

Sony Digital Gear Targeted to Radio

by Frank Beacham

NEW YORK Seeing an all-digital future for radio broadcasting, Sony Corp. has announced a major new lineup of digital audio equipment especially designed for radio stations.

At the debut news conference at its new New York City headquarters, Sony introduced a digital broadcast console, MiniDisc cart machines, compact disc players and changers, and the DATStation, a DAT field editing system built into a laptop computer.

The DMX-B4000 digital broadcast console is designed to be the heart of a digital radio station. It is based upon Sony's proprietary digital signal processing technology that delivers 32-bit processing accuracy with 24-bit AES/EBU I/O for high quality audio across multiple generations.

Available in 8-channel and 16-channel configurations, the board introduces a new style of broadcast mixing in which most operations are fully automated, integrated and centrally controlled via a graphical, touch-screen interface. For example, the on-air hierarchy of operation is programmable from the touch-screen, removing redundancies and allowing both easy access and the ability to define and change console settings.

Other automated functions include routing, programmable presets for news applications, a 3.5-inch floppy disk drive for storing console setting snapshots and a lock-out function. The console can accept up to 30 stereo sources and can control multiple devices from the integrated control surface. All phases of audio production, from equalization to filtering, are man-

aged through the routing switcher. Available this fall, the basic console is priced at \$45,000.

Sony also adapted its consumer MiniDisc technology to a broadcast cart machine, which is slated for fall delivery. The PMD-C1P player, priced at \$2,200, and the PMD-C1 recorder/player, at \$3,000, are designed to replace analog NAB cart machines, according to the company. The MiniDisc allows the recording and random access playback of 74 minutes of "near-CD" quality audio on a 2.5-inch rewritable optical disc. Disc start-up time is 50 milliseconds.

Because of the data reduction scheme used by MiniDisc, Sony executives emphasized the new cart is designed only for on-air playback of pre-produced audio material. It is not designed, they said, for use in post-production applications where multiple generations are required.

Sony also introduced the dual-deck PCM-E7700 DATStation transportable digital audio editing system. The field editor, which resembles a laptop computer, offers real time digital jog, all-digital

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High-Quality AM On A Budget

by John Gatski

WASHINGTON Even with all the publicity about the high-performance AMAX

standard, few high-quality AM radios are being manufactured at any price. In the \$50 price range, such a product would be fantasy—except for the GE SUPERADIO III.

The large portable radio does not quite meet the NRSC's AMAX AM tuner standard (it only lacks the prerequisite AM noise blanking) and is mono, but the SUPERADIO III offers good wideband AM and FM performance for the money.

In appearance, it is a throwback to the larger portable mono radios of the 1970s, but with some modern features. Now in its third model design, the six-pound unit is somewhat abundant in plastic, but is equipped with goodies that may be appetizing to radio engineers on a budget. Features include six-inch woofer, two-inch tweeter, analog tuning with log scale, expanded AM band, separate bass and treble controls, headphone jack, external AM and FM antenna connections, AM wide/normal switch and a switchable AFC switch.

There is a top-mounted telescoping FM antenna that can be replaced easily by removing a set screw if it is broken (or accidentally twisted in the shape of a pretzel by your toddler). Inside, the GE unit (actually made by Thomson at a factory in Hong Kong) there is a somewhat longer than normal, eight-inch ferrite rod for AM reception.

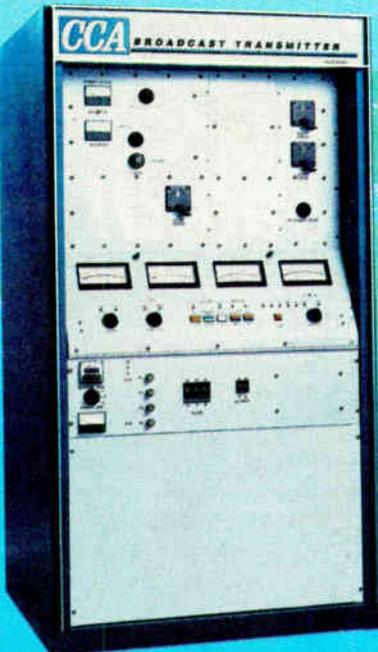
The circuit board includes a ceramic IF filter and three IF tuned FM circuits, four IF tuned AM circuits, and varactor tuning diodes.

The unit will operate on six "D" batteries or on AC via a built-in cord. In the

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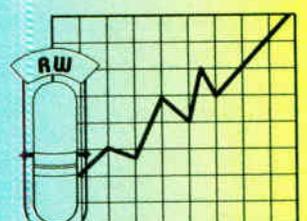
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NEWSWATCH

NAB, EIA May Agree On DAB Testing Plans

WASHINGTON At press time, the Electronic Industries Association (EIA) and the NAB appeared ready to strike a bargain on digital audio broadcast systems testing.

NAB Senior Vice President of Science and Technology Michael Rau confirmed there is a proposal that would allow the National Radio Systems Committee (NRSC) to select the in-band DAB standard, but let the EIA test in-band and other proposals including satellite and out-of-band. A meeting was scheduled

for March 8 to discuss the proposal.

EIA had wanted to begin testing all DAB systems by July, and select a standard by the end of 1993 or early 1994. The NAB, however, wanted only in-band systems tested, such as USA Digital's Project Acorn, and pushed for NRSC testing of such systems.

If the compromise is approved, the NAB will contribute toward the costs of testing the in-band systems.

Video Game Maker May Save Radio Giga

TOKYO Nintendo may invest in the financially-ailing Satellite Digital Audio

Broadcasting Co., also called Radio Giga. Radio Giga was created in 1991, becoming Japan's first digital satellite audio service. It has, however, incurred massive debt in its two years of operation.

NAB Set to Display Special Technologies

LAS VEGAS Special technology exhibits will be displayed at the 1993 NAB Convention, April 18-22.

Exhibits will include RDS, data broadcasting, new EBS technology, television data systems, (TVDS), and television ghost cancelling.

Companies planning to display at the RDS exhibit include: RE America, VG Electronics, Rohde and Schwartz, Access USA, Gemstar Development,

TELI and Coupon Radio.

Rid Dial Of Dark Stations

WASHINGTON The NAB wants the FCC to delete FM licenses that have been off the air for more than six months as a way to reduce "the number of surplus radio stations."

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Radio Has 'Amazing' Specs

by Leonard Feldman

GREAT NECK, N.Y. If anyone told you that you could buy an AM/FM radio in which the AM performance came close to "AMAX" quality (at least insofar as audio frequency response was concerned) for around fifty dollars, you'd probably dismiss the statement out-of-hand.

Well, that's exactly what the GE division of Thomson Consumer Electronics has come up with in their "SUPERADIO III." Although the mono-only radio performed

their "flat" or mid-positions.

Low frequency response extended down to 40 Hz for the same -6 dB roll-off. While one of the design engineers at Thomson told us that FM frequency response in the "normal" or narrow-band mode was guaranteed to be at least 2.3 kHz, our sample did much better than that, with response extending to nearly 6 kHz.

Initially, we had hoped to be able to measure these and other parameters via the headphone jack.

Measurement of the response at that point quickly dissuaded us from the course and the best results were obtained by opening the set and accessing the wires leading to the speaker leads. Even when the volume control is set at its maximum (to avoid any loudness control compensation), extra bass boost has been added to the phone jack output.

We wanted to determine the true level of harmonic distortion generated by this set for a nominal 30 percent modulated signal.

To do so in the conventional manner would have yielded a curve (or a single number) that actually consisted of distortion *plus noise*. To avoid that, we used the Fast Fourier Transform (FFT) capabilities of our Audio Precision Test System to run a spectrum analysis that showed only the discrete components generated by the system rather than the random residual noise.

The fundamental 1 kHz modulating output is "nulled out" and the only other

major harmonic component is seen at 2 kHz, at a level of around -34 dB relative to the 30 percent modulation gone. That corresponds to an actual harmonic distortion level of roughly 2 percent—not bad for a small portable radio.

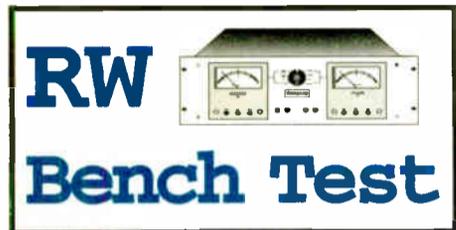
Other measurements we made on this sample included AM sensitivity, which ranged from approximately 125 microvolts

In logging AM stations we deliberately used only the built-in AM ferrite rod antenna, the way we presume most owners of this type of set would use it. Obviously, if we had connected a good, long-lead outdoor antenna to the AM antenna terminal and a suitable grounding wire to the grounding terminal our result would have been even better in terms of long distance reception.

Nevertheless, even with the built-in antenna, and using the "normal" bandwidth, we were able to receive 26 acceptable noise-free AM signals. Amazingly, that's exactly the number of stations we were able to log when we tested the Denon "Super Tuner" a couple of months ago. Consider the fact, that the Denon tuner costs more than ten times the price of this little GE radio.

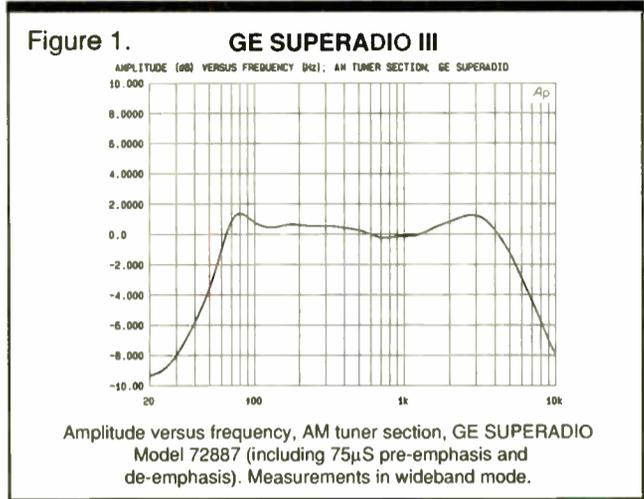
We are not suggesting that this radio is the equal of the more expensive Denon Super Tuner.

What we are saying is that the engineers at Thomson have demonstrated that a decently performing AM/FM radio need not cost hundreds and hundreds of dollars to provide more than adequate AM fidelity, sensitivity, selectivity, and image rejection.

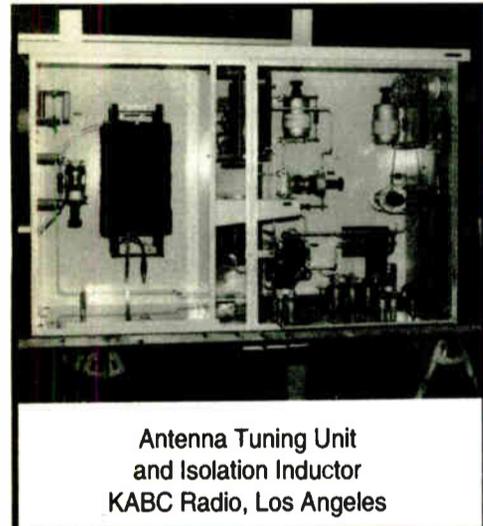


well enough in the FM mode, it was the AM performance that surprised us. So our bench tests were confined to AM.

Having first listened to the AM section of this remarkable radio, our chief interest was to determine its frequency response capability in the wideband position, where we audibly detected response far better than what we have become accustomed to. Sure enough, as shown in Fig. 1, the -6 dB point at the treble end of the spectrum was reached at a frequency of around 9 kHz! Mind you, this response was achieved with the tone controls at or near



per meter to 150 microvolts per meter, depending upon the incoming RF frequency. Selectivity, in the normal mode, for adjacent channels measured 38 dB, while for alternate channels (two channels removed) it measured just over 65 dB. Image rejection ranged from 65 dB to 78 dB, with best rejection observed at the low end of the frequency dial as might be expected.



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It Was a Dark and Stormy Afternoon . . .

Local wisdom has it that Washington is no place to be in August. I can tell you Washington in March isn't so great either. Forget the snow-turned-into-ice storms, the murder capital of the U.S. moniker, or the Beltway horror stories. As I write this, my first column as editor of **RW**, torrential rains are pummeling our building so hard that water is pouring into the editorial offices and I've been warned by the building super to keep my feet off the PC-table legs so as to not risk electrocution.

The flood came amidst construction being done in our offices, and right in the middle of producing the NAB preview issue. So while men in overalls were tearing down walls and re-erecting them down the hall, and editors were running around stealing trash cans from each other to contain yet another water leak, your dedicated crew was busily putting together the largest **RW** ever.

Talk about trial by fire. All 120 pages of this issue are packed with new product information, the engineering primer for management and *Running Radio*, *Buyers Guide* on automation equipment and software (a category that has exploded over the last year), and our usual first-rate news reporting and practical, informative features. And *Page Four*.

Readers of **RW** know that the Earwaves page has traditionally served as a sort of Editor's notebook. When Alex left last month, I assumed the title and inherited the page as well.

What you can expect from me on *Page Four* is not so different from what my predecessors offered—commentary you won't find elsewhere in the paper and a view of the news distilled through my take on the industry.

From my water-logged seat on the sidelines, Radio's Big Picture is considerably brighter these days. Leaf through this issue. It is packed full of ads from companies introducing products to serve you. They must believe that better days are ahead.

Read the front page. Frank Beacham's

Sony equipment announcement story shows that the electronics giant has enough faith in the radio industry's future to introduce what could be the heart of the radio station of the future; an all-digital board designed specifically for radio, the DMX-B4000 digital broadcasting console. Sony also introduced a whole line of digital products to go with it: MiniDisc cart machines, new compact players and changers and the DATStation™, a DAT field editing system built into a laptop computer. They aren't testing the waters, they are jumping in with both feet.

Look over our NAB preview section. The NAB expects a record turnout this year, including a record number of international broadcasters.



Which brings up another important convention-related matter. During the fall Radio Show, a group of fitness fanatics played a 7 a.m., three-on-three game of basketball on the rooftop court of the New Orleans Hilton. The "Dream Team" consisted of the distributors versus the manufacturers. Broadcast Supply West, Broadcasters General Store and Harris Allied teamed up against 360 Systems and Cutting Edge Technologies.

The game was so much fun that the "Dream Team" game has become a trade show ritual. Sean Bowers of BSW tells me that "Dream Team" II is scheduled for 6 a.m. on Thursday, April 22. Sean made arrangements for the game to be held at the Las Vegas Sporting House at 3025 Industrial Ave., just west of the

Stardust Hotel.

Five out of six of last year's players are confirmed for the rematch as of this writing, but Sean stressed that the game is open to all. The gym will charge a one-time \$15 fee per player but that will entitle you to use of all the club facilities.

I hope to see you there (I'll be on the sidelines with the camera).

While I'm on the subject of Vegas, **RW** News Editor John Gatski and I have a list of Las Vegas Dos and Don'ts. By no means complete, the list is a small sample of the tricks we've picked up from years of covering the NAB spring show. Here goes:

Do pack your Reeboks with your Armani suit and leave your Cole Hahns at home. Do pack your rolls of quarters, but don't bring the family bankroll. If this is your first trip to Vegas, don't let the McCarran Field slot machines grab you as you disembark. There are plenty more of those one-armed bandits lurking around every corner of the city.

Do make sure that you sample the food at the Alpine Inn across the way from the convention center, but don't eat at the hot dog stands on the exhibit floor. And, while we're still on food, check out the \$3 breakfast buffet at Circus Circus. Those long lines move very quickly.

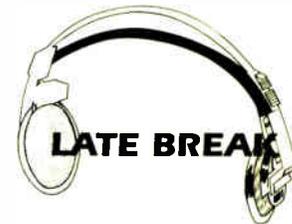
Do check out the exotic birds at the Tropicana Hotel and the tigers at the Mirage. But don't go near the shark tank at the Mirage; those aquatic predators can scare the heck out of you.

Transportation-wise, don't ride the Caesar's Palace tram unless you feel like getting lots of exercise finding your way back. If you do work up a huge appetite from walking, order a sundae at the Pepper Mill—you won't need to eat again for a week.

Do stop by the **RW** booth on the exhibit floor and tell Steve Dana what a great job we are doing. And whatever you do, don't lose your NAB badge. Doing so will relegate you to non-person status and you'll have to pay for a new one.

If the Las Vegas fever grips you and you decide to get married, avoid the long lines at the Court House for licenses—go after dark, they are open until midnight.

And finally, don't book a "red-eye" flight back home because we (the **RW** staff) will be stretched out on all the airplane seats comfortably settled in for the night.



Tore Nordahl has joined Media Touch Systems Inc. as president. MTS Chairman, John Connell, said the computer automation and technology company hired the digital audio veteran to help "revitalize" the company and "strengthen the sales, marketing and customer support areas."

Nordahl joins MTS after a successful career in the professional audio industry, most recently as president of U.S. operations for Studer Revox. Prior to that Nordahl was president of Neve North America and subsequently, of the Mitsubishi Pro Audio Group.

David Roudebush, formerly corporate marketing manager for AKG Acoustics Inc., has formed Strategic Marketing Partners Inc., an independent firm specializing in the marketing of technology-based products.

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The Early Days of FM

Dear RW, I have read with great interest the article by Mr. Howard L. Enstrom ("Low Power Translators, Then and Now," RW Jan. 20, 1993). However, I question the accuracy of his statement that the FCC moved the FM band from 45 MHz to the present band in 1950s.

Writing in his book, "Man of High Fidelity," Lawrence Lessing states otherwise.

The Broadcasting Yearbook shows that in May, 1947, I was manager-chief engineer of KMUS, Muskogee, Oklahoma. I installed this FM station on this date with only 10 (actual count) listeners to our FM station in a city of 40,000 people.

We realized our problem immediately and purchased 20,000 Pilot FM tuners and sold them at cost. Just imagine the problem of trying to sell advertising with these few listeners.

Thank you for your interesting and informative news magazine. I do appreciate it. I served 46 years as manager-chief engineer of AM-FM stations.

Duane Hoisington, Florence, AL

More On Power Supply Failures

Dear RW, Congratulations on your continued success and surviving other technical publications in the broadcasting and audio fields. Now I can spend more time scrutinizing your columnists. To that end I have comments about John Bisset's Workbench of Feb. 10, 1993.

In it he shows a quick fix to Scientific Atlanta DAT-32 satellite receiver power supply failure. It is quite clever. However there are several caveats to be noted.

First, if the receiver frame is heavily loaded, i.e. there are several of the new SEDAT audio cards in it, you may be beyond the capacity of the remaining power supply. At best it will not work. At worst you chance overtaxing the remain-

ing supply and killing it too!

Second, don't try it on any other piece of equipment unless you know that the voltage test jacks go directly to the supply rails. A properly designed test jack has protective isolation resistors in series to prevent the sampler from shorting the supply. At best it won't work. At worst you will cook the resistors.

Third, many power supplies do not like to have a voltage applied to their outputs when shut off. At best you might overload the good supply by back driving the bad supply. At worst you could destroy the downed power supply with reverse current flow.

Fourth, when one supply fails the other is not far behind. You should repair not only the downed supply but also rehab the other unit too. Most of the power supply failures in the SA receivers, that I've encountered, are due to leaky electrolytics in the bipolar open frame 15V supply. They can be quickly and easily replaced with off the shelf capacitors from your neighborhood hobbyist electronics emporium (Radio Shack).

The repair is not expensive and will save you a more costly repair down the road. I have "rebuilt" over a dozen of them.

RF interference to telephone lines in the vicinity of transmitting antennas can be alleviated with the addition of a good modular phone line filter such as the AT&T Z-100A. I've used it at radio stations and at neighbors' homes with plain old fashioned telephones and fancy electronic single line phones. It works better, in most cases, than the old fashioned RF suppressor caps wired into the phone itself.

Ira Wilner Putney, VT

Fighting the stereotype

Dear RW, The other day I received a brochure for what seems to be a nifty new remote product that ordinarily I would have perused and filed in the "wish" file. However, the front cover caught my eye, and got my goat just a little.

You see, on the cover of this brochure are two pictures, supposedly a before-and-after comparison, with one on the left showing two men standing on an untidy pile of RPU equipment and cables. The man on the left is shown wearing a baseball cap, a worn jacket and workpants, and a T-shirt with some raunchy bar-room saying on it covering a noticeable beer gut ("the engineer"). Next to this gentleman is a man ("the talent") dressed in neatly pressed pants and a dress shirt and tie, holding a microphone. They both have rather disgusted looks on their faces, but the "engineer" has a grotesque snarl. The picture on the right shows the same talent in a nice suit, smiling, with the touted remote product over his shoulder. In the copy inside, the third sentence says, "...Old remote systems require an engineer to handle the heavy equipment..."

I take offense to this primarily because as a broadcast engineer, I consider myself a professional. Such a brochure indicates to upper management that broadcast engineers are a bunch of slobs who do little else than tangle up cords at remotes. The

Better Times Beckon to NAB '93

Early economic indicators for the industry continue to gather upward momentum. Recent figures released by the Radio Advertising Bureau reveal a combined (local and national) increase in revenue of 5 percent for the first month of 1993 over January of last year.

In April, the National Association of Broadcasters annual convention (NAB '93) will be held in Las Vegas. It's important for everyone in the industry to make the effort to attend the convention and exhibition.

Stations looking to exploit the upsurge in business while remaining financially competitive will have a large number of product introductions to choose from—particularly in the areas of automation software and digital products. The program also is packed with sessions geared towards enhancing operations and generating more revenue. Creative owners that can combine technological enhancements with management skills to run lean, profitable operations will be poised to gain the greatest benefits of all.

From the standpoint of equipment manufacturers, the large number of product introductions underpins the optimism they feel about the future of the business. But beyond the expected product enhancements, this year's exhibit hall will feature entire new product lines designed for radio station use. Some of these new products will come from companies that had never (or only peripherally) served the industry before.

The high-tech parade of equipment innovations is a classic signature of a healthy NAB convention. But NAB '93 also is a place to sharpen one's skills in the other areas of running radio. From the engineering sessions to the management presentations, to the legal forums, to the sessions on opportunities in overseas broadcasting (and the chance to meet and exchange information with international broadcasters), the annual gathering offers something to enhance the performance of anyone working in radio today.

A better business climate, education, new technology, networking opportunities, the chance to do business—individually these are all good reasons to attend NAB '93. Make sure you attend the show to reap the gains.

—RW

reality is that at 90 percent of the stations out there, either a producer, an intern, or the talent sets up and runs the remote. If the station still has a full-time engineer, he is busy and much too valuable to be out on a remote handing out bumper stickers.

Most of the engineers out there, for you management types who actually believe the message that brochure is sending, are not just repairing the equipment, but are doing things like repairing the photocopier, unjamming the laser printer, moving telephones, making the phone system work, repairing plumbing in an emergency, looking after the air-conditioning, making the computers and LAN work, and all the time thinking of better ways to do things with less time and money.

Thanks to the attitude that this brochure is helping to perpetuate, more and more broadcast engineers are being eliminated from the station staff. Some continue to work as consultants, but they also find work elsewhere. After all, what company would not want someone on staff who can keep the office electronics working efficiently and who can solve logistical problems? And if that company business is in electronics to begin with, the former broadcast engineer's previous experience designing and fixing things is icing on the cake.

I was one of those engineers who was laid off from a major market "legendary" station, and fortunately I found another job at a competing station. But with the coming of duopolies and "downsizing," I really don't know my future. And stereotypes like the one presented in this ad are not going to help me, or any other broadcast engineer. We are trying to change with the times. We would appreciate it if equipment manufacturers would at least meet us half-way by not perpetuating these negative, outdated stereotypes. Who knows—we might actually buy the product!

John Landry WHDH(AM) Boston, Mass.

ISO Clarified

Dear RW, I'm writing to point out an error in your article entitled "Broadcast Interests Guide Digital Compression Tests" (RW, December 9, 1992).

The ISO Layer III is not a MUSICAM algorithm or derivative. Layer III is a version of ASPEC that is compatible with Layers I and II, which are essentially MUSICAM. At a given bit rate, Layer III provides the highest audio quality, due to ASPEC features. ASPEC is an algorithm due to AT&T, Fraunhofer Gessellschaft and Deutsche Thomson Brandt.

We would very much appreciate your noting a correction of your December 9 article in a future issue of RW.

N.S. Jayant, Head Signal Processing Research AT&T

Dee McVicker replies: Mr. Jayant, thank you for clarifying this point for RW readers. At the time of my writing, communication within the task group referred to Layer III as a "collaboration between ASPEC and MUSICAM."

As you know, there were three Layer IIIs considered by the group, all of which were collaborated with ISO Layers I and II that were essentially MUSICAM.



