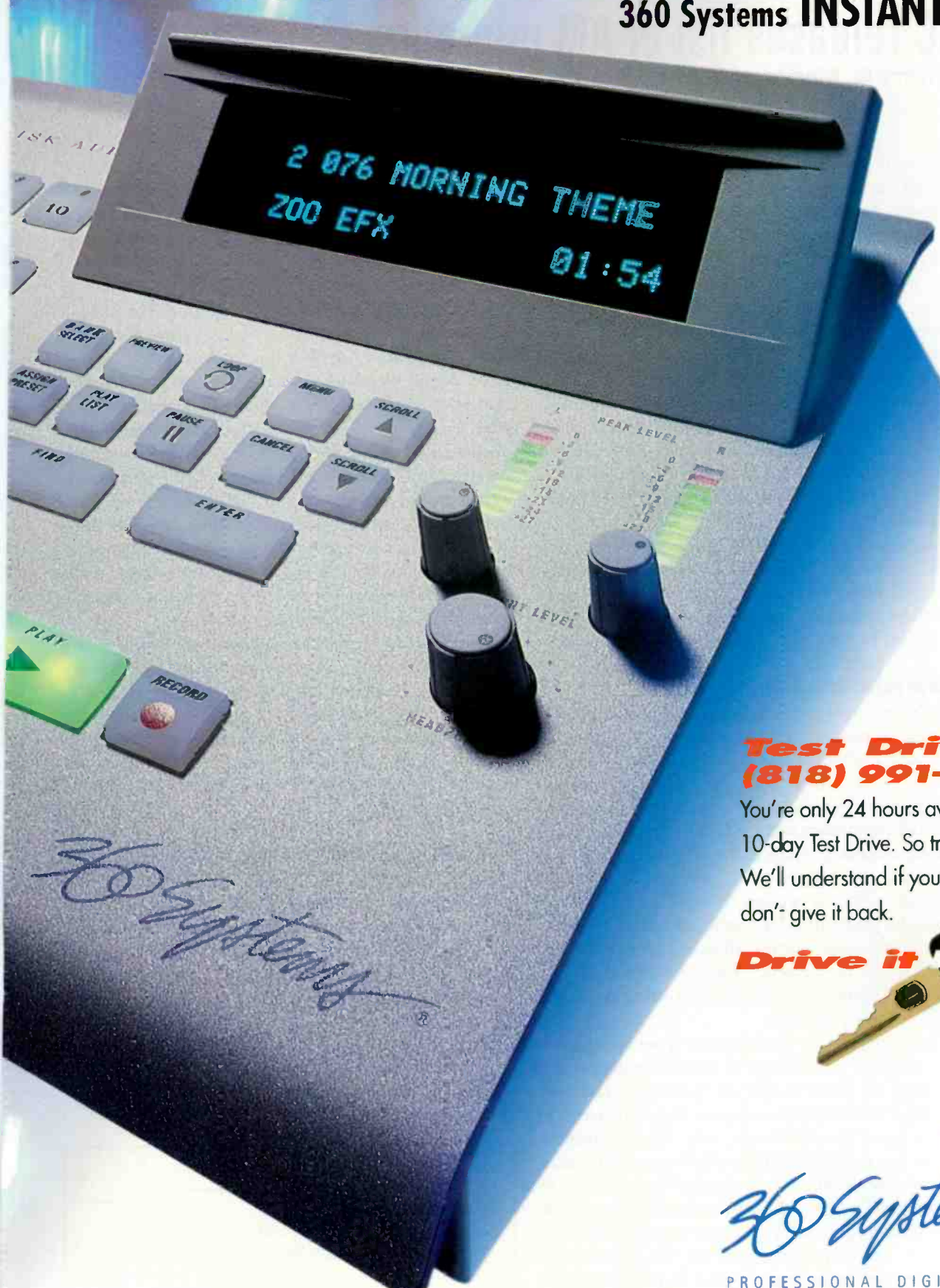
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FCC releases list of AM migration stations

By Harry C. Martin and Andy Kersting

In its continuing effort to improve AM service, the FCC released its latest list of stations to migrate to the expanded AM band (1,605kHz to 1,705kHz). This list is the FCC's third attempt at determining which stations will be allowed to migrate. The commission's past two actions were rescinded primarily due to flaws in the computer software used to generate the list of stations permitted to migrate. There were also inaccuracies in the database, which the FCC relied upon in making its calculations.

The most recent list is comprised of 88 stations. Fifty-nine of these stations haven't changed channels since the last list was released, but 19 have been assigned new frequencies. The remaining 10 are new stations eligible for migration. Nine stations listed in the last release have been dropped.

Although the commission is accepting comments on the revised list, no stay has been imposed. Construction permit applications will be accepted over a three-month period beginning upon the date of release of the FCC's order, March 17, 1997, and ending June 16, 1997.

Ex parte rules amended

The FCC amended its rules governing ex parte presentations in its proceedings. This action was taken to simplify and clarify its ex parte rules, to make them easier to comply with, and to enhance its effectiveness in promoting fairness in FCC proceedings. The commission expects full compliance with such rules. Ex parte presentations are communications to the FCC that are directed to the merits or outcome of a contested or restricted proceeding which, if written, are not served on the parties to the proceeding, or, if oral, are not preceded by notice to the other parties affording them with an opportunity to be present. The ex parte rules are designed to ensure the fairness and integrity of the decision-making processes.

The new rules specify the following types of proceedings: (i) "exempt" proceedings, in which ex parte presentations may be freely made; (ii) "permit-but-disclose" proceedings (formerly referred to as "non-restricted"), in which ex parte presentations to FCC decision-making personnel are permissible, but subject to certain disclosure requirements; and (iii) "restricted" proceedings, in which ex parte presentations to and from commission decision-making personnel are generally prohibited. The FCC noted, however, that its staff has the discretion to modify the applicable ex parte rules in particular cases


where the public interest so requires.

The new rules contain descriptive lists that describe the types of proceedings that have been specified as "exempt" and "permit-but disclose." All other proceedings are "restricted." Unlike the former rules, in which the ex parte status of a proceeding could change depending upon whether certain events occurred (e.g., the filing of an opposition pleading), the new rules generally fix the status of a proceeding from its inception.

The degree to which presentations are prohibited or subject to disclosure requirements is dependent upon what "parties" (as defined by the rules) are present in the proceeding. For example, in a single-party proceeding, the sole party is free to communicate with the commission even if the proceeding is "restricted." Where there are two or more parties in a restricted proceeding, however, none of the parties may communicate with the commission without either party serving any written presentations on the other parties, or giving the other parties the opportunity to be present at any oral presentation.

The new rules also have abolished the concept of a "formal" opposition or complaint. Instead, the test for determining whether a person or entity is entitled to service or an opportunity to be present generally relies upon whether their complaint or other submission has been served on the subject party or references the relevant proceeding, which would make them a "party" to the proceeding.

FCC extends period to close transactions

The FCC has extended from 60 to 90 days the time period in which parties to assignment and transfer applications must close their transactions after obtaining a grant of their application. Although parties may still request additional time in which to close, the 90-day consummation period will provide parties with more flexibility to set closing dates in accordance with business practices and reduce the need for extension requests. 

Harry Martin and Andy Kersting are attorneys with Fletcher, Heald & Hildreth, P.L.C., Rosslyn, VA.

dateline

Tower owners in Colorado and Minnesota must register their tower structures between June 1 and June 30, 1997.

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NAB 97

THE BOUNDLESS PARADE OF PRODUCTS IS SORTED AND EXPLAINED.

Although the casual observer might think that NAB 97 was all about digital television, the radio industry went about its business there with a vigorous spirit. The number of new products in the radio and audio field was remarkable, and the attitude of attendees was generally quite positive despite the show's nearly untenable size.

Overall attendance at the show broke the 100,000 mark for the first time, producing an 8.6% growth over 1996. International attendees made up 22% of this year's total (about the same as last year). Exhibitors represented nearly 1,250 different companies on the show floor, and demand is already high for more space at next year's NAB convention (April 4-9, 1998, again in Las Vegas).

Another record set at NAB 97 was the number of confer-

ences — 13 in all — with a total of more than 200 separate sessions. The converging/expanding industry brought forth conference topics ranging from telephony issues to multimedia authoring, with RF engineering, broadcast law, management, education and plenty more in between.

The leading-edge radio technology slot once occupied at the show by DAB was clearly taken over this year by the Internet and on-line broadcasting. Indeed, DAB was almost nowhere to be seen, while the influence of the computer industry was hard to miss wherever you turned — particularly at the Sands Expo Center. Thought of last year as "overflow space," this year, the Sands was the center of the action by many attendees' accounts. The excitement and energy of the overwhelmingly computer-based environment there was palpable, making the Las Vegas Convention Center seem somewhat lackluster by comparison. This was reflective of the growing influence of the computer industry in the media, now extending beyond the content-creation sector to content delivery, as well.

A number of major announcements were made at NAB 97, certifying its position as a pivotal

annual moment for the rapidly

changing industry. But just

when you thought you

were about to lose

your grip on the pace

of change, here comes

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to get in, get the goods and

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been assembled into an

anthology of articles that

covers all aspects of the show

for radio professionals.

Whether you attended NAB

97 or not, you're sure to find

something of interest in these

next pages, so read on.

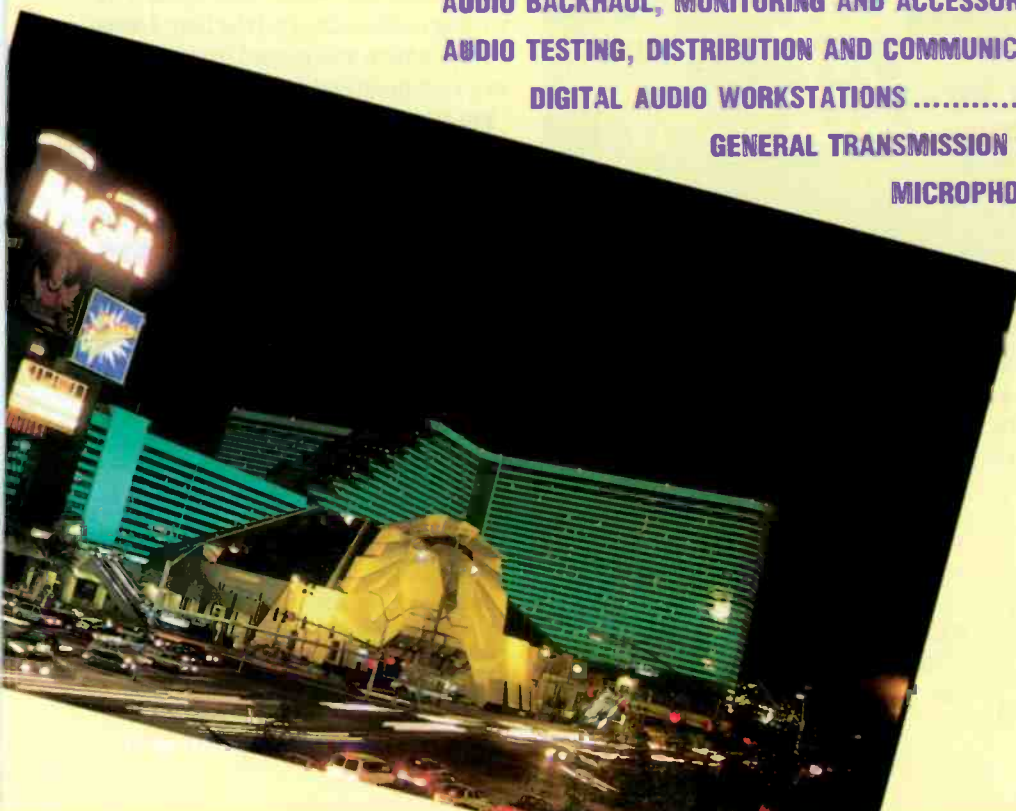


review



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NAB 97 review

AUDIO PROCESSING, RECORDERS AND STORAGE MEDIA

By **Chriss Scherer**

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

Audio processing and recording were almost exclusively digital at NAB 97, indicating how far the industry has come in about the last dozen years. Some analog elements exist, of course, and these are driven to even higher performance levels by their close proximity to digital components. Overall,

draws on all the Orban experience put into its other processors.

TC Electronic makes a broadcast processor debut with the *DBMAX*. Derived from its multiband music mastering processor called the Finalizer, the *DBMAX* is a 1RU, menu-driven processor.

Inovonics showed its well-known line of audio processors for FM and AM broadcasting.

Cutting Edge Technologies released the *OmniaFM*, a fully digital processor with stereo encoder. (See Pick Hits of NAB 97, "Honorable Mentions," p. 70.) Other features include multiband AGC, peak limiting and composite clipping. A unique capability is that external control can be performed with any HTML web browser.

Aphex Systems displayed the *FM Pro model 2020* FM processor, a digitally controlled analog device designed to provide aggressive processing. (See

verb that uses a high-quality, third-generation DSP chip that Yamaha uses in several of its other recent products.

Continuing its commitment to high-quality mic processors, **Symetrix** presented the *628 digital voice processor*. Modeled after the 528E, it adds the quality of DSP to its power, allowing for multiple presets.

Eventide displayed its line of profanity delays and the recently released *DSP4000B production ultraharmonizer*. It includes numerous presets, and using the built-in flash card reader, program cards can be loaded for additional effects.

For more information circle (213) on Free Info Card

Audio recording and playback

360 Systems has made a change to its familiar DigiCart, now called the *DigiCart II Plus*, which now supports up to two internal hard drives (instead of just one) and ZIP-drive removable media (replacing the Bernoulli disks used in previous versions). An update to the *Shortcut* hard-disk recorder/editor now provides a SCSI interface, which also allows it to write ZIP discs that can be used with the DigiCart II Plus.

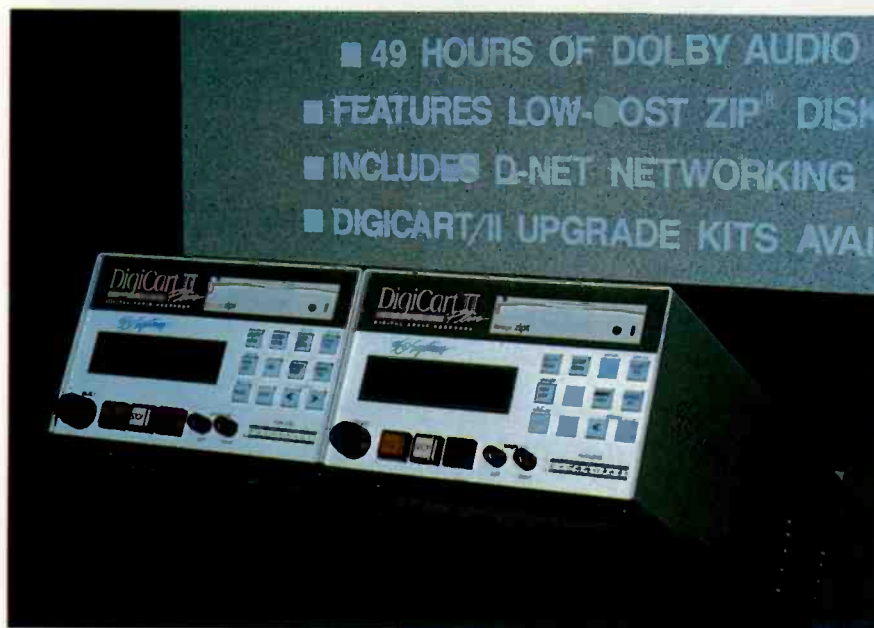
DRS Ahead Technology announced that it has taken over the support of *ITC* cart machines.

Eastman Kodak demonstrated its *PCD Writer 600*, which can be used for writing audio CDs, and the *Disc Transporter*, which will record up to 75 CD-Rs in an unattended fashion.

Fidelipac has repackaged its popular floppy/MO audio recorder as the *DCR-10*. This new unit is fully compatible with the previous *DCR-1000*, but is only available as a recorder/player.

Fostex demonstrated the *D-90* and *D-160* removable hard-disk recorder/editors. The *D-90* is an enhancement of the *D-80* eight-track with additional ADAT functions, better A/D converters and a larger hard drive. The *D-160* has 16 tracks, time code and a SCSI interface. Also displayed was the *DMT-8VL*, a self-contained eight-track recorder/editor/mixer.

Sony continues its commitment to the Mini-Disc format with the release of the *MDS-35* recorder and *MDS-B6P* player. Both have cart machine-style



this year's show indicated a maturing trend that moves beyond pure fidelity issues toward increased convenience, reliability and cost-effectiveness for both the processing and the storage of audio programming.

On-air audio processing

Orban continues its digital progress with the release of the *Optimod 9200*, a digital processor built for AM. (See "Pick Hits of NAB 97," p. 70.) This monaural-only, five-band processor

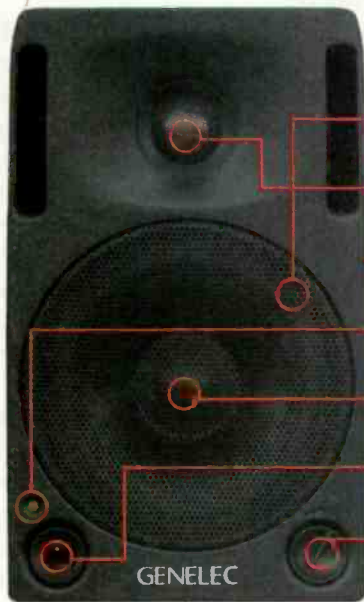
"Pick Hits of NAB 97," p. 70.) Available options include an internal stereo generator, digital I/O board and a pre-emphasis limiter. The remote-control software runs under Windows 3.1 or 95, and gives a clear and easy interface to all the functions.

For more information circle (212) on Free Info Card

Studio processing

Yamaha announced the release of the *REV500*, a 1RU multiple-effect re-

ACTIVATE YOUR STATION.