Vol. 17, No 6 March 24, 1993 Editor.....Lucia Cobo Managing Editor.....Randy Sukow Editor (International).....Alan Carter Managing Editor (International).....Charles Taylor News Editor.....John Gatski Assistant Editor.....Mary Ann Dorsie Contributors.....Frank Beacham/N.Y. Bruce Ingram, Pamela Watkins, Nancy Reist Technical Editor.....John Bisset Technical Advisor.....Tom McGinley

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Next Issue of Radio World April 14, 1993

solution to March 10 puzzle
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SCA Battle Results In Suit; KBC Wins In Civil Decision

by Dee McVicker

WASHINGTON It's the same old story of two radio stations locked in a vicious battle for the same listeners. One accuses the other of unfair competition, the other counters with the same. The new twist on this old story, however, is that the two radio stations in dispute are on the SCA band.

Once considered auxiliary spectrum, FM subcarriers are fast becoming new territory for profit—and conflict. SCA broadcasts, which are subcarriers that ride on an FM's main carrier, have become a prominent income generator for ethnic programmers in recent years.

In what appears to be the first case of its kind, Korean-American Broadcasting Co. (KBC), Inc. of the Washington D.C. area sued its competition, Korean American Broadcast Communications (KABC), Inc. of Annandale, Virginia, on the basis that KABC had distributed SCA receivers modified to receive all SCA broadcasts on 92 kHz.

The modified radios are capable of picking up broadcasts from KABC and KBC, both Korean language programming formats on 92 kHz channels within the same market. KBC claims that by distributing tunable SCA receivers, KABC had thwarted its ability to collect subscription dues for its SCA service and, therefore, hindered its ability to make a profit.

Both stations run 24-hours a day from fully functional broadcast studios, and rely on pay-for-listening subscribers to make a profit.

On December 18, 1992, the United States District Court for the District of Columbia ruled in KBC's favor, judging that KABC had violated Section 605 (a) of the Communications Act of 1934.

According to the judgement, "The distribution of devices that enable users to receive broadcasts intended only for subscribers

violates section 605 (a)."

Section 605 (a) of the Act provides that "no person not being entitled (to receive a radio communication) shall receive or assist in receiving any interstate or foreign communication by radio and use such communication for his own benefit or for the benefit of another not entitled thereto."

A later court date is to be scheduled to determine damages. The fine for violating the Communications Act ranges from \$250 to \$200,000.

Henry Song, a spokesperson for KBC, said the organization was "absolutely satisfied with the judgement." In a later court date expected for mid-year, she is hopeful that KBC will prove damages resulting from 700 lost subscribers due to receivers distributed by KABC.

The problem became evident when KBC changed frequency from 67 kHz to 92 kHz in September 1990, when its lease with WPGC-FM in Washington for the 67 kHz frequency SCA expired. WPGC-FM transferred KBC to the 92 kHz frequency on a new lease. During the transition, KBC subscribers were asked to return their 67 kHz receivers for radios that were modified for 92 kHz.

Seven hundred of KBC's subscribers never renewed their subscription under the new frequency, and KBC claims some of these listeners didn't do so because they were receiving KBC's broadcasts free of charge on the tunable SCA receivers distributed by KABC.

In the memorandum opinion of the class action suit, it was stated that, "those violations began with Mr. (David) Chu's (owner of KABC) first distribution of these radios in 1986 and continued through the corporate defendant KABC's sale of these radios in the early 1990's."

Chu admitted that he distributed SCA tunable receivers, but said there are only 95 in the field. The radios, he said, were distrib-

uted in 1986, prior to KBC's frequency change from 67 kHz to 92 kHz.

Chu said he was unaware that he was breaking the law, and purchased the modified receivers in 1986 as part of a plan to become part of a network of independent KABCs in various markets.

The SCA network of Korean programming stations included KABC of New York, KABC of Philadelphia, KABC of Chicago, and KABC of Baltimore. All KABC SCA channels were operating on 92 kHz in order to unify the network and give its listeners consistency, according to Chu.

Chu's KABC in Virginia was the fifth independently owned SCA in the network, and he said he didn't see how the tunable receivers, tunable only on 92kHz, could pose a problem since his competition, KBC, was broadcasting on 67kHz at the time.

Chu further stated that he had originally ordered 175 of the tunable receivers only for temporary use until his fixed-frequency receivers came in.

Soon after KABC's fixed-frequency receivers arrived in March 1987, Chu explained, some subscribers that had tunable SCA receivers traded them in for the fixed frequency receiver. As of January 1, 1991, Chu's records show that only 95 of the original tunable receivers were still in the field.

These remaining 95 radios are the only tunable receivers of the radios distributed to KABC's approximately 5,000 subscribers, he said. All the rest, Chu added, are fixed for KABC's SCA frequency leased from WAMU-FM in Washington and cannot be tuned for reception of KBC broadcasts or

continued on page 9 ▶

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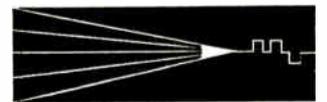
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Radios Altered For SCAs

by John Gatski

BROOKLINE, N.H. Bonneville International recently entered into a contract with Compol Inc. to purchase hundreds of modified GE SUPERRADIO IIIs for SCA use.

Cook Inlet also is evaluating samples of the converted SUPERADIO III for potential sale to SCA clients of its D.C.-based WPGC(AM) business radio station's signal. The Cook Inlet AM station does not have nighttime coverage and has decided to put the signal on WPGC-FM's second SCA to garner nighttime audience.

According to Compol President Frank Karkota, GE is not involved directly with the SUPERADIO III conversions, but is aware of the deal that Compol has with a distributor that resulted in the purchase of the radios.

Normally, \$49.95, the modified SuperRadio III will sell for \$85 to the Bonneville customers, Karkota said. Because the radio is modified, however, GE won't honor the warranty, but Compol said it will warranty the radios for two years.

Karkota said Bonneville wanted the SUPERADIO III because of its price, solid performance specifications on FM and wideband AM, and its chassis was easy to modify.

"For a consumer product, it's a good radio," Karkota said. "It has better than average performance. They didn't want a boom box."

Karkota said the large body size allowed him to add a second FM board containing the superheterodyne SCA circuitry. The SCA receiver is activated by AM wide/normal bandwidth switch when the FM mode is selected.

Karkota said the SCA capability could not be added to the existing FM board. "The bandwidth is too narrow coming out of their IF strip," he said, which can cause phase anomalies and crosstalk.

Karkota's GasFET superheterodyne FM

board uses a patented SCA technology, resulting in "less distortion, less noise low group delay time and better noise rejection," he said.

Compol was due to go into production in late February for the Bonneville contract, and subsequent production runs are probable, according to Karkota.

Cook Inlet said that if the samples were good, it also would place an initial order for 100 radios, and perhaps more later.

For more information about the modified SUPERADIOS, contact Compol at 1-800-0755.

KBC Wins In Civil Court

► continued from page 7

any other broadcasts on 92 kHz.

Chu said the majority of the 700 subscribers KBC claims did not come forward to exchange 67 kHz radios for those modified with the new 92 kHz frequency were delinquent accounts.

Furthermore, he stated, it's probable that KBC's sister SCA station in Baltimore also could be in violation of the Communications Act since this station was at one time part of the KABC network. As part of the original KABC network, he explained, it's very likely the same tunable receivers had gone to this station's subscribers as well.

When the KABC network dismembered a few years ago, he said, KABC of Baltimore was ultimately sold to the owner of KBC, who is running Korean-language programming on the station. Chu is currently consulting his attorney for legal advice on this matter and hasn't ruled out a countersuit.

In the meantime, Chu has been ordered by the court to retrieve all tunable receivers KABC had distributed in the past. So far, only five subscribers have replied to a letter sent by KABC to the 95 subscribers that have the tunable receivers.

Japan Embraces C-QUAM

by Alan Carter

TOKYO If only the successful launch of AM stereo in Japan could have been matched in the U.S.

Japan seems to be enamored with AM stereo since radio stations started broadcasts in February 1992. Currently, 13 stations broadcast using the Motorola C-QUAM system here, and listeners are accepting the technology more than expected.

Manufacturers also are adding AM stereo as a standard component on receivers for home and automobile markets.

All this activity is in sharp contrast to the U.S. market, where action by the U.S. Congress has forced the FCC to pick an AM stereo standard by the end of 1993. This may rejuvenate some interest in U.S. AM stereo broadcasting after years of inaction that resulted from the FCC declining to set a standard. Penetration in the U.S. also was affected by the litigation between Motorola and Leonard Kahn, who designed the ISB system.

In Europe, AM stereo could be bypassed as radio interests focus their attention on the Eureka-147 Digital Audio Broadcasting (DAB) system. While discussions are on-going in Russia, France, Norway and Luxembourg, the U.K. decided not to proceed at this point.

The Radio Communications Agency of the Department of Trade and

Industry in the U.K. wanted extensive testing of the systems. Those involved are hesitant to spend the money because they believe the funds can be better spent on DAB. The British, however, were awaiting translations of the exhaustive tests of AM stereo conducted by the Japanese.

In Japan, the leading manufacturer of AM stereo radios is Aiwa, followed by Sony and Hitachi.

Aiwa has added AM stereo to its new mini component stereo system and CD/radio and cassette players. The company also introduced three pocket radios, four headphone stereo players and two stereo radio cassette players. Aiwa markets its line with the phrase, "Aiwa is for AM Stereo."

Sony, which initially introduced a cassette-size AM stereo radio, has expanded its line with a pocket radio, clock radio, radio/cassette player, car stereo system, tuner, headphone stereo player and mini system—all with AM stereo. Also, Sony was placing AM stereo on a portable CD system and personal MiniDisc system.

JVC put AM stereo in its mini system series and CD/radio cassette series. Matsushita sells portable radios, mini systems and CD/radio/double cassette players with AM stereo.

Other manufacturers using the technology are Sanyo, Sharp, Pioneer, Kenwood, Sansui, Onkyo, Nippon Columbia, and Clarion.

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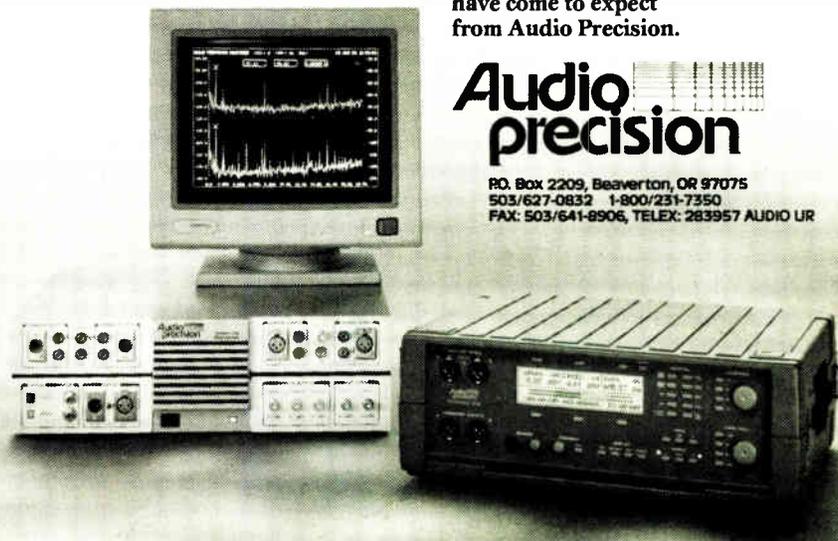
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GE SUPERADIO Offers Quality AM

► continued from page 1

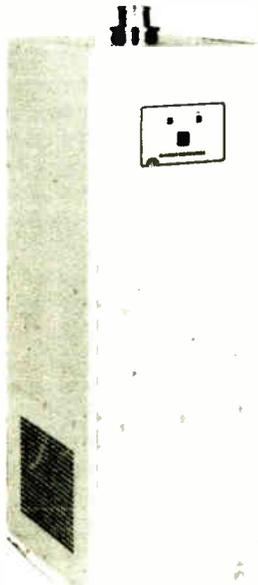
portable mode, you have to stuff the non-detachable AC cord into a small compartment adjacent to the battery area. Lights-out listening adjustments will have to be done by feel because neither the dial nor the controls are lighted.

Listening to the SUPERADIO

During listening tests, some local area stations were sampled, finally choosing WMZQ(AM), an AM stereo country music station with a strong signal. As *RW* readers know, a lot of markets don't have an abundance of music-formatted AMs. Washington is no exception.

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As with the high-end, high-dollar Denon TU-680 NAB "super tuner" we tested last fall, the audible difference in switching from normal to wideband with the SUPERADIO III was immediate, with good results.

With a strong station such as WMZQ, the radio sounded great. In a very crowded section of the band, however, the wideband mode produced more noise, but could be eliminated or minimized by selecting the normal position.

In listening to nighttime skywave signals in wideband, the noise increased as the band became more crowded. The normal mode, however, brought in numerous listenable stations.

Others who tried out the radio agreed that its performance was very good. "It does an excellent job of tuning DX stations," said John Marino, NAB manager for technical regulatory affairs, who sampled the SUPERADIO III for a week.

The FM tuning performance was very good, too, with some stations benefitting from the AFC switched in and others sounding better with it off. On strong-signal classical and jazz stations, there was little background noise that sometimes is unavoidable in the FM stereo mode.

According to GE, the SUPERRADIO III's "guaranteed" frequency response extremes meet the AMAX standard of 60 Hz-7,500 Hz in the wide mode, and it will at least reach 2.3 kHz in the normal mode. The radio actually performed much better. (See *RW* Bench Test for actual measurements)

Because of a two-way speaker configuration, sound quality is much better than

your average portable. The six-inch, low frequency driver pumps out decent bass. Clint Pinkham, Thomson's manager for technical application, said most portables don't have adequate bass, and a lot of effort was put into designing performance into the SUPERRADIO III.

Solid bass response

In the "flat" bass and treble positions, the



GE's high-performance SUPERADIO III comes in a low-cost package.

bass is ample, but the radio seemed to be a touch on the "bright" side. But with the separate tone controls, you can tailor the sound any way you want it.

On the minus side, the internal audio amp only supplies 700 mW of power.

Without noise blanking, as expected, AM reception can be marred by extraneous electrical noise from fluorescent lights and other devices when the radio is placed near these sources.

Pinkham said Thomson may add noise blanking to subsequent SUPERADIO models, which would enable it to meet the full AMAX specs, but it needs a low voltage chip, not yet available at a cost that keeps the SUPERRADIO in GE's intended price range. As proven by the Denon

tuner, however, noise blanking would significantly reduce or eliminate various kinds of electrical interference.

The NAB's Marino said the ultimate SUPERRADIO would have AM stereo and FM stereo added, which would enable GE to use a soon-to-be available Motorola stereo/noise blanking chip combo. No word from GE yet on such an upgrade.

The SUPERADIO III seems to fill the bill for an inexpensive wideband radio, but you may have to do some searching to find one. Apparently, the mass-market, discount stores, such as Wal-Mart and K-Mart carry the radios, but all of them may not. In New York City, many of the discount electronics stores do not carry it, according to an informal survey.

Your best bet is to find a store that carries GE products and find out if they stock the SUPERADIO III or can order it for you. Radio World found two stores in the Washington area that carried it: Lowes, a hardware store, and discount retailer Best.

One important caveat. A few early models of the SUPERRADIO III, made in mid-to-late 1992, were shipped from the factory with severe sensitivity problems. Thomson said it did not catch all bad ones before they got into the distribution channels.

According to Thomson, would-be buyers can look at the four-digit date code (not the serial number) on the box or in the battery compartment to see if the product is a potentially defective unit. Check the second, third and fourth numbers, which represent the year, and fiscal week it was manufactured (the first number represents the day of the week and is not important in identifying a bad radio).

If the second number is "two" then it was built in 1992, which means it could be defective (don't worry about the radio when the second digit is three). Next, look at the last two numbers. If they are "42" or higher, the unit does not have the sensitivity problem. Those with "41" or earlier fiscal week codes should be auditioned before purchasing. Chances are, however, that most units built before the 42nd week are good, Thomson said.

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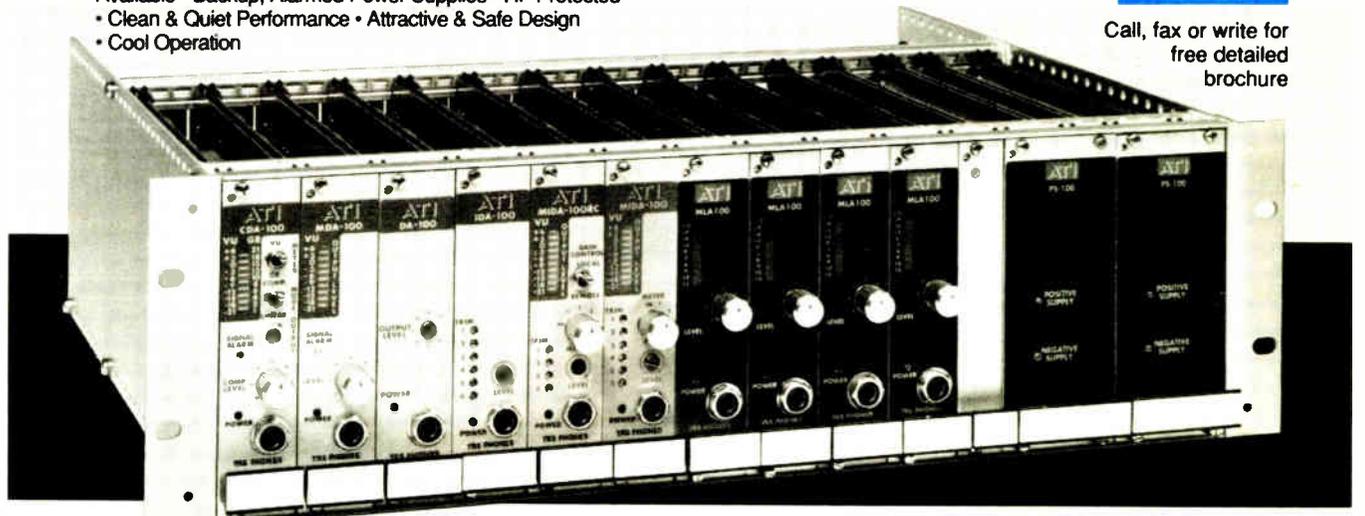
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by Nancy Reist

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The national sports talk show is hosted by

Emmy Award winning sportscaster Ron Barr. The program airs weeknights from 7 to 10 p.m. Pacific Time.

Sports Byline USA began five years ago as a two-hour broadcast with 13 affiliates. By February of this year, it had grown to three hours with 157 affiliates—including XEPH, an English station in Mexico City

and Radio Station 1ZB in Auckland, New Zealand.

It also is carried by the Armed Forces Radio Network, and some of the best interviews can be heard on the in-flight service of U.S. Air. Barr said he expects to be carried by 200 stations by June 1, and he also plans to expand the programming to eight hours this summer. The extended program would include an hour-long sports center, three hours of Sports Byline, a sports update and a rebroadcast of Sports Byline.

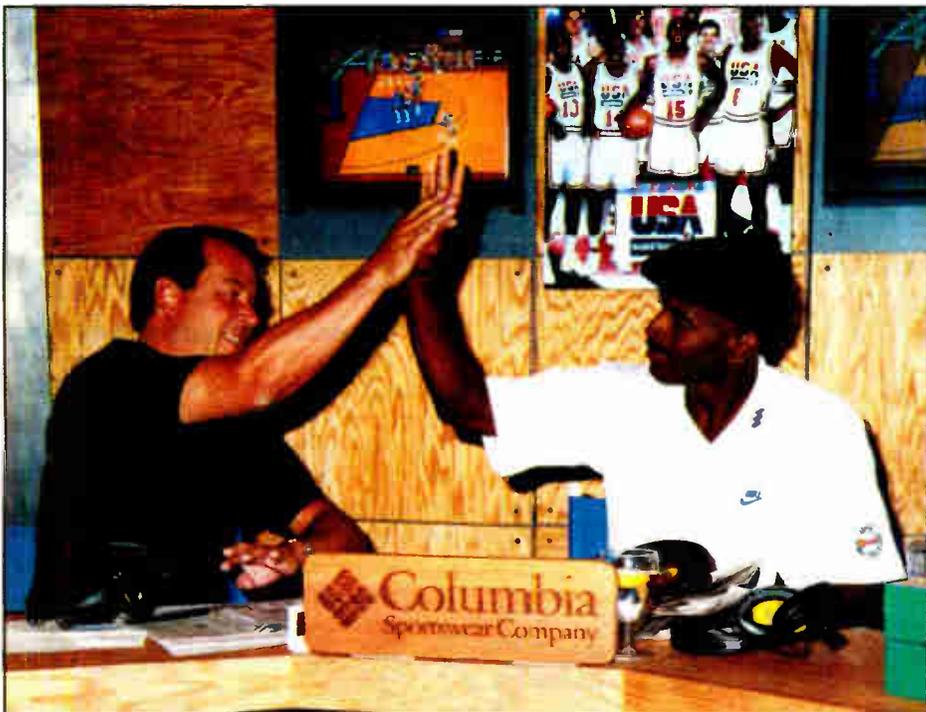
Sports Byline USA originates in San Francisco and is distributed free to affiliates via satellite. A digital signal is delivered on the SATCOM C5 satellite and an

analog signal is delivered on the GALAXY II satellite. Though they have recently moved the program from the studios of KSFO(AM) to those of the NPR affiliate KQED-FM, the satellite delivery remains the same. Affiliates are given six minutes of local advertising time per hour, while Sports Byline USA retains six minutes of national time per hour.

A free show

Barr said many stations are eager to carry the program. "You've got to remember in these hard economic times, these stations get this show absolutely free. They have to give up some inventory time, but night

continued on page 26 ▶



Sports Byline host Ron Barr "high-fives" with Tim Mckyer of the Atlanta Falcons.

See TTC At NAB Booth 13806

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Sony Targets Broadcasters

► continued from page 1

processing and non-destructive editing so that users can save and archive their source tapes for later use.

Other key features include auto assemble from an EDL, digital cross-fade, simple cueing, tape splice-style graphical editing for confidence monitoring on the electro-luminescent display during editing and dubbing, analog and digital inputs and digital level adjustment. Editing and copying occurs at double speed. Available in the fall, the DATStation is priced at approximately \$13,000.

The Sony CDP-3100 broadcast CD player and its CDS-3100 remote con-

troller were also introduced. The new CD player, depending on options, can easily



Sony's DMX-B400D digital console

address applications from high-end radio broadcast to audio/video post production and CD remastering and editing.

For example, in the broadcast on-air studio, the player, equipped with the optional RAM-based memory start feature, provides instantaneous start times and precision cueing capabilities. Available this summer, the price is about \$3,600, depending on options.

The Sony CDK-3600 CD Disc changer is designed to benefit radio stations with large CD libraries, Sony officials said. It can hold up to 360 compact discs and has a dual-transport system for cross-fades, auto-cue and other key automated broadcast functions. It can find, retrieve, load and cue a specific CD track across the entire system in



Sony will show its professional MiniDisc cart machines, PMD-C1P player and PMC-C1 player/recorder, at NAB '93.

less than 15 seconds.

Delivery is scheduled to begin in April at a price under \$10,000.

NEWSWATCH

► continued from page 2

The growth in the number of U.S. radio stations and increased amount of interference among FM stations has "worked against the interest of both broadcasting and the listening public," the NAB said.

The NAB has asked the FCC to modify broadcast licenses to include information on whether the station is on the air or not, and use that information to purge dark stations.

U.S. Government Should Pay For EBS

WASHINGTON The FCC should pay for new station EBS equipment that will be required when the new technology is approved, according to the NAB.

In comments filed on FCC dockets 91-301 and 91-171 concerning proposed new EBS technologies, the NAB said "the Commission should place funding of the new EBS system on its highest priority in order to not economically burden broadcasters..."

Depending on the final version of the new EBS technology chosen by the FCC, smaller stations could end up shelling out thousands of dollars if the federal government does not provide at least some funding.

RBDS Standard Text Available

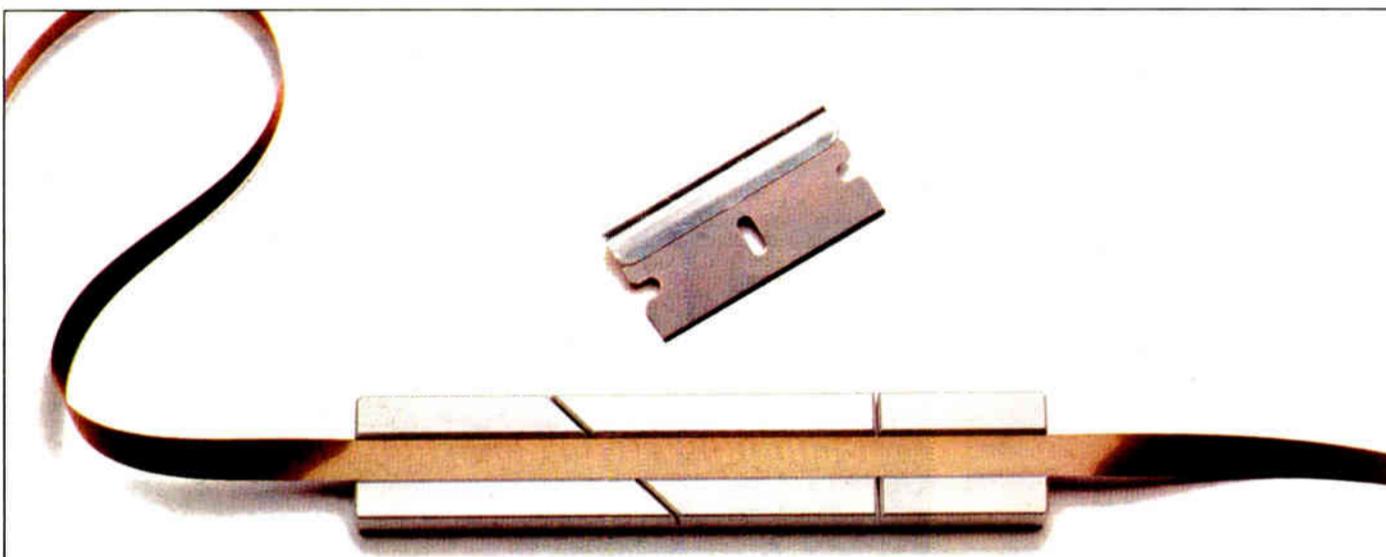
WASHINGTON Those interested in the full text of the U.S. Radio Broadcast Data Systems (RBDS) standard that was approved in late 1992, should contact the NAB at 800-368-5644 or 202-429-5373.

ITC Restructures

BLOOMINGTON, II. International Tapetronics Corp. (ITC) is undergoing a major restructuring to better serve its broadcasting and commercial sound markets, and move into advanced technologies.

To spearhead the change, ITC has appointed Willem F. Baker to the position of general manager. The company also is moving some of its technical personnel into its sales force including Mike Bove.

According to ITC President Don Carle, "In making these changes, we are focusing on opening all available channels to our customers so they can make educated and informed purchase decisions..."



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page 21.

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Live from Nashville: Country's Best

by Charles Taylor

NASHVILLE Nobody imagined the night of Nov. 28, 1925 that a 1,000 W AM station in Nashville, Tennessee, would spark what was destined to become an institution in country music and radio.

At 8 p.m., from the cramped fifth-floor studio of WSM(AM), announcer "Judge" George Hay introduced listeners to "The Barn Dance," a three-hour program showcasing live American folk music.

"For the past hour, you have been listening to music taken largely from Grand Opera," he began, "but from now on we will present The Grand Ole Opry."

Some 65 years later, WSM's country music continues to be heard over the AM's now-50,000 W clear channel signal, reaching up to 33 states over a 750-mile radius. It is broadcast before a live audience of 4,400 with accompanying

television coverage that reaches in excess of 50 million cable homes nationwide.

Over time, the Grand Ole Opry has come to represent more than a lasting institution in radio programming; in fact, it is responsible for much of the growth of country music throughout time and the popularization of its artists.

"WSM played the major role in making the Grand Ole Opry popular," says Hal Durham, senior VP and GM of the operation. "It so happened at the time when clear channel radio was at its peak, when the artists had to have something like that to prosper. It was before country records and long before country radio."

Sing their songs

Today, modern artists like Garth Brooks, Reba McEntire and Clint Black still aspire to a place on stage to sing their songs amid the Grand Ole Opry

audience. When Black accepted the Country Music Association's Horizon Award in Nashville in 1989, he told the crowd that it was like "stepping into a picture I've been looking at all my life."

The story of WSM's progression to legendary status unfolds almost as soon as the station went on the air. In October 1925—only five years after KDKA in Pittsburgh began the nation's first regular broadcast—the National Life and Accident Insurance Co. founded WSM, basing the call letters on its slogan, "We Shield Millions."

Soon after the first "Barn Dance" was broadcast, enthusiastic crowds began to gather in the narrow hallways of the station's studio to watch the performers play. Edwin W. Craig, VP of the insurance firm, suggested construction of an acoustically designed auditorium capable of holding 500 fans.

Within two years, the Barn Dance show was officially changed to the Grand Ole Opry as it continued to gain in popularity. Its location was moved again and again to accommodate the increasing demand for seating. In 1943, the show settled into the Ryman Auditorium, making room for upwards of 3,000 people.

By this time, the genre of country music was subtly changing. For many years, the Opry featured instrumentalists almost exclusively. By the early 1940s, two young performers named Roy Acuff and Eddie Arnold brought vocals to popularity in country music. They went on to proliferate country music as a lyrical format, while themselves becoming among the most popular entertainers of the day.

Throughout the next couple decades, WSM became a mainstay for the devel-

continued on page 22 ▶

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WorldRadioHistory

The 'Big Picture' View of Automation

by Jeff Loughridge

RICHMOND, Va. It's early 1993 and we're on the road to economic recovery. It is time to look forward to ensure we are properly positioned for the changes that await us economically, socially, and professionally.

Look for the cost of doing business to continue to rise. Personnel soft costs are sure to continue their upward trend, programming and promotions must go up as well.

People or PCs?

All these increases in operating costs leave owners and managers with only one choice if they are to maintain, or even achieve profitability; use fewer people and have them perform at higher levels of productivity. In other words, do more with less.

Many stations are cutting costs by purchasing an automation system. The current state-of-the-art in automation is centered on a PC that stores spots, liners, jingles, etc. on a hard drive, and interfaces with a program source. All of these sources are selected and played back according to the program log, which is entered and stored in the computer.

These PC-based automation systems have all but erased the often deserved reputation of automation being unreliable, unnatural sounding, and a maintenance headache. Quite the contrary, when properly matched to the desired tasks, today's system can sound tight, seamless, natural, and—dare I say—even live.

When improperly matched, they can still be a total disappointment.

If you are leaning toward buying a PC-based automation system, the number one rule is (engrave this on your desk, tattoo it on your forehead, or chisel it in stone): *Don't take anything for granted!* In other words, assume nothing.

Make no assumptions

Don't assume that because a system can play two sources, that it can play them both at once. Why? Segue ways, you may want those. Don't assume that because it can play and record, that it can do both at the same time. It may require coordination between production and on-air, or additional hardware.

And just because the 1969 automation you are replacing has space age technology like a Silence Sensor, don't assume your new 1993 system will. Surprisingly, many don't. As you can see, there are many questions you must ask yourself and your vendor to insure you are happy with your selection.

First, a few basics. The typical PC-based automation system uses a dedicated PC and audio switcher to control and select the various sources found in a professionally presented on-air product. These include music, commercials, liners, ID's sweepers, etc. Each item is called an event. A stop-set can contain any number of events.

The automation software uses the program log, which it receives directly by data disk or network, or is entered manually. This tells it what to play. It is told when to play events by one of two means. External triggers or time of day. When using a satellite based format, the network provides contact closures which

tell the system when to play the events. A format which uses locally originated music will use the computer's clock to trigger events.

Most systems use a combination of these. The first event in a stop-set will be triggered by the network, all subsequent events in that stop-set start automatically based on the duration of the preceding event.

Commercials are stored on a hard disk. The capacity of the disk determines how many commercials you can have in the system at one time. Two other factors affect capacity as well as quality. Sample rate is how many times a second the audio is sampled. When fewer samples

are taken there is less data to store, so you can store more spots. A lower sample rate yields lower quality audio when played back.

Data compression takes the sampled data and removes common parts to take up less space, much like condensed milk or frozen orange juice concentrate. As in these examples, when you add back the missing parts, the result is not exactly the same as the original. The more you compress the data, the less it resembles the original.

The selection process

Where do you begin when selecting automation? First, you must assess your

needs. PC-based automation systems run from several thousand dollars for a basic system to tens of thousands for one that can switch multiple networks, play local music, and run more than one station at a time.

In case you are wondering why I have not addressed setting a budget first, I believe this is one area where you select the equipment to suit your needs, not your budget. When you consider the long term savings this purchase will net, it is worth spending whatever it takes to do the job right. Only then will you get the on-air presentation and execution you want.

Look at it this way, there are a plethora of methods to pay for a system that suits your needs, but seems beyond your budget; there is no way to make a system

continued on page 20 ►

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TECH TALK

STLs Flourish in a Consolidated World

by Judith Gross

EAST ROCKAWAY, N.Y. Once upon a time there were lots of individual radio stations each with their own full time air staff, their own studio complete with console, cart machines, tape sources and a network feed, and microphones, where the air talent spoke live and could leave the studio for no longer than the longest song on the top 40, which in my day was "MacArthur Park" but these days, who knows?

The live signal traveled on its own phone lines or via microwave to its very own transmitter. Down the hall from the

control room was a complete sales staff selling availabilities for just the one station or the combo AM-FM, and a traffic staff took orders, arranged for production, generated logs and invoiced clients for that one station or the combo.

You can kiss those days good-bye.

Consolidation anyone?

Spurred by the recession and inspired by new technology, the buzzword is "consolidation" and it's happening in nearly every market to some degree. There is no one right way to set up these pioneering arrangements. Some owners

LMA another station in the same market, use some sort of digital program automation for a completely separate programming format, and use one or more sales staffs to sell them in any combination.

Other owners, encouraged by relaxed duopoly rules, are buying second stations in the same market outright, either to eliminate the competition or add to the revenue-generating inventory.

Then there are the simulcasts and triple, quadruple and even quintuple-casts of stations in nearby markets. Some owners are even going so far as to set up their own regional networks.

There are technological advances and new products galore to help the new breed of owner accomplish his or her goals and save costs, increase revenue and, thankfully, upgrade quality as well. They fall into three product categories: traffic/billing software; digital programming automation; and studio-transmitter links.

This month we'll take a look at the last category, and give you a sampling of what's happening with traffic/billing and digital programming automation in the next two columns.

New STL choices

Digital Studio-Transmitter-Links have been on the market for awhile, but they have really found a niche among stations setting up LMA deals. The reason is simple.

A typical LMA combines studio operations at single site but still needs to send discrete programs to two separate transmitter sites.

Sometimes the second site adds to the STL hops, which poses doubts about maintaining quality over the long haul. Sometimes, the primary station has to run an entirely new STL from the same studio, which means two transmit dishes and two receivers.

Enter the digital STL, for example the Moseley DSP 6000. It can accommodate four channels of 15 kHz digital-quality audio—two for each stereo signal—on a single STL.

That means one dish on the roof of the studio. It can maintain quality over longer distances, and in many cases the site of the first station's transmitter becomes the first hop for the LMA'd station's signal.

Engineer Chris Murray recently used the DSP 6000 to accomplish this for, not an LMA, but a duopoly set-up when McKenzie River Broadcasting's KMGE-FM in Eugene, OR, bought KSND-FM.

"We did it to be cost effective and at the same time upgrade quality," Murray said.

Five-hop net

Most ambitious of all was Jim Travis, engineer for Family Life Ministries Radio in upstate NY. The network used several DSP 6000s to accommodate seven affiliates, including two links which had multiple signals, one which would send up to three stereo signals.

"One of our big concerns of the new task at hand was that one station was to be located 120 miles from the studio. Five hops would be needed," Travis wrote in a communication to Moseley. In this case, a digital STL was almost a necessity.

"We now operate seven full time FM stations, all fed with digital STLs. It is truly amazing to drive 120 miles from the studio and hear an FM station broadcasting with a totally quiet signal knowing that it originates five hops back," Travis noted.

But digital STLs aren't the only way to go. Several new arrangements use the more traditional microwave approach.

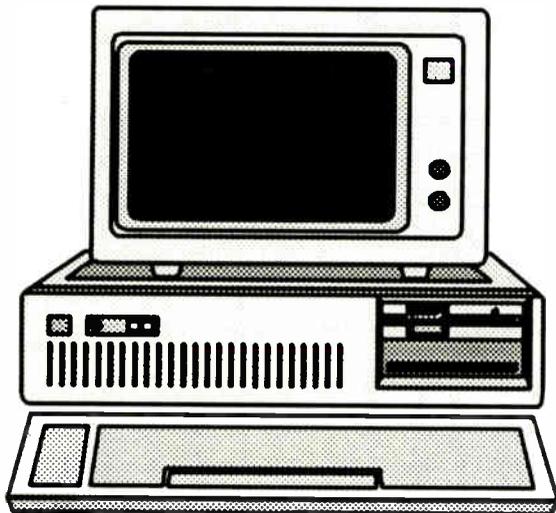
Eldon Coffman, part owner of West Arkansas Broadcasting, owns KEZU-FM which just LMA'd KZBB-FM. He's hoping to use TFT's Reciter to get the signal from one studio to the two stations, whose transmitters are 45 miles apart.

"We have one hop and from there the

continued on next page ►

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► continued from previous page

signals go east to KEZU and west to KZBB. We're trying to use the TFT to the hop point and then another for the extra leg to KZBB," said Coffman.

In a set-up that is more a regionalized network than LMA, KLCE(AM) in Cleburn, Texas, which is part owned by George Marti, is sending a simulcast from 11 a.m. on to KBAL(AM) in San Saba, 180 miles away, to KOES(AM) in Hamilton, 60 miles away and to KCLW-FM in Glen Rose, 35 miles away. The equipment of choice, is, of course, Marti.

"George and I wanted to try this as a way to keep these dying AMs on the air," according to Gary Moss, another part owner. One announcer at KCLE does live segments for each of the four feeds, and "People in those towns think these are local stations," said Moss.

Phone line upgrades

New products from the phone companies are also opening up new choices for a changing market. Companies like California Digital and Comstream have helped set up simulcasts and triple casts of morning shows in particular regions using Switched 56 phone lines.

These are digital dial-up lines which, when combined with audio data compression, yield near-CD quality. CBS-owned WYNF-FM in Tampa, Fla. has simulcast its morning show on WDIZ-FM in Orlando this way. The result is the chance to use the highest quality talent and production on two stations, instead of one.

Another advance is the availability of T1 lines, which offer the ability to send audio to two or more separate stations and which are becoming more affordable.

"The fiber optics networks are in now, so there is an over abundance of T1 capacity," says Intraplex's Peter Eady. "The supply exceeds the demand, so prices are dropping by as much as 50 percent."

Much as many old-time engineers shudder at the thought of having to do business with Ma Bell again, there are advantages to considering this approach.

For one thing, it's the Baby Bells, and

not their mother, that are handling T1 lines in each region. And secondly, some of the long distance carriers are getting into the T1 act and smoothing the arrangements out, especially when they cover more than a single area code.

Eady says that under \$1000 a month is "typical" and under \$500 a month "probable" in today's climate. Then again, T1 may be a necessity in geographical areas unsuitable for microwave.

But there may be another reason to consider T1 lines. A station can get as many as 12 15 kHz signals from a single T1. That's a lot of LMAs, duopolies or affiliates.

Or a station can use the excess lines for

NSN has set up regionalized networks for such radio services as Colorado Public Radio and the Word in Music.

One advantage, according to NSN's Muffy Montemeyer, is the ability to send commercials and other production, in full fidelity digital audio, to each of the affiliates, along with regular programming and traffic/billing info.

"If you own a group you can now branch out, get additional revenue from affiliates and provide spots, customized IDs, traffic and billing," said Montemeyer.

One owner who has successfully set up a satellite network linking up five sites in

and Comstream equipment, with two uplinks and a downlink at each site. One of the uplinks sends regular programming and the other sends pre-recorded breaks and voice tracks, commercials, jingles and other production, in full digital quality.

A Gentner Audisk at each station records and stores the digital audio for playback and responds to satellite cues. Traffic and billing is centralized on CBSI software, and orders are sent in by fax and put into the system.

What makes it work, according to Gardiner, is the excess revenue potential from affiliates plus the ability to cut overhead.

"If you have 30 stations, it doesn't make sense to play the same thing 30 different places. We were able to reduce our staff by 32 people, mainly by eliminating air staff," said Gardiner.

Gardiner noted that there were a few "bugs" to be ironed out as Comstream, Gentner and CBSI wrote software to handle the growing network. But he added that the quality is "superb."

"At the same time you cut costs, you don't want to sacrifice quality, because that's what helps increase your revenue," he noted.

For Gardiner's five owned stations and growing affiliates, a satellite network makes sense, but he pointed out that while costing out the satellite time over five or more stations makes it affordable, it could be economical for as few as three stations.

"If you can eliminate air staff from a couple of stations, you can afford the satellite time," he said.

And while aspiring air talent may not be happy to hear words like "consolidation" creeping into radio owners vocabularies, the needs for new products and the ability of stations to increase their profit margins should be good news to anyone who has been keeping a watchful eye on the economic state of the radio industry.

□ □ □

Judith Gross is a New York City area writer and radio newscaster, and former editor of RW. She can be reached at 516-599-4564.



Inside the lodge:
Left to Right—NSN's Kelly Hethcote, Mike Love - WBLB, New York, NSN's Muffy Montemeyer, Marsha - WBLB, NY during a network broadcast.

duplex communications, faxes, modems and even to provide call-in lines to the station without resorting to long-distance number, in effect setting up its own phone network. And it's all done with dial-up lines.

Satellites

But once a single originating station starts looking at sending programming to three, four or even five sites, it becomes cost-effective to consider satellite, either V-Sat or Ku-band.

V-Sat has already proven itself for centralized transmitter control offered by National Supervisory Network. Now

Colorado ski resort areas is Cliff Gardiner. His Gardiner Broadcasting owns KZYR-FM in Avon, KSNO-FM in Aspen, KSMT-FM in Breckenridge, KIDN-FM in Steamboat Springs and KKYY in Gunnison.

In addition, KSK1 in Sun Valley, Idaho, is the first of what Gardiner hopes will be many affiliates.

"We're going to accept about 30 affiliates and that's all, because of the complete services we provide. We're starting in the Mountain Time zone and then we'll move to the Pacific zone, where we'll delay everything an hour," said Gardiner. Gardiner uses GE Ku-band satellites



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DEERFIELD BEACH, Fla. Bill Livek and Bill Engel joined forces to launch Symmetrical Resources Inc., a qualitative ratings service company. The initial offering from Symmetrical is Symmetrical Polling Inc.

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For information, contact Bill Livek at 305-427-4104.

Film House Campaign Helps Stations

NASHVILLE Film House Inc. designs and produces television marketing campaigns for radio stations. The company boasts a fully-equipped in-house art department with four, full-time artists and the latest in computer-based art design and production gear.

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For information, contact Wayne Campbell at 615-255-4000.

Unistar Debuts New Products

NEW YORK Unistar Radio Networks introduced "The Entertainment Newscall," a news service designed to provide affiliates with entertainment news stories and audio cuts each morning in one bulk feed, live at 6:35 a.m. ET, and again at 9:35 a.m. ET. "The Entertainment Newscall" will include a 60-second wrap of entertainment stories, and a 60-second wrap-up of the best kicker and offbeat stories of the day.

Unistar also announced "Nineties Country," a weekly, one-hour radio show presenting the most popular country

artists in the U.S.

For information contact Unistar Station Clearance at 800-225-3270.

Bonneville Markets 'Young Country'

NORTHBROOK, Ill. Bonneville Broadcasting System signed an agreement with Alliance Broadcasting giving Bonneville exclusive rights to market the "Young Country" format both in the U.S. and abroad.

Alliance Broadcasting pioneered the format on KYNG-FM Dallas in January 1992. Since its debut, the station has tripled its audience share.

For information, contact Mindy Herman at 800-631-1600.

Jones Satellite Networks Targets Country Audience

ENGLEWOOD, Colo. Garth Brooks, Clint Black, Trisha Yearwood and Billy Dean will be among the artists featured on Jones Satellite's new satellite-delivered radio format, "CD Country."

The network will be personality-driven and feature a format emphasizing audience interaction. Listeners calling the toll-free number will help dictate the network's format, according to the company.

For information contact Roy Simpson at 303-792-3111.

Broadcast Programming Debuts Two Country Formats

SEATTLE Broadcast Programming is targeting the country music audience with two new formats, "Today's Country" and "Pure Country."

"Today's Country" targets the 25-54 demographic by offering a more broad-based gold library, but is still 70 percent current and recurrents. The format is available on CD or reel-to-reel.

"Pure Country" is the company's traditional country format. The format offers a large gold library and targets the 35-plus demographic. It is currently available on reel-to-reel, but can be adapted to CD.

For information, contact Keith Chambers at 800-426-9082.

CBS Hispanic Radio Network Offers Daily Sports Show

NEW YORK "Deportes CBS," the first regularly scheduled, full-year broadcast on CBS Hispanic Radio Network made its debut March 1. The three-minute report is hosted by Jaime Jarrin, airs Monday-Friday and will focus on sports of greatest interest to the hispanic audience: soccer, boxing and baseball. Additionally, a special segment devoted to World Cup Soccer news will begin this summer.

For information contact Jerry Villacres at 212-975-4321.

TNNR Available on CD

NASHVILLE TNNR's weekly countdown series, "The Nashville Record Review," will begin distribution via compact disc.

The program is hosted by entertainment reporters Lorianne Crook and Charlie Chase, and is a weekly four-hour countdown of country music's top 40 hits. The program also provides for cross-promotional opportunities with The Nashville Network and Country Music Television cable channels.

For information contact Jeff Lyman at 615-871-6725.

Jerry Pippin Expands Programming

OKAY, Okla. "The Jerry Pippin Show" is expanding its time to affiliates by adding three hours of programming on Sunday evenings. Currently the show is broadcast on the Independent Broadcasters Network in three, hourly segments. The program brings listeners a blend of Pippin's commentary, comedy, debate, news and advice, along with listener participation and interviews.

The new offering will be distributed nationally through a joint venture with Clear Channel Communications, on its Oklahoma News Network channel, and Contemporary Media.

For information contact Roberta Scott at 918-682-2630.

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UPLINK

Local Strategies for Satellite Stations

by Karl Baehr

ALBUQUERQUE, N.M. Do you understand your radio station? Do you know who the target audience is and why? Do you know how your station fits into your market's "scheme of things?" Those that understand how their station meets market needs will make more money.

In my dealings with satellite-affiliated stations and networks I've heard many things regarding how to effectively sell a satellite radio station. The next two installments of *Uplink* will deal with selling advertising on your station.

Some guidelines to know

We will focus on tips from station operators who have sold satellite successfully for many years. Topics will include creating advertising "events" on your station. It is my hope that by approaching this in a series of "steps" you will be able to take this information directly into the marketplace and make money with it.

Know your radio station. Know your market. Your station is the product you are selling and if it sounds bad, you cannot expect good results on the street. Identify your target audience and why this audience and your station are pertinent in your market.

Obtain current market research. This information is readily available for free from various local, state and federal agencies, colleges, local offices of economic development or chambers of commerce. Learn not only who lives in your market, but where they live, why these people are important and why your station is a player.

Know about the client. Find out what is important to them before you call. You do this by taking the time and making the effort to understand your client's real advertising needs.

Listen. So many sales are lost because the salesperson is too busy waiting for the next opportunity to talk. Be quiet and listen. The client may have just given you the order. Be interested in their business. Be attentive.

Be credible. Don't try and dazzle them.

Show them how your station can help them. Never distort ratings performance. If a client is wrong in their expectations tell them. If you don't, you run the risk of them expecting something from you they may not get. At that point, if they don't get the results you just lost a client.

Your station's only job is to get the people "on the lot," not selling the cars. Selling the cars is the clients' job.

Sell for the long-term, don't sell spots. The advantages are many. (1) You're not "starting over" every month. (2) The station has a certain level of "built in" revenue every month. (3) You can bypass cost-per-point and rate wars. Let the other guys sell air and discount their spots. There are several things you can negotiate besides a lower rate: A longer contract, ads in more dayparts, package unsold inventory, add sponsorships or a remote.

The minute you start discounting. You lose. "If you keep doing what you're doing, you'll get more of what you've already got." Roger Dodson, President of Radio One Group, a group of nine satellite stations (Unistar affiliates) said that. It only serves that if you do what you're doing now for less, you'll get less.

Roger requires his sales people to make a formal Presentation every week. That's how to get the annuals, the long term buys. Put some work into it. Target a large local/regional client. Find out what's important to them. Who are they after and how can your station deliver those people to them?

Get involved

Be active in the community. Get out there! Your market probably has direct business that has never been tapped. Stopping into a prospective client's business and giving them clear, concise information about your station and how you can help them weighs more than trying to grab someone's ear in the middle of the work day.

First impressions are important. Look your best. Be friendly, be interested. If they can talk, great, and if they can't, no problem. You're not there to sell them something right then (though always be ready!). You're there to get them ready

to sell them something.

Tell them, "Mr. Jones, I'm Karl Baehr from KARL FM and I just wanted to introduce myself and my radio station to you. I know you'll find this information helpful, and after you have had a chance to look at it, I would like to set an appointment with you to discuss how we might help you promote your business to

If you are not talking to the decision maker at the business, you're wasting your time.

new customers."

In the brief information you leave, give them something they can use right now. These can be tips on qualifying radio buys, which will set the stage for your next visit!

Be enthusiastic about your station. Be enthusiastic about selling your station. If you're not, examine why. If you're not pumped up about your product how do you expect anyone else to be?