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- 3/8 Inch Threaded Mic Stand Hole

THE NEW GENELEC 1029A BI-AMPLIFIED ACTIVE MONITOR

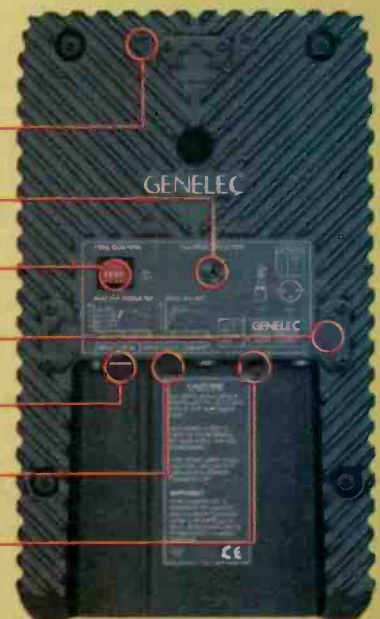
Our roots are showing. When we introduced the sharpest, clearest, most accurate acoustic stage possible in 1978, the European broadcast industry sat up and listened. Since then Genelec has become the most respected manufacturer of active monitors throughout the world... and now we are proud to bring even more incredibly true sound to broadcast studios with the Genelec 1029A.

The 1029A's neutral sound and precise imaging, together with its impressively compact size, make it ideal for areas normally short on space. The 1029A features line-level inputs and crossovers, along with bi-amplified power modules (40 watts) directly coupled to magnetically shielded drivers. The unique Directivity Control Waveguide (DCW) technology provides excellent stereo imaging and frequency balance, even in difficult acoustic environments, while the rugged cast aluminum cabinet (also available in titanium gray) features rounded corners and a hard-wearing outer surface. The optional 1091A Active Sub-Woofer extends the system frequency response down to 38Hz (± 2.5 dB).

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The Whole Truth and Nothing But The Truth.

GROUNDING IN SOUND BROADCASTING

NAB 97 review

layouts for broadcast. Also new to the Mini-Disc line is the *MDM-x4*, a four-track recorder/editor. New to the DAT line is the *PCM-R500* mastering DAT recorder and the *PCM-7040* time-code DAT recorder.

Denon has added two products to its already large line of recording and playback devices. The *DN-M1050R* is a rack-mountable Mini-Disc recorder/player with all the features available to Mini-Disc. Also available is a HotStart feature that allows up to 20 tracks to be loaded into memory locations for instant playback. The *DN-C680* is a rack-mount CD player with a jog shuttle wheel, AES3 output, XLR-balanced and RCA-unbalanced analog outputs and a large fluorescent display.

Otari presented the *DTR-8S* Pro DAT machine, supporting sample rates of 32kHz, 44.1kHz and 48kHz. An added feature is the ability to monitor the input without a tape being loaded in the machine.

Sonifex introduced the *Courier*, a portable recorder that uses PCMCIA cards. (See "Pick Hits of NAB 97," p. 70.) This recorder is designed for field use with stereo analog XLR inputs and outputs and an AES3 output. Internal editing and ISDN transfer capabilities are also offered.

Superscope Technologies/Marantz unveiled the *PMD350*, a rack-mounted cassette deck and CD player combo. Each section has independent unbalanced audio connections, with an optional balanced XLR kit and an additional combined output. Remote control, cassette vari-speed and CD digital output are some of the additional features.

TASCAM has added two new products to its ever-growing family of audio recorders. The *DA-302* is a unique double-well DAT deck. (See "Pick Hits of NAB 97," *Honorable Mentions*, p. 70.) Each section has fully independent transport controls and audio connections, and the unit can also perform internal 2x speed dubs or "relay" (i.e.,

continuous) recording/playback, with sample rates of 32kHz, 44.1kHz or 48kHz. The *DA-98* is an addition to the DTRS line of recorder/players. New features include off-tape monitoring (selectable by track), switchable reference level, 20-bit conversion and full parallel remote control.

For more information circle (214) on
Free Info Card

Storage media

Eastman Kodak displayed its line of recordable CDs, originally developed for Photo CD, but usable for any recordable CD application.

Maxell presented its full series of recording media, including DAT, MS series cassettes and recordable CDs.

Sony showed its complete array of audio media products, which includes some new tape lengths for the *Pro-DAT*, *DARS-MP* and *DARS-116* (for eight-track DTRS) and *DASV* (ADAT) formats.

For more information circle (215) on
Free Info Card

AUDIO BACKHAUL, MONITORING AND ACCESSORIES

By Kevin McNamara

Kevin McNamara, BE Radio's consultant on computer technology, is president of Exegesis Technologies, a consulting firm in New Market, MD.

Many interesting products fall into this category, which includes several relatively narrow, but vitally important, niches of studio equipment. There was no shortage of new products in these areas at the NAB convention this year.

Audio backhaul products

Comrex presented three new products at NAB 97. Most notable was the *Hotline* POTS codec, which can provide up to 10kHz of full-duplex audio (with a modem connection of 33.6kb/s), using a proprietary algorithm written specifically for the low bit rates obtainable on analog telco lines. (See "Pick Hits of NAB 97," p. 70.) Two units are required — one at each end of the circuit. It can be purchased as a rack-mount or in a small rugged remote

package. The remote unit features a keypad, two inputs, one output (1/4 inch or XLR) and even a remote contact closure.

Also from Comrex was the new *Mix-Minus Bridge*, which can create and conference up to five mix-minus feeds. This is particularly useful when doing an occasional broadcast requiring multiple simultaneous remote feeds, such as during election night coverage. (See "Pick Hits of NAB 97," *Honorable Mentions*, p. 70.) Finally, Comrex introduced a rack-mount version of the *NEXUS* ISDN codec that premiered in its portable form at last year's show.

The *NXL256* and *BCF256* from **Audio Processing Technology** (APT) give broadcasters more options for sending full-duplex digital audio over dedicated lines or STL systems that can support transmission bandwidths from 56kb/s (for 6.8kHz mono audio) to 256kb/s (15kHz or 20kHz stereo). The systems use the company's well-known apt-x coding. The *NXL256* is a 1RU basic device, while the *BCF256* at 2RU offers additional interface options and possibility for integral ISDN backup.

Intraplex announced a partnership with Telex to provide digital intercom via ISDN. The Intraplex *IntraLink* ISDN codec connects a Telex intercom panel at a remote site to one or more ADAM digital intercom matrices at the studio site. Intraplex also presented its solution for auxiliary audio on video microwave, replacing multiple analog subcarriers with a single T-1 signal in the subcarrier region of the microwave channel.

Three new telephone hybrid products were unveiled by **Gentner Communications**. The *SPH10* analog hybrid replaces the *SPH-3* and adds such features as a built-in monitor amp. The *DH20* replaces the *DHA-1A* digital hybrid and features improved 16-bit DSP technology, selectable automatic gain control, automatic mix-minus bus, auto answer/disconnect and monitor amp. The *DH22* has the same features, but adds a second digital hybrid.

JK Audio presented a host of devices that can help you interface a telephone to an audio source. The *RemoteMix 3* is a small audio mixer that can attach to a POTS telephone line, modular

Audio Solutions

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Audio Precision offers three lines of audio analyzers.

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- ❖ PC/Multimedia audio testing
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- ❖ Dual Domain™ version includes digital I/O
- ❖ Total analog system THD+N residual $\leq 0.001\% + 1.5\mu\text{V}$, 22Hz-22kHz

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Circle (23) on Free Info Card

AES/EBU?



....DSA-1

The Prism Sound DSA-1 AES/EBU interface test system provides *unique generator and analyser capabilities* enabling the *most comprehensive* assessment of AES/EBU interconnections.

For example, the DSA-1 can measure differences between *source and cable jitter*, or it can *simulate* either sort with its *signal generator*.

To find out more, call or fax us now for a full information pack, or look up the latest DSA-1 V2.0 specification at our web site.



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Circle (24) on Free Info Card

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handset cord or even a cellular phone (with the proper fax/modem adapter from your cellular dealer). It has two XLR mic inputs, RCA line in/out, XLR-balanced output, VU meter, dial keypad, built-in monitor speaker and microphone. The company also offers a variety of devices that can tap audio from any handset cord.

For more Information circle (216) on Free Info Card

Audio monitoring

Wohler Technologies makes the monitoring of those digital signals easy with its latest offerings. A series of rack-mounted, self-powered speakers are offered in a number of configurations that permit monitoring and metering of analog, AES3 and/or SDI signals. These units can also be used as

gral receiver. The headphones can be operated for up to three hours per charge on internal NiCad batteries. The system features three switchable frequencies and offers a range of up to 250 feet. The RS-6 wireless headphone system is similar to the RS-8, but intended for a more casual user.

In the **TGI North America** booth, **Tannoy** presented its full line of studio monitors, including its popular **PBM** series, ideal for near-field monitoring in radio control rooms.

For more information circle (216) on Free Info Card

Audio accessories and furniture

Looking for a simple solution for creating a listener information line or audiotext service? **Audio Online** is a product from **Henry Engineering** that can handle up to 16 incoming phone lines simultaneously. (See "Pick Hits of NAB 97," p. 70.) Callers can select from a menu of messages and hundreds of messages can be available to callers. The best part is that it is DOS-based and



digital-to-analog converters of these digital formats. Other products included a line of stand-alone audio D/A converters and an audio error alarm system that can remotely report error conditions on up to 800 digital or analog stereo channels.

Wireless headphones can be helpful in many remote situations. The **Sennheiser RS-8** wireless headphone system features a 900MHz transmitter and **HDR-8** stereo headphone with an inte-

can run on that old 386 in the closet.

ESE always seems to have some new solution to a problem, and this year the company presented a couple more: an expanded line of self-setting clocks, the **LX-5116** (16-inch face) and **LX-5105** (five-inch face). If you've had experience with a master clock system, you'll appreciate these clocks because they continue to work independently in absence of a driver signal. When the signal is re-established,

Others are proud of their many buttons...

... on the On-Air 2000 you can get by with three keys and one fader per channel unit.

Studer On-Air 2000: This is the name of the digital audio mixer for broadcast applications that features a completely new, simple, and intuitive user interface based on the "Touch 'n Action" concept (pat. pend.):

■ The most important settings of each input channel can be seen at a glance on the screen. Only three keys (On, Off and PFL) and one fader are needed.



The modular mixing console features 6, 12, 18 or 24 input channels (each assignable to 2 sources)



On-Air 2000 offers the convenience of central operation as well as a synoptic status overview of all channels.



■ Simply touch the corresponding area of the screen with your finger - and you can process all settings on the central control monitor and save them either as global snapshots or individual Mic settings (integrated PCMCIA slot!).

■ The four incremental encoders for setting the parameters have a tactile feedback: the stops and detent points are set individually, depending on the function area. The ergonomic convenience of an analog mixing console is now surpassed by the digital technology!

On-Air 2000: The mixing console for state-of-the-art broadcast automation with DJ mode. Sounds interesting? Please do not hesitate to contact us! ■



Touch 'n Action also means: Quick access to all functions without navigation through complex menu trees.



Incremental encoders with software-controlled stops and detent points optimize the operating convenience.



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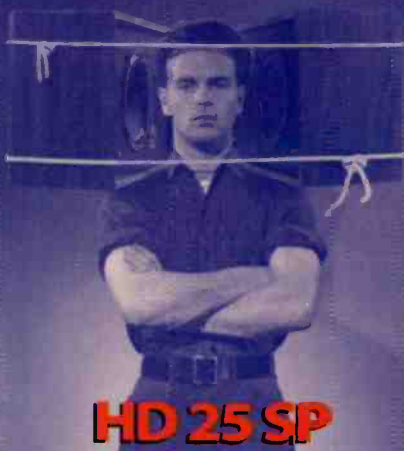
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all of the clocks will synchronize. A rack-mount version of the LX-5105 with one or two clocks is also offered.

The PC-471 is a plug-in PC card from ESE that hooks to your house master clock system and synchronizes the PC clock to the master using either the ESE or SMPTE time-code format. This has many potential applications in the radio facility.

For those that design and build equipment, Selco has a new family of *Soft Touch* knobs that can be purchased in a variety of knob/cap color options. Also for the do-it-yourselfer was Opamp Labs, presenting its ever-growing range of modules and systems for audio circuitry.

More and more stations are expanding their use of computer networks within their facilities. The problem of what to do with the network servers and disk arrays is addressed by the *File Server Station* from Winsted. This is a steel, open-frame shelf unit that features space for multiple servers/monitors/keyboards, pull-out shelves and extensive cable management capabilities.

A more custom approach to studio furnishings was advanced by Murphy Studio Furniture, as well as a wide range of items and options from Space-wise Broadcast Furniture. For furnishing your remote, KD Kanopy presented its clever series of promotional and easy-to-assemble tent structures, including a new line marketed under the *Party Shade* name. Also in the remote area was Kart-a-Bag, presenting its *Kartmaster 500* and a wide variety of other hand trucks and equipment cartage systems.

New this year at Acoustic Systems — well-known makers of acoustical doors, windows and modular studios/control rooms — was a fully glass acoustical door. One was installed in the company's display booth, which provided a welcome moment of quiet respite from the show floor.

For more information circle (217) on Free Info Card

AUDIO TESTING, DISTRIBUTION AND COMMUNICATIONS

By Garrett Wood

Garrett Wood is chief engineer at WUKY-FM, Lexington, KY.

This behind-the-scenes group of products is deceptively important to getting the program on the air and keeping it sounding good. As the rest of the industry moves forward, so too must these areas, although not everyone notices. But each year at NAB, those who labor in such obscurity come out to display their progress. Here's what they had to show at NAB 97.

Audio test and measurement equipment

Audio Precision introduced the SWR-2122 series of audio switchers that can be configured to allow for large-scale production testing of audio devices. This switcher occupies one rack unit and is available in balanced XLR and unbalanced BNC connector configurations. The standard 2x12 arrangement can be cascaded to 16 units that allow up to 192 channels to be addressed. This new series replaces the current SWR-122 line.

Tektronix introduced two new options for its 764 digital audio monitor. Option 01 adds a serial digital video input with embedded audio demultiplexing that provides operators real-time monitoring of audio level, data and phase relationships. The logging and reporting features provide continuous monitoring of groups of four channels of audio activity. The Option 02 analog line output can be used to drive an audio amplifier, allowing the monitoring of one stereo pair of any of the various inputs provided to the 764.

The NC10 digital sound and noise analyzer was displayed by Neutrik Cortex Instruments. This portable unit contains the industry's first handheld, battery-powered, psychoacoustic loudness analyzer capable of providing live loudness calculations. Standard features include a precision sound level meter, third octave spectrum analyzer and a data logger with 340MB

So, you think you know Prophet Systems? Take a look at us now!

Prophet Systems has expanded to better serve our customers. Here are just some of the things you will notice—

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HARDWARE - We continue to expand our approved hardware list as hardware becomes more stable Industry-wide. Ask us about using your own hardware.

SALES - More sales people and a Sales Manager!

Our Sales Manager will make sure your account gets the attention you deserve. And with a larger sales staff we will respond quickly to your needs.

SALES SUPPORT - Pre-Sales Engineering Support

More support! We have added a broadcast engineer with 15 years of experience to our staff to help your engineer configure the system.

EXPANDED - Manufacturing capabilities fourfold

Our expanded facility and inventory allow us to ship more systems faster.

ADDED - Hundreds of software additions and improvements

We are well known for offering the most innovative software. Last year was no exception. With the additions over the last four years, Audio Wizard for Windows is the most complete, full-featured system on the market.

OFFICE MANAGER - Fast and accurate business system

Colleen, our new Office Manager, will make sure your accounting and sales orders will be processed quickly.

DEVELOPED - An internal support/business database system

We have developed an extensive support and business database system that allows us to track your needs on a continuous basis. We can access your records quickly to reduce the time you spend on the phone.

JD (HARDWARE SUPPORT) IS STARING AT A SILENT PHONE BECAUSE:

- A) OUR SYSTEM IS JUST THAT GOOD
- B) HE REALLY WANTED TO BE A MAYTAG REPAIRMAN
- C) KEVIN TURNED HIS PHONE OFF AGAIN



GEORG* (L) AND SCOTT (R) ARE THE ONLY ONES WEARING TIES BECAUSE:

- A) THEY ARE VERY PROFESSIONAL PROGRAMMERS
- B) THEY WEAR A SUIT AT LEAST ONCE A YEAR TO SEE IF IT STILL FITS
- C) PROGRAMMERS WEARING TIES ARE COOL (PROGRAMMERS CREEDO # 3)



* YES, THAT IS HOW GEORG SPELLS HIS NAME.

EVEN IF YOU'VE CALLED BEFORE—CALL US IN '97

JEFF (ENGINEERING SUPPORT) IS POINTING TO A MAP BECAUSE:

- A) HE IS POINTING TO OGALLALA, NEBRASKA THE HEADQUARTERS OF PROPHET SYSTEMS
- B) WE CAUGHT HIM PRETENDING TO BE A TV WEATHERMAN
- C) WHERE THE HECK IS SOLDOTNA, ALASKA ANYWAY?



KEVIN'S OFFICE IS FULL OF WOLF PICTURES BECAUSE:

- A) PROPHET SYSTEMS IS LIKE A WOLF—INNOVATIVE AND AGGRESSIVE
- B) PLEASE—DON'T GET HIM STARTED ON WOLVES!
- C) ALL OF US THINK HE WAS RAISED BY WOLVES



TODD (SALES) IS GETTING READY TO LEAVE BECAUSE:

- A) HE IS LEAVING TO GIVE A DEMONSTRATION
- B) OUT OF SIGHT, OUT OF MIND (SALES RULE #1)
- C) IT IS 5 O'CLOCK—WATCH OUT!



COLLEEN IS A GREAT OFFICE MANAGER BECAUSE:

- A) SHE USES 20-YEARS EXPERIENCE TO KEEP PROPHET SYSTEMS ORGANIZED
- B) SHE STARTED WORK WHEN SHE WAS 3 (SEE ABOVE)
- C) 5 KIDS—'NUFF SAID!



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capacity. Optional software modules provide frequency-selective reverberation time calculations and FFT analysis.