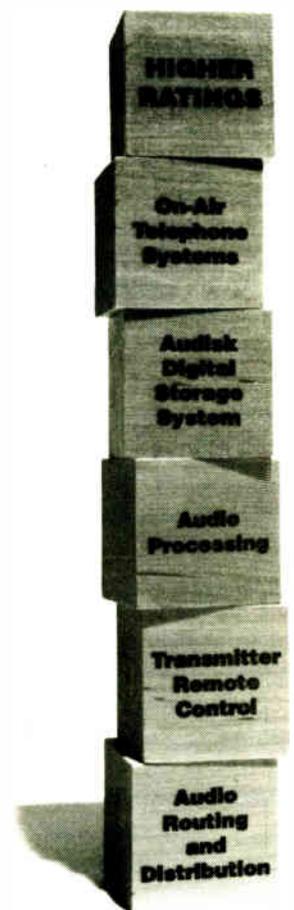
Make sure you're talking to the decision maker at the business. If you're not, you're wasting your time.

Now try this, select a client not currently on air with you and develop a proposal and presentation for that client to advertise on your station for the next six months. As this will include the summer vacation months, end of school and back to school, you have several possible promotional tie-ins. Think ahead. Try presenting these proposals in a sales meeting before they are presented to the client. Friendly camp feedback can improve a presentation and the chances of getting the order. Let me know how it goes.

Next time: How to introduce a new satellite station in your market. A look at "Street Smart Marketing," "Creating Sales Events," a "Must Read" list and some "Non Traditional" marketing opportunities. Have you ever thought of selling your radio station's own potato chips? Software? See you next month.

Karl Baehr is president of KBE "Broadcasting By Design" a radio consultancy that provides support services for satellite radio stations. The company also produces the Actual Radio Measurement (ARM) electronic survey system, and is involved in the development of Radio Tropico Internacional, a proposed tourist oriented satellite radio network in Mexico. Baehr is a former radio programmer and air personality, currently pursuing a graduate degree in Mass Communication at the University of New Mexico. He can be reached at 505-828-0488.

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The 'Big Picture' View of Automation

► continued from page 15

fulfill your needs if it wasn't configured with them in mind, even though it was within your budget. Approach this purchase with a look at the long term savings, not short term cost.

What is it, exactly, that you want your automation to do? Take long-form programming from a single satellite network and play your spots and liners? Select between multiple networks, with each one controlling its own liners, etc? Play music locally? Off CD or reel? Control cart machines and reel-to-reels too? Operation totally automated, live assist, or both? A combination of these? If auto-

mated, how many days do you want for "walk-away operation?"

Don't forget software

You must also decide what traffic software you will use. If you are already doing traffic on computer, your decision is made. If you are still doing it by hand, accept the fact that you have to get a computer-based system. The man hours and associated costs involved to manually create a log, then enter it into the system for every hour of every day will dwarf the cost of a simple PC and some basic traffic software.

At current prices, a 386 DX40 MHz

system with VGA monitor, 100 Mb drive, 2 floppies, and a printer will cost between \$1000 and \$1200. You have to shop around, attend a computer show, or find someone who will go to one on your behalf, but you will save that much, and more, in a few months. Lesser computers

A system won't fulfill your needs if not configured with them in mind.

such as 386SX and 286 machines are even less. You might be able to work out a trade.

Do not plan on using the computer that comes with your automation to also do your traffic. While most are 386-based systems, they are configured specifically to perform their automation tasks and are not suitable to share with other tasks. If you are going to program music locally, this is also the time to decide what scheduling software you will use.

It is a good idea to shop automation systems at the same time you are shopping software. It is necessary to have a software interface to take the traffic and/or music logs generated by your software and translate the data to the format needed by your automation system. You will likely be told by both parties that an interface is: a) *Available*; b) *Being written right now*; or c) *No problem to write, as soon as you need it*.

Insist on having a working interface before you pay anyone any money, and get it in writing. In my experience, this is the area where you will have the most trouble when first acquiring and setting up your system. Expect to pay for the interface software, it isn't free.

Most systems are sold in levels, much like buying a car. There is the basic mode, which typically offers the minimum disk space. This means fewer spots can be stored in the system at one time. You add disk space as well as overall capabilities from there. By mixing and matching, you will be able to put together a system to do exactly what you want.

As you see your cost going up, you will be tempted to cut out things you feel

may not be absolutely necessary. One of the first items to go is usually a tape drive for doing backups. Don't fool yourself into believing you (or someone else) will sit in front of the computer and swap floppy disks to do a backup. A system with a 100 Mb hard drive will use 60 to 70 disks and take several hours.

Your system may have several hundred megabytes of disk space. This adds up to many dollars for disks and many hours to backup. A 250 Mb tape system will do it automatically in an hour or two. Tapes cost around \$20. This will hit home when your hard drive hits a glitch and your commercial inventory suddenly won't play. Remember, in a computer that runs up to 24 hours a day, it is not *whether* it will fail, but when and how.

Putting it all together

Once you have found the system that fits your needs and selected software that will seamlessly interface with your automation, it is time to plan for the installation. Most system suppliers offer on-site installation assistance and training for your staff. This is always a bargain.

Unless you have a friend close by who knows the system thoroughly, you will need the factory training. Don't rely on their manuals, they aren't finished writing them yet. I have yet to see one that has addressed all the different angles or problems that can come up.

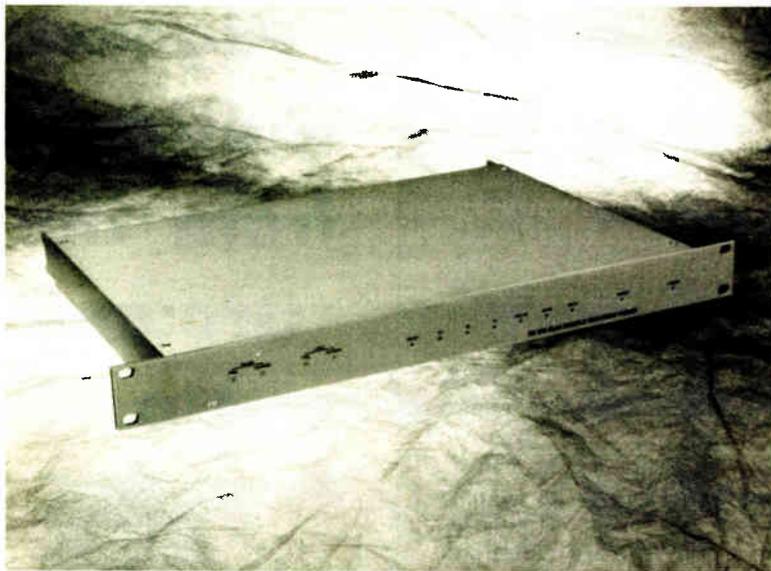
The reason for this is that system manufacturers are still writing the manuals. This technology as a whole is in its infancy and these systems are still being developed. As a result, the manuals are still in their draft stages. Since you will probably want this put in over a weekend, your engineer will appreciate their assistance up the learning curve as well.

Service after the sale is very important. Ask if they have a 24-hour customer support number. You will appreciate it when everything grinds to a halt at 3:00 a.m. on a Saturday.

If you fully assess your needs, research the available products, and ask plenty of questions, you should have an automation system that will enhance your on-air sound and your profitability.

□ □ □

Jeffrey Loughridge is president of Audio Concepts and Engineering, a technical consulting firm that designs and renovates studios. He can be reached at 1-800-777-4172.



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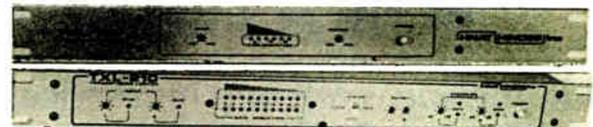
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PROMO POWER

Non-Profit Groups Can Work for You

by Mark Lapidus

WASHINGTON Golf tournaments...foot races...concerts...road rallies...bike tours...You'd like your radio station to become more active in presenting these activities, but feel that you don't have the necessary "people power" to pull them off. You're not alone!

Because of the size of most promotion departments, it would seem that many stations couldn't possibly put together more than a few major outdoor events each year without over-extending themselves.

What about those stations that are able to present event after event and yet have either small or non-existent promotion departments? The most active stations have discovered the magic method: they let someone else do all the work!

Not for profit

Every city, regardless of size, has non-profit groups that spend much of their time attempting to raise funds. These groups have discovered that activities can provide them with substantial cash flow. Typically they can muster enough volunteers for their causes and activities. However their most difficult task is getting the publicity that's needed to attract outsiders to participate in these events. That's where you come in.

You can provide Mr. & Mrs. Non-profit



WCXR in Washington gets help with a bike-a-thon.

the exposure they so desperately need. Instead of just getting a few crummy ten-second public service announcements read once in awhile, you're going to make a big deal out of their event by making it your own.

Here's what you offer a non-profit group:

1) Regular exposure on your radio station(s). Offering a minimum of sixty mentions starting a month prior to the activity

is a good beginning. If you're an FM station with an AM counterpart or vice versa, you can mention the event on both stations either with frequency public service announcements or in live DJ mentions.

If you have local newscasts, you may wish to develop an ongoing "report" about the progress of the event and the good work of this non-profit group. Be sure to interview the CEO of the non-profit for one of your weekend public affairs programs.

2) One of your on-air personalities to host the event. Most events require a professional host for the kick-off or concluding ceremonies. Few non-profits have personnel with the skills needed to make the event seem important. You can add the touch and give your DJs exposure as well.

3) Prizes and/or merchandise. These prizes could be station T-shirts, key chains, hats or the like. More about the merchandising of the event below.

4) Your van, sound system, and mascot. All of these call attention to the event, a goal for the non-profit. If you don't have portable sound, you should consider investing in a small public address system. You should be able to purchase an adequate system for less than a thousand dollars.

Give and take

And here's what a non-profit group should offer you:

1) Title sponsorship of the event and exclusive radio station participation. If the activity has been known as the MS150K Bike Tour, it should now be titled the (Your call letters)/MS150K Bike Tour. Yours should be the only radio outlet involved, but don't prohibit the group from getting PSAs on other stations. These extra announcements work for you in drawing more people.

continued on page 24 ►

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Motivate Your Staff Without Money

by Sue Jones

BURKE, Va. If someone asked you what is the best staff motivator, would you reply, "money"? Bonuses, pay increases and incentives can motivate people, but only for the short term.

How long would you be motivated with a 10 percent bonus if you had to work for a boss who degraded your efforts in front of other staff members or pointed out every minor mistake that you made? General Managers who think that money is the primary motivator have overlooked some of the most long term motivational aspects of solid management.

Money isn't everything

Successful leaders know there are several things that motivate and inspire staff. Let's look at a few of them:

Share major goals and objectives with all staff members. Everyone in your station should know the station's annual goals and objectives and your plan for achieving them. Everyone means the receptionist, the DJs, the sales staff—not just the managers. If everyone is knowledgeable of the goals, they can help achieve them. If they don't know them, they will only do what they think is required for their position.

For instance, if you announce at the beginning of the year that one of the objectives for the new year is to increase advertising revenue by "X" percent, all

staff members have a definable goal to work toward. They are aware of the goal and can use opportunities in their work to achieve the it.

You can further enhance their efforts if you explain the steps that you plan to implement. You will gain even greater support if you explain how specific people can contribute to the effort.

Another example is keeping all staff members informed about a special promotion or initiative. If the Promotion Director has the DJ announce a call-in promotion that is to begin at a specific time and the receptionist has not been advised, he or she will be less than enthusiastic when the switchboard is flooded with calls.

He will be not be knowledgeable about the promotion and unprepared with the appropriate responses. You will have an unhappy receptionist and perhaps some unhappy listeners. By keeping your staff advised of the station's objectives you will guide your staff to pull in the same direction creating improved individual and team performance.

Think of standing ten matches on end with nothing to support them. With no support, they will all soon fall down when you take your hand away. However, if you place a rubber band around the ten matches and stand them on end, they will stand together when you take your hand away. Providing the station's annual goals to the whole staff

becomes the rubber band that helps them all stand together to achieve the common goal.

Encourage participation

Encourage staff members to make recommendations and offer suggestions. Solicit ideas on how to improve the station and on improving the work environment from all of your staff members. You might be surprised to find out what little things can do to improve the morale of the staff. More than one manager has discovered that providing lunch room improvements such as a refrigerator, microwave oven, and free coffee service has improved the productivity of the entire staff. Moreover, these items could be obtained by trading advertising for the products.

Other added benefits in this area would include a subsidized soda/snack service. A subsidized service may cost the station a minimal amount of money, but you will more than regain it with improved morale and added time on the job that is not spent down at the corner drug store buying a snack.

Other work environment improvement ideas you may consider are gasoline trades for advertising. Could you give a free tank of gas to the receptionist who picks up advertising tapes for you a couple of times a week using his or her own vehicle?

Another possible advertising/trade could be free or subsidized parking for staff members. How about a free birthday dinner for two for staff members that you have from a restaurant-trade deal.

If you really want to build commitment

with staff members with children, offer free/subsidized day care that you negotiated with a day care provider with a advertising/trade deal. These ideas will only work if you ask the staff for their ideas and then implement their suggestions.

Implement the ones that are feasible for your station. The staff will soon recognize that management listens and uses their ideas. You will begin to reinforce their sense of ownership toward the job they do and the management of the station.

Credit where it is due

Give recognition to staff members for excellent work. How often have you observed a sales representative being criticized for not obtaining all of the information needed for an order? How about seeing a production manager getting a tongue lashing for missing a spot due date? Have you ever seen a DJ yelled at because he/she did not follow some aspect of the station's formatics?

Human beings make mistakes. These are best handled privately and not within earshot of the entire staff. Instead of catching staff members doing it wrong, try to catch them doing it right.

Mark Twain once said that he could live for two months on a good compliment. Your staff members need to know that individual initiatives will be recognized and rewarded. One of the best motivators is to tell a staff member that you recognize and appreciate their successful efforts. Be specific in your praise.

If you receive a compliment from an advertiser about how a sales representative has handled the account, make the effort to tell that staffer about the client's satisfaction due to his/her efforts.

continued on page 24 ►

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Live from Nashville: Country Music's Best

► continued from page 13

opment of country and a primary platform for its biggest stars, from Hank Williams and Minnie Pearl to Ray Price and Patsy Cline. Country radio, meanwhile, inundated markets across the nation as a legitimate radio format.

In 1974, the Grand Ole Opry operation was moved into a new home, the 4,400-seat Grand Ole Opry House within the 440-acre Opryland USA theme park, completed in 1972. By then, Nashville had been deemed Music City, USA.

Today, the Nashville Chamber of Commerce claims the city's music business is a \$1 billion industry. More than 900,000 fans travel from every state to see the show each year.

WSM's record of innovation also continues in modern times. In 1982, the station was among the first AMs in the nation to convert to C-Quam stereo.

"We've always felt that WSM(AM) was a leader in broadcasting, so as technology changed, we changed with it," says station GM Bob Meyer.

Today's WSM is a full-service AM station featuring traditional country music and a heavy news and information base. It offers live on-air traffic,

weather and 24-hour news. Over the years, it has won numerous broadcast journalism awards.

And of course the station continues to broadcast live performances of the Grand Ole Opry every Friday and Saturday nights.

"People come to the Opry to see a radio show performed live, not a concert per se," Durham says. "They're very similar to the shows of the '30s and '40s. They provide a continuity that today's audience heard about from their parents and grandparents."

Added Meyer, "We feel that as the broadcaster of the Grand Ole Opry, we still are the country tradition—not as in old, but as in the home of country music."

"When the Country Music Seminar comes here every March, some of the great (disk jockeys) of country radio come over and tell us they've always wanted to just say 'WSM 650 Radio' over the air," he says. "I think that says what the station has meant and what it still means to the industry."

□ □ □

The Grand Ole Opry will be inducted into the National Association of Broadcasters' Hall of Fame at the NAB spring convention next month.

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Motivate Your Staff Without Money

► continued from page 22

Mention the specific items that the client talked about. Explain how that helps the station meet those annual goals that I mentioned earlier. Be sure to tell the sales representative how much you, as the management, appreciate the special effort. Avoid just saying, "Good work" or "Nice Job".

Recognize efforts

Recognition can be given privately or publicly. Whenever possible, give the praise and recognition in front of the other staff. Public recognition amplifies the praise and also sends a positive management message to the other staff members that you are willing to give credit to staff members for exceeding expectations. Of course, if you have a staff member who is embarrassed to tears if you praise his/her work in front of others, talk with that staffer privately but follow the same guidelines.

Make sure that your recognition and special awards are fair and equally distributed. Favoring one group with lavish rewards such as dinner at a four star restaurant and recognizing another group with a pizza and coke lunch will immediately stratify your staff and build resentment that can destroy morale and team building efforts.

A better approach would be to bring the entire staff together at a moderately priced lunch or dinner to recognize all

work groups and their contribution to the station's annual goals. Perhaps you could have a special quarterly meeting or event to brief the staff on how well they are doing to meet the annual objectives, announce any adjustments to the plan, and recognize outstanding performance

of individuals and work groups.

Before you implement a recognition initiative, evaluate it from the gender, race and work group viewpoints. Make sure that it is equitable and given to all who deserve the praise for contributing to the station's goals.

Next month I will discuss some additional motivators. In the meantime, think about how much extra money we spent on the above ideas and how much benefit the station and staff gained by using them.

□ □ □

Sue Jones is a senior manager at Computer Data Systems, Inc. in Rockville, MD. She can be reached at (703) 323-0491.

Using Non-Profit Groups

► continued from page 21

2) Merchandising of at least one product. You're getting great exposure by doing this event and it also gives you a wonderful opportunity to make money. Many advertisers ask for "merchandising" regularly. The next time a buy is up and a beer or soft drink company asks for a sampling opportunity, you'll be able to put their product in the hands of hundreds or even thousands. You can even mention them on-air... "and thanks to Joe's Sparkling Water for providing the refreshments."

The non-profit group will love this because it cuts down on their expenses. A word of caution. When negotiating, tell the non-profit you'd like the ability to merchandise a product. This way, if a product doesn't present itself, you won't have to buy it for them. In some cases, you may wish to go as far as giving the product title sponsorship as in the (Your Station)/MS150K Bike Tour sponsored by Joe's Fruit Coolers.

3) The brochure, ads, and any other printed materials should recognize you and the product you're merchandising. All parties should also receive signage for the event.

Items of note

Here are a few other items to note. When talking with non-profits, find out how long they've done the event and what type of success they've had. Only accept those events that have been done for at least two years and have a substantial amount of participants. Most mistakes are made in the first couple of years and it's easier to build a successful event from one that's already got momentum.

Be sure to ask what type of problems (if any) they've had in getting the event off the ground. It may turn out to be something simple like scheduling during the rainy season each year or not doing a direct mail piece to their entire list.

Do you want media co-sponsors?

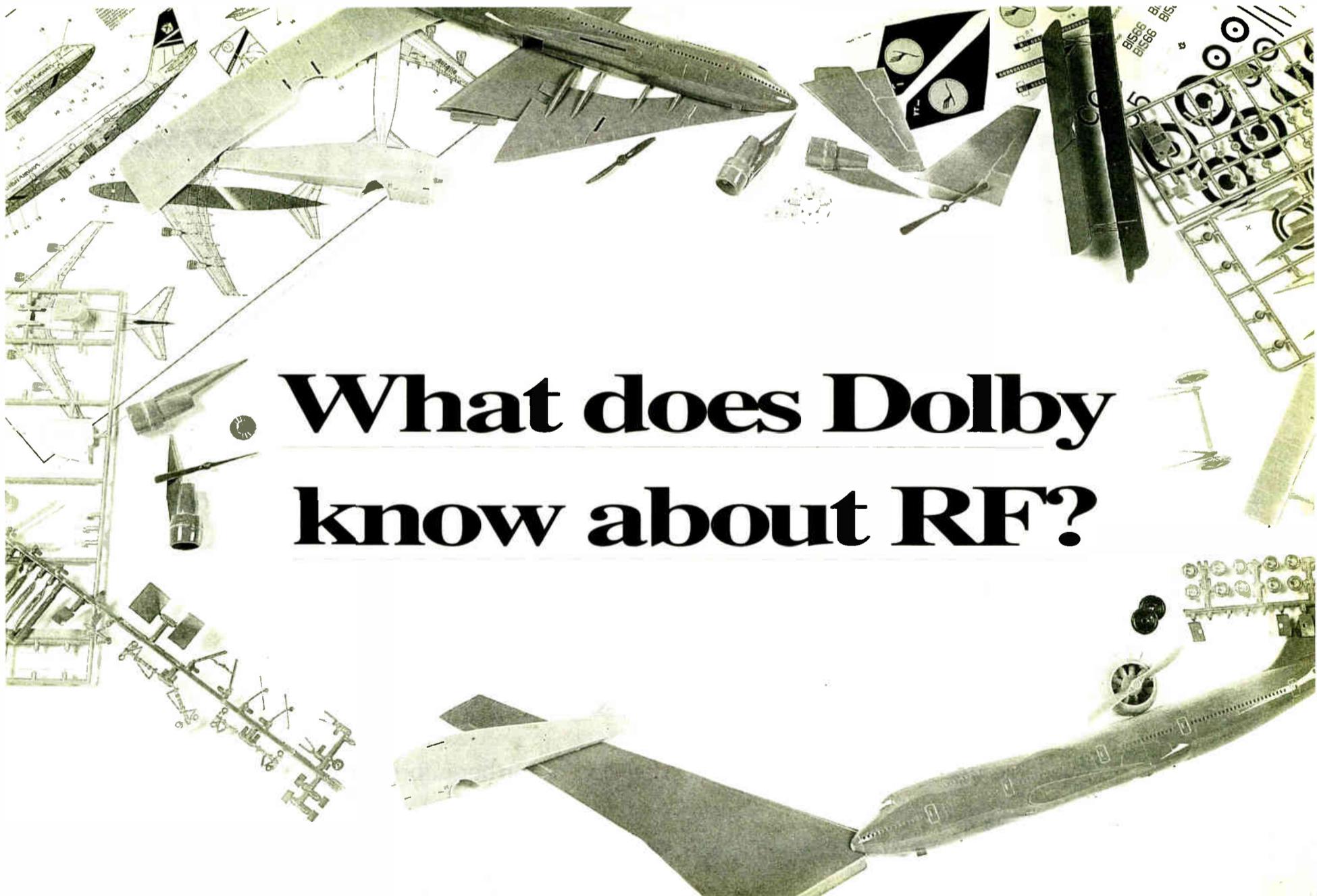
Absolutely. It gives you added exposure if you can tie in a broadcast or cable television station or newspaper. You should each equally credit the involvement of the other. In the long run, you'll discover that your radio station gets the most out of the arrangement, because newspapers and television stations don't typically have the personalities you have that capture the imagination of the public.

Finally, the most important part of doing races, golf tournaments, or any of the other activities mentioned: remember what business you're in. You're in the radio business, not the event business. Do what you do best. Promote the event. Don't get saddled with worrying about where the porta-johns should be placed or what permits you need. As the Beatles were fond of saying "I get by with a little help from my friends."

Next time: Contests... how you can win more often.

□ □ □

Mark Lapidus is promotion director for Group W's WCPT(AM)-WCXR(FM) Washington. He can be reached at 510 King Street, Alexandria, VA 22314.



What does Dolby know about RF?

See Us At NAB Booth 3908

World Radio History

Vintage Radio Lingo Reflects Early Days

by Frederick John

HONOLULU What is "radioslaytion?"

In the old days, that is what they used to call a radio station that did a poor job of transmitting its signal. Even today, we still have too many radioslaytions around.

How about "radioite?" That's another way of saying you are a radio buff. "Radiation" is a speech delivered over the airwaves, and "radiator" is the speaker who delivers it. And you have "radioitis," if you turn on your radio and leave it going all day.

Modern radio workers, and radio fans, as well, may have their own slang, but the language used during the early years of the industry was far more interesting, and a lot more fun. Some of the terms have endured and retained their original meaning.

Let's test your memory, and see how much vintage radio lingo you can recall. We'll warm-up with some easy ones. For example, what was "airways?" That's the same as airwaves, or radio broadcasting.

How about "canned music?" Before CDs and cassettes came along, that is what they used to call music on records. "Platters" meant the same thing. Disc was also another name for a phonograph record. Disc Jockeys used to play them all the time.

For the record—no pun intended—"canned speech" was a talk recorded on a disc, in advance of the broadcast.

Religious programs often took advantage of canned speech, because, in many cases, they were unable to find permanent spots on the Sunday morning radio schedules, which were jammed with religious programs. The programs came on at different times in different cities.

"Continuity" was all that talk you heard between musical numbers, whether popular or classical. It was a bridge between the selections. A "waxed library" was where they kept all those platters.

"Web" was a radio network. A "warbler" was a popular singer, usually male. Warbler fans all across the land could not see their favorite's face, so they conjured up their own magnificent images, only to have them crushed when they came across a photograph of the singer. Many a popular warbler would never make it on television.

"Unwind the stanza" was a soap opera term. It meant to complete a week of shows.