Two new CD/CD-ROM jitter meters were demonstrated by **Leader Instruments**. The LE-1853 and LE-1854 jitter meters facilitate the optimization of disc mastering and multimedia player systems. The LE-1853 handles CD-ROMs up to 8x operating speeds, while the LE-1854 manages up to 12x operating speeds. Leader also displayed the LG-3226 synthesized signal generator, offering fully programmable operation from 100kHz to 2GHz. Its dynamic range of -133dBm to +13dBm facilitates the testing of sensitive receivers.

Prism Media Products attracted significant attention with its new version 2.0 software for the PrismSound DSA-1, a hand-held AES3 test system. The unit includes generator and analyzer capabilities, allowing it to examine electrical, timing and data-content parameters of AES3 signals and paths. An AES11 reference signal input is also provided for time-base measurements and synchronization of the internal generator. Also on hand were Prism's Dream DA-1 and AD-124, which are 24-bit D/A and A/D converters, respectively, as well as the MR-2024T, an interface to TASCAM's DA-88 and DA-38 that provides AES3 or SPDIF I/O for eight tracks at 16 bits, six tracks at 20 bits, four tracks at 24 bits or two tracks at 24-bits with 96kHz sampling.

The Q-Box from **Whirlwind** is a battery-powered audio line tester capable of performing various checks on microphones, speakers and cabling. A source selector allows the selection of a built-in condenser mic or 440Hz tone generator that can be used to talk back up the line at +4, -20 or -50dB levels. A speaker selector can be used to confirm mic or line levels and test dynamic microphones. Outputs for standard headphones or a 2kW ear-piece are provided, as well as voltage-presence monitoring for phantom or

S W E E T S P O T



20 Bit

CE

Analog dreams become digital reality with the Symetrix 628 Digital Voice Processor. Everybody on the staff will sound better, including you!

Top-notch voice professionals now demand personalized signal processing. The Symetrix 628 gives you the ability to create and store in memory 118 custom presets. You can get on the air instantly by selecting from several finely tuned factory presets.

It rolls a microphone preamplifier, 20 bit A/D converter, de-esser, downward expander/gate, compressor/limiter and parametric EQ into a single rack space unit. Rotary knobs allow real-time parameter adjustments while eliminating multi-layer menus. An optional remote control allows selection of the first 11 presets and a bypass function without frantic dashes to the equipment rack.

With analog and digital outputs, the 628 is ideally suited to recording, live performance, and broadcasting applications. Analog outputs provide either line level (+4 dBu) or microphone level (-40 dBu) output. AES/EBU or S/PDIF digital outputs are switch selectable. The 628 operates at sample rates of 32 kHz, 44.1 kHz or 48 kHz.

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NAB 97 review

intercom power.

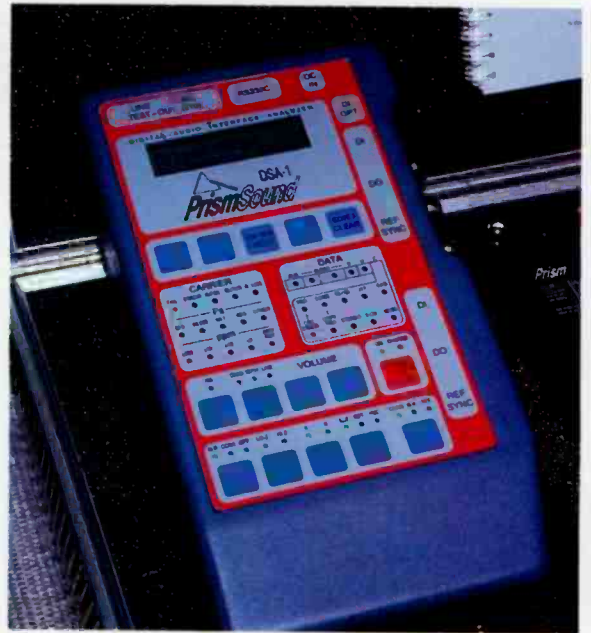
For more information circle (220) on
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Audio distribution

Synchronous AES3 digital distribution is now available with the introduction of the NV3064SA router displayed by NVision. AES3 audio can be switched cleanly without the clicks and glitches normally associated with asynchronous routers. The NV3064 uses proprietary ASIC technology to provide error-free crosspoint transitions. System architecture allows a 32x32 router to be expanded to a full-framed 64x64 with the addition of an I/O card. The NV1025 AES3 distribution amplifier (with EQ, jitter removal and re-clocking) and the NV1035 AES3 20-bit analog-to-digital converter were among several other new NVision prod-

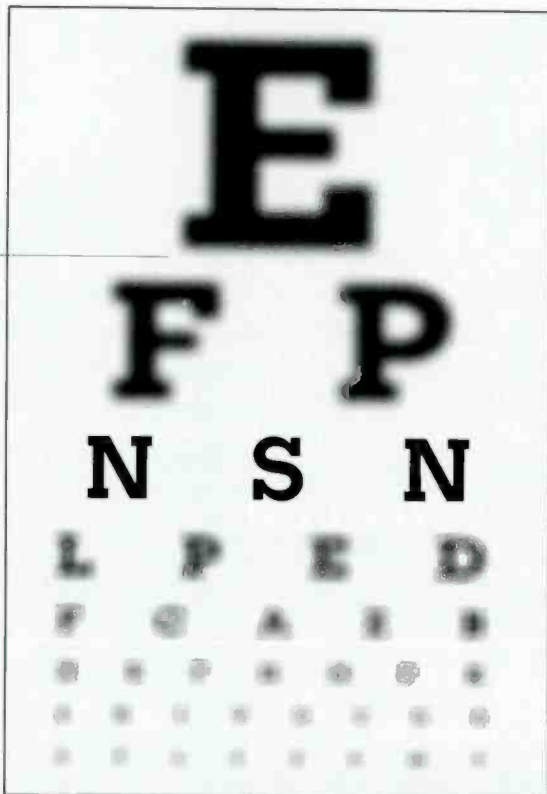
ucts at NAB 97. Also shown was the NV1050 AES3 sample-rate converter that can simultaneously convert multiple AES3 inputs of different sample rates to a common output rate.

New to the Leitch XPlus series of routing switchers is an AES3 16x16 module with an optional quiet-switching output for clean, noise-free switches. The XPlus uses 1RU and 2RU mounting frames for installation of various modular components. AES3 and analog audio modules can be installed in the same rack unit and expanded with the use of multiple frames. New to the Xpress series of monitor routers is the 12x1 serial digital video and analog stereo audio units. The VZA32 series of routers can be configured for 32x32



distribution of serial digital video, AES3 and analog audio.

Leitch also has added products to its AES Glue family — a series of versatile plug-in audio modules that address a wide variety of analog/digital signal

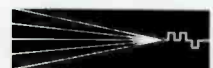


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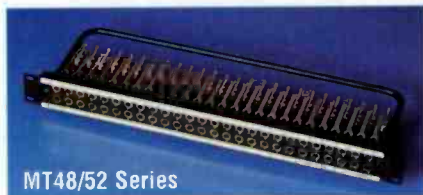
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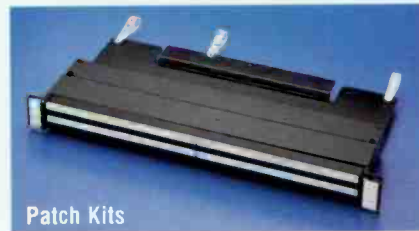
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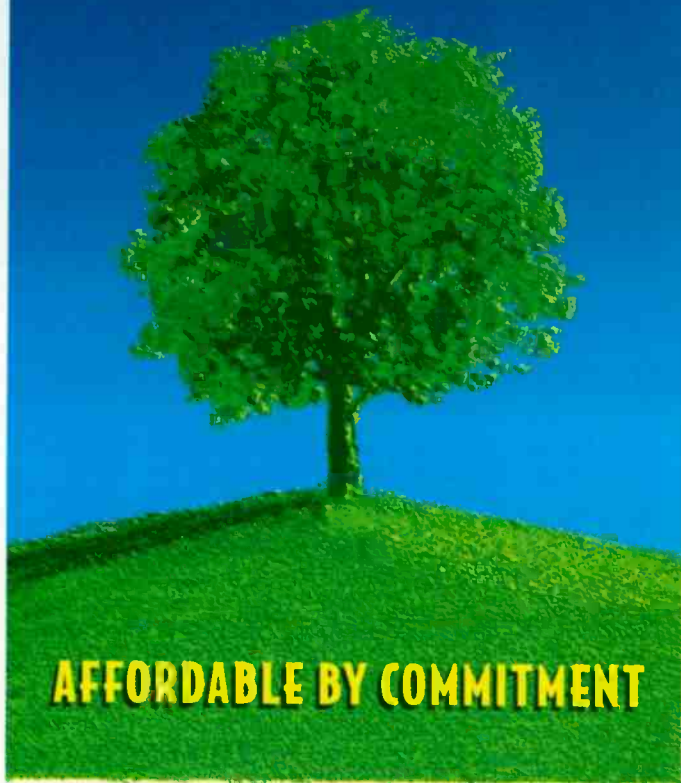
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processing, distribution and routing needs. The *DAR-6880* digital audio reference/tone signal generator combines timing functions and a full-function audio tone generator. The *ADC-880* and *ADC-6880* are low-cost/high-performance 20-bit A/D converters.

Pesa Switching Systems introduced the *Ocelot* family of routers. The basic system is built on 8x8 and 16x16 matrix sizes that are housed in a compact 1RU chassis. X/Y control is provided by front-panel operation, with Windows-based computer control available via RS-232/RS-422 serial interfaces. A total of seven *Ocelot* switchers can be addressed via a single RS-422 control port.

Fidelipac showed the *DMR-4x1*, a four-input/one-output AES3 combiner. This unique product is ideally suited for applications where multiple AES3 channels need to be combined into a single feed, such as in a radio automation system.

Telect presented its full range of audio DAs, routers and digital converters, as well as its audio patch panels, fiber-optic distribution and associated hardware. The company also specializes in cable management systems for a number of different industries including telecommunications and broadcasting.

At **Broadcast Tools**, a neat little device was being demonstrated that could be highly useful in many broadcast studios. It's a 12x4 stereo audio switcher, which is fully monitored with appropriate LED readouts. The little unit was quite inexpensive and should be extremely welcome in many parts of an analog facility's design.

For more information circle (221) on Free Info Card

Communications systems

Clear-Com unleashed its new *Matrix plus 3* digital intercom system at NAB 97. It uses distributed digital signal processing to connect up to 200 full-duplex ports for voice and program audio. Variable individual listen levels are available at each station, with adjustable dip control on IFB interrupts. The level of each input/output port is also variable. Various modules can be used to interface two-way radios, telephones and two- or four-wire equipment.

The *RadioCom* line of UHF wireless intercom systems was featured by **Telex Communications**. The *BTR-600* model is a two-channel, encrypted digital system that provides secure system transmissions via UHF base stations. Operations are fully agile in the 524MHz to 608MHz and 614MHz to 746MHz frequency bands. A cipher code provides 65,536 possible combinations of encrypted delivery.

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Wire, cable management and connectors

Gepco International showed the *7537 super trunk*

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Chris Andree, Asst. PD
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"We're a news programming provider and deal with a large number of actualities every day, so speed in production and getting it down the line are paramount. DAD allows us to bring information in, and seconds later it's ready to go. The greatest feature is the ease of editing and file transfer between our four workstations. On-air is a breeze."

Dane Wilt
Radio News Company,
Las Vegas, NV

"Way cool. The greatest thing about DAD is that it acts and thinks like a cart machine and doesn't intimidate the talent. We use touchscreens, and the learning curve is about 2-1/2 hours before they're up and running. From an engineer's standpoint, it's great because DAD uses off-the-shelf hardware, so maintenance is a snap."

J.R. Rogers, Asst. CE
KSON/KIFM,
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"The DAD system was on the cutting edge of systems we looked at, and there was some initial reluctance to enter the digital arena. After having the system in-house for a month, the entire production and on-air staff felt like they could never do without it again. Now our news staff has a system of their own, and we're getting a third system for our sister TV station."

Chuck Whitaker, PD
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NAB 97 review

cable designed for digital audio distribution. Up to 50 channels of AES3 audio can be carried at distances up to 2,500 feet with a bandwidth of 450MHz. It's available with five, 10, 12 and 25 color-coded 75W coax cables per bundle. Also offered was a low-loss miniature serial digital coaxial cable, model 7538, which uses gas-injected foam technology to provide extremely low signal loss. This 75W cable is 0.159 inches in diameter and weighs 14.3 pounds per 1,000 feet, making it attractive for mobile production truck applications.

A new line of XLR panel receptacles was displayed by **Neutrik USA**. The *A* and *B* series offer the smallest XLR available, with a 0.90-inch center-to-center mounting density. The *A* series units are constructed in plastic, while the *B* series has a metal shell supplied in nickel or black finish. Both are available in a PC vertical or horizontal mount and left or right horizontal mount.

ADC has improved on its QCP punchdown system with the introduction of the *QCPII* quick connect punchdown technology. The blocks are now insulated on both sides to allow pre-lacing of wiring and permit one-handed setups.

Deeper channels allow up to four wires to be punched on a terminal, and there's a new punch that doesn't require the proper orientation before punching.

Well-known, high-end audio distributor **Gotham Audio** has teamed up with connector manufacturer/dealer **Deltron** to form **DGS Pro Audio**. The joint venture stocks a wide variety of audio cables and connectors, including a new "silent" 1/4-inch phone plug and a highly flexible, double-shielded cable for high RF rejection. A clever new XLR identification system is also offered.

The *Quick Winder* line from **Reel-A-Pail** provides an easy method of storing power and other cables used in remote production. This simple-to-operate device is available in three sizes and allows the units to be stacked for convenient storage. The *Quick Winder* model RAP-200 can hold up to 200 feet of 1/2-inch cable.

New items at **Clark Wire & Cable** included *Bittree* patching systems designed for digital audio, video and other high bit-rate data applications. Also on hand was Clark's wide range of analog and digital cables in single and multicore versions, plus some examples of the company's custom cabling work.

CANARE showed its full line of high-quality cables, connector reels, snake systems and tools for audio and video applications. Tools include handy crimpers and cable strippers, while the cable line features a wide spectrum of colors and the well-known Star-Quad design for maximizing common-mode rejection.

Mohawk/CDT demonstrated its new *Spectrum* AES3-compliant cables for digital audio applications. Both single, double and multipair configurations are available. A new dual-purpose 12-channel breakout box was also presented for remote field production. Each channel is provided with an XLR female, an XLR male and three color-coded binding posts in a parallel and feed-through configuration.

New Hampshire-based **Audio Accessories** showed off its line of standard and pre-wired audio patch panels, plus a nice selection of patch cords and holders. The company also carries video and RS-422 patching equipment.

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The FM Series

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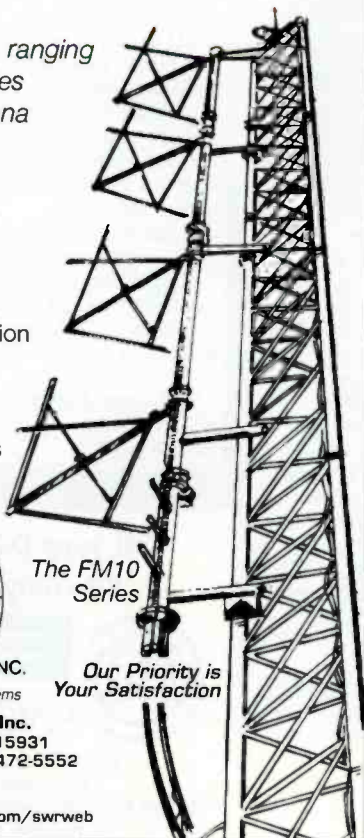
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DIGITAL AUDIO WORKSTATIONS

By Yasmin Hashmi

Yasmin Hashmi, BE Radio's international correspondent, is a partner in the London-based consultancy firm Sypha, and co-author of "The Tapeless Audio Directory" buyers guide.

Along with expanded editing and mixing functions, some of the most popular DAW developments shown at NAB 97 included support for Windows 95/NT, PCI platforms and 24-bit recording. There was also increased support for plug-ins, the introduction of next-generation systems, and revitalized initiatives for file import/export.

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NAB 97 review

pact versions of their systems, **Solid State Logic** has moved in the opposite direction with the introduction of *Altimitx*. Designed as an integrated 48-track recording, editing and mixing system with non-linear video and dedicated control surfaces, the system

is expandable up to 128 channels, supports surround-sound capabilities for all major formats and can be networked with other SSL systems, such as the *Axiom* and new *Aysis* digital mixing consoles.

AMS Neve, on the other hand, is offering a cut-down 16-bit version of AudioFile called *AudioFile Prolog*. Designed for a range of editing functions, including operating as a feeder system for larger 24-bit audio file/logic mixing systems, the Prolog supports 16 chan-

nels with six hours of storage, includes a comprehensive ADR package, and can be upgraded in a variety of ways.

An upgrade path to the new **Orban Audicity** will also be available to existing DSE-7000 users. As with its predecessor, Audicity provides high-speed RAM-based editing, with background shadowing to hard disk or removable Jaz drive. Launched as a second-generation workstation supporting 24 tracks and time code, it features a new contoured mixer/editing surface with assignable controls and effects, including Optimod EQ and compression and Lexicon reverb.

Announced by **Digidesign** as "the single most important evolutionary step in Pro Tools development since the introduction of TDM," the new *Pro Tools 4.0* software uses native PowerPC programming and supports the new PCI and NuBus-based Pro Tools III, Pro Tools Project and Audiomedia hardware. It includes new editing and mixing capabilities, an improved GUI, faster processing and dynamic automation of virtually all TDM plug-in parameters. In addition, the system can be operated using the new **Mackie HUI** controller. This features touch-sensitive motorized faders, rotary controls that can be assigned to DSP plug-ins, metering, a scrub wheel, edit, transport and navigation controls and an analog control-room section.

Furthermore, having taken over development of the **Avid AudioVision**, Digidesign also introduced *AudioVision version 4.0*, which features native PowerMac PCI support. Available as an upgrade to Pro Tools III PCI users, the software can read and write Pro Tools 4.0 session files, and will operate with the Digidesign Universal Slave Driver.