What was "timecasting?" That was when the announcer came on between shows, at the half-hour or on the hour, and gave the correct time, right down to the exact second. "Tub-thumping" was advertising over the air. "Tomtoming" meant the same thing. So did "blurbing," "drum beating," "ether bally" and "hullabaloo."

What was "paycheck?" That was the advertiser who paid for all that ether bally you heard over the Airways.

A newscaster was the announcer who

read the news. An "air spellbinder" was an effective announcer, or speaker. A "blaster" was a radio broadcaster. So was an "etherer," "mikester," "sound tosser"

Test your memory—see how much radio lingo you can recall.

and "word slinger."

"Rettytsnitch" was a mythical instrument of torture that was supposed to be used on performers who made obvious goofs during a live broadcast. And since most shows were live back then, it is a good thing those rettytsnitchers were strictly mythical.

Remote was a broadcast away from the station. Remember the big bands? Mike was short for microphone. "Hit the air" meant to broadcast by radio. "Mat stint" was an afternoon program, or assignment. "Miketivity" was the fine art of radio broadcasting. A "musical tab" was a short musical program, or interlude. "N.G." meant a terrible program (that's short for No Good, as you may have guessed).

On the air meant a station was in operation. On, all by itself, was a shorter version of the same expression. What was "parlor spray?" That is what they used to call radio programs in general. How

about programmer? That was the director of radio programs at a station. "Radiotics" were anecdotes about radio. The "gang" was what they called all "the members of the radio brotherhood". A tunesmith was a composer of tunes. No mystery about that one. But how about "tunesmithing?" That was singing the song composed by the tunesmith.

Let's have a quiz. Ten examples of radio slang follow. Let's see how many you recognize: wobble; adenoidal; beard; bootleg; land the nod; mike hugger; squeak box; crime club airing; easy on the ears, and ether links.

The answers: unsteady radio signals; poor radio voice; a mumbler on a radio show; an unlicensed station; to get a job in broadcasting; excited performer who grabs hold of microphone; another name for the parlor radio; a mystery or police show; pleasant listening and a radio network.

Bet you can't get this one. What was "Local Galli-Curcia?" It was one of those amateur shows that were all over the air during radio's early years.

And finally, how about sign-off? That meant you were almost out of time. The moment had arrived to give your signature farewell, and get off the airwaves. Simply stated, the time had come to shut up.

□ □ □

Frederick John is a freelance writer living and working in Honolulu. He can be reached at P.O. Box 25895, Honolulu, HI 96825.

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Interviews Staple of Sports Show

► continued from page 11

time, they're probably not selling anyway. So here's a chance to get something that's a quality program which they don't have to pay anything for.

"What they get is a three-hour program with guests they could not afford normally themselves and they get half the inventory. They get six minutes of time each hour to sell and we retain six minutes nationally to sell."

Once a station decides to pick up Sports Byline USA, Barr said he tries to create the feeling that he's part of the local staff. Affiliates interview him for a national perspective on local issues, while Barr frequent-

ly interviews sports directors from affiliates to get the local angle of a story. He also cuts individualized radio promos for stations and provides print ad slicks.

Of course, much of the appeal of Sports Byline USA is the cavalcade of sports heroes interviewed on his show. He enjoys giving fans the opportunity to chat with the stars: Billie Jean King, Bill Walsh, Ronnie Lott, Terry Bradshaw, Willie Mays, Reggie Jackson, Julius Erving, Lee Trevino and Mark Spitz to name a few.

Barr also prides himself on his interviewing style. He said he tries to ask the questions the average person does, including the traditional topics like instant replay and

realignment. But he often focuses on controversial social issues like steroid abuse and battered women.

The big picture

"I love getting people to think of the bigger picture. For example, I have taken a position on the Washington Redskins. I think Redskins is a racist name. We had a great discussion about the nicknames of teams like the Braves and the Chiefs and what have you. We went round and round. It was a very insightful discussion. A woman called from South Dakota. She said, 'I'm one-half Chippewa, and I'd just like the rest of the country to know, how

do I explain to my children that we don't look like the Cleveland Indians logo?' That says it all."

Call-ins are a critical component of Sports Byline USA. They received 50,000 calls on their 800 number in 1992. The calls put special demands on the show's engineers. Doug Carroll was an engineer for the show in the KSFO studio.

"The call-in guests tend to take call-in callers." The two lines came up on separate mods which had a tendency to fight each other. "I found that by sending signals to multiple submasters, I was able to keep the gain of the individual mods lower so the phase cancellation and comb filtering was less."

Carroll also used equalization to improve the quality of the phone signal. He had high and low shelving filters on the phone lines themselves. He also used parametric equalization on the mods which he adjusted for problems with each particular phone line. "The most common problem was a deficit in low frequency. I could warm it up with a low frequency boost. Other problems involved the various noises on the lines. Sometimes there was a 60 cycle hum that I could EQ out. Other times there was a high frequency hiss that I was able to alleviate with a peaking filter." He also frequently used a peaking filter set at 1K to increase the callers' intelligibility.

Call-in technology

In addition to adjusting the lines, the engineer is responsible for bringing the callers in and out at the correct time. When the show originates from the San Francisco studio, the producer takes the calls and enters each caller's first name, location and topic into a computer.

Both Barr and the engineer can see the list of callers on a terminal. The engineer correlates the list with Barr's cues to bring the callers in smoothly. Affiliate Relations Director Darren Peck also worked as an engineer for the program. He said that orchestrating the calls was very challenging and that it was helpful to have "a healthy interest in sports. You need to keep focused. The more involved you are, the more you get to know the flow of the show. You get a feeling for where everything is and you can steer things in the right direction."

Frequently, Barr takes Sports Byline USA on the road. Carroll said these broadcasts are particularly challenging. The calls are still received in the San Francisco studio. The San Francisco producer calls the remote producer to give him or her the information about the callers. The remote producer writes it down and hands it to Barr. The engineer listens for verbal cues from Barr to know when to bring calls up. "It's typically a very nerve wracking experience for everyone involved."

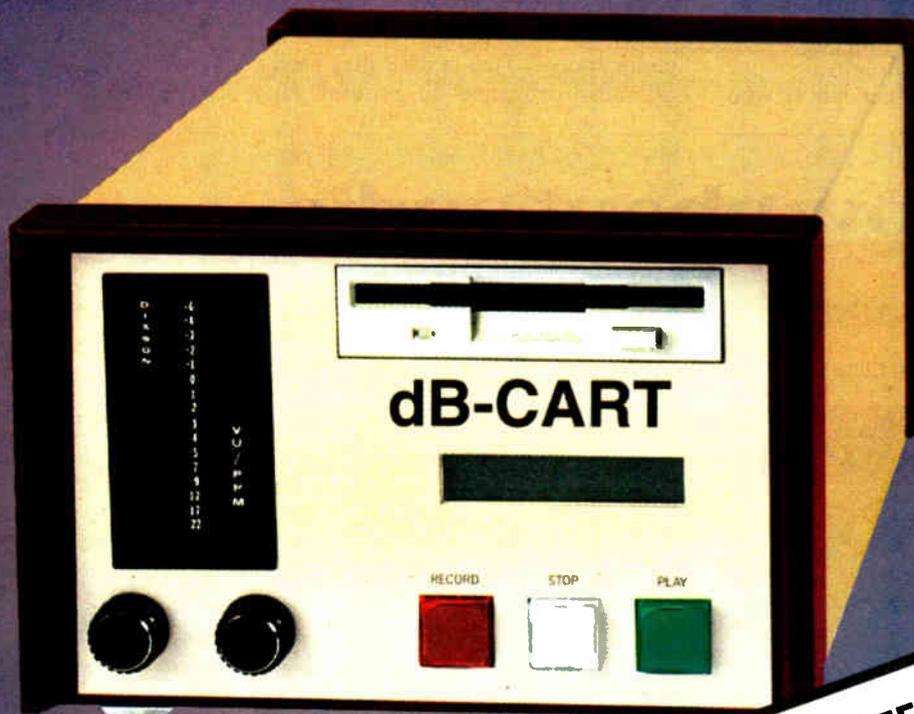
Barr seems to thrive on the churning energy that surrounds his show. During the day, his office phone seems nearly as busy as the studio phone is at night: calls from affiliates, sponsors, sportscasters, stars and fans.

He is confident that Sports Byline USA will continue to prosper, regardless of the directions that the technological and economic winds may blow. "We're the one thing that everybody needs. You can have four stations under one roof, fine, but you've got to have programming. We're the answer and when we expand out to eight hours a day, we'll be programming a full third of a station's broadcast day for zero cost at a time that they don't want to staff. So they, in essence, can focus on 16 hours a day. It's very appealing."

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MARKETING & MANAGEMENT

Successful Sales: More Than Just Spots

by John Cummuta

ALGONQUIN, III. Success today is based on the inescapable fact that a business can no longer just hang out its shingle, or put an ad in the paper, or run a schedule on the radio saying, "Here we are...we're open," and expect to be successful.

Unfocused, me-too advertising delivers diffused, unimpressive results. Focused, well-conceived marketing, based on your understanding of your customer's individual characteristics and tastes, will produce dramatic, profitable results.

I believe that for most businesses, understanding and implementing a customer-focused, database marketing process could mean the difference between having many profitable sales or one big going-out-of-business sale.

More profit too

The sales and marketing systems we'll be describing in this column are not only designed to keep you from going under. On the contrary. They will help you know if you are really making a profit. You are going to learn the direct relationships between your marketing expenditures and the revenues they generate.

But, more than that—customer-focused database marketing can dramatically affect the level of your profits. Properly implemented, it can double, triple,

quadruple your advertising responses and your profits. So let's focus on your customers, and get to know them better.

Every human being acts out of self-interest. Even the most unselfish and philanthropic people get a sense of self-satisfaction from the good things they do. To a certain extent, you could say they are acting for self gain. This is not to depreciate the value of a noble act. These people are every bit as admirable as they seem, but from a psychological standpoint, they are doing these things because they bring them pleasure, by making them feel better about themselves.

No one will intentionally do anything that he/she knows or believes will make him either mentally or physically worse off than he was before the act.

No matter what you're trying to motivate a person to do through your marketing, you must remember that regardless of the call letters of the station you are advertising on, your prospect's and customer's favorite station is WIIFM (What's in it for me?).

If your marketing messages can't answer that question, you're not going to make the sale. It's that simple. Your prospect or customer couldn't care less that you have the largest selection or the friendliest sales people. You must tell him how these things benefit *him*.

Let's take this concept one step further.

Unless you really understand the person you are trying to sell to, you cannot hope to anticipate his wants and needs. If you can't anticipate them, you can't advertise that your product or service meets them. In other words, you can't effectively tell anyone "What's in it for him." And if you can't do that, you can't sell to them,

Customer-focused database marketing can dramatically affect the level of your profits.

so you can't stay in business.

Obviously, the better you know your customer, the more clearly you can communicate with him, on his level and in his terms. A stronger understanding of your customer can also lead you to an awareness of other products and services he might buy from you.

And, the better you know your customer's individual characteristics, the more easily you will be able to find other people just like him.

Knowing is the first step

In later articles in this series I'll tell you how you can capture and act upon the

information you come to know about your customer. Suffice to say that we have gotten off on the right foot. You must first know who your prospects and customers are, how they feel about your business and its products and services, what they ideally want from you, and how you can best communicate to them that you have what they want.

Secondly, you should always keep in mind that your prospects and customers are only concerned with how your offer benefits them, and are totally uninterested in the things you are probably most proud of: your place of business, the competency of your staff, the fact that you are number one in your state, etc.. They only want to know *how* those things might come to benefit them.

With that foundational knowledge, we can set out next month to examine the "communication process" of marketing. In the meantime, sit down and consider how well you really know your *typical* customer, what he wants from your type of business, and what kind of offer would excite him. Write down everything that comes to mind. We'll use it later.

□ □ □

John Cummuta is an independent Marketing and Management consultant, and the author of the Sales Machine database marketing course. He can be reached at 708-658-9107.

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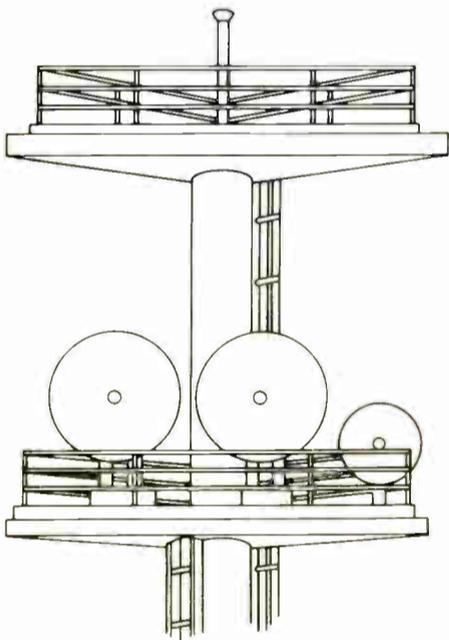
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Techie Jargon for the Non-Technical

by Howard L. Enstrom

MOUNT DORA, Fla. For non-technical readers, here are definitions of some commonly used expressions in FM translator and broadcast work:

Adjacent channel: The next higher or lower numerically allocated channel(s) to a reference channel.

Antenna gain: Figure of merit for directional types. For power gain, the ratio of maximum radiation in a given direction to that of a half wave dipole antenna in the same direction for equal power input in free space at 0 degrees elevation in the elevation pattern. As a gain reference, a half wave dipole antenna has a power gain of 0 dB.

Array: Combination of antenna elements, electrically-driven or parasitically excited. A "Yagi" type antenna is a parasitically-excited array.

Bandpass filter or cavity: Inserted into transmission line to reject energy at all frequencies outside a narrow pass frequency.

Beam width: Angular width measured in degrees between half power points (3 dB less than maximum) of an antenna's major lobe, in either the elevation or azimuth radiation pattern.

Beam tilt: Typically, the angular tilt of the main lobe in the elevation pattern above or below 0 degrees elevation.

Capture-effect: Phenomenon in reception whereby the strongest cochannel signal suppresses the weaker one.

Circular polarization (CP): Usually generated with crossed antenna elements fed with a 90 degree offset in electrical phase. Propagated wave energy threads it way through space, clockwise or counterclockwise. A non-CP (linear) receive antenna will intercept its wave energy, but a CP receive antenna's left or right hand polarization must compliment that of a CP transmit antenna. If CP wave energy is reflected by a surface, direction of electrical rotation of the reflected wave may be reversed.

Co-Channel: Same channel as reference channel.

Construction permit: Document (often referred to as "CP" or "grant") issued by the FCC authorizing construction of facility proposed in application, to be completed within 18 months. It is not the instrument of operating authority, which is the license.

COR: Physical center-of-radiation of an antenna or array, in feet or meters (1) above ground level (AGL), height above (2) average terrain (HAAT), or (3) average mean sea level (AMSL).

Decibel: Convenient unit ("dB") of measure to express, for example, power gain or loss. In translator work, to show gain or loss in an antenna, loss in a transmission line, or relative intensity in a radiation pattern. A reference level of 0 dB must be specified, where dB gain = $10 \log_{10} P_2$, where P_2 is the power ratio. \log_{10} here is the common logarithm. A system's gain is conveniently calculated using decibels, which may be added and subtracted to obtain net gain.

dBd: Gain of an antenna array using half wave dipole reference.

Desens: (Receiver desensitizing) Strong off channel RF energy passing

through wide front door of receiver, reducing gain. Cause usually due to close proximity of receive antenna to other service.

dBk: Commonly used to express ERP (effective radiated power) of an FM translator or full service station. When 1 kW is referenced to 0 dBk, the relationships of power and dBk are:

ERP(kW)	dBk
100	+20
10.0	+10
1.00	0
0.100	-10
0.010	-20
0.001	-30

dBu: A convenient expression of the field strength of RF wave energy, where 0 dBu = 1 microvolt per meter ($\mu\text{V}/\text{m}$). The relationships of field voltage and dBu are:

Field in $\mu\text{V}/\text{m}$	dBu
1000	60
316	50
100	40
31.6	30
10.0	20
3.16	10
1.00	0

Ducting: (Tropospheric) Sporadic reception of long distance FM signals caused by layering of dissimilar air masses above the earth.

Footage: Multiply by 0.3048 for meters.

Frequency search: Uses retrieval/organization of database information to analyze and preclude use of channels for NCE or commercial FM translators, revealing candidate channels.

Free space wavelength: 300 divided by frequency in MHz.

Geographical coordinates: Precise location of point. On a map, expressed for latitude and west longitude, dividing earth circumference distance in increments of 360 degrees, 60 minutes, and 60 seconds.

HAAT: Height above average terrain.

Harness: Coaxial cable assembly used to distribute RF power to elements of an array in proper electrical phase and for beam tilting.

I.F. Relationship: (Undesired) Where two signals presented to translator input differ by, or close to, I.F. frequency of 10.7 MHz, e.g. incoming signal of 101.7 MHz and translator output signal of 90.9.

Interference contour: Geographical location of station's predicted field strength contour based on F(50,10) curves.

Intermod: Sometimes mysterious phenomenon when signal energy exterior to translator heterodynes (mixes) to produce a resultant signal with same frequency as translator's input.

Kilometer: (1,000 meters) Multiply by 0.6212 for mileage.

License: Instrument of authority to operate a translator.

Local modulation: process whereby a translator substitutes a locally-generated and modulated radio frequency signal for that of the FM station regularly rebroadcast. Use may be for making 30 second announcements once per hour, prescribed by Part 74.1231(f)(g) of Rules.

Meters: Multiply by 3.2808 for footage.

Mileage: Multiply by 1.609 for kilometers.

Multipathing: Several translator primary signals, or translator signals, received at different time instants due to

effective antenna height above average terrain, at various radial intervals, as a function of terrain elevation changes. For a candidate channel, to calculate predicted coverage and incoming/outgoing interference contour distances.

VSWR: (Voltage Standing Wave

A system's gain is conveniently calculated using decibels, which may be added and subtracted to obtain net gain.

"billiard shot" reflections. Effect degrades recovered audio, especially stereo.

Muting control: Adjusted to cut translator signal in absence of primary station signal, or level suitable for rebroadcast.

N Connector: Superior type for RF lines, designed for constant impedance at joints, terminations, etc.

Polarization: Alignment of radio wave (parallel or perpendicular) to earth surface.

Power divider: Used with single transmission line to feed multiple loads such as antenna arrays, or elements of an array, with specific (1) percentages of power and, (2) electrical phase relationships.

Protected contour: Geographical location of a station's field strength contour predicted from F(50,50) curves, according to class of station.

Radio horizon: Somewhat beyond line-of-sight horizon.

Terrain study: Analysis of a site's

Ratio) Ratio of the maximum to minimum values of voltage or current in the pattern at the antenna terminal. Produced when load (antenna) impedance differs from the characteristic impedance of the line.

White area: (In re waiver of 0.25 kW ERP limit) Any area not served by a full-service public radio station, even if served by a full-service commercial station.

White noise: Random or aperiodic broadband impulse energy distributed throughout the frequency spectrum, heard as audible "hiss" from an unquieted receiver.

□□□

Howard L. Enstrom is an engineering consultant and president of FM Technology Associates, Inc., specializing in FM translator services and equipment supply. He may be reached at 904-383-3682, by FAX at 904-383-4077 and by mail at 30925 Vista View, Mount Dora, FL 32757.

LPB Helps Station KDJI Return to the Airwaves

by Nancy Reist

HOLBROOK, Ariz. Just a few months ago, KDJI didn't have a back-up transmitter, but a serious flood forced the station to buy one in a hurry.

Normally, a 5kW AM station, KDJI was still running on the back-up LPB AM100P transmitter at press time in late February, but engineers expected to have a new main transmitter installed in a few weeks.

The station ordered the 100 watt backup after the January 8 flood damaged the main transmitter, leaving KDJI off the air for 12 days. President and General Manager Roy Roberts explained that KDJI, which is the EBS CPCS-1 station for the area, was off the air for 12 days.

"We didn't have a backup transmitter, which is a mistake we'll never make again, plus we had no electricity for several days and we had kind of a health hazard with some of the debris from the flood," he said.

KDJI broadcasts from a low, marshy wetland area which was selected for its conductivity and convenient loca-

tion when the station was founded thirty years ago. Until January, there never was a problem with excessive water. But this winter, heavy snow and rains, followed by a major melt period, saturated the watersheds in Arizona.

Flooded studio

On Friday, January 8, the nearby Leroux Wash flooded. Roberts explained, "We had about an hour's notice that the water was rising to unprecedented levels and we had better make some preparations. It was totally a surprise to everyone involved, so in an hour we didn't have much time to do anything. What we tried to do was sandbag effectively at least in the transmitter room, which is a separate block building that connects to our studio and offices. We barely got out of here. The water at that point was rising in our driveway to tire height on our truck."

KDJI contacted the three stations that relied on them for EBS messages and told them they were off-the-air. Those

continued on page 90 ►

FACILITIES SHOWCASE

WVAZ-FM Settles into River City Studio

by Dee McVicker

CHICAGO Unless you're the lead dog, the scenery never changes. That certainly was true for WVAZ-FM of Chicago, Illinois, which shared company with a retirement home for several years until it reached and sustained top-market ratings.

Then it was time for a change of scenery to the likes of River City, a city within a city in Chicago's trendy Printer's Row area. The change in view came by way of a new 10,500 square-foot facility a "little off-broadway" from downtown Chicago, and has helped the station stay on top in a brutally competitive market.

Humble beginnings

WVAZ-FM's move up to top-dog ratings started at a retirement home in Oak Park, which previously had been a large hotel when the station moved into the same building decades ago. To get to WVAZ-FM, personnel and guests had to wind their way through the retirement home, take a freight elevator up to the sixth or seventh floor, and once there, had to walk single file down the hall in order to go from one room to the next.

That is how Barry Mayo remembers WVAZ-FM's old facility when his company, Broadcast Partners, made an offer to

The search for new studios began in earnest by the station's chief engineer, John Bortowski, who previewed over 40 buildings. He was looking for that special building that would give WVAZ the prestige, space and scale of economies it needed.

The list of possible sites narrowed to 10, with River City taking the obvious lead because of an innovative financial package it offered. "They were eager to have us and they went the extra step forward to try to get us here," said Bortowski.

That extra step included financing the construction of the facility to the station's specifications, which saved Broadcast Partners from seeking funding elsewhere or holding off the move for another year.

Plus, noted Bortowski, the property managers of River City were amenable to letting the station put up its satellite dishes in the parking lot. Not many properties in Chicago allowed for these radio necessities, he commented, and none—including River City—had a direct line-of-site to the Hancock Building where WVAZ-FM's tower resides.

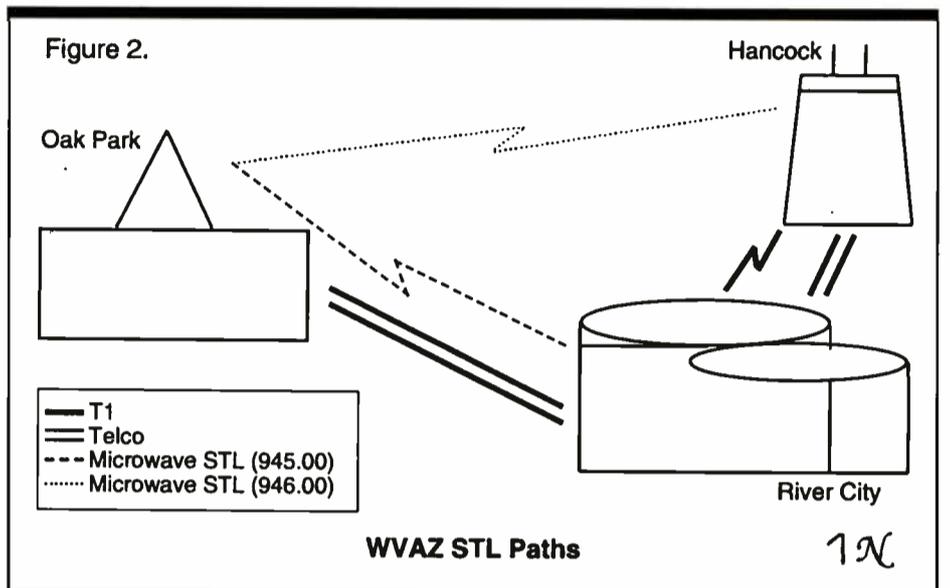
One of the first purchases for the new facility was a QEI CatLink for T1 carrier from River City to the Hancock Building. The options to transporting programming across town were either phone lines or double hopping. Neither of these proved to be as economical as T1. For backup,

console, which WVAZ-FM beta tested at Oak Park under extreme RF conditions. The studio also has logging equipment and a Moseley MRC remote control to handle this workload as well.

The interview studio likewise serves a dual purpose, both as a room to conduct interviews for the station's weekly community affairs program, and also to lay down voice tracks for productions when sound effects equipment isn't required. It

hall from the on-air studio, which houses a RAM console.