Other next-generation systems at the show included the **Korg SoundLink DRS** with Mac-based GUI and dedicated control panel and the **Fairlight MFX3plus**. According to Fairlight, the MFX3plus runs up to 40 times faster than its predecessor and features an upgraded CPU, improved graphics, a PCI bus for high-speed networking between workstations and a more compact controller.

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New releases

After a marked absence for a number of years and having been purchased by managing director Mike Parker, **Digital Audio Research (DAR)** made a welcome return to the United States at NAB 97. On show were *SoundStation Gold* and *Sabre Plus*, both sporting new audible editing features, and the *Translation Station* featuring compatibility with Lightworks and Avid files.

The **Studer** booth demonstrated an example of a total broadcast solution. The Videoquip/ASC *Dave 2000* was used for acquisition of audio and text files, which were sent via the **Merging Technologies** new Audio Mail feature to the *Pyramix* system for editing, and then forwarded in real-time to the Studer *Digimedia* for broadcast.

Networking was also one of the highlights for **Sonic Solutions**, which announced its new Fibre Channel-based *MediaNet FC* for uninterrupted delivery of D-1 digital video and multitrack surround-sound audio. In addition, the new *SonicStudio version 5.3* includes support for four channels of 96kHz 24-bit high-density audio, an extended list of supported CD-R drives and support for the new **JL Cooper MCS 3800** motorized moving fader controller.

Another company to introduce 96kHz, 24-bit sampling was **Studio Audio & Video** for its *SADiE3* software, which also includes support of DSP plug-in architecture for both proprietary and third-party processes.

DSP plug-in support, in the form of *Firewalkers* and the *Osiris* real-time sound restoration system, was also one of the new features for the **Creamware** *CUTmaster* and *tripleDAT* systems. These now include support for Audiobahn cards, such as the *TDAT 16* PCI card for 16-channel I/O and two ADAT optical interfaces.

Other new releases of note included version 4.3 of the **Pacific Research &**

number of real-time processes.

For more information circle (225) on Free Info Card

Hard-disk recorders

Modular eight-track recorders on show included a beta version of the **DAR OMR-8** and a production model of the **Timeline MMR-8** featuring 24-bit resolution, built-in multimachine synchronizer and OMF compatibility. Meanwhile, both the **Genex 8000** eight-track recorder on show at the HHB booth and the **Akai DD8** modular dubber, demonstrated instant lock in any direction to time code or bi-phase at any speed. The DD8 can use hard disk or removable media, can be controlled via its front panel, RS-422 or the DL1500 edit controller, and is compatible with other Akai systems, such as the DD1500 editor and DR8 and DR16 recorders.

For those who need fewer tracks but more storage, version 1.1 for the **Studer D424** four-channel recorder now supports more than two hours, as well as 16-, 20- and 24-bit recording, PQ editing and transfer to CD via SCSI. Conversely, for more tracks, the **Otari RADAR version 1.4** allows two units to be connected via a single cable for 48-track operation, being controlled by a single *RE-8* remote for recording and editing.

For more information circle (226) on Free Info Card

Compact workstations and portables

A growing number of self-contained compact workstations with built-in hard drive, mixer and editing sections were on show, such as the "V-Xpanded" version of the **Roland VS-880**. Additional features of this model include an auto-mixing function, effect insertion for master output, 10 additional effects



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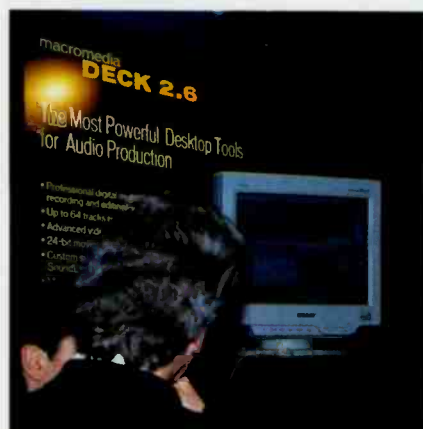
NAB 97 review

algorithms, a voice transformer and a microphone simulator.

Fostex has also added to its range of compact workstations by introducing the *D-160* 16-track and *D-90* eight-track units. Both allow simultaneous

recording up to the maximum number of channels and support backup via SCSI, DAT or ADAT.

Taking advantage of the newly launched **Digigram PCXpocket** PCM-CIA audio card (see "Pick Hits of NAB 97," *Honorable Mentions*, p. 70), the **Dalet Free Edit** laptop is designed for journalists in the field and allows recording of linear or compressed audio, cut-and-paste waveform editing and advanced processing, with transfer of



files back to the studio via modem.

Another portable on show was a production model of the **Zaxcom Deva** four-track recorder. Complete with mixing and monitoring, the battery-powered unit weighs six pounds, supports 24-bit recording and provides 2.5 hours of storage to a removable drive that can be inserted into a rack-mount version serving as a four-track source.

For more information circle (227) on Free Info Card

Cards and software

Spectral launched new versions for its *Express* and *Producer* software packages that run under Windows 95 and include device drivers for operation of the Spectral Prisma card under Windows NT. The company also launched the optional *Transfer Agent* software, supporting compression, file conversion and database insertion for direct LAN transfers to a range of on-air delivery systems.

Windows 95/NT support was also announced for the new **Antex Studio-Card** multichannel board, the new **IQS SAW Plus 32** software package, and the **Digital Audio Labs (DAL) CardD** family. DAL also demonstrated the production model of its *V8* 16-channel card with optional ADAT and DA-88 interfaces, a comprehensive synchronization interface and support for editing and DSP plug-ins. **Digigram** also presented its new *PCX11+*, an ISA bus card with balanced I/O.

Sonic Foundry announced a range of new plug-ins for *Sound Forge* version 4.0. These include the *CD Architect* for Red Book CD-Rs, the *Acoustics Modeler* for reverb, support for Mi-



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NAB 97 review

Microsoft ActiveX plug-ins including ActiveMovie, support for RealAudio 3.0 and noise-reduction and spectrum-analysis plug-ins.

On the Mac front, the **Macromedia Deck II version 2.6** supports multiprocessor platforms for increased real-time effects processing, 64-track playback, support for the Korg 1212 I/O PCI card and downloadable plug-ins from the Macromedia web site.

Macs are also supported by the **Sonic Solutions SonicStudio Engine**, an application programmer's interface for controlling SonicStudio hardware. Co-development efforts with third parties have resulted in releases, such as **Opcode Studio Vision Pro 3.5**, which adds MIDI sequencing capabilities to SonicStudio, as well as pitch processing, support for Adobe Premiere plug-ins and an integrated QuickTime movie player window.

For more information circle (228) on Free Info Card

GENERAL TRANSMISSION SITE EQUIPMENT

By Don Markley

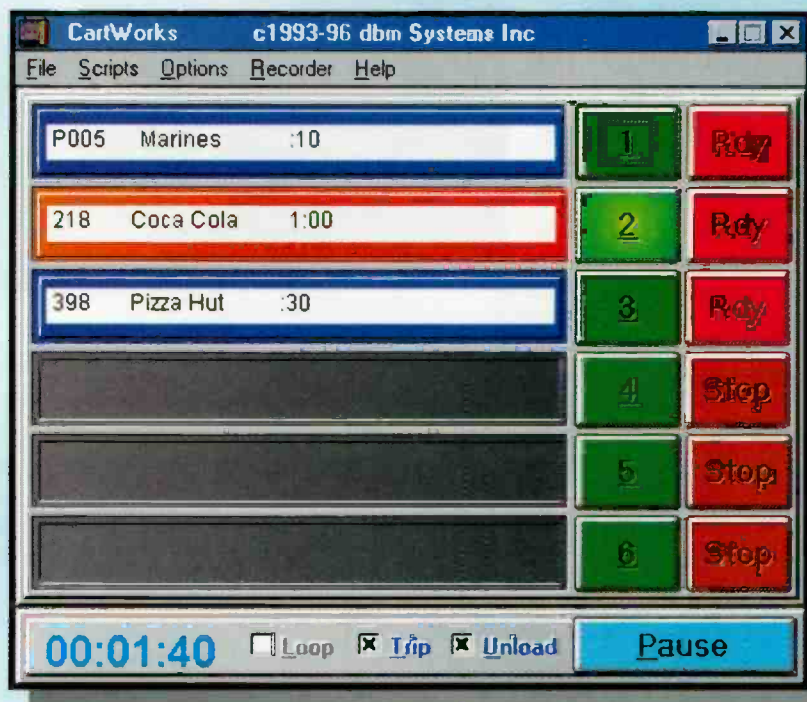
Don Markley, BE Radio's technical consultant on transmission facilities, is president of D.L. Markley & Associates, Peoria, IL.

This product area covers everything besides the broadcast transmitter and antenna, such as towers, transmission lines, power conditioning, site control, EAS and other miscellany. With a little hunting, a number of treasures were revealed in these areas at NAB 97.

Site control

Gentner was demonstrating its **GSC3000** site-control units again with some new upgrades. The controllers allow operation up to 256 sites or up to 256 functions per site. The unit can be accessed by any number of computers and terminals, and the system

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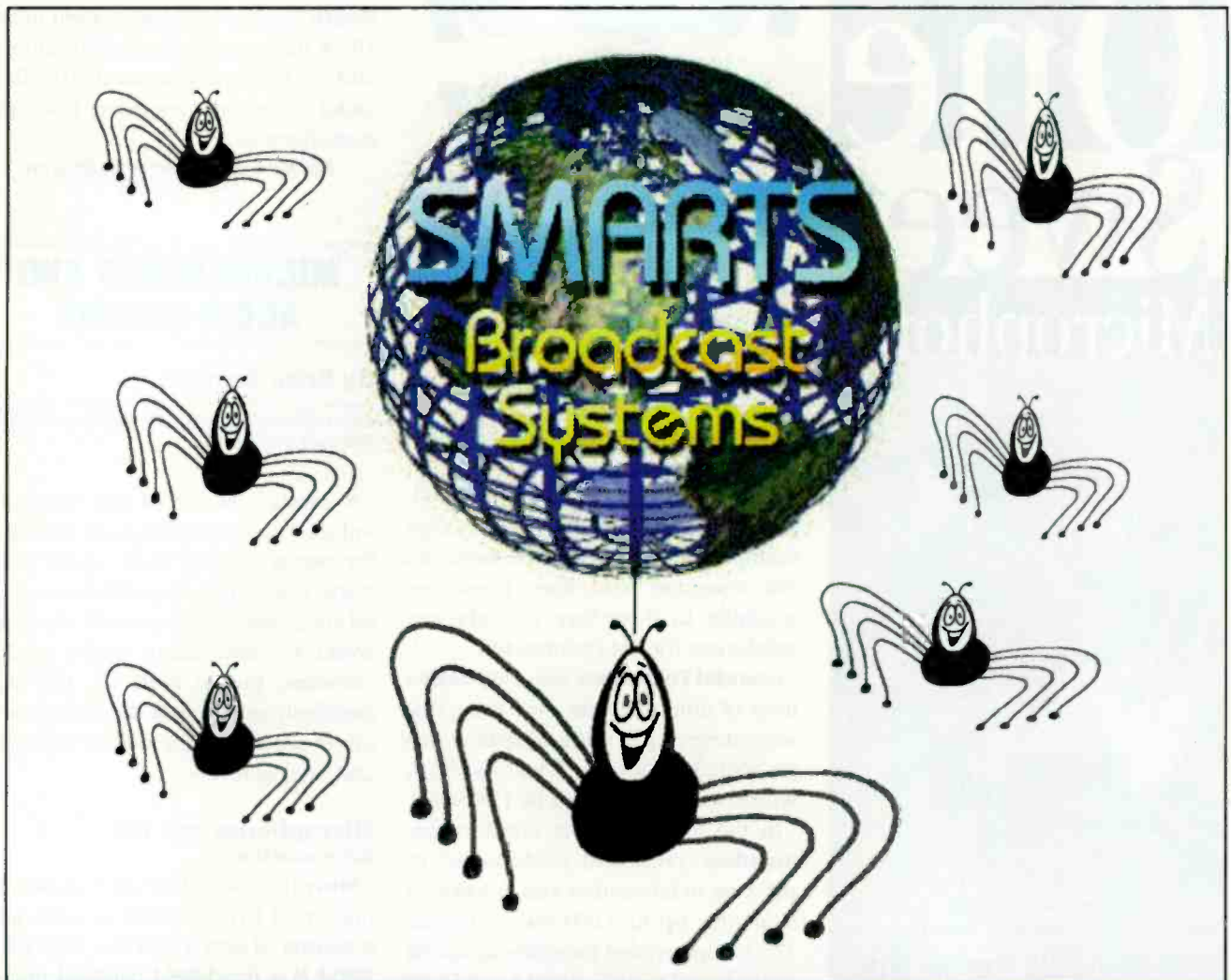
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NAB 97 review

displayed at the **Equi=Tech** booth. The company specializes in balanced power systems, and introduced this year was a range of downsized systems ideal for remote facilities or small studio/automated operations.

For more information circle (230) on Free Info Card

Towers, transmission line and accessories

New from **Myat** were power combiners. These combiners will accept multiple inputs and combine them into one common feed line. These are available in three-way to eight-way combiners for FM frequencies.

Coaxial Dynamics was showing its lines of dummy loads. One thing that was interesting at this year's show was air-cooled dummy loads up to 12.5kW, which were rated at up to 1,000MHz.

In the area of tower construction, **Stainless** presented evidence of its prowess in fabrication and erection of structures up to 2,000 feet in height. The company also provides structural analysis and modifications for existing tower owners.

For more information circle (231) on Free Info Card

Measurement and miscellany

Holiday Industries was demonstrating its standard meters, as well as its small personal meters. A new item at Holiday this year was Naptex RF-protective clothing. The manufacturer claims that this clothing will reduce exposure by up to 50dB in the range of 2MHz up to 10GHz. The company claims that this will meet ANSI C95.1 requirements in RF levels as high as 125mW/cm².

At the Antenna Concepts booth, some interesting coverage-mapping software was shown by **RadioSoft**. The company's **ComStudy V1.50** software includes calculations for shadowing and accommodates AM, FM, paging and land mobile propagations, including directional antennas.

New in the area of EAS was a receiver and indicator unit from **Gorman-**

Redlich. This low-cost system meets all of the commission's requirements and can be re-programmed in the field using software forwarded from the manufacturer.

For more information circle (232) on Free Info Card

MICROPHONES AND AUDIO MIXERS

By Brian Sanders

Brian Sanders is program director at KUNV-FM, Las Vegas.

A product sector of the broadcast industry that remains largely analog is the one where the audio signal chain starts: microphones and their associated electronics. Until recently, the same could be said about audio mixing consoles, but at NAB 97, this was decidedly in question. Numerous new mixer products were offered in digital and analog forms.

Microphones and mic accessories

Sony has added to its already diverse line-up of UHF wireless systems with a quartet of new products. The **WRT-800A** is a hand-held cardioid microphone/transmitter package with 5mW RF output and a miniature helical antenna. The **WRT-805A** is a body-pack design with 10mW of power and compatible with musical instruments, as well as lavaliers. Frequency agility is broad, with 94 channels available. On the receiver side, the **WRR-800** is a single-frequency receiver in a half-rack-space enclosure. The **WRR-801** receiver is a modular design, able to accommodate six mics simultaneously, all in a 1RU space. Both receivers and the body-pack transmitter offer multifunction displays. These products are compatible with other Sony series 800 units.

"Revolutionary" is how **Telex** describes its new UHF intercom. The **BTR-600** two-channel system goes the extra yard and provides digital encryption for ultrasecure transmissions. It was developed to eliminate wire tangle for football coaches on the sidelines without compromising game tactics.

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Now, the RS-12
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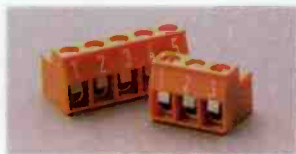
This is a great opportunity to own a Radio Systems RS-6, 12, 18 or 24 console. Today, while some console companies are just finally offering scaled-down versions of their boards for around \$10,000 - Radio Systems' most popular console, the RS-12 channel, is on sale for half that amount!

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NAB 97 review

Security-minded news crews on a breaking story could take a page out of the NFL playbook. A non-encrypting ENG version, the *BTR-500*, is also available.

EVI Audio has repackaged its popular Electro-Voice CO2 lavalier microphone as the *CO2 Pro*. Eight different cable- and mic-mounting clips are included, along with a zipper pouch. E-V's *RE500* is a new hand-held, true condenser cardioid mic with a 128dB dynamic range. Durability and handling noise issues are addressed by a patented internal shock system and the rubberized grip, factors appreciated in the live performance or ENG trenches.

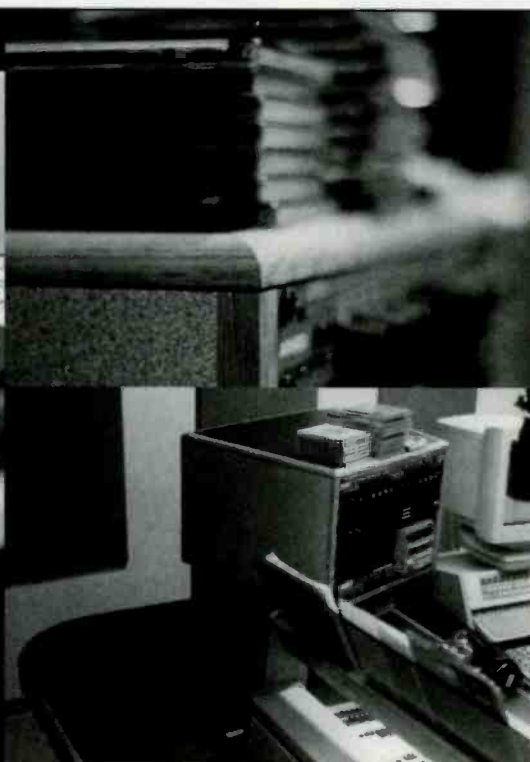
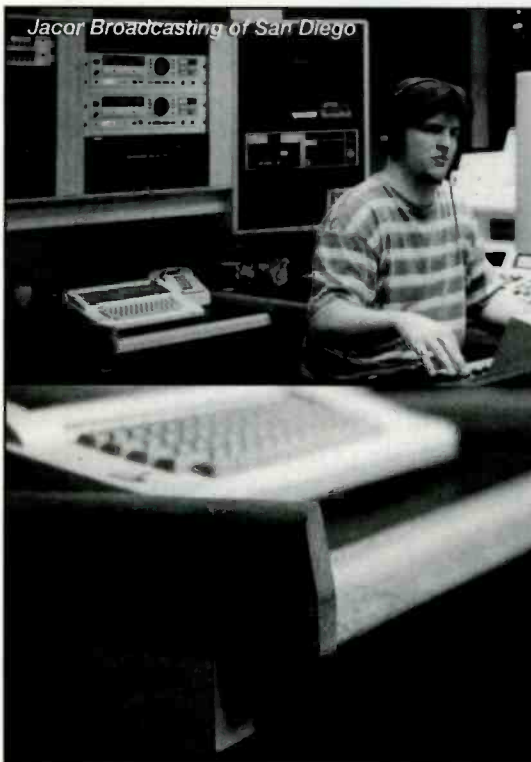
New from EVI's **Vega** division is a 16-channel, computer-controlled UHF wireless mic receiver, the *R-672*. It can



be used with any fixed-frequency UHF wireless transmitter operating with Vega's exclusive Dynex III companding. To complement the *R-672*, Vega introduced the *T-690* hand-held transmitter and *T-772* body-pack transmitter. Several mic heads are available with

the *T-690*, including Shure's SM87 supercardioid condenser and EV's N/D-857S. Both transmitters offer user-programmable channel and microphone gain controls.

Sennheiser's catalog has been enlarged by a pair of new UHF receivers.



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The screenshot displays the Maestro software interface. The main window has a menu bar with 'Workstation', 'View', 'Tools', and 'Help'. Below the menu bar, there are controls for the current track: 'BROWN EYED GIRL' by 'VAN MORRISON' with a 'Play', 'Pause', 'Stop', and 'Auto' button set. A 'Queue' table is visible below, listing tracks with their cart numbers, titles, and artists. A 'Cart Express' window is open, showing a grid of buttons for various audio sources like '70's music', 'Beats', 'KPFJ Beds', etc. An 'Audition Window' is also open, showing details for track 'M104 FALL IN LOVE', including its length, intro, and outro times, and a progress bar.

Queue	Cart#	Title	[Time: 14:20]	Artist
<input type="checkbox"/>	09:12	* Non-stop Music Kickoff *	00	
<input type="checkbox"/>	<CHW	LOOK AT ME		BRIAN
<input type="checkbox"/>	M104	FALL IN LOVE		KENNY
<input type="checkbox"/>	SW05	Yng Entry/Why U Listen?		
<input type="checkbox"/>	09:21	*** :20 Stopset ***	00	
<input type="checkbox"/>	T333	MILLER LITE		
<input type="checkbox"/>	T490	PIZZAHUT		
<input type="checkbox"/>	T004	COKE/DIET		
<input type="checkbox"/>	T317	MCDONALD'S RESTAURANT		
<input type="checkbox"/>		Dodge.dlr		
<input type="checkbox"/>	U701	Voice Track		
<input type="checkbox"/>	09:26	*** 70's Flashback ***		
<input type="checkbox"/>	J716	KHHT - Legal ID #1		
<input type="checkbox"/>	J714	KHHT - U/M		
<input type="checkbox"/>	<73F	THE LION SLEEPS TONIGH		
<input type="checkbox"/>	J960	KISS FM Jingle		
<input type="checkbox"/>	<71H	SOUL MAN		

Main Screen

The Audition Window shows details for track 'M104 FALL IN LOVE'. It includes fields for 'Description', 'Length', 'Intro', and 'Outro'. A 'Hook Line' section is also present. At the bottom, there is a progress bar with time markers: 00:00.00, 00:22.76, 00:45.52, 01:08.28, and 01:31.06.

Audition Window

Computer Concepts Corporation

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NAB 97 review

Both units offer 32 programmable frequencies and boast a signal-to-noise ratio of more than 100dB. The *EM3031-U* is a single-channel unit. The *EM3032-U* houses two receivers, plus antenna splitter in just one rack space. Sennheiser's new hand-held

transmitter will soon join the line. The *SKM30721-U* will have 50mW of RF power, frequency response of 80Hz-20,000Hz and a supercardioid condenser mic element. And the Sennheiser *Class* (400) series of dynamic mics has grown. The latest addition is the *MD425* hand-held supercardioid vocal mic. Owners of MD421s will appreciate the 425's elegant solution to a persistent problem with the older mic's design — the mount. A new elastic-suspension mount fully, but un-

obtrusively, isolates the mic from physical shocks and provides a significantly more secure lock-down. This accessory is backward-compatible with the classic and the new versions of the 421. (The latter, called the *MD421-II*, features a more rugged body made of glass-composite material, with acoustic components moved deeper inside the mic's housing, thus reducing problems due to dust and moisture.)

Prototypes of three new miniature microphones by Danish Pro Audio's **Bruel & Kjaer** were on display at the Tannoy/TGI America booth. The tiny (only 5.4mm) *DPA 4060/61/62* series comes in three sensitivity levels for applications from on-camera studio work to location special effects recording. The 4062 model will handle up to 152dB-SPL before clipping. Each mic is identical in frequency response, although spectral performance can be tailored with the use of two differently shaped "protection grids" that alter the tonal pickup. The system offers optional cable adapters to fit nine different wireless mic "standard" pin configurations. (After all, what good are standards if you can't have lots of them?)

In microphone-associated gear, **Shure Brothers** presented an interesting new product, the *DFR11EQ feedback eliminator*. At the first sign of audio feedback, the unit identifies the offending frequencies and activates one or more of its 10 adaptive notch filters in order to control the problem. Broadcasters will be especially interested in the unit's other mode of operation — a PC-programmed, one-third octave graphic EQ. Tune your studio mics or monitors with a PC interface and your settings are rendered accident- and tamper-proof.

For more information circle (233) on Free Info Card

Mixing consoles

Wheatstone's D-500 digital board has the look and feel of a traditional console, making operator transition a non-issue. First shown at NAB 96, the console is now ready for shipment. It offers four stereo output buses and large analog VU meters, but beneath the surface is formidable signal pro-

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NAB 97 review

cessing power from 40-bit floating-point DSP processors. Each input position accepts analog signals, as well as digital information, so present equipment is not rendered obsolete. A snapshot feature saves individual configurations, such as bus assigns, fader levels and user preferences. Meanwhile, Wheatstone presented its many analog console designs across a wide range of prices, including the new, low cost R-5 on-air radio board from the company's AudioArts Engineering division, plus an attractive line of stylish, custom-designed radio studio furniture.

Several other manufacturers displayed digital consoles with surprisingly reasonable price tags. The *MX/D* by **Fidelipac** is a 16-channel (eight stereo input) mixer designed in collaboration



with Graham-Patten Systems. Each interchangeable input module is either analog or digital, allowing the user to select according to need at time of purchase, then upgrade gradually. An optional outboard 4x1 mixer with built-in sample-rate converter easily accom-

modates additional inputs.

Many digital consoles physically separate the signal processor unit from the mixing control surface (which could be thought of functionally as an overgrown computer mouse). Two new products from **Logitek**, the *ROC-10*

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NAB 97 review

and the *NUMIX*, take this approach. Central to both systems is Logitek's Serial Sound digital audio engine. The rack-mount engine comes with a DSP processor module (capable of EQ, pan and profanity delay), a communications processor for machine control, a four-channel mic pre-amp section and one 8x8 I/O card available as either analog or digital. The ROC-10 is a one-piece controller with 10 faders and a traditional — almost "retro" — look, while the NUMIX control surface is made from RF-shielded ABS plastic, with a futuristic, low-profile wedge design. Both controllers feature LCD displays over the faders to show source and destination information.

Auditronics' NuStar 3000 also stands at this level. The intuitive, straight-ahead layout fits 16 faders comfortably. Eight additional universal module positions carry tradition-



al monitoring and other controls. Four large mechanical VUs share the meter bridge with a cue speaker. The mainframe processor accepts any combination of analog or digital input cards. Comprehensive fault-detection software is intended to make both operator and chief engineer comfortable. Several fail-safe modes ensure uninterrupted signal flow in near-catastrophic situations, and self-diagnostics are well thought out. Remote operation is possible via modem.

Pacific Research & Engineering demonstrated new entries in the digital and analog classes. Its *AirWave* is a medium-size (12- to 14-channel) analog board with basic features. (See "Pick Hits of NAB 97," p. 70.) Nice touches include combined control room and studio monitor module with talkback, an optional telco module, several neat things under the hood (including a snappy no-tools-required access compartment for easy maintenance) and a moderate price point. At the other end of the spectrum is the digital *Integrity*. This sleek, highly automated controller allows smooth transitions from show to show with set/save/recall

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NAB 97 review

functions, dedicated mic inputs and large LED channel-ID displays. Ten digital input channels come standard with sample-rate conversion, and all digital input channels also accept analog signals. A flat-screen display complements the package.

In the production room, **Mackie Designs** continues to advance. Preliminary information on the new *Digital 8 bus* mixer promises a console absolutely loaded with features: automation, DSP, machine controls, MIDI, built-in hard drive and modem, plus the flexibility for which Mackie is known. Pro Tools users will appreciate Mackie's new *human user interface* (HUI). Complete bidirectional interaction is possible with Pro Tools 4.0: eight motorized faders, two mic pre-amps, transport/locate functions and a large scrub wheel, plus control-room monitor operation and much more. Broadcast users can only wonder if or when Mackie will introduce a dedicated on-air console.

Ward-Beck Systems was showing its *Renaissance* consoles along with a range of other handy products. These included the ABB-1 digital audio monitor, digital and analog audio DAs, the M445 extended-range meter/monitor system and the PODS line of low-cost audio problem solvers.

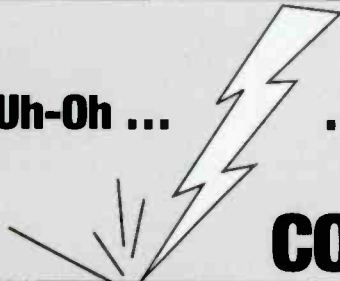
Similar to **Yamaha's** earlier *02R*, the company's newest digital production mixer is the *03D*. Although smaller than its predecessor, the 03D still has a healthy 26 inputs, including eight mic inputs, AES3 and eight-channel digital I/O with one of the optional interface cards. Though a four-bus system, there is enough built-in flexibility to adapt to many situations. The goodie list is extensive: two internal effects processors, up to 50 scene memories, motorized faders, parametric EQ and dynamic processors for each channel. Meanwhile, new version 2.0 software for the 02R offers improved automation, more digital sends, remote control and 24-bit recording. Another relatively new entry from Yamaha is the analog *MX 12/4* mixer. Designed with the musician in mind, broadcasters will also find it useful for remotes, in the edit/dubbing studio and for other basic production.

Autogram released its *Solution-20*, a clever method of accessorizing any simpler, or perhaps older, console. A 10-space rack frame holds a number of problem-solver cards, such as relays, tone generator, DAs, monitor amp or a mic processor.

Finally, a lot of heads were turned at the **Graham-Patten Systems** booth by the company's new *SoundPals* line, a series of low-cost, problem-solving modules for digital audio interface, level-control and conversion. (See "Pick Hits of NAB 97," p. 70.)

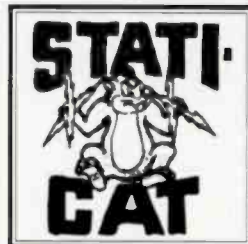
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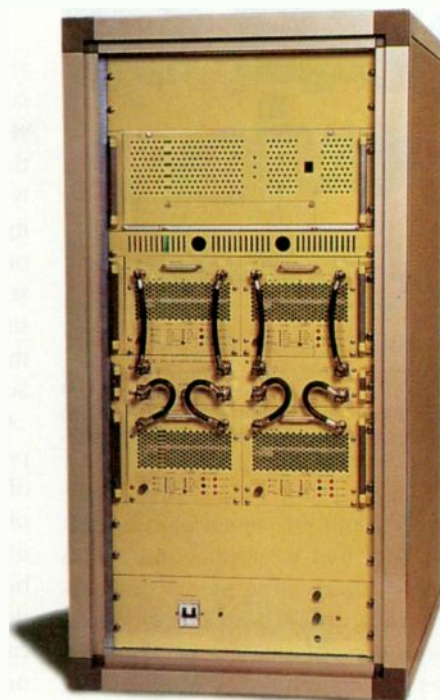
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NAB 97 review

RF TRANSMISSION

By John Battison, P.E.

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

Even though the digital glory seems to be attached to studio and audio products, there were plenty of interesting new offerings in the RF transmission category at NAB 97. Lest we forget, the radio industry still provides



programming content and wireless delivery service.

Broadcast transmitters

In the transmitter area, **Harris** was showing its new line of FM transmitters, the *Platinum Z CD series*. MTBF's of more than 250,000 hours are specified, providing solid-state reliability at tube transmitter prices. The well-known

and trusted DX line of AM transmitters continues to be offered, along with a second-generation digital FM exciter, the *DIGIT CD*. It features improved S/N and AM noise-nulling, plus the ability to sync to an external reference for on-channel booster operation. At the show, **Harris** also announced its acquisition of **Northeast Broadcast Lab**, the radio equipment dealer based in South Glen Falls, NY.

Continental Electronics defines superior AM performance with its *D* line of solid-state AM transmitters. Powers of up to 12kW are available, and in the unlikely event that a PA unit fails, it can be changed on the air or graceful degradation to a slightly lower power can be maintained. On the FM side, the new *802D* digital exciter is the heart of the new Continental FM line. At the user's option, audio input can be AES3 or analog. Subcarrier operation is also available.

Long-time transmitter manufacturer **QEI** has a frequency-agile 1kW FM transmitter tunable in 10kHz increments — solid-state throughout, of course. A composite automatic gain control system maximizes modulation to give a competitive edge.

To drive your regular transmitter or to provide a frequency-agile input to a multistation standby transmitter, try **Energy-Onix's** new *Stealth* FM exciter/transmitter series with outputs of up to 100W.

Many transmitters need tubes and **Svetlana** continues to broaden its catalogue of them. The Russian-based company also offers them at about one-third the price of some other tube makers.

Many engineers have always thought of **Crown International** as a leader in the audio amplifier field. Actually, **Crown** also has a broad interest in RF. It offers the *SpectraCast* family of hardware and software products for use in satellite operations. These include the Spectracast *DR 2000* inte-

grated receiver/decoder, the *DTMX1000* low-data-rate MPEG data transport multiplexer and the *DR 1000* integrated receiver decoder. For broadcast applications, **Crown** presented the *FM 2000A* FM amplifier package with an overall efficiency above 70%. (See "Pick Hits of NAB 97," *Honorable Mentions*, p. 70.)

OMB is a Spanish transmitter manufacturer with a U.S. subsidiary, **OMB America**, in Miami. The company makes a range of solid-state FM transmitters, and new this year was a unique 20W portable design. Its compact size, carrying case and battery operation make it ideal for emergency backup and disaster relief.

Armstrong Transmitter showed its line of cost-effective FM transmitters ranging from 1kW to 30kW. The design employs a grounded-grid, single-tube PA with a solid-state driver. A wideband quarter-wave cavity provides good AM synchronous noise performance.

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Beware, the *Predator* was the watchword at the **Broadcast Electronics** booth. This new digital FM exciter/transmitter design offers front-inserting modules, with spectrum noise eliminated or undetectable by virtue of multistage filtering. Efficiency is high and specifications are impressive.

Thomcast presented some leading-edge radio transmitters that are of greater impact outside the United States. The *Crystal* VHF and L-band DAB transmitters are designed for Eureka 147 DAB installations, while the *Skywave 2000* is an innovative digital/analog hybrid short-wave system.

Similarly, Italian transmitter-maker **Itelco** has been a pioneer in the DAB arena. The company has U.S. offices in the Denver area (serving North America) and in Miami (serving Latin America). Its L-band transmitters are already in use for Eureka 147 DAB around the world.

For more information circle (235) on Free Info Card

Broadcast antennas

At the **SWR** booth, notable items included the *FM10* and *FM20* series of high-power FM broadcast antennas. The FM 10 series is a circularly polarized design capable of 10kW per bay, while the FM20 series is a panel designed for three-around omni installation, with 20kW capacity per panel.

Jampro antennas have been around a long time. (I recall putting one up in Uganda in 1963). Pete Onnigian, the founder, initiated a line of good equipment, and the company's 1997 offerings are reminiscent of Pete's influence. A highlight is the *Penetrator* FM series, with designs that range from side-mount, to panel types, to a top-mounted spiral and FM booster versions.

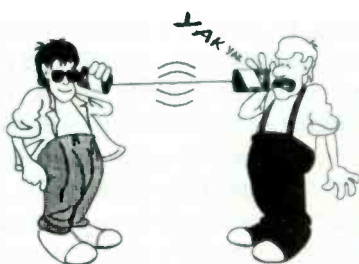
When using RF, it is often necessary to switch it. This applies particularly to AM operations. **Phasetek** of Quakertown, PA, is offering a new and long-needed *RF switching contactor* suitable for up to 50kV/90A at 1MHz. The company was also showing its well-

known DA phasing equipment and an assortment of antenna components. One of the more interesting items was a complete skirt and detuning system for monopoles.

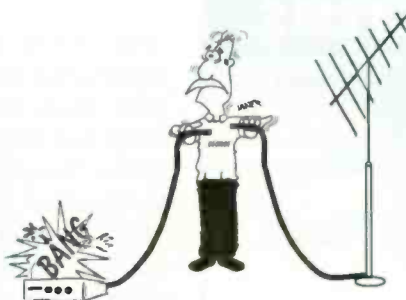
Dielectric Communications presented its unique *DCR-M Quadrapole*, a broadband FM antenna that excels in pattern performance, horizontal-to-vertical ratio and low ice sensitivity. For use with multistation combiners, the *DCR-MBR* offers the additional advantages of low weight and windloading compared to other designs, plus reduced downward radiation.