Both production studios and the on-air studio are equipped with Gentner telephone system and hybrids for listener calls. Also in the 13,500 square-foot facility, Mayo at last got not one but two rooms to bring prospective clients. He's not only proud of the conference rooms, but says they are valuable to the marketing of WVAZ.



houses a Shure mixer with microphones and table and chairs for this purpose.

Production a major role

One of the two production studios, which uses an Audiotronics 210 Series console, is in constant use all day by a full-time production operator. "We do a lot of agency stuff," explained Bortowski. Studer CD players, Eventide harmonizer, and Alesis MiniVerb are in use in the studio.

Production 2, another two-track with a Harrison console, has similar source and effects gear to carry the overload. Both production studios are located across the

"One is done up in a very corporate setting with low voltage lighting, neon black lighting," he said. "In our other working conference room, where one whole wall is done in whiteboard, we now offer creative problem solving as a service to our clients. We invite them up here and we do brainstorming sessions with our staff."

□ □ □

Dee McVicker is a regular contributor to RW and a freelance writer specializing in industry newsletters, manuals, and brochures. She can be reached at 602-545-7363.



WVAZ-FM's Production Room Number 1

purchase the station in 1988. When the papers were signed in September, he vowed to move the station as soon as he could.

But first, there was work to be done. There was a new format to pioneer that would impact an up-and-coming demographic, the adult black consumer, and later, the Chicago market.

"We're the conduit between our advertisers and the black consumer market," Mayo likes to say. Overnight, WVAZ-FM's new format of Urban Adult Contemporary was a success, and the station's Arbitron rating shot up to number one with the 25 to 54 year-olds. It has since sustained the top three slots in the Chicago Arbitron over the past four years and has become the model for "The Touch" format on Satellite Music Network, which Mayo consults on a regular basis.

But with this hard-won success came an even greater urgency to move. "We're selling upscale black consumers, and I couldn't invite clients in. If I wanted to have a meeting, I had to rent a hotel room downtown," recalled Mayo.

Bortowski said, "We still have a backup transmitter back in Oak Park, which is west of the city. We had a microwave already going from Oak Park to downtown Chicago."

Nice on the inside

Cash was spent on studio furniture for the on-air studio, two production studios, a newsroom, a news announce studio and an interview room. Only the news announce studio was new to the station, the need of which became evident during layout of the facility.

Ergonomics required that the newsroom be situated down the corridor from the on-air studio, which made it impossible for the news announcer and jock to signal each other during the morning news break. It was also ergonomically impractical for the news announcer to enter and leave the on-air studio prior and after the breaks.

The solution: a news announce studio facing the on-air position through a glass divide. The news announce studio houses a new Broadcast Electronics Air Trak

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'Didja Ever Notice' Radio's Funny Bits?

Dear Luci,

I've had ample opportunity to touch base with a bunch of my buddies in other markets recently. You know, the kind of thing where I see their names in print because they either got a great new gig somewhere or wound up on the beach and they plug an ad into the publications.

What I enjoy hearing from all these folks is their very best Andy Rooney-isms; your basic "Didja ever notice..." anecdotes, mostly pertaining to the industry in one form or another.

In all fairness to where the proper credit is due, I've always thought George Carlin should get the nod for popularizing "Didja Ever Notice." But face it, Andy's more fun to mimic—therefore he gets the popular vote from most of us.

Laughing at ourselves

How, you may ask, can "Didja Ever Notice" be funny when it comes to radio. Hey Luci, how can it *not*? Some of the inconsistencies in my line of work make things pretty darn amusing.

I take no credit (or blame) for the accuracy of what I hear from my pals, Luci, and I hope they won't generate piles of mail in the front of the paper. The fact is, a lot of these just make you flat-out *think* about things for a moment and wonder how they got that way.

Didja ever notice, based strictly on telephone contact, the smaller the market (and even smaller the station), the more the PD is "in a meeting and can't come to the phone"? Hmmm.

Didja ever notice, when circumstances dictate the consultant has to handle an air-shift, how frequently he shatters his own rules?

If a triode has three elements and a pentode has five, how come "sextode" is a

process which creates tadpoles?

Didja ever notice the promotions assistant won't sit anywhere near the computer tower case for fear of RF exposure, yet stares through the glass on the microwave oven waiting for the popcorn to be done? While having a butt?

Everybody's favorite: Why didn't Dr. Johnny Fever ever wear cans?

Who was first?

KDKA Pittsburgh is generally recognized as America's "first" station (and please don't write me on this one), with a listed date of November 2, 1920 in the 1988 Broadcasting Yearbook. Look just beneath that listing to see KQV Pittsburgh, with a listed date of November 19, 1919. Didja Ever Notice?

Didja ever notice you can wrap a digital reverb with Sonex™ foam and kill the echo? (Personally I don't buy this one.)

This one gets sneaky and I don't condone its practice, but didja ever notice when several stations' remote vans are all at the same place together—e.g. at a state fair or a city event—one station is giving away aluminized mylar balloons? Watch how high they're being flown over the van...perhaps to skunk up another van's Marti shot back to the studio? Uh ohhh...

Didja ever notice, regardless of your market's position, how many folks don't listen to the radio when you're doing snow cancellations? Meter them as they phone the station.

Finally to stations now automated, didja ever notice that the "torque-modified self-lubricating servomechanism bushing" you paid fifty bucks for is being sold at the hardware store for a nickel? It's a felt washer made to be soaked with oil.

I've got a feeling both George and Andy would be proud of the guys I know. Sometimes it takes a sharp eye and a ready

FROM THE TRENCHES

by Alan Peterson



ear to catch some of these "didja's" that go by. When they do, it makes for another slice of lunacy which keeps us coming back for more.

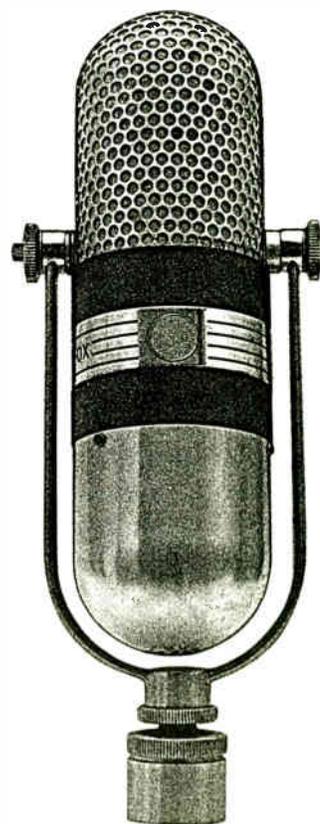
And believe me, there's plenty more which I hope to be able to tell you about if my buddies cooperate with

me. I'll let you know.

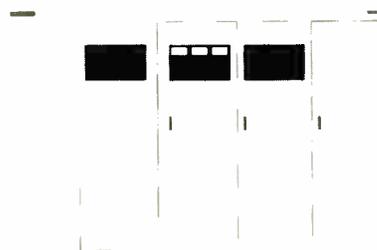
—AL

□□□

Didja ever notice Al Peterson always has something dippy to put here at the end? Didja? Huh, Didja? Write him at WLAD, 198 Main Street, Danbury CT 06810.



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Using Vectors to Express Relationships

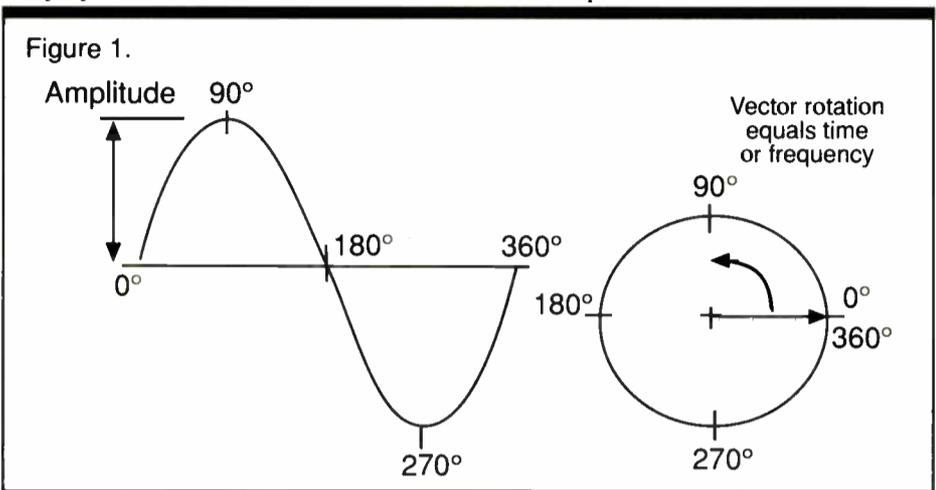
This is the eighth in a 10-part series called Fundamentals of AC. Northern Virginia Community College will offer 1.2 CEUs (Continuing Education Units) to registered students who successfully complete the course and an examination mailed at its conclusion.

To register, contact the Community Education Office, Annandale Campus, 8333 Little River Turnpike, Annandale, Va. 22003, or call 703-323-3168 or 323-3528. The fee for the course is \$30.

circuits that are made purely of coils and capacitors. The impact AC and pulsating DC has on these devices creating voltage and current phase shifts has been covered.

The relationship of voltage and current in a coil or capacitor can be expressed in a rectangular manner using vectors. A vector is a mathematical term defining something that has a definite magnitude and direction.

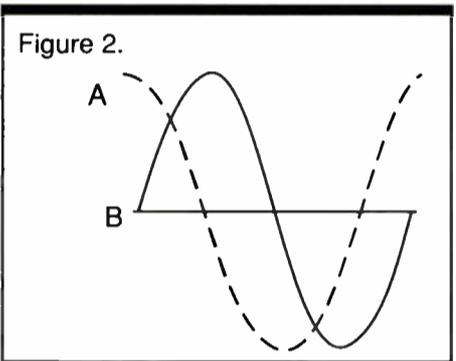
Figure One is an illustration of a sine wave and its vector equivalent. A sine wave is a linear expression of circular movement



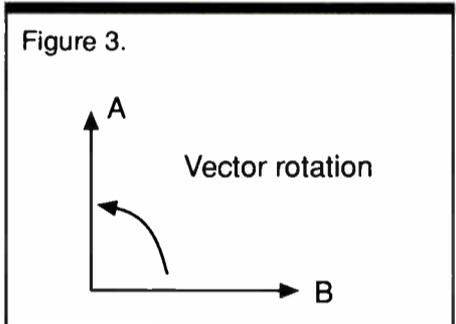
by Ed Montgomery

Part VIII

ANNANDALE, Va. In previous lessons we have looked at the characteristics of inductive and capacitive reactance within



through 360 degrees. Completing the entire circle is considered to be one cycle. The time it takes to rotate through the 360 degrees is known as the period or cycle. The number of cycles per second is the fre-

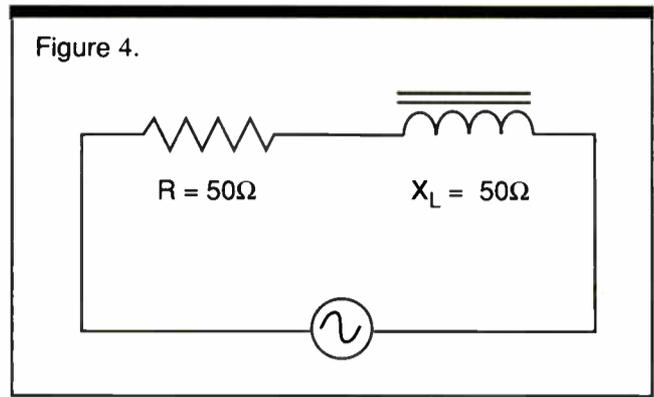


quency of the rotation expressed in hertz. The sine wave illustrates the circle and the time it takes to complete the rotation. The

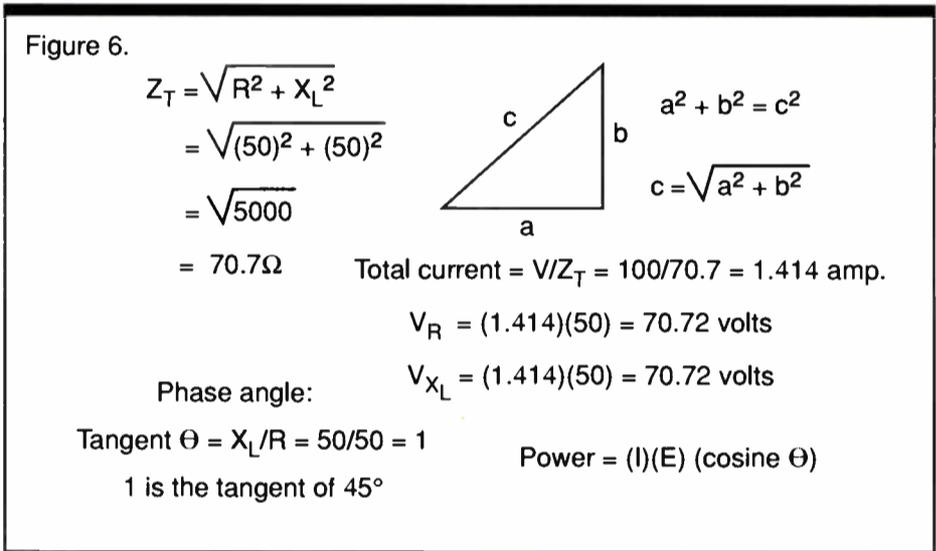
vector simply illustrates the magnitude or amplitude of the wave and its rotation.

Using vectors can be helpful in analyzing the properties of voltage, current, and resistance in circuits with inductive or capacitive reactance. Voltage and current are 90 degrees out of phase in circuits with coils and capacitors. Figure Two is an illustration of this. Waveform "A" in this illustration is leading waveform "B" by 90 degrees. In this instance waveform "A" is already at 90 degrees when waveform "B" is at 0 degrees.

This relationship also can be expressed in vectors and this is illustrated in Figure Three. The two waveforms are illustrated in rectangular coordinates using both



resistance and inductive reactance. Total resistance in this circuit will be known as



an X and Y axis.

Circuits containing inductive reactance will have maximum induced voltage when the rate of change of current in the coil is at its maximum point. Because the induced voltage of a coil occurs when the current is passing through its minimum amplitude lev-

impedance. This is a combination of voltage and current in phase in the resistor and voltage and current out of phase in the coil.

The symbol for impedance is "Z" and it is measured in ohms. Because inductive reactance and resistance have properties that are not in phase with each other, calculating total impedance is no longer a simple arithmetic function. The rectangular coordinates expressing the terms out of phase must be considered.

Vectors can be used to solve these circuits. Figure Five is an illustration of how total impedance can be measured. A right triangle is developed with the total impedance being the hypotenuse. Mathematically this can be solved using the Pythagorean theorem.

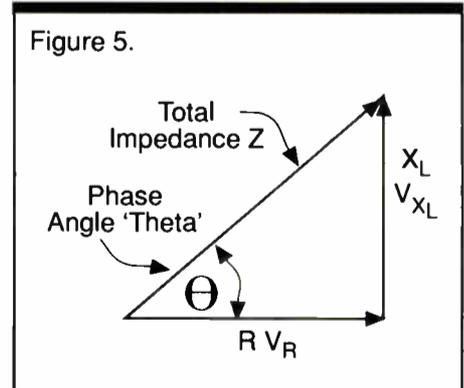


Figure Six is an illustration of how a problem can be solved mathematically. If the resistance and reactance were simply added together, the answer would be 100 ohms. When the phase shift of voltage and current are considered, the total impedance is calculated to be 70.7 ohms.

This change has an impact on what the

continued on page 34 ▶

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Learning to Use Vectors

► continued from page 32

total current and voltage drops are throughout the circuit.

The phase angle of the total impedance can be measured using a protractor on the triangle, or it can be solved mathematically as illustrated in Figure Six. The tangent of the angle can be found in most pocket calculators, personal computers, or trigonometry tables. Pythagorean's Theorem also must be used to calculate total voltage.

The phase shift of voltage and current also will affect the power dissipated within the

Figure 7.

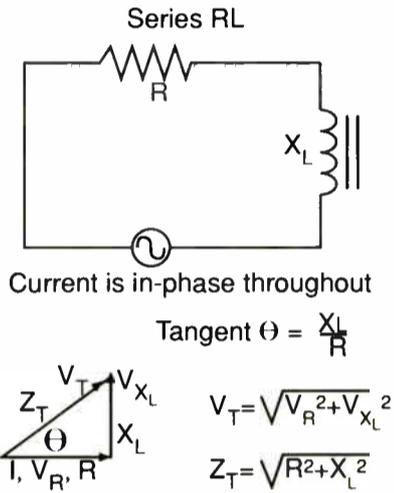
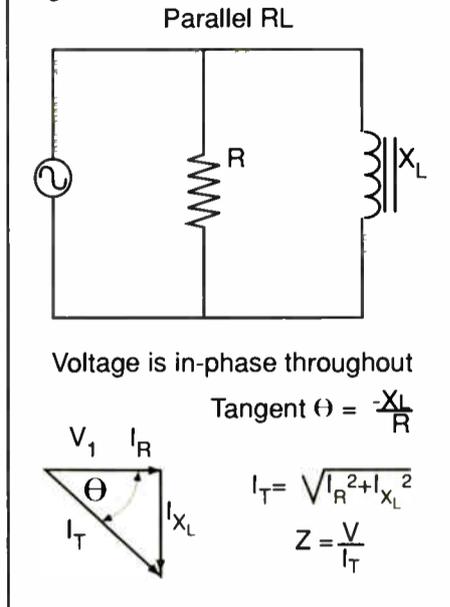


Figure 8.



circuit. Power is usually the product of current and voltage within a circuit or device. However, in circuits containing reactance, the phase shift must be considered to determine how much power is consumed.

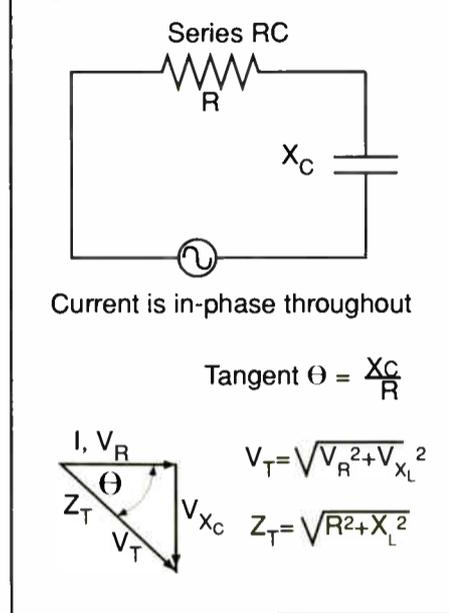
Power in resistive/reactive circuits is equal to the product of voltage, current, and the cosine of the phase angle.

The vectors on circuits containing capacitors are similar to inductors but in the oppo-

site direction. Remember the voltage current relationship in capacitors is opposite that of coils. Formulas and vector relationships for series and parallel circuits containing coils and capacitors are illustrated in Figures seven through 10.

Circuits containing resistance and reactance are quite useful in electronics and are used quite extensively in filter circuits. The

Figure 9.

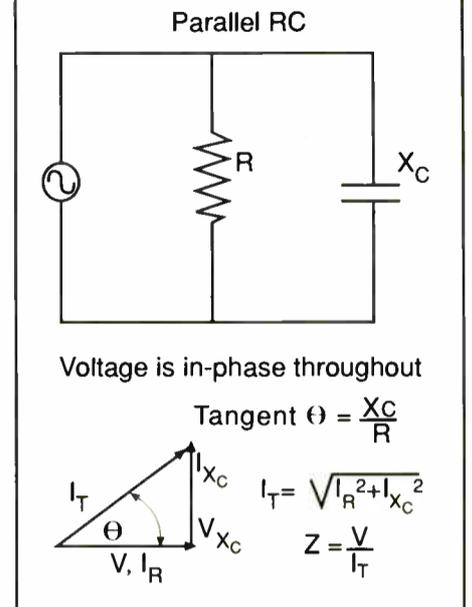


impedance and phase angle of this circuit?

Z=___ ohms

Phase angle=___ degrees

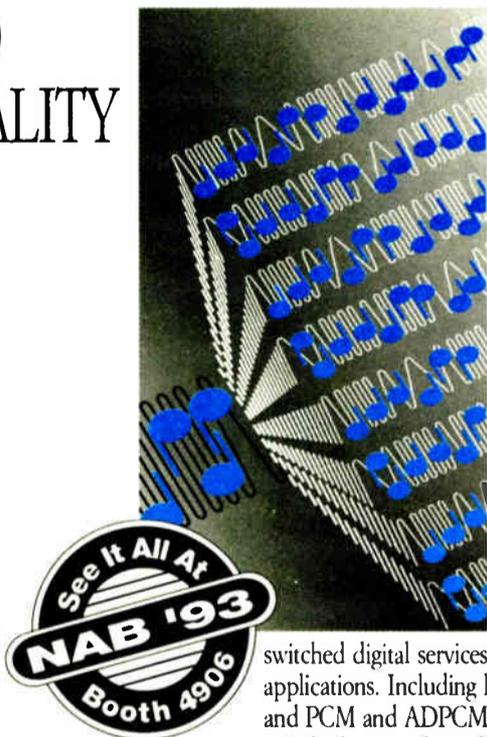
Figure 10.



The answer to last installment's problem: When 60 Hz is applied to 5,000 microfarads; 0.53078 ohms of capacitive reactance is produced. □ □ □

Ed Montgomery is a communications teacher at Thomas Jefferson High School for Science and Technology. He has taught broadcast engineering at Northern Virginia Community College and worked as a broadcast engineer for several radio stations. He can be reached at 703-750-5090.

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COLE'S LAW

Off-the-Air? Don't Forget to Write the FCC

by Harry Cole

WASHINGTON In what might be seen as one of the sadder legacies of the 1980s, the Commission has proposed, on its own motion, to add a question to the postcard renewal form (FCC Form 303-S). That question is: "Is the station off-the-air as of the date of this filing?"

While this question might be seen by some as kind of dumb, the FCC's proposal highlights an increasing problem in the radio industry. The problem is that, with the dramatic increase in the number of stations on the air (and the accompanying increase in competition for advertising dollars), more and more licensees are apparently just throwing in the towel, turning off their stations, and finding another line of work.

For example, the Commission already knows about more than 200 commercial AM and FM stations which have discontinued operation. And, as you might have guessed from the fact that the FCC wants to include a specific question on the renewal form, it would appear that the Commission figures that there are a bunch more off-the-air stations that it *doesn't* know about.

It is, of course, impossible to pinpoint precisely why stations are shutting down. While it is likely that many, if not most, are simply reacting to the harsh competitive environment, there is no way of saying for sure unless each shut-down (or shutting-down) licensee provides an explanation.

The FCC's proposal is designed to assist in developing some information along those lines. If the renewal applicant acknowledges in response to the proposed question that its station really is off the air, the applicant will have to provide an explanation and a description of the steps to be taken to get back up and running.

The FCC's proposal gives us the opportunity to remind you of what you're supposed to do if, for whatever reason, you are forced off the air. Section 73.1740 of the FCC's rules permits stations to cease operation for up to 30 days without prior Commission approval.

In other words, if you need to take the station down for testing, equipment repair or installation, or some other temporary situation, and if you crank back up within 10 days, you don't need to notify the Commission at all. If you're off the air for more than 10 days but no more than 30 days, you have to notify the FCC. And if you're going to be off the air more than 30 days, you have to get FCC approval to remain silent.

Finally, if you do decide to end it all and permanently discontinue your operation, Section 73.1750 of the rules requires that you send your license back to the Commission for cancellation.

A further step which might be

expected would be the issuance of fines for failure to comply with Sections 73.1740 and 73.1750. As we saw last year, the Commission has become a lean, mean, fining machine. In fact, in just the two weeks between December 30, 1992 and January 13, 1993, the Commission issued or reaffirmed fines against broadcasters in the aggregate amount of more than

\$90,000—and that doesn't count the \$600,000-plus fine issued earlier in December with respect to the Howard Stern show.

And don't think, just because you've called it quits and pulled the plug on your station for good, that the FCC won't try to shake some cash out of you. One unsuccessful applicant for a new FM station happened not to advise the

Commission that it had lost its transmitter site. That pesky little fact surfaced during the comparative hearing.

Normally, you might have thought that denial of the application would have been penalty enough. But no. Instead, the Commission has fined the applicant \$7,500 for failure to notify the FCC of the loss of the transmitter site.

Now, if the Commission is willing to go to such lengths against a mere unsuccessful applicant, it is not hard to imagine it going even farther against someone who is actually a licensee.

□ □ □

Harry Cole is a partner in the Washington-based law firm of Bechtel & Cole, Chartered. He can be reached at 202-833-4190.

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- Record and edit direct to removable MO, and transmit finished productions via network? Yes No
- Customize the interface to your working style, & set up favorite music/effects for instant use? Yes No
- Answer the ad clients', "What if we tried this...?" by doing it instantly, while they watch? Yes No
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KEYBOARD CONNECTION

Infobases Streamline Operations

by Barry Mishkind

TUCSON, Ariz. Every day, broadcast stations are inundated with information. From FCC Rules changes to the wire services to music and program logs to sales and bookkeeping. Sometimes it seems the electronic media is a bigger "tree killer" than many other industries.