Antenna Concepts has an interesting line of FM antennas with a wide range of capabilities. Among these are the *FM Tracker*, a full-wave-spaced, circularly polarized (CP) omni design handling input powers of 1kW to 120kW, and the *Ultra Tracker*, featuring a 1/2-wave-spaced CP omni design with reduced RFR from sidelobes.

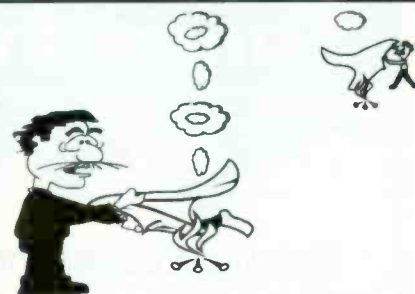
Shively Labs has introduced a wide range of FM antennas that covers the



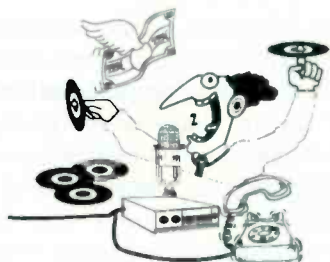
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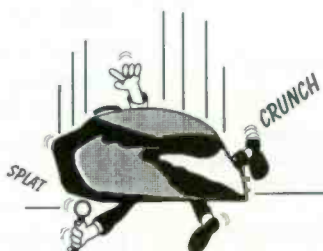
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NAB 97 review

full gamut of transmitter powers in physical size and power gain. Both side-mount and panel designs are offered, along with a comprehensive selection of RF patching hardware.

Bext has introduced a new line of low-cost FM antennas. If they are as good as the company's TV line, they should be a good buy. The wide range of products extends from simple single-polarization dipoles to heavy-duty circularly polarized antennas.

For more information circle (236) on Free Info Card

Satellite distribution and hardware

NPR Satellite Services continues to offer non-pre-emptible satellite service with rates that have not increased. Ad-hoc networks, full-time and one-time service are available on C- and Ku-band satellites.

A complete line of TWTs for both C- and Ku-band uplinks was displayed at the **Litton Electron Devices** booth.

For more information circle (237) on Free Info Card

Microwave, monitoring and subcarriers

To update an old STL, the **Energy-Onix Digital One** STL encoder and decoder provides a new, low-cost solution. It

is designed to adapt quickly and easily to an existing STL and offers quick resynchronization after outages.

My good friend Arno Meyer of **Belar** told me he has a new piece of equipment coming out later this year, but he couldn't describe it yet. All he'd say is that it is complementary to the company's existing range of monitoring equipment.

Some products that could be openly revealed were found at **SCA Data Systems**, which showed a full line of data equipment, which included high-speed FM subcarrier generators and receivers. The new **NT96R** and **NT96HD** are fully compatible with the **9600** data encoder, with speeds up to 12kb/s.

Harris debuted an exceptional, compression-free 950MHz STL, the **CD Link**. (See "Pick Hits of NAB 97," p. 70.)

Finally, **Inovonics** always has a list of interesting things for the engineer. This year, the company offered an FM subcarrier monitor/demod. It provides complete monitoring of a station's SCA operation including RDS decoding as a plug-in option. Another new product was an inexpensive RDS-encoder that enables transmission of RDS radiotext.

For more information circle (238) on Free Info Card

RADIO AUTOMATION SYSTEMS

By Yasmin Hashmi and Stella Plumbridge

Yasmin Hashmi, BE Radio's international correspondent, and Stella Plumbridge, BE Radio's European correspondent, are partners in the consultancy firm Sypha, based in London, England. They are also co-authors of "The Tapeless Audio Directory" buyers guide.

For stations looking to invest in computer-based cart replacement or automation systems, NAB 97 had plenty to offer. Items of interest were available for the first-time buyer and those looking to expand their existing investments. The most common new development was support for Windows 95 and NT, spawning buzz words, such as "drag-and-drop" and "multitasking." Voice-track recording (or "non-linear program assembly") also featured highly, whereby announcers can prerecord breaks and schedule them for automatic playback at the appropriate times.

New systems

Although the choice of systems on the market is already wide, manufacturers still maintain that there is room to offer something new, as in the case of **Sonic Solutions**, which unveiled the **Sonic On Air** family of workstations. Designed to provide a complete suite of broadcast solutions, the product range includes the **RecordCentral** unit for intake of up to four stereo feeds, a **Journalist Editor** for production of news and spots, a **Broadcast Producer** for multichannel editing with comprehensive DSP functions and the **PlayServer** for live-assist and automated playback.

ENCO Systems previewed the **DADPro32** delivery system, running under Windows NT with multitasking and support for Digigram **PCX** cards. (This is a significant departure in that ENCO has previously been exclusively DOS-based.) Designed to operate on commonly available

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NAB 97 review

PC platforms and network architecture, the system can also be used with the *DADSAT* store-and-forward management system. This allows a host site to produce scheduling, spots and IDs for multiple markets, and forward these via satellite channel to downlink sites which, if unmanned, could contain the *DADjr* limited functionality workstation for automated insertion of local content.

Pristine Systems launched its new *RapidFire* system for live-assist, automation and satellite operations. Supporting replay of three audio sources while simultaneously recording a telephone bit or time-shifting a network feed, the system includes instant triggering, auditioning while playing on-air and a range of production tools including voice-track preparation and multitrack editing.

For direct triple-deck cart machine replacement, the Harris booth featured the new rack-mountable **Arakis Digilink IV**. With control via the front panel, fader start, a proprietary button panel, a PC running Windows 95 or through the *Digilink II* and *III* systems, two units can share the same storage or up to 32 units can be connected to a central server.

For more information circle (239) on
Free Info Card

New features

Among the range of new options for the *Smartcaster* from **Smarts Broadcast Systems** was *The Spider* package for audio and data file transfer between remote local networks via the Internet. In addition, the new *SMART-Temp* option allows automatic time and/or temperature announcements referenced to the system's internal clock or temperature probe.

Voice-track support was also a feature of the new **Axel Technology Radio Light**. Designed for live-assist and automation, the system supports pre-recorded song intros and sequencing of national, local or sports news announcements.

Prophet Systems, on the other hand, concentrated on its touchscreen-compatible *Live Show Interface for Audio Wizard for Windows version 5.0*. This supports drag-and-drop of commercials and songs, up to six simultaneous stereo audio events, macro buttons for complex control functions and a quick record feature with waveform editing

Segue Editor, hot key audio and a *Real Feel VoiceTracking* feature that allows presenters to hear elements around their voice as they create a talkover.

Yet another company to feature drag-and-drop capability was **Computer Concepts**, which in addition to showing the *DCS*, launched a new traffic system called *Visual Traffic*. Designed



of telephone calls.

In fact, the telephone featured highly in one of the new modules for the **Digital Link ADAS** live-assist system. As well as a multipurpose event recorder with DTMF mailbox and voice activation, options include an MPEG editor, multichannel recorder, a news editor, two playlist generators and a file transfer module that can use various media including the Internet.

Broadcast Electronics previewed a number of software applications as part of the forthcoming *AudioVAULT version 6.5*. These included a cut-and-paste editor aimed primarily at news/talk-intensive production, a voice-track feature for playback in music playlists and a playlist creation and management module with drag-and-drop functionality.

Radio Computing Services also announced drag-and-drop log adjustment capabilities for the new Windows NT version of *Master Control*, including the ability of all studios and offices able to see log changes instantly. In addition, the new version includes a

to work with Windows 95 and NT, the graphical interface supports all traffic operations from preparation of the original contract through final payment.

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Free Info Card

News systems

Dalet announced two new applications aimed at the newsroom, namely the *Newsedit* advanced text editor that allows associated audio clips to be drag-and-dropped from the Dalet database into the text and the on-air *Newscast* application. This displays the bulletin with embedded audio icons, which can be triggered by mouse or keyboard, and allows multiple workstations to control the on-air screen so that, for example, the news director or editor can work in tandem with the newscaster to make any required modifications during the broadcast.

Along with its new *Super Duopoly* multiformat acquisition system, **MediaTouch** introduced the *I-NES* integrated news editing system. Demonstrated as part of the MediaTouch network, the Windows NT-based *I-NES*

provides news text capture, text and waveform editing, news story line-ups and a delivery screen that integrates stories, audio and bulletins.

Supporting similar features, the **Videoquip/ASC Dave-2000** includes the *Dnews* news-wire text and audio capture system and also supports editing and automation. Other new features included peak metering of digital audio, support for Windows 95 and direct import and/or conversion of .WAV files.

For more information circle (241) on Free Info Card

Music on hard disk

Now that **Rosputin** has introduced music storage on hard disk for its *Radiomation* system, the company was keen to demonstrate the reliability of its implementation. The software has been designed so that even if power is lost to the controlling computer, the music continues to play and the user interface will reset to the correct position.

A preliminary version of music on hard disk for *CartWorks* was also shown by **dbm Systems**. Planned for release in July, the new feature will be accompanied by support for MPEG Layer II compression in addition to the apt-X format currently used, and an X-Convert application, which allows conversion between apt-X and .WAV files.

Register Data Systems (RDS) demonstrated a range of new features for the *Phantom* and *PhantomLite* automation systems. These include the *Multi-Cut Carts* log feature for easy traffic handling of simple cart rotations, as well as complex day-parting and new special format clock codes with audio overlap for enhanced music-on-hard-drive operation. A new music-schedule import routine supports playlists from most major packages and, in conjunction with **TM Century** and **Halland Music**, RDS is now offering prerecorded music libraries on hard drive.

TM Century, however, continues to support music playback to air from CD. As well as providing an interface for its *Ultimate Digital Studio (UDS)* to the **Broadcast Electronics AudioVAULT**, the company now provides an

interface to **NSM CD** jukeboxes and plans to interface with the **Denon** 200 CD jukebox. The UDS also interfaces with the *Sistema Digital de Radio*, a system developed in the Dominican Republic and marketed by Teo Veras to the Spanish-speaking market.

A-Ware Software presented several new reporting features for its Windows-based music-scheduler package, *MusicMaster*. The company's *MusicMaster-Nexus Server* creates a real-time interface between the scheduler and several popular automation and traffic systems. Also new was an update on *TrafficMaster*, a traffic, billing production and copywriting software package for multistation operations.

For more information circle (242) on Free Info Card

Mergers and acquisitions

Having acquired the *DDS* live-assist system and rewritten all the code to make it "bulletproof," **Orban** launched the product under the new name of *AirTime*. Based on the QNX operating system which, according to Orban, provides far more data throughput than Windows-based systems, *AirTime* allows multiple on-air studios to use a single computer server. A variety of user interfaces are available including the *Sound Cube* cart machine emulator, the *Sound Slate* for instant access of up to 99 audio events, touchscreens, QWERTY keyboard and mouse.

New features for the **Scott Studios Scott System** include the integration of a telephone editor with the on-air system (with editing on-the-fly), and enhancements to the voice-tracking feature (with auditioning of music outros and intros while recording). **Scott Studios** also announced its acquisition of **Electric Works** (a.k.a. **The Management**), maker of the *AXS Pro* automation system. It plans to introduce compatibility between the *Scott System* and the *AXS*.

Another recent acquisition was that made by **LPB of Systemation**. New features for the *LPB Salsa* include Windows NT-based multi-user, multistation operation, support for the **Digigram XTrack** multitrack editor and support for a range of audio cards.

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Pick Hits of NAB 97

**The cream of the crop,
as our judges see it.**

By Skip Pizzi, editor



More products, more exhibitors, more space, more attendees — but this did not deter *BE Radio's* "Pick Hits" judges from completing their appointed rounds and selecting the top 10 new products of NAB 97. (For a list of judges and "Pick Hits" rules, see p. 75.) Here's what they came up with, presented in alphabetical order.

Aphex Systems FM Pro model 2020 broadcast audio processor

Aphex has taken the next step in its crusade to bring the best in analog audio processing to FM broadcasters. The FM Pro combines several of the company's past successes into a single, integrated 2RU device, then adds some newly developed features. The result is a unique, digitally controlled analog audio processor with great versatility and modular design. Controllable from its front panel

or remotely via an RS-232 link to a Windows 3.1 or 95 PC, the FM Pro includes a patented leveler, a multi-band compressor, a bass processor and a peak limiter with analog stereo I/O. Options include AES/EBU digital I/O, an innovative pre-emphasis (50 or 75 μ s)

processor and a patented stereo generator. In fact, no less than 10 patented or patent-pending circuits are contained in a fully loaded unit. The FM Pro comes with eight factory presets and 16 user-definable memory registers, which can be used to store all operating parameters of the unit. Settings can be recalled automatically for daypart processing, with up to four changes per day and each day's settings stored independently. Setting changes are password protected, and an insert point and front-panel headphone jack are provided.

For more information, circle (202) on Free Info Card





Belden Belfit and PowerBrite power cords

Belden scores with two simple, but extremely useful, AC powering ideas. The Belfit power cord provides a unique user-adjustable IEC female connector that swivels to left-angle, right-angle or straight configurations. This allows a single cord type to be used in various rack-mount or other high-density applications where rear panel space is often at a premium. Remote applications can benefit particularly from such space-efficiency with quick yet neat routing of AC power. Belfit cables are available in 7.5- or 24-foot lengths with standard NEMA 5-15P molded, grounding male plugs (or with stripped leads on the 7.5-foot cables). Meanwhile, Belden's PowerBrite cables are standard IEC power cords in a variety of neon-bright colors — pink, green, yellow or red-orange. They come with either straight or right-angle molded female connectors, and are available in shielded and unshielded versions, in lengths from one to three feet. The color makes them easy to identify and trace, even in the dark or crowded environments often encountered in the back of a rack or on remotes. Both products are UL approved with 10A ratings (unshielded PowerBrite cables are also available in 13A versions).

For more information, circle (203) on Free Info Card

Comrex HotLine POTS codec

This handy unit combines a V.34 modem with a proprietary audio data compression algorithm optimized for low bit rates, to provide up to 10kHz audio on standard analog telephone lines. The compact size and simple operation make the HotLine ideal for radio remotes, as well as permanent news, sports, weather or traffic links. Full-duplex operation is standard, allowing high-quality backhaul and talkback/cue on a single dial-up circuit. Non-technical operators will enjoy the one-button operation, auto-re-dial and auto-setup features. The codec can handle a wide variety of phone line fidelities, maintaining a connection down to 12kb/s (at which point it provides 4.5kHz audio). Full 10kHz audio requires a 33.6kb/s connection. A manual upper bandwidth limit can also be selected. One balanced XLR (mic/line) input and one unbalanced mini-jack (line) input are provided, plus a 1/4-inch headphone jack and line-level XLR output. The operator can mix local and return audio to the output, and two contact closures are also provided. One is automatically enabled upon connection, while the other is a momentary contact closure that can be fired by pressing a keypad button. A rack-mounted version is available for studio installation.

For more information, circle (204) on Free Info Card



Pick Hits of NAB 97

Genelec 1029A/1091A monitoring system

The 1029A is a small, high-performance two-way monitor speaker with built-in bi-amplification (40W + 40W) from Genelec, the legendary Finnish loudspeaker masters. The speaker is electromagnetically shielded, allowing it to be used adjacent to computer or video monitors. A pair of 1029As can provide an acoustical output of approximately 110dB-SPL at 1m distance. Excellent stereo imaging is possible with either horizontal or vertical mounting. Bass and treble tilt controls are provided on the rear panel, while volume control and a power switch are on the front. Line-level audio input is via balanced XLR or 1/4-inch phone connectors placed in a downward-facing, recessed rear panel section. This lets the speaker be flush-mounted on a wall or a table surface without connectors getting in the way. Both connectors can be active, allowing two sources to feed the speaker simultaneously. This also allows a single speaker to sum-monitor both channels of a stereo source. If the 1029A's 70Hz low-end performance is insufficient for your needs, the 1091A active subwoofer can be added, extending response to 38Hz. The system's compact nature makes it ideal for near-field monitoring in radio control rooms.

For more information, circle (205) on Free Info Card



Graham-Patten Systems SoundPals digital audio processor series

A range of specialized digital audio needs is served by this clever and cost-effective series of small boxes from Graham-Patten Systems. They include a no-frills digital 4x1 mixer (DMIX-41), a stereo digital fader (DFADE-2), 20-bit analog-to-digital and digital-to-analog converters (DAC-20 and ADC-20 respectively) and a mic pre-amp with built-in 20-bit analog-to-digital converter (DMIC-20). The units can be used in freestanding fashion or rack-mounted using optional 1RU panels. The entire line is powered by external 6V supplies. The DMIX-41 mixes up to four AES3 inputs (selectable at 20- or 24-bit resolution) at unity gain to a single AES3 output. Sampling-rate conversion is an option, and inputs can be individually muted via an RS-232 remote interface. The DFADE-2 provides individual L/R on-board gain trim and outboard full-depth fading via RS-232 (either individually or ganged stereo). The DMIC-20 includes a wide-ranging sensitivity control and phantom power feed-through. The DAC-20 includes a front-panel headphone output with volume control. All units besides the DAC-20 can be internally or externally timing-referenced.

For more information, circle (206) on Free Info Card



Harris CD Link digital STL

The CD Link breaks new ground as the first 950MHz-band digital STL that does not use perceptual coding (i.e., lossy data compression) to reduce bandwidth requirements. Instead, a sophisticated channel-coding and modulation system is employed that squeezes more bits into a given amount of RF spectrum (similar to the methods used by computer modems) that allow 28.8kb/s or more through POTS lines that once carried 2,400b/s or less). The CD Link is compatible with existing STL channels of 300kHz bandwidth or wider, providing two uncompressed digital audio channels (5Hz-15kHz ± 0.1 dB, S/N >90dB, THD $\leq 0.005\%$ @ 1kHz), plus two RS-232 data channels. One data channel can operate at up to 9,600b/s, while the other can carry 4,800b/s. Optionally, a compressed digital audio channel (12kHz audio bandwidth) or pair of channels (6kHz audio each) can be added. Main-channel input is analog stereo or AES3 (at either 32kHz or 48kHz sampling rates), with receiver output supplied as AES3 (32kHz only) and analog stereo. A composite output is available as an option. The system is cost- and space-efficient, and is designed as an easy, direct replacement for existing analog STLs.