Nevertheless, it's important to have all sorts of data ready at hand. The program director wants to know how many spots there will be this afternoon. The sales manager is interested in the "unsold inventory" or a spec script for a carpet store. The news director is searching for the background information on a key local story. The sports director needs to know who quarterbacked the high school team four years ago.

While some of these needs can be handled with specialized programs, such as those for traffic and billing, other needs may require hours of searching through old books and records. In stations where a good deal of information is stored on computer, there now begins a long search through perhaps hundreds of cryptic filenames.

Heard about infobases?

What's an infobase? Sometimes called a "free-form database," it's a cross between the traditional database and disk utilities that search for phrases and words. By taking the stronger points from each, a stronger application results.

For example, in a database, information is input in a structured way. Layouts can then be designed to search for and display the information.

While best suited to find multiple results, a database isn't really good for easily locating phrases in the middle of lots of text. On the other hand, a text search program usually requires precise instructions; "East High School" and "East high school" are two different phrases. In fact, with various permutations and misspellings, searching for a phrase could take as long as going through piles of old papers.

An infobase combines the best parts of both applications and adds several features that save time and effort. Two infobase generators worth your attention are askSam™ from askSam Systems and Folio Views™ from Folio Corporation.

As Folio Views processes your files, it indexes every word and compresses the text, typically almost 50 percent, saving lots of disk space. The index then provides almost instantaneous access to the information for which you are seeking. As fast as you can define your desire, the text appears.

For instance, asking for "East High School," "quarterback" and "1989" avoids all East High material on last year's football team, basketball team, orchestra, or the new dean of students.

The news director might go another direction and match "murder" with "downtown" and "November" but *exclude* "gun." It's the flexibility of *and*, *or* and *not* that makes zeroing in on needed information easy.

Recall it again, Sam

One of the problems that often bedevils talk show hosts is finding information quickly while on the air. Folio's index fea-

ture even overcomes the frustration of typos slowing you down. As a word is typed, the closest match is shown, with adjacent possibilities, letting you see quickly which words are in the infobase.

The index feature also generates another time saver. As you add words, the number of matches is shown. In effect, you narrow the search dynamically to fit your needs and time pressure. During a trivia show, pop in the information you remember and you immediately know how close you've gotten. And, by using a series of windows for each search, you can switch between

each slice of information.

What about infobases that grow in size, like a news morgue with every story broadcast each day? Folio allows you to just append each day's material to the existing infobase, and recompile in short order. Information can be gathered by week, month, etc., and accessed rapidly.

Another key feature of infobases is the ability to insert hypertext links, which "jump" the reader to related information, or help screens. One use some stations have made of hypertext capability is developing Operator's Manuals with

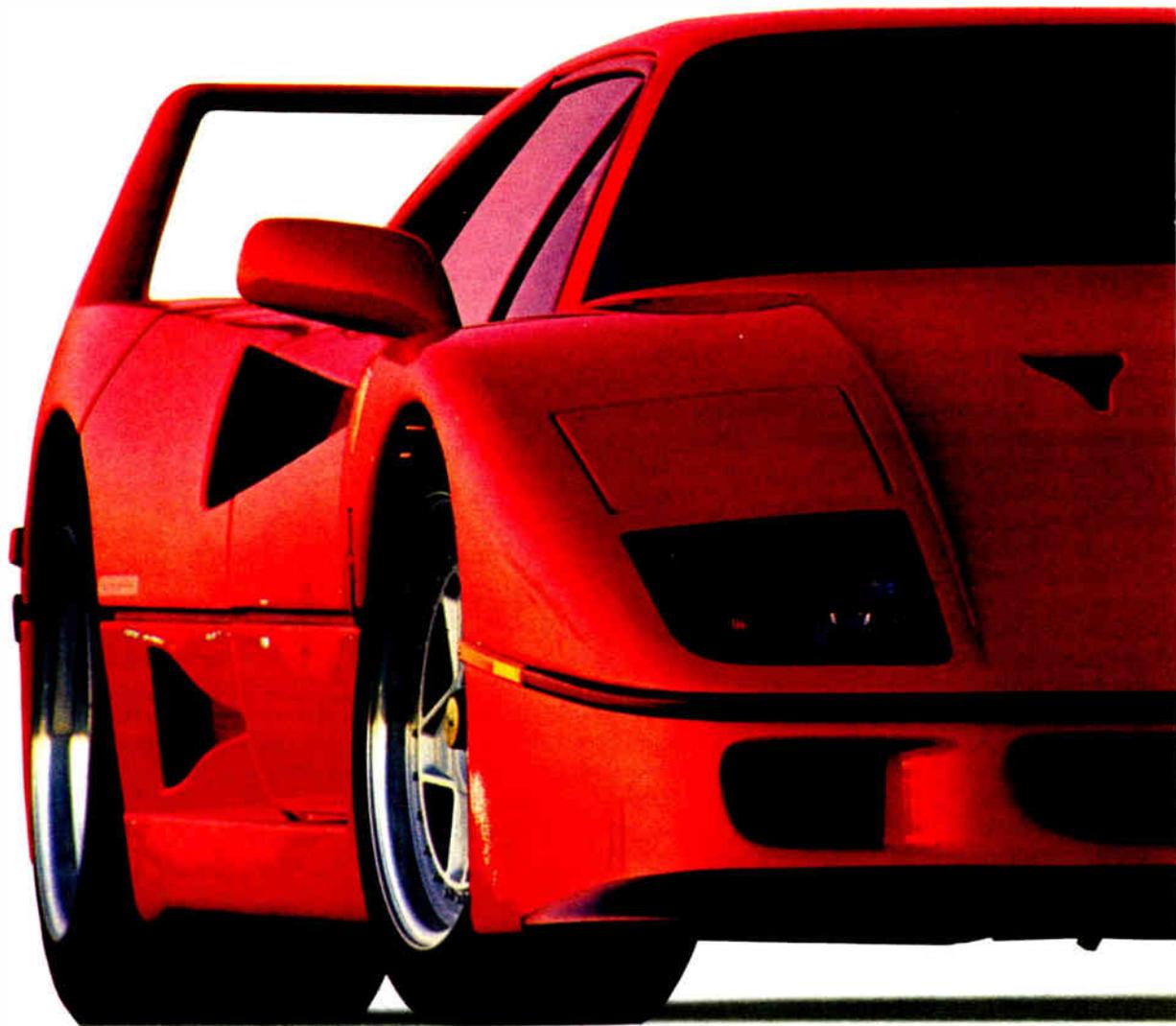
hypertext links that explain unfamiliar terms or jump to emergency instructions.

A further way infobases can speed information gathering is to provide relational access to several files. For example, the engineer might search one file to locate a piece of gear from inventory, inspect its service record, and then jump to another file to find the best priced supplier for repair parts.

Fast on the output

askSam shares most of these features, a major exception being indexing (until a file grows very large, the searching is still quite rapid). But the key difference is askSam's ability to quickly generate formatted output. When searching produces

continued on next page ►



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World Radio History

WORKBENCH

Gadgets to Use Every Day

by John Bisset

FALLS CHURCH, Va. Michael Schweizer, from IMF Telecommunications and Broadcast Engineering Service in San Francisco, sent in a sharp idea that focuses the light beam of those tiny Mini-Mag Lite® flashlights to a narrow beam. Place two No. 6 nylon washers around

the lamp bulb, and the light will be focused nearly to a fine spot.

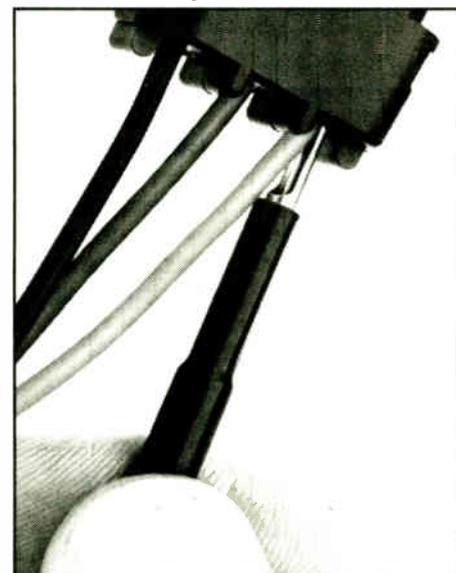
By modifying the flashlight in this way, the amount of twisting required to get from full off to the narrow beam setting is reduced (see Figure 1). When making the modification, or opening the lens assembly for re-lamping, do so carefully—the washers are easy to lose.

Michael can be reached at IMF—Improbable Missions Force—a broadcast engineering service company—by dialing 415-239-7447.

★★★

Lightning season is closer than you think, and from the lightning state, Florida, comes a new tower leg ground strap developed by Lightning Master Corporation in Clearwater. Designed to provide an economical low impedance ground for virtually any type of tower, the new LMC grounding straps come in

four sizes and are constructed of plated copper to assure minimum dissimilar metal corrosion problems.



Forget disassembly of connectors for signal testing. The PROBE allows you to reach the conductor easily.

If you'd like more information on the Tower Leg Guard Straps, call Lightning Master Corporation in Clearwater. The number is 813-447-6800.

★★★

Take a look at Figure 2 and see if this isn't just what you've needed to test D connectors! The JP-29591 PROBE is designed to reach the conductor within a connector or plug without desoldering or disassembling the housing. The half-round shape conforms to the space it is entering, and minimizes damage to the connector body.

The PROBE is available in two sizes and comes on a test lead with a banana plug on the opposite end, or by itself for custom applications. The PROBE is manufactured by J.S. Popper. For more information, call Robert Popper at 201-641-3252.

□□□

John Bisset is a principal with Multiphase Consulting, a contract engineering and projects company. He can be reached at 703-764-0751.

Infobases Make Tasks a Cinch

► continued from previous page

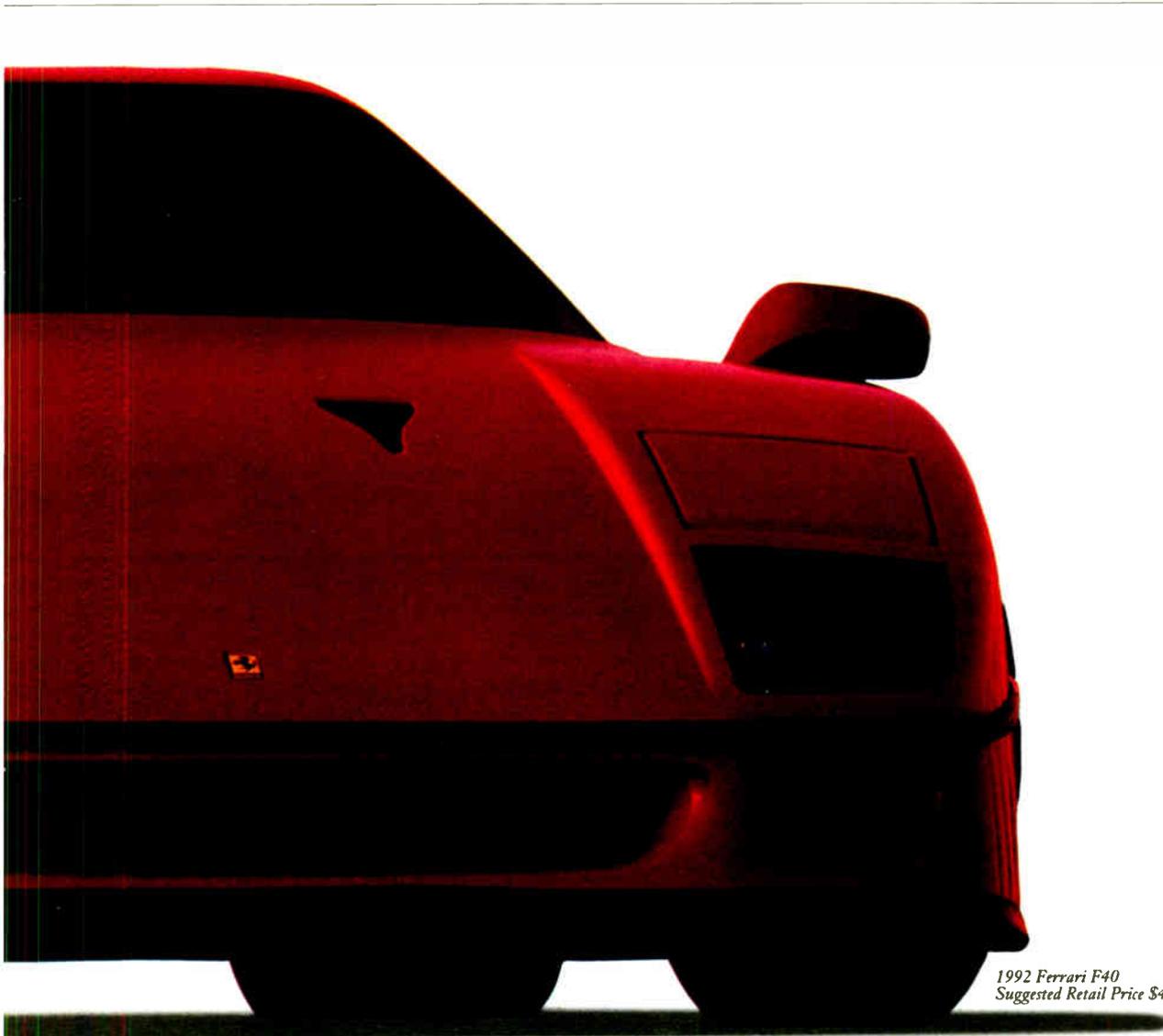
several sets of text, defining some fields will result in a screen much like a traditional database might show.

Both Folio Views and askSam are able to produce static "read only" files for wide distribution. A "run time module" is good for compilations created where you don't want users changing the data. It also reduces the size of the distributed product.

Which program is best for your situation depends on whether you deal mostly with blocks of text, or desire specially formatted output. For further information on askSam, call 800-800-1997. Folio Corporation can be reached at 801-375-3700.

□□□

Barry Mishkind, aka RW's "Eclectic Engineer," can be reached at 602-296-3797, or on FidoNet at 1:300/11.3 or "barry@coyote.datalog.com" on Internet.



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Bringing Satellite Technology Down To Earth

New Technology Will Dominate NAB Show

Radio Focuses on RDS Demonstration as Well as DAB Transmission Systems and EBS Technologies

by Arthur Cole
and John Gatski

LAS VEGAS With the U.S. economy heading out of the doldrums, National Association of Broadcasters officials are expecting this year's April 18-22 convention at the Las Vegas Convention Center, to be the biggest draw ever.

Exhibits and conference sessions are expected to focus on the newest technology trends including RDS, and DAB.

The NAB predicts nearly 800 exhibitors, with attendance topping 1992's 52,704 mark.

"We had record attendance last year, and I would go so far as to say that we expect an even larger number of attendees this year," said Richard Dobson, senior vice president of conventions and exhibits at the NAB.

And, as in previous years, the NAB forges growing attendance from other parts of the world—particularly Europe.

With the upswing in the U.S. economy,

Dobson and others at the NAB forecast a lot of sales activity on the show floor this year, as facilities resume capital spending plans that were scaled back during the recession.

High hopes

"There is a tremendous amount of optimism about the purchasing plans of the typical NAB attendee," Dobson said. "Research indicates that the broadcast and post-production market will make significant purchases this year.

"The amount of business done at the 1992 show was pretty good. But we have been watching the normal flow of company cancellations for the 1993 show, and we haven't seen any noticeable ones."

In addition to the main conference, the NAB organized two concurrent events: HDTV World, making its third appearance, and the new Multimedia World.

According to NAB Engineer Kelly Williams, radio-related special events will include a separate RDS exhibit of

receivers and encoder equipment as well as RDS over-the-air demonstrations from ten Las Vegas stations. Other special exhibits will include new EBS technologies, and proposed DAB transmission systems.

For the overall show, a number of logistical changes have been made to the convention. The most notable of these is a new system designed to help attendees locate booths more easily.

continued on page 45 ▶

Digital and Analog Topics to Dominate Discussion At Engineering Sessions, Seminars and Workshops

by Andy Butler
NAB Staff Engineer

LAS VEGAS The 1993 Broadcast Engineering Conference will open at 9 a.m. on Sunday, April 18.

Sunday is digital day for radio engineers. At 9:30 a.m., Gerry Robinson from Hearst Broadcasting hosts "Digital Audio Systems" in room N109/110. Tom Lookabough of Compression Labs, Inc. will discuss "MPEG in Broadcast Applications" to open the session. Herb Squire of WQXR radio will detail his findings in "Dueling Algorithms, A Real World Test of Multiple Digital Compression Treatment of Audio by Different Devices" at 9:55 a.m.

Dr. Richard C. Cabot from Audio Precision, Inc. will take a look at digital

audio testing in "New Techniques in Audio Performance Assessment" at 10:20 a.m.

Digital workstations

At 11 a.m., moderator Fred Morton from KMGZ-FM examines the latest in "Digital Audio Workstations" in room N109/110.

CBS has eliminated audio carts by using "DAWN: Digital Audio Workstation Network." Gregory Coppa examines the goal, the project and the results.

KEGL-FM Chief Engineer Wes Bell will outline "Practical Hints for Implementing Digital Audio Workstations in the Radio Station Environment" at 11:25 a.m. Doug Simpson of Crouse-Kimsey will share his insights in "Practical Field Experience with a Digital Workstation" at 11:50 a.m.

continued on page 42 ▶

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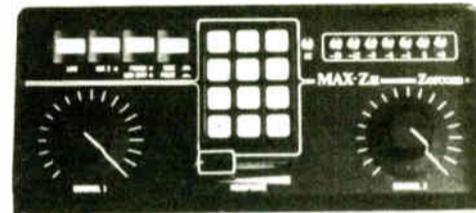
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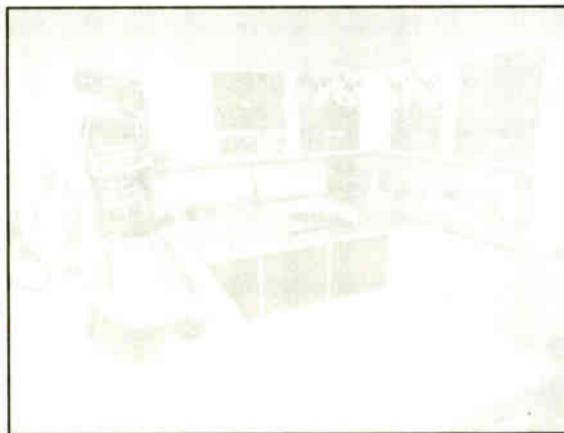
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READER SERVICE NO. 76

The Truth About Digital Automation Systems

Why some systems are ^{Much} better than others..

Digital hard disk programming systems are not alike. There are one or two good ones, the rest aren't much. Don't get stuck. Ask the right questions. Use our free system comparison chart. Get your priorities straight. Take the time to compare carefully. Look for the best combination of features and price. This isn't the easy way, but it works.

Make your own, independent decisions. Remember that early purchasers of unsophisticated systems may say they're happy, but they really haven't had the chance to compare their systems against an intelligent system like Digital DJ, so they don't know what they're missing. And, they're missing a lot! Please read the non-technical discussion below. Then, call or FAX with your questions. Get a proposal. Compare Digital DJ with other systems on a point-by-point basis. Get the right system at the right price.

Why Digital DJ leads the pack

Absolute Audio Quality

Audio Quality: Digital DJ has superb audio quality, at no extra cost. Using the advanced apt-X™ compression technology, Digital DJ produces stunning, transparent, musical audio quality at high compression using only one megabyte per minute in mono for a full 16 kHz FM band response. No other audio card on any system at any price exceeds this. More importantly, the only two other systems that compare, sell for a premium price.

The Digital DJ apt-X™ system, unlike systems with low quality audio cards, requires no external processing or filtering to provide broadcast quality sound.

How can you tell which systems have low quality audio processing? The 'scope tells the tale. Just call and we'll tell you who they are, then you can check for yourself.

Stereo Background Record

Finally, there is a reasonably priced system that can do *stereo simultaneous record/play*. Some systems offer simplistic forms of *mono simultaneous record/play* for time shifting newscasts, dubbing spots, etc. Many of these systems impose some strange restrictions on the user that make you wonder if it *really* is simultaneous record/play.

Our new *Programmed Background Record* (PBR) option offers true simultaneous record/play in *stereo*. The only two other systems that do this come at *premium* prices. Call us to check it out.

Absolute Support

How many digital audio vendors offer 24 hour per day, 7 day per week *emergency* factory Support? Check carefully. Not many do. And there will be times when you need it. Our DJ support staff are all old radio staffers and they understand programming. If you have an *emergency*, then they will be there.

Absolute Format Control

Hall of Shame: It is a shameful fact that most of the digital audio hard disk systems (even the most expensive) are incapable of running a standard satellite format to the published specification. And, that most of them have only the most rudimentary live assist ability.

Other than audio quality, *nothing* is more important than the control software that runs your format. But the truth is, that beside Digital DJ and perhaps one *premium* priced system, there is really nothing out there but some pretty crude software.

Software Check List: Below are a few of the *basic* features that are necessary to run a reasonable format.

- Real Time operation.
- Audio Cut Number Rotations
- Auto Sub with Cut rotations for illegal Spots
- Auto Spot Set Fill-to-time with Cut rotations
- Automatic reboot and reset to correct Log position.
- Full satellite Jock work schedules with Cut rotations and day-of-week scheduling.
- True, log-based Live Assist operation
- Buffered Satellite closures
- Live Copy on Air Log
- Live rotating spot Tags
- LAN network compatibility
- Direct Air Log editing
- Programmable out-going control closures
- Automatic Air Log Loading
- External Air Log Editor

Sounds reasonable doesn't it? Well, it is. But not to some others. If you don't understand the terms above, then you need to before you get any system. You also need to know *why* these features are necessary and who has them and who doesn't. Call us, we've got the information. You'll be surprised.

Incidentally, Digital DJ has many more features than just the basics above. Ask us about *MACRO* programming time-based closure shifting and *jock sensitive* calls. We do software and no one does it better.

Absolute Magic

CD-Systems: Are you aware that most of the CD digital audio systems offered today are just barely capable of simple end-to-end sequential operation? And, that they have been designed to work like the tired old reel-to-reel dinosaurs? And, that they are essentially unloadable and uneditable once they are started? Or that several of them are hybrids of incompatible components? Call us about this..

In contrast, the CD version of Digital DJ is filled with features that really let the user *program* their format from a real Log. CD-DJ is a sophisticated, single PC, integrated control programmer that will handle up to 32 of the popular *Pioneer™* consumer PD-M501 and TM/2 players as well as the new *Pioneer™* CAC-V3200 300 disc player.

The CAC-V3200 sets a new standard in professional CD playback devices. With two turntables, the unit is capable of instantaneous and overlapped playback on a disc to disc basis. Unlike the consumer playbacks, the V3200 sends CD-DJ continuous player *status* information so that if a CD sticks or skips, then the DJ system can make a correction immediately.

Digital DJ is the only CD system to offer a fully integrated hard disk digital audio control system and seamless live assist with the superb audio quality of the apt-X™ audio processor. Everything is CD quality all the way.

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SOS: The Station Operating System is our name for the tightly integrated Super Log Traffic, Digital DJ and CD-Music Log program set. Tied together by an extremely intelligent bidirectional interface and a low cost LAN network, the combination of these software systems is very powerful and very easy to use and the price is easily justifiable. We have had basic SOS system combinations in operation for more than two years. Call for information..

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Digital DJ - DJ-Lite - Super Log - Simple Log - EZ Log - CD-Music Log - Music Log

Coupon Radio Turns RDS into Dollars

by Frank Beacham

NEW YORK David Alwadish thinks RDS is a brilliant technology without a business plan. So expect to find this aggressive New York entrepreneur on the floor at NAB '93, trying to convince radio broadcasters he's found a better way to turn data into dollars.

Alwadish is promoting CouponRadio, an application of RDS that ties program material together with related alphanumeric data. That data could carry the title of a broadcast musical piece, the artist's name, catalog number and recording label and, not incidentally, a paid advertisement. The alphanu-

bile manufacturers, record companies, record stores and other promoters will place their colorful and exciting logos," Alwadish said.

Not just "parlor spray"

CouponRadio, according to its inventor, operates under the premise that all radio text messages, which he calls "infomessages," are valuable and should be saved. Limited to 64 characters of text, the coupon-formatted "infomessages" are stored in a computer database by the broadcaster at the radio station. Each "infomessage" is given a specific access code, associating it to a particular program piece or advertiser. As the regularly scheduled programming is being aired, its corresponding coupon message is being simultaneously accessed and sent from the computer's RS-232 port to the data encoder.

The encoder instantly transmits the message over the station's 57 kHz subcarrier to a CouponRadio-equipped receiver. The new "infomessage" will appear on the consumer radio receiver's alphanumeric display, replacing the preceding message.

A consumer radio equipped to receive CouponRadio data would have a slot for the RadioCard, a memory button, a scroll button and three indicator lamps. The lamps signify MEMORY FULL, INSERT RADIOCARD and BROADCAST/RECALL modes. At the push of the MEMORY button, the receiver will allow the listener to instantly save the coupon-formatted "infomessage" into the read/write memory of the RadioCard.

Message in a card

At another time, the listener can switch the CouponRadio receiver into the RECALL mode by pressing the SCROLL button. In this mode the alphanumeric display will read out the messages stored in the card. Then, if

the listener wishes to turn the data into a printed message or coupon, the RadioCard is inserted into a printer for hard copy.

With CouponRadio, radio broadcasters can transform RDS into a new income producing technology, according to Alwadish. "I don't see RDS being the income producer it could be," Alwadish said. "My proposal to radio broadcasters is a plan for the technology. If I were running for President, I'd have an economic plan. But if you read all the articles about RDS you just read about new radios. Who is going to benefit from the new radios? It's the people who make them, not the broadcasters who will have to power them."

To date, Alwadish said he doesn't have hard numbers on the cost of implementing CouponRadio technology. He predicts the added manufacturing costs to new radios will be under \$5.00, but offered no firm data to support that estimate.

At NAB '93, Alwadish plans to promote CouponRadio and hopes to get needed support from major radio broadcasters. Although he said he could launch the technology with a single leading radio receiver manufacturer and some major radio stations, he hopes to achieve widespread industry support for his proposal.

□ □ □

Alwadish is president of Ing Communications, Inc., 10 Rockefeller Plaza, New York, NY 10020. He may be reached at (212) 586-8880.

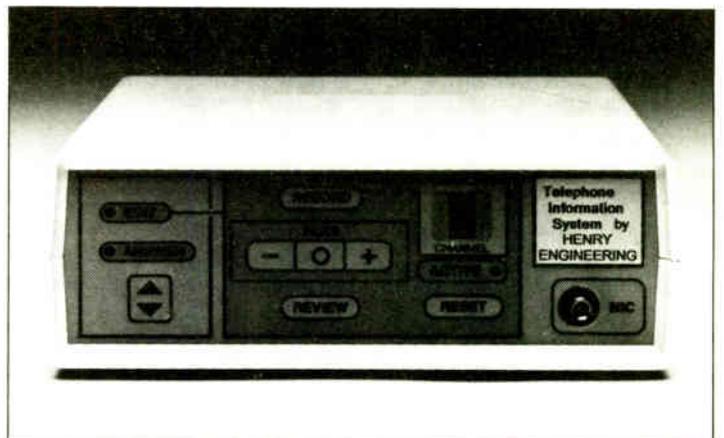


A prototype version Coupon Radio Card and radio receiver

meric information can be decoded by the radio receiver for output on a real-time visual display or for storage on a removable memory card for later retrieval for reading or printing.

With CouponRadio, Alwadish's patented technology, radio becomes interactive through the RadioCard, a credit card-sized, non-volatile 2K RAM storage card that slides into the radio. When removed, this card can be taken to participating advertisers and turned into promotional coupons. The coupons can be printed from the RadioCard on small credit-card type printers or on more elaborate portable kiosk printers that provide color graphics.

"(RadioCard) should prove to be a new multi-industry billboard, on which broadcasters, electronics manufacturers, automo-



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Digital to Dominate NAB

► continued from page 38

Carl Davis of Voyager Communications will open Sunday afternoon at 1 p.m. with a look at "Digital Audio Processing" in room N109/110. Stanley Cossette and David Watts will discuss "The Least Treatment Principle and Its Application to Single-Ended Signal Processing."

Melvyn Engel of WavePhore outlines "Graceful Failure, Tolerating High Bit Rate Errors With Mild Degradation, Not Signal Muting" at 1:25 p.m. A.V. Hills of Neve Electronics surveys analog-to-digital considerations in "Designing for Total Automation and Digital Equalization in a Broadcast Mixer" at 1:50 p.m.

Fred Morton swings the focus back to practical implementation at 2:30 p.m. with "Digital Audio Storage." Rick Fritsch of KBZQ-FM in Lawton, Oklahoma will present "Practical Station Experiences with Digital Automation" to open the session. Tom Hill of Telos Systems advocates "Utilizing Over-the-Counter Hardware and Windows-like Software to Produce an Inexpensive Hard Disk Replacement for the Audio Cart Machine" at 2:55 p.m.

Hard-disk storage

Gregory J. Uzelac of Broadcast Electronics shares his "Key Considerations When Choosing a Hard Disk-Based Digital Audio Storage System" at 3:20 p.m. Bruce Bartlett of Crown International continues this theme at 3:45 p.m. with "Specifying Audio Workstations for Broadcast." Production guru Ty Ford completes the day with "Suggestions for Choosing and Using Digital Storage Tools in the Production Studio Environment" at 4:10 p.m.

Those who work on the transmission side of radio also will be busy on Sunday morning with Great American Communication's James Ary's "AM-FM Improvement" in room N111. Consultant Thomas Osenkowsky will begin at 9:30 a.m. with an "Economic Methodology for AM Broadcast Antenna System Tuneups." H. Naka of NHK will profile "A New

Medium-Wave Radio Transmitter Using Hybrid Modulation System" at 9:55 a.m. Dion Messer Funderbunk and Sangil Park of Motorola will present "A Digital Receiver Design for AM Stereo with Enhanced Frequency Response Performance" at 10:20 a.m.

Harris' Ron Frillman will look at improving traditional FM modulation in "A Digital Approach to an FM Exciter Design" at 11

Two highly successful station managers will discuss their radically different views of the engineering function.

a.m. Karl Lahm of the Voice of America (VOA) will discuss "Selection of FM Antenna Elevation Patterns" at 11:25 a.m.

Christopher Downing of KMPC Radio, John Bissett of Multiphase Consulting, Dave Harry of Potomac Instruments, and Dave Herschberger from the Grass Valley Group will close the session with some suggestions in "Specialized Signals for Testing and Evaluation of Broadcast Audio Transmission Systems" at 11:50 a.m.

Monday, April 19, the NAB spotlight focuses squarely on digital audio broadcasting (DAB). Don Wilkinson of Fisher Broadcasting and chairman of the NAB DAB Task Force Technical Advisory Group will moderate "DAB-I: Technical Considerations for DAB Performance" in room N109/110.

DAB Receivability

The NAB's digital expert, Ken Springer, opens the day with a survey of "The Likely Impact of Multipath on DAB Receivability." Next, a representative of Delco will detail its position on DAB development at 9:25 a.m. Louis Thibault of the Broadcast System Research Center in Canada will report on that country's DAB effort at 10:30 a.m.

Skip Pizzi of "Broadcast Engineering" will present his findings in "Projected Conversion Costs for DAB" at 10:55 a.m. Don Messer of VOA profiles the "NASA-VOA Satellite Receiver Project" to conclude the morning session.

On Monday afternoon, the emphasis shifts from development to implementation as Ken Springer chairs "DAB-II Implementation Alternatives for DAB." The EIA is attempting to establish a national DAB standard. Consultant Tom Keller will outline the proposed testing methods to open the session at 1 p.m. At 1:25 p.m., the focus shifts north when Gérald Chouinard will present the results of the Canadian "Parametric Study of the COFDM System." U.S. system proponents will take over at

1:50 p.m. First, John Cioffi will profile the Amati system. Then, at 2:15 p.m., Eureka's stateside proponent, Thomson Consumer Electronics, will be represented by Clint Pinkham. Nikil Jayant will follow at 2:55 p.m. with an AT&T system profile. Then, beginning at 3:20 p.m., USA Digital will conclude the afternoon with a survey of Project Acorn's AM and FM in-band, on-channel development efforts.

Margaret Bryant of WMAQ radio has prepared a survival course for '90s engineers, "Managing in Broadcast Engineering" Monday at 1 p.m. Brad Dick of "Broadcast

frequency coordination.

You will face your greatest fears Tuesday afternoon at 1 p.m. when SBE Day presents "Dealing With Disasters" in room N109/110. Speakers will focus on radio and TV station reaction during recent calamities, including the Los Angeles riots last year.

The "EBS Summit Conference" will be held Tuesday afternoon at 2:30 p.m. SBE board member Dane Erickson of Hammett and Edison Consulting Engineers opens the session with "EBS: Where Do We Go From Here?" The FCC's Richard Smith follows at 2:55 p.m. with "Where the Regulators Stand on EBS." Darryl Parker of TFT will offer suggestions on "EBS: Implementing the New Technology" at 3:20 p.m. The afternoon concludes with an "EBS Roundtable."

SBE Day also includes a special session for independents. The "Contract Engineering Workshop" will feature Barry Victor of the Victor Group, Chris Imlay of Booth, Freret and Imlay, and Paul and Sarah Edwards, a husband-and-wife contracting firm, with sound advice on running a contracting service. Issues will range from recruiting clients, to managing time, collecting receivables and managing liability exposure. Highly successful contractor Chip Morgan of Chip Morgan Broadcast Engineering will lead the discussions beginning at 1 p.m.

SBE Day at NAB '93 will conclude with two important meetings. A general membership meeting, to be held at 4:30 p.m. in room N113/14 will be followed by a chapter chairmen's meeting at 5:30 p.m. These meetings are open to all SBE members.

Data broadcasting

Get full details on the possibilities for your station Wednesday morning during "Data Broadcasting: Radio" beginning at 9 a.m. in room N109/110. Jim Chadwick and Vijay Patel of the Mitre Corporation will begin with "A Preliminary Analysis of the Prospects for Utilization of Secondary Capacities in the Commercial FM Radio and TV Channels for IVHS Data Communication Needs."

Osamu Yamada of NHK's Science and Technical Research Laboratories will profile "NHK's High Capacity FM Subcarrier System" at 9:25 a.m. David Alwadish will discuss his novel RBDS implementation, "Coupon Radio," at 9:50 a.m. John Casey of RE America and Mark Krieger of WGAR-FM will conclude the session with two reports on practical field experience with RDS implementation. Casey will speak at 10:55 a.m., followed by Krieger at 11:20 a.m.

In a special session Wednesday afternoon, at 2:00 p.m. in room N109/110, a number of experts will offer some practical suggestions on RF radiation management. Gene Cummings of United States Tower Services and Richard Mertz of United

continued on page 46 ►



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Renowned Consultant Silliman Reflects on His Career in Radio

Editor's Note: The NAB has awarded its 1993 Radio Engineering Achievement Award to Robert Silliman, senior partner in the consulting firm, Silliman and Silliman.

Silliman, 79, began his radio engineering career in 1937 with the FCC. He later joined the World War II effort as a researcher at Harvard University, specializing in radar and developing several patents.

After the war, Silliman opened a consulting firm in Washington. Over the years, his accomplishments have included co-development of the Collins Ring FM antenna, inventor of the FM isolation transformer coupling to dual frequency transmitter antenna, advances in antenna pattern measurement and RF radiation measurement. He also served as president of ERI for many years and is now chairman of the board. His son Tom Silliman, who is now current president of ERI, calls his father an "engineer who is not afraid to change with the times."

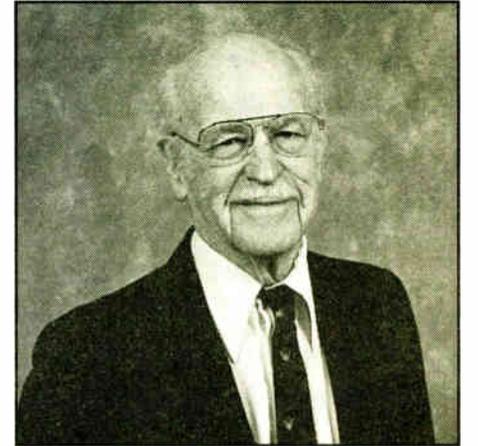
Silliman and his wife Elizabeth have been married for fifty-four years and reside in Silver Spring, Maryland. They have four children and nine grandchildren.

Radio World News Editor John Gatski recently interviewed Silliman about his career in radio engineering.

that it would take a full day to analyze the results of a single set of tests with so many towers using my graphical approach and that this would require an unacceptable amount of time.

RW: So you developed a computerized version of the "talk-down System." What did that design entail?

Silliman: Storer agreed to underwrite the development of a computerized talk-down program. I decided to use the Algol computer language for the IBM 7090 computer.



Robert Silliman

RW: You have been involved in radio engineering for many years. How did you get started?

Silliman: My first building of radio equipment was an amateur radio operator at W9AST in Duluth, Minnesota as a sophomore in high school.

When I was a graduate student at the University of Minnesota, I built a two-way radio to keep in touch with Dr. Jean Piccard during a balloon ascension which he made at Rochester, Minnesota. For five years prior to 1942 I was an engineer with the Federal Communications Commission. My work there was interrupted by World War II. I left the FCC to be research associate at the NDRC Radio Research Laboratory at Harvard University which was run by Dr. Frederick Terman of Stanford and Dr. Roger Hickman of Harvard. I worked on antennas for radar countermeasures, which resulted in the issuance of a number of patents, and I have been interested in antennas ever since.

I started my radio consulting engineering business in 1947 and worked to a considerable extent on the adjustment of AM directional antenna systems and FM antenna system design and measurement. In the 1950s, I was called in by NASA to assist with a problem which they were having with their satellite tracking antenna in Chile.

RW: Can you discuss the work you pioneered in calculating AM antenna performance in the 1950s and 1960s, particularly the "talk-down system"?

Silliman: I developed a procedure for improving the adjustment of an AM directional antenna, which I called the talk-down System. It was a graphical method of analysis. It got to be pretty cumbersome as the number of towers increased. In the 1960's, I was asked to confer with consulting engineer Earl Cullum, Jr. and engineers from Storer Broadcast to assist with the adjustment of a 12-tower directional antenna, which they were designing for Detroit using the talk-down approach. We decided

This meant that everything had to be punched out into IBM computer cards, each one containing, as I remember, a single line of text in the form of punched holes. This led to a stack of punched cards which we kept in shoe boxes. Lord help you if you got the order mixed up. At any rate, a computer program did develop and it was used in connection with the adjustment of the WJBK directional array in Detroit.

The program was later translated into basic language for small computers and an improved version is still used by a number of engineer in the adjustment of AM directional antennas. What it did was to bring the array closer to its theoretical pattern, especially in the nulls, while taking account of errors in the measurement of individual fields and phases without losing the adjustment in other directions.

RW: Besides AM, you also made progressive innovations in FM antenna technology during its infancy. What were some of the more significant ones?

Silliman: I was co-inventor of the Collins ring FM antenna, manufactured by Electronics Research, Inc. (ERI), which was widely used during the early days of FM radio. A vertically polarized dipole array was later added to the ring antenna to provide dual polarization. This led later to dual polarized elements and then to circularly polarized elements as used today.

I especially remember one consulting job on which I worked with Dr. Frank Kear to make measurements at the Empire State master FM antenna built by Dr. Andrew Alford's antenna company. We found the project to be very difficult. Our test equipment wouldn't work in the environment. We were only a very small number of feet from the antenna itself. We had to construct a screened enclosure to hold our test equipment and use a special tunable cavity which Dr. Alford loaned us.

I have since continued to be very interested in the design of master FM antennas and consulting in connection with master FM antennas.

Variety Is Key to Product Services at NAB

LAS VEGAS Although technology will abound at the show, a fair number of companies will be available to talk about programming and automation services as well.

Don Elliot Creative Services will offer "The Legend" CD promo and commercial music library, and "'90's News" and "Newsical" instrumental news production packages.

TM Century Inc. will demonstrate its new TM Mix and TM Country GoldDisc3 NoNoise music libraries and the new MegaMusic production library.

Broadcast Programming will have available Today's Country on compact disc and reel-to-reel, Digital Memory Music on CD and Pure Country on reel-to-reel. Also available will be Sentry Systems' FS-Line multiple facility link for group ownership and LMA.

NPR Satellite Services will demonstrate its line of interconnection services, including fixed and transportable uplinking, SCPC audio transmission, down-

linking, digital fiber optic audio channels and service to Galaxy and Satcom.



Valentino's Production Music Library

GE Americom will provide information on the GE-1, the company's new

hybrid satellite scheduled for operation in the first quarter of 1996. The company will also provide information on its total satellite program delivery services for broadcasters.

Omnimusic will offer an 80-CD library of full-length themes, including the Professional Broadcast Series of pre-edited commercial lengths. Also on hand will be OMNI-FX, a 12-CD sound effects library.

Celebrating its 10th anniversary, **International E-Z UP Inc.** will display its line of E-Z Up instant shelters.

Valentino Inc. will release its production music and sound effects on CD-ROM, interactive and VIS Computer technologies at the show.

Halland Broadcast Services Inc. will unveil "The Eighties Plus" AC/CHR music library featuring 768 digitally mastered titles from 1980-1993. Other packages include the "Rock 'N' Roll Graffiti" digitally remastered oldies library and "The Seventies" library of

1970-79 hits.

Manhattan Production Music will introduce the five-CD Audiophile Sound Effects series, as well as the Chesky Records Classical series.

Network Music Inc. will have available the Network Production Music Library, a 100-volume CD library. The company will also demonstrate the Sound Effects Library and the ShockWave Library of production elements. The Primrose Music Library of European recordings will also be available.

Event Marketing will be available to talk about its turn-key event productions and event sales consulting.

Dataworld Inc. will showcase its international database of broadcast facility and map information, as well as improved AM and FM allocation mapbooks.

Radio Focuses on RDS, EBS, DAB

► continued from page 38

While last year's haphazard numbering system drew complaints from attendees and exhibitors alike, the NAB has added a color-coded system this year.

"The numbering system is always going to be complicated," Dobson said. "That many addresses in a neighborhood of that size requires five digits. But rather than educate 50,000 people on how the numbering system works, we divided the floor into bite-sized chunks."

As always, each exhibitor will get a different booth number, but the floor will contain different colored carpets to make it easier to navigate.

"Just look at your feet, and you'll know what section you're in," Dobson said.

Heightened security

Another change from last year that

might draw attendees' notice will be an increase in security, Dobson said. The increase is mainly in response to last year's incident in which a speech by former U.S. president Ronald Reagan was disrupted by a political activist.

"That is something that is very difficult to predict," Dobson said. "But having had that experience in 1992, it has affected the way we address the entire matter of security."

Although Dobson would not say how many additional security personnel have been added, he did say there will be a "much higher level of security for 1993 and beyond."

"We will not have a police state, but there will be a significant increase over 1992," he said.

Dobson said more care will also be taken when assigning credentials (the

activist who accosted Reagan gained entrance to the show by obtaining a press photographer's badge), however, he said it is uncertain what form this new scrutiny would take.

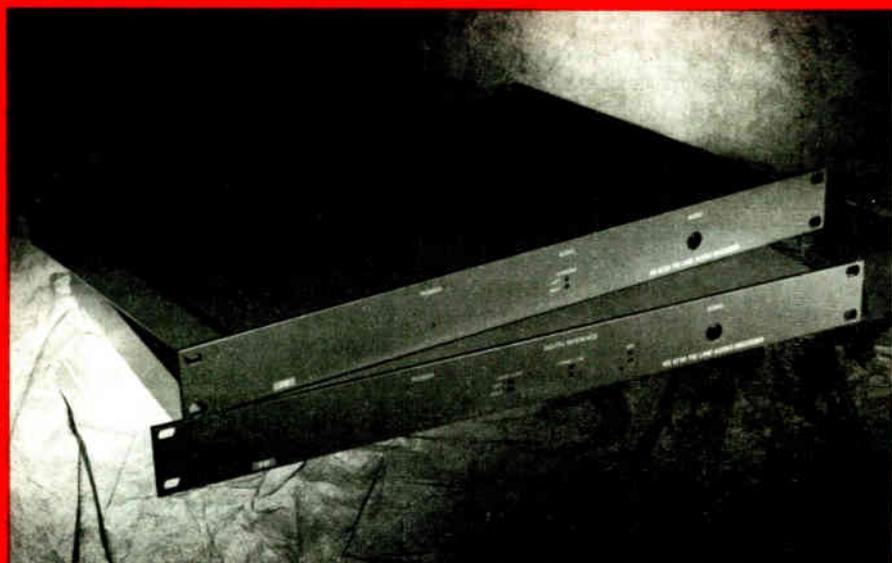
"(The Reagan incident) was an extraordinarily difficult situation to intercept," he said.

A coordinated effort

The NAB also is continuing its program of coordinating its show with that of smaller groups. This year's show will coincide with meetings of the Radio Advertising Bureau, the International Association of Broadcasters, the Society of Broadcast Engineers and the IEEE.

The keynote luncheon speaker will be Apple Corp. President John Sculley. The NAB Radio Engineering Achievement Award will be presented to Robert Silliman, long-time consultant engineer.

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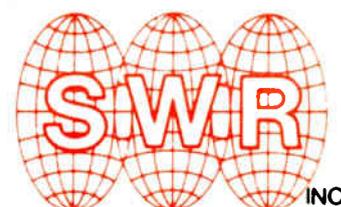
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NAB Booth #16043

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LAS VEGAS The importance of accurate measurements in radio broadcasting is emphasized by the diversity of test and measurement equipment that will be at NAB.

Among the equipment on the exhibit floor will be the **Dielectric Model 7000 Series Calorimeter**. The unit offers a compact, easy method of accurate RF measurement. It utilizes accurate paddle wheel flow sensors and platinum resistance temperature detectors, and works with any fluid compatible with copper, nylon, brass or stainless. A remote option and RS232 interface are available.

encoder, Model 700.

Digital input

Wohler Technologies will introduce a digital input option AES/EBU and SPDIF for its line of powered single-rack space and two-rack space audio monitors. Also available will be a MSM-2 two-rack space companion to Wohler's single rack-space visual monitoring system, with up to 20 high-visibility channels.

Rohde & Schwarz Inc. will display its microwave spectrum analyzer (FSM) and its modulation analyzer (FMAV).

Avcom will introduce the NASA-1000A

trum analyzer and network analyzer in one package, and the SDM-42A is a panoramic signal display for VHF scanners and communication receivers such as the ICOM R-7000.

Modulation Sciences will exhibit the ModMinder Modulation Analyzer, StereoMaxx Spectral Image Processor and the CP-803 Composite Processor, among other equipment.

ESE will promote a line including the ES-215 HP2 Stereo Audio Level Indicators; ES-215 P6 Rackmounted Tri-Stereo Audio Level Interface; ES-770 Computer-based Time Controller System; the PC Family that includes PC-219 5-Output Black Burst Generator, PC-217 1x4 Audio/DA and PC-207A 1x4 Video DA computer cards; and the ES-201 1x4 Video DA with independently adjustable outputs.

Dorrrough Electronics will show a new AES/EBU digital reading audio level meter, while also displaying the 1200 Stereo Signal Test SET, the DAP 610-A, and the Dorrough line of dual parameters audio meters.

Monitors abound

TFT Inc. will introduce a low-cost AM modulation monitor, Model 923, as well as a new RBDS/MBS injection level option for FM modulation monitors. The company will display its established products, including its AM/FM/TV modulation monitors.

Belar Electronics Labs is expected to show its line of modulation and frequency monitors, including the FMM-2 modulation monitor, the FMS-2 stereo monitor and the AMM-4 and FMM-4 frequency monitors.

Tektronix is expected to display its new line of TAS 400 series analog scopes ranging in bandwidths from 60 to 200 MHz and featuring two to four true input channels. The company also has an established stereo audio monitor.

Audio Precision will feature the new ATS-1 audio test set, a rack-mount unit designed for industrial and telecommunications. It includes a standard IEEE-488 GPIB control port and also features modular panels to accommodate front or rear mounting of an international variety of standard audio input and output connectors. Also shown for the first time is the IEEE-488 GPIB control port option for the Portable One PLUS.

Holiday Industries will introduce a new line of field strength meters with digital LCD readout optically coupled to active sensors for accurate measurements of electric fields of 10 kHz to 1 GHz. RF magnetic field sensors also are available.

Delta Electronics is expected to show its line of stereo monitors among displays of

its operating impedance bridges and NRSC measurement equipment, including the Splatter monitor and stereo noise generator. Delta also has an AM stereo exciter, the ASE-2.

Eventide produces a digital broadcast logger, the VR240, that can record more than 252 hours on 24 channels on a single 90-meter DAT cassette. The device can be used to record your own signal or that of competing stations.

Doty Moore Tower Service will highlight RF radiation protective suits, and **ASACA/Shibasoku Corp.** will show a variety of audio analyzers and associated equipment.

Gorman-Redlich Manufacturing is expected to display its line of EBS monitors, and look for **Potomac Instruments** to present its line of directional array antenna monitors.

Amber Electro Design produces the Model 7000 sine-wave generator that offers digital features, such as arbitrary waveform generation and editing capabilities, 24-bit parallel output and internal and external sync'd sampling rates.

Engineering Conference

► continued from page 42

Broadcasting will open the session with a cooperative presentation, "Strategies for Managing Tower Projects While Maintaining Worker Safety