For more information, circle (207) on Free Info Card



Henry Engineering Audio OnLine telephone information system

Designed for listener information lines, this DOS-based software/hardware package handles up to 16 phone calls and hundreds of messages simultaneously and unattended. Callers can select from a menu of available messages (that could include announcements such as weather, school closings,

concert information, sports scores, ski reports, news headlines, road conditions, contest rules, polls and so on) or each incoming line can be mapped to a single announcement or limited group of messages. A resettable call counter tracks the number of times each message is played and provides reports. Using any 486 or higher PC platform as host, the Audio OnLine system provides a special multiline modem (ISA slot) and software that can be configured for two-, four-, eight-, 12- or 16-line operation. (A 386-class computer can be used for up to four phone lines.) The computer's hard drive holds all messages recorded with μ -law encoding that allows about two minutes of audio per megabyte of disk storage. Messages can be recorded at the station or phoned in. Editing functions

allow messages to be quickly updated, deleted or saved for later, using text descriptions of messages for easy identification. Password protection prohibits unauthorized reprogramming.

For more information, circle (208) on Free Info Card

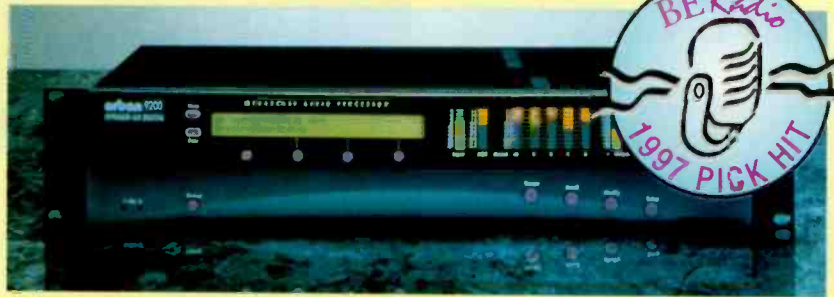


Pick Hits of NAB 97

Orban Optimod 9200 digital AM audio processor

Building on the experience gained from its digital FM processors, Orban has created its first digital processor specifically designed for AM broadcasting. The Optimod 9200 includes eight factory presets that span a range of voice and music formats, with simple adjustments available to customize and store user modifications. More advanced users can avail themselves of additional levels of control. Automatic daypart switching and Windows-based remote control are standard. Eight opto-isolated control inputs are also provided for standard remote-control interface. Although designed purely for monaural operation, an AES3 I/O module is optionally available, operating at 20-bit resolution and 32kHz, 44.1kHz or 48kHz sampling rates, using 18-bit conversion. Two independent analog outputs are provided with separate level controls (for feeding two transmitters or airchains). Other features include a five-band compressor/limiter, precise and adjustable output filtering, gated AGC, absolute peak control (<2% overshoot) and equalization/delay for receiver and transmitter/antenna system compensation. Equalization can be set differently for each output and/or switched by daypart (for day/night operations). The advantages of digital processing are also obvious in the device's cost, which is lower than comparable analog systems.

For more information, circle (209) on Free Info Card



Pacific Research & Engineering AirWave on-air broadcast console

Long known for its high-end broadcast mixers, Pacific Research & Engineering (PR&E) has moved down market without compromise in the AirWave console. Available in 12-input or 20-input mainframes, the AirWave offers modular, all-steel construction, 96-pin gold-plated Euroconnectors for module-to-motherboard mating

and sealed button switches with LEDs or long-life (100k-hour) lamps. The console's low profile allows tabletop mounting for easy installation and maintenance access. Gain trim pots and dip switches for control logic are located at the top end of each module's front surface (hidden under the hinged meter panel), making setup and reconfiguration a snap. Control logic follows A/B input selection. Five high-quality mic pre-amps with phantom power and balanced insert points are included, along with four illuminated Sifam meters and LED clock/timer display. The clock

includes a temperature-stabilized internal crystal or it can be driven by an outboard master clock system (using ESE-standard time code). One mono and two stereo output buses are provided, plus a dual seven-input remote line selector. The console is equipped with independent control room, studio and headphone monitoring, a talkback microphone and an easy-to-use telephone module.

For more information, circle (210) on Free Info Card



Sonifex Courier PCMCIA portable digital audio recorder

The industry's wait for an affordable, user-friendly and reliable non-linear field acquisition device may be over. The Courier uses standard (Type III) PCMCIA hard-disk cards to store full-fidelity audio in either 16-bit linear (.WAV) or compressed (MPEG Layer II) formats, with a capacity exceeding four hours.



Supported sampling rates include 22.05kHz, 32kHz, 44.1kHz and 48kHz. Two balanced analog mic/line inputs (with switchable phantom power, filtering, attenuation, limiting and gangable operation), two analog line outputs and an AES3 output are provided. Confidence monitoring, index marking and top/tail editing using the Courier's backlit LCD screen are offered, along with instant .WAV file upload to suitably equipped digital audio workstations. The LCD screen also displays audio levels, timing data, remaining disk space and battery condition. Later software versions will include full graphical scrub-wheel editing (non-

destructive), plus audio file transfer or real-time transmission via POTS or ISDN with memory dialing. A universal power supply/battery charger is supplied, along with a rechargeable battery that provides 90 minutes of operation. Optional four-hour batteries and car adapters for powering/recharging are available. The unit weighs about three pounds with standard battery and media.

For more information, circle (211) on Free Info Card

Honorable mentions

The judges also found the following products worthy of recognition:

- Comrex *Mix-Minus Bridge*
- Crown Broadcast *FM2000A* RF amplifier package
- Cutting Edge *Omnia.fm* audio processor
- Digigram *PCXpocket* PCMCIA audio card
- DK Audio *MSD200-SA* audio monitoring meter
- Kintronic Labs *DAC-MOD-2-12 series* programmable AM antenna system controller
- TASCAM *DA-302* Dual-Well DAT recorder

Judges

Bud Aiello
Manager, Engineering Services
National Public Radio
Washington, DC

John Battison, P.E.
Owner
Battison & Associates
Loudonville, OH

Margaret Bryant
Director of Engineering
ABC Radio Networks
Dallas, TX

Andy Laird
VP Engineering,
Radio Group
Heritage Media
Santa Clarita, CA

Don Markley
President
Markley & Associates
Peoria, IL

Chip Morgan
President
CMBE
El Dorado Hills, CA

Richard Rudman
Director of Radio Engineering,
Los Angeles
CBS Radio
Hollywood, CA

Chris Scherer
Chief Engineer
WMMS-FM
Cleveland, OH

Terry Skelton
Consultant
Doylestown, PA

Milford Smith
VP Radio Engineering
Greater Media
East Brunswick, NJ

Dave Taylor
Technical Director
KFRU/KPLA/KBXR/
KOOL
Columbia, MO

Pick Hit rules

"Pick Hits" judges operate anonymously and independently. Each year they look for new products that meet the following criteria:

1. Products must be new and not shown at a previous NAB (spring) 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 should search for equipment that will 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 involved, but some new approach or application should appear in the product's design.

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

5. The products must be available for purchase within calendar 1997. Equipment must be displayed on the NAB show floor and currently (or imminently) in production. Judges take the exhibitor's word on availability dates. Products demonstrated in private showings off the general show floor are not eligible.

TC Electronic *Finalizer*

By Steve Rowland

By now, you may have heard of the Danish company TC Electronic and its high-quality line of signal processors. TC stunned the pro audio market a couple of years ago with the release of its M5000 — a multi-effects unit that incorporates reverb and compression and is upgradable via its PCMCIA card slot. Conventional wisdom held that no device with so many functions could offer high quality. The M5000 proved that not only could high quality be achieved, but that there are many advantages to putting so many functions along one high-quality, superclean digital signal path.

In an effort to bring its products to a broader market,

Performance at a glance:

- High-end, multi-effects digital audio processor
- Includes level-control, EQ, enhancement and stereo-image processing
- Compact and cost-effective
- Friendly to a wide range of user skill levels
- Factory presets and user memory for quick recall of settings
- PCMCIA slot for upgrades and user-setting storage
- Comprehensive display features

TC Electronic has wisely chosen to break out the functions of the M5000 into two separate devices. The time-based effects (reverbs, delays, etc.) are now available in the company's M2000, while the powerful three-band compressor/limiter and mastering programs are available in a product called the *Finalizer*.

At first glance, what is so remarkable about the *Finalizer* is how much power is packed into so small a device — it takes up just one rack space and is only eight inches deep. The unit provides the functions of eight or more independent digital processing algorithms: equalization, de-essing, stereo adjust, DRG (a proprietary type of harmonic enhancement emulating tube circuitry), normalization, expansion, compression and limiting. Each of these "algorithm blocks" can be easily turned off or on, creating a variety of sound-shaping tools.

In addition, the *Finalizer* has high-quality, 20-bit A/D and D/A converters. If you don't already have decent outboard converters, you could justify much of the *Finalizer*'s cost on its converters alone.

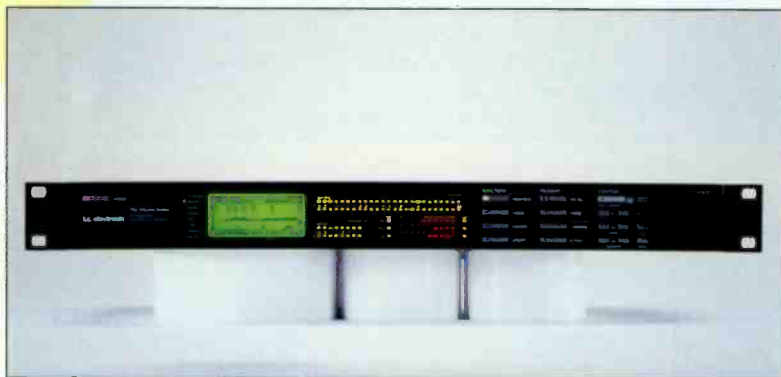
Applications

In radio production, almost anything you are working on can probably achieve an extra level of clarity or punch with the *Finalizer*. I have used it for mastering of radio documentary programs and video soundtracks, cleaning up individual voice tracks, location music recording, enhancement of archival recordings, level control and de-essing during narration recording sessions and more.

There are two basic ways to think of its function: as an overall mastering device used at the last stages of an audio project or as a series of individual tools used in the preliminary stages of any production.

As a mastering device it works smoothly, while it can add punch and sparkle to music recordings, interview programs, news spots, commercials and long-form programs. (TC Electronic has also released another product similar to the *Finalizer* called *DBMAX*, which is specifically designed for broadcast air-chain processing.)

Great value can also be gained by merely singling out one or two of the *Finalizer*'s effects and applying them



to specific elements of a mix. Individual bass or drum tracks can be compressed. Voices can be de-essed. Old recordings can be normalized and EQ'd. The EQ settings can be set to simulate notch filters and used to lessen annoying hums and buzzes. Narrations can be pre-compressed so that they punch out over background music or ambient sound beds.

Getting oriented

The *Finalizer* comes with 25 functional presets, which offer a wide range of applications. Scrolling through the list — which includes presets with names like *CD Master*, *Country Shape*, *Final Pop*, *Orchestra Compres-*

son, Commercial Speak, Stereo Enhance and Compressor — you can quickly try out a series of choices, and by quick listening comparison, find one closest to the desired effect.

In some cases, the presets will give you everything you'll need. But many users will want to make adjustments beyond the presets and the Finalizer is well-designed to make that process quick and effective.

One thing I look for in new equipment is a level of ease that allows you to explore the device in a logical and

The unit provides the functions of eight or more independent digital processing devices.

intuitive manner. Hopefully, if I'm away from the device for a while, or using another product, I'll be able to reacquaint myself with all the tools available simply by following a logical sequence of steps.

Another concern I have, as devices get smaller and smaller, is that the interface is going to disappear. Screens become too tiny to read, and buttons become too small to manipulate easily. Both of these issues are addressed well in the Finalizer. A full half of the unit's front panel is devoted to display, using LED meter bars and an LCD screen. Seven LED meters are dedicated to simultaneous, full-time display of stereo input level, stereo output level and three frequency bands of gain reduction. Meanwhile, the LCD screen is available for a number of other displays at the user's option.

If I have one minor complaint about the device, it would be to make the LCD screen even bigger and bolder. Yet, given the limited real estate available in 1RU, the Finalizer's designers have done a remarkable job of displaying lots of information in a logical and accessible form.

The LCD's *Main Page* display consists of eight sequential "blocks,"

most of which have subpages behind them. The top line of the page, which remains constant, is a list of each block in the chain, the title of the current page and a system-status overview that allows you to see quickly which devices are on or off in the processing chain.

Operating the system

Equalization is offered in five fully adjustable bands, each with independent frequency, gain and bandwidth settings. As you make adjustments, there are three ways to audibly compare your signal: the *Bypass* switch allows you to compare the unprocessed input signal with the final output, while another switch drops only the processor block currently under adjustment out of the circuit. The third method lets you bounce between the factory preset you've selected, to your modified version of it, to full-processor bypass.

In the gain-control area is a "leveling" process called *normalization*. It can be used lightly or heavily, but beware — it can wreak havoc on your dynamic range if improperly applied. Standard expansion, compression and limiting are offered as three-band processes. This allows you to individually adjust gain reduction low, mid or high frequencies independently, with adjustable crossover points between bands. If

Another nice feature is the ability to cut and paste whole parameter settings from one preset into another.

you don't care to do so, however, the default settings allow the three bands to work well together for quick gain-reduction setup.

Each section of the Finalizer is designed with two levels of adjustment: one for general users to tweak

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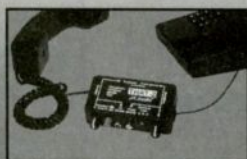


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Field Report

by ear, and another, more detailed or *Expert* level, at which each parameter can be carefully and specifically adjusted and saved.

Another nice feature is the ability to cut and paste whole parameter settings from one preset into another. For example, if you like the compression setting from the *CD Master* preset, but need the EQ setting from *Country Shape* or a saved EQ setting of your own, it is a simple matter to copy and paste the compression preset into the EQ setting, and then save the process in a new memory register.

There is also a PCMCIA slot for a memory card, so multiple users in a station environment can keep their own presets without fear of having them erased by other users. It also allows users to swap presets with other Finalizer owners.

The Finalizer's design allows users of many levels to be comfortable operating the system.

Finally, a *Tools* display provides another five LCD pages that offer less frequently needed, but still useful, operations. These include a flow meter (displaying relative operations of each independent process), a peak-hold meter, a phase meter, two digital I/O pages for status bit and copy-protection management and a 1kHz calibration tone.

Overall, TC Electronic has integrated a series of great-sounding processors into a versatile product, while also providing it with an extraordinary degree of user customization. Its design also allows operators of many skill levels to be comfortable with the system.

The Finalizer proves that it is possible to provide high quality in a multi-effects unit, and that in fact, there are advantages to such an approach — the signal stays cleaner, the effects are easier to implement and compare, and it's cheaper. This is one of those devices that makes you wonder how you ever got along without it.

Steve Rowland is an award-winning radio producer based in Philadelphia.

Editor's note: Field reports are an exclusive BE Radio feature for radio broadcasters. Each report is prepared by well-qualified staff at a radio station, production facility or consulting company.

These reports are performed by the industry, for the industry. Manufacturer's support is limited to providing loan equipment, and to aiding the author if requested.

It is the responsibility of BE Radio to publish the results of any device tested, positive or negative. No report should be considered an endorsement or disapproval by BE Radio magazine.

FOR MORE INFORMATION

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“Grand Alliance” for IBOC DAB technology

The two remaining in-band, on-channel (IBOC) DAB proponents, USA Digital Radio (USADR) and Lucent Technologies, have agreed to jointly develop technology that will create an acceptable IBOC system. The new digital audio broadcasting technology will allow AM and FM radio stations to provide higher-quality audio, along with integrated data services. (See “Editorial,” May/June 1996.)

The agreement between the companies involves patented digital audio compression technologies from Bell Labs, the research and development arm of Lucent Technologies, along with digital broadcasting technology from USADR, a partnership of Westinghouse Electric Corporation (and its wholly-owned subsidiary CBS Inc.) and Gannett Co. Inc.

The alliance is currently in the planning stage, with development expected to begin later this year. Work will take place at Lucent’s labs in New Jersey and Westinghouse’s facilities in Maryland. On-air demonstrations for AM and FM formats are planned, although no target dates for these presentations have been announced.

The systems will reportedly be designed in a flexible manner that allows eventual expansion to occupy an entire AM or FM channel, should its analog modulation ever be discontinued. In their initial forms, however, the systems will coexist with existing analog broadcasts on shared channels.

Radio equipment manufacturers ask NAB for rate relief

Some disgruntled radio equipment manufacturers are questioning the cost/benefit value of their NAB exhibition fees after the NAB 97 convention in Las Vegas. As a result, a new organization called the Radio Equipment Manufacturers Association of America (REMAA) has been formed.

During the NAB convention, some

radio/audio exhibitors expressed concern over paying the same price per square foot as the more popular television/video and multimedia exhibits. NAB’s attendee figures show that only 5% to 6% of attendees have an interest in radio/audio exhibits although all exhibitors are assessed at a single rate for space at the show. A REMAA spokesman claims this translates into a cost-per-lead-generated at the show of six to eight times that paid by TV exhibitors.

Dissatisfaction continued to grow when it was announced that for the NAB 98 convention, a proliferation of video-related businesses would be taking floor space in the Audio Hall at the Las Vegas Convention Center displacing radio/audio exhibitor space, while the radio/audio exhibitor space at the Sands Expo Center would be doubled.

For more information on REMAA, E-mail remaa@usa.net.

DBS DAB construction begins

CD Radio Inc., Washington, DC, and Space Systems/Loral, New York, have commenced construction of CD Radio’s “satellite-to-car” radio broadcast

system that will provide high-quality digital radio broadcasts to automobiles in the continental United States.

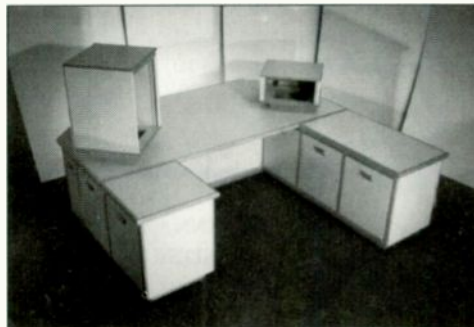
Loral is under contract with CD Radio to build two satellites for launch in 1999 with an option to build one additional satellite. Their design will be based on Space Systems/Loral’s FS-1300, a three-axis stabilized spacecraft, and will have a mission life in excess of 15 years.

CD Radio is developing the 50-channel mobile DBS digital radio service for the delivery of music and other programming to motorists throughout the United States.

RealAudio via the PC

Wavephore Inc. has agreed to license Progressive Networks’ RealAudio server and live encoder technologies for the company’s broadcast PC consumer service, WaveTop. Starting this fall, RealAudio will be integrated into WaveTop’s RadioTop broadcast, a nationwide FM-like radio station, delivered directly to the PC. It will automatically launch a user’s RealAudio player for receiving live streaming audio.

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Business/ People

BUSINESS

Harris Corporation, Quincy, IL, signed a letter of intent to acquire Northeast Broadcast Lab, Inc. a leading supplier of radio broadcast equipment and studio systems. The acquisition will become part of Harris Broadcast Division operation in Richmond, IN, and the main sales center for Northeast Broadcast will remain in South Glen Falls, NY.



Aphex Systems, Sun Valley, CA, and **AKG Acoustics-Munich**, have settled their claims against Behringer for patent infringement on the Aphex Aural exciter for approximately \$450,000.

Aphex also announced that WIQB-FM, Ann Arbor, MI, has cleaned up its fringe areas and is covering its entire listening area with a louder, more stable signal with the help of the Aphex Air Chain.

Three stations in Dayton, OH, all owned by American Radio Systems, are using a new version of a **Radio Computing Services** product called Master Control-NT, a Windows-NT version of its Master Control. RCS, based in Scarsdale, NY, claims that this site is the world's first NT-based on-air radio system.

Last year, **TC Electronic** purchased a state-of-the-art manufacturing facility and headquarters in Risskov, Denmark, and now the company's U.S. office has moved to a larger facility. TC Electronic U.S. is now located at 790-H Hampshire Ave., Westlake Village, CA 91361; 805-373-1828; fax 805-379-2648; tcus@tcelectronic.com.

HHB Communications has moved its U.S. distribution office from Portland, ME, and relocated on the West Coast. The new address is 626 Santa Monica Blvd., Suite 110, Santa Monica, CA 90401; 310-319-1111; fax 310-319-1311.

Digital Courier International (DCI) is involved in an interesting media cross-promotion between a newspaper and a radio station in Cleveland. Each weekday at about 1:00 p.m., a Cleveland advertising agency receives information on the next day's paper from the *Plain Dealer*. The agency copywriter writes two scripts, sends them to a local recording studio that produces the spots by 2:45 p.m. and feeds them via DCI to seven local stations in time for the afternoon drive.

DCI has also announced an agreement with Vyvx Advertising Distribution Services to integrate DCI's Electronic Distributor Interface with Vyvx's electronic order entry system for distribution of radio spot advertising in the United States via ISDN telephone lines.

San Diego-based **Pacific Research & Engineering** (PR&E) delivered five on-air broadcast consoles, production equipment and custom technical cabinetry to several American Radio Systems' stations in Dayton, OH.

As part of a \$1.59 million deal with Cox Radio Inc., PR&E also will design and equip new studios to house the Atlanta radio stations WSB-AM, B98.5-FM, WJZF-FM and WCNN-AM.

CNN Radio has chosen **Sonic Solutions** as a partner in a digital radio project. Under the agreement, Sonic Solutions will supply recording stations that capture incoming feeds and source material from field reporters, to be stored on hard disk; editing systems for journalists, engineers, producers and directors to edit and prepare programming; and on-air systems for direct digital feeds for broadcast.

In a separate agreement, Sonic Solutions is supplying complete digital radio production and on-air delivery systems to WQED-FM, Pittsburgh.

Belden Wire & Cable, Richmond, IN, has partnered with CBS, Inc. to become the exclusive supplier of wire and cable products for a wide range of CBS operations.

StarGuide Digital Networks, **Bloomberg L.P.** and **MUSICAM EXPRESS** have teamed up to provide real-time programming distribution to nationwide affiliates. By using MUSICAM EXPRESS' satellite uplink services, news is quickly distributed over GE Satcom C-5 to StarGuide II digital satellite receivers installed at Bloomberg's nationwide network of affiliates.

Digigram, Monbonnot, France, one of the developers of the broadcast WAVE format (BWF), has implemented the new EBU-approved standard to ensure easy exchange of sound files in

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broadcast and pro audio applications. The BWF can be used for all kinds of linear PCM coding, as well as for MPEG files, at all stages of the broadcasting chain from production to final transmission and archiving.

In other news, a North American enterprise was launched by Digigram setting up a U.S. subsidiary called Digigram Inc. in Arlington, VA.

Last May, **AccuWeather** and **Premiere Radio Networks** entered into a partnership that allowed the two companies to make forecasting and program services available to network radio affiliates on a barter basis for the first time. Since that time, AccuWeather has gained more than 100 diverse radio affiliates through the partnership.

The Emmis Broadcasting FM radio stations WQHT and WRKS, New York, became the first major-market stations to produce, process and relay all of their audio signals from CD to transmitter totally in the digital domain. Engineering plans for the all-digital audio system were developed by Philip J. Altenburg, design associate at **Northeastern Communications Concepts, Inc.**, New York.

The **Eimac Division of Communications and Power Industries Inc.** (CPI) has completed the consolidation of product lines into its ISO-9001 certified facility in San Carlos, CA. All Eimac products are now manufactured at the San Carlos operation.

Sennheiser Electronic Corporation, Old Lyme, CT, has been appointed exclusive distributor of D.A.S. Audio products for the United States. Sennheiser will warehouse, market and sell the complete line of D.A.S. loudspeakers and accessories.

Due to popular demand, **Neumann**, Old Lyme, CT, announced that a high-quality wooden jewelers box is now available for its model KM 184 or model KM 84 microphones.

New York-based architectural firms, **The Phillips Janson Group Architects P.C.** and **The Walters-Storyk Design Group**, formed a strategic affiliation aimed at providing clients

with expanded resources and acoustical-design expertise.

Wegener Corporation, Duluth, GA, received an order from Minneapolis-based Skylight Network for primary network conversion to Wegener's Digital FM2 subcarrier technology.

PEOPLE



Luis C. Endara Jr. joined Orban, San Leandro, CA, as sales manager for Latin America and the Caribbean. Based in Miami, Endara will oversee sales of all

product lines through Orban's dealer network in Latin America.

In other news from Orban, **Rick Sawyer** was appointed head of North American sales and will supervise sales of all product lines through Orban's dealer network in the United States and Canada.

Leitch has added a second regional sales manager, **Tom Christenson**, to help cover the Northeastern states. Christenson will operate from his office in the Boston area and will share the Northeast coverage with regional sales manager Bob Combs.

Criss Onan has joined Radio Computing Services, Scarsdale, NY, as Northeast marketing manager covering the New England states, in addition to New York and Ohio.

Broadcast Supply Worldwide, Tacoma, WA, named **Tim Schwieger** as president of the multimillion dollar broadcast supply company.

New web sites:

Bruel & Kjaer/T.G.I. North America
www.danishproaudio.com

ESE
www.es-e-web.com

Furman Sound
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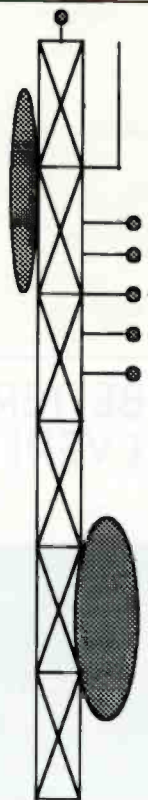
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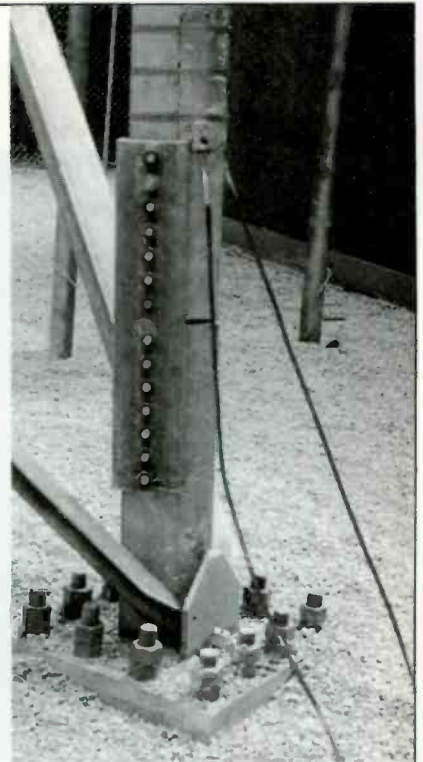
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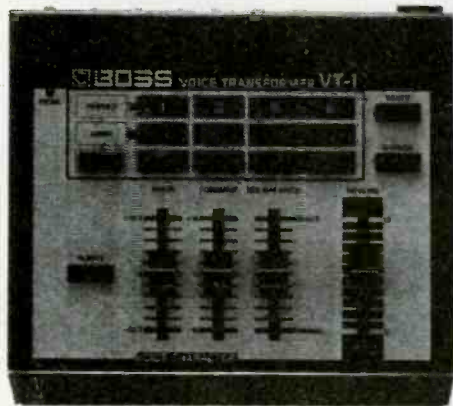
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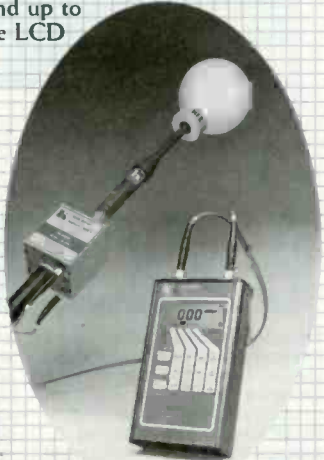
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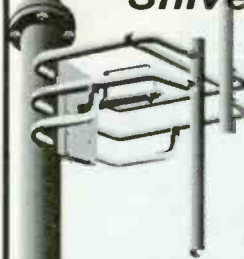


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10KW	AM	1980	Harris MW-10
50KW	AM	1978	Harris MW50C3 (1100 KHZ)
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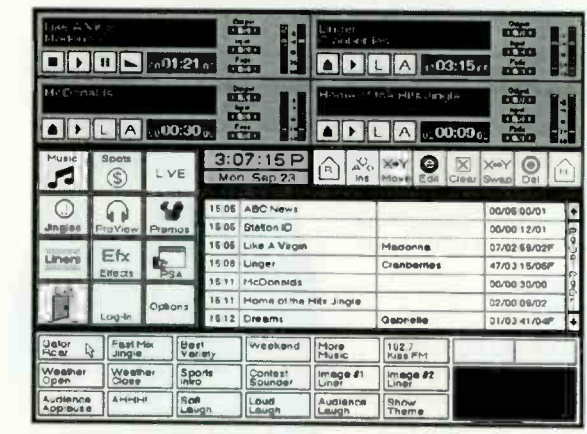
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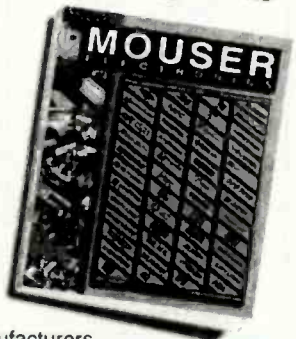
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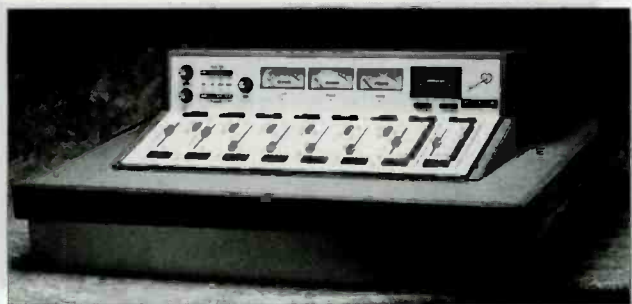


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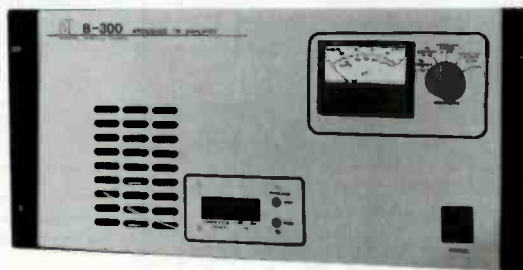
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COMING IN THE JULY/AUGUST ISSUE OF *BE RADIO*:

Cover Story: *Studio Equipment*

There is still plenty of radio broadcasting equipment that's not computer-based. Here's a comprehensive look at "dedicated" audio devices like microphones, mixers and audio recorders, and how to best interface them with computer-based systems.

Feature: *Computer-Based Audio System Profiles*

The leading computer-based on-air automation/audio delivery systems are profiled in this valuable special report.

EXTRA: *Salary Survey*

An exclusive analysis of the salaries of radio managers, engineers and contractors across the United States.

Contract Engineering: *LAN Basics, Part 1*

An experienced computer/broadcast engineer explains the basics of setting up a local area network at a radio station or production facility to interconnect computer-based administrative, audio and control functions. (Part 1 of a two-part series.)

Managing Technology: *On-line Radio Strategies*

Internet radio may become a major element in the broadcaster's array of services soon. Understanding the business side of this emerging technology is as important (and as foreign to broadcasters) as the mastery of its steep technical requirements.

RF Engineering: *Dealing with RF Interference*

One problem that never seems to go away forever is RF interference. Whether it's tracking down intermod products at a multitransmitter site or keeping high-power AM out of the FM audio chain, it's a safe bet that it will strike unexpectedly, and you'll be expected to solve it immediately. Our resident RF radiation consultant presents some advice.

Also in AUGUST: *BE Radio's Product Source Tabloid*

Our second annual compilation of the top radio products on the market today.

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The viability of webcasting

By Skip Pizzi, editor

There's no doubt that the technological horizon for radio broadcasters is currently occupied (if not fully occluded) by the concept of streaming audio on the World Wide Web (WWW) — otherwise known as Internet audio or simply on-line audio.

The technology is fairly new, and is the result of two major, ongoing developments. The first involves a subject fairly familiar to radio broadcasters: digital audio data compression. The extremes of this technology are applied to on-line audio, allowing audio transmission of marginal to reasonable fidelity at extremely low bit rates. The second fundamental ingredient is the streaming algorithm itself, a system that literally redefines Internet operations by allowing a packet-switched network to be used for what appears to be continuous, real-time audio playback.

Current roadblocks

For on-line audio to be truly successful, however, a number of other obstacles still need to be conquered. The first is audio quality. For real-time listening, fidelity has only recently approached a level that exceeds AM radio quality. This is probably adequate for news and other voice programming, but certainly not yet good enough for music listening.

Next is the issue of reliability. Internet audio operates on a principle known as "best efforts" delivery. In telco parlance, this means there is no guarantee that service will always be the way you'd like it. That's what happens when you reverse-engineer a packet-switched network to deliver real-time audio — something it was never intended to do.

Then there's the issue of cost, particularly to the content provider (i.e., the "webcaster" or on-line radio station). It's generally accepted that each web listener pays a nominal charge for his/her own Internet connectivity, on either a flat-fee or time-block basis. But at the "station" end, the connectivity is treated as an aggregate of multiple users, with each one of these listeners connected to a webcasting server *individually* (even if they are all listening to the same real-time "broadcast" stream of on-line audio). Again, the issue of the Internet's original intent comes up. The structure was intended to be point-to-point — or later, multipoint-to-multipoint (such as in the "chat" model) — but never point-to-multipoint, as in broadcasting.

This means that the webcaster has to pay up front for

the server capacity to feed a reasonably large number of simultaneous users, and then pay for Internet connectivity to serve all these listeners via separate, individual connections. Under this regime, even a large-scale webcaster can only feed a few hundred listeners simultaneously before maxing out the capacity of even an expensive server. Moreover, add to this the cost of supporting each of these listeners with discrete Internet access from the server, at something like \$15 per listener per month. This is hardly a viable operating condition when viewed through the lens of traditional broadcast economics. Such limitations are particularly frustrating when the potential service area is literally worldwide.

Finally there's the matter of accessibility and portability. Right now, the only way to listen to a webcast is at a computer. This certainly doesn't match conventional radio's convenience or receiver cost.


Potential solutions

By today's reckoning, however, each of these problems is solvable. Audio-coding algorithms continue to improve, providing increasing fidelity at decreasing bandwidths. Reliability is also improving, with future network architectures aiming for a more guaranteed level of performance along with wider bandwidths and lower connection costs.

Perhaps most interesting at present is the technology known as *IP Multicast*, which would allow a webcaster to feed a single server output over a single Internet connection to the network backbone, after which the network routers will "replicate" the webcast signal to any listener that calls for it. This would drastically reduce the cost to the webcaster, and substantially alter the economics of on-line broadcasting.

The matters of cost and convenience in receivers will likely be the last to be solved, since they involve new hardware development and the availability of cheap *wireless* Internet access.

Yet the pace of change in the on-line world could allow all of these hurdles to be cleared within the next two to three years, in some observers' views.

Whether or how (programmatically) today's radio broadcasters should use the web for audio distribution is an altogether separate question. Regardless of its answer, however, on-line technology continues to move toward the establishment of a structure that will lend itself more aptly to an interactive broadcast delivery model. 



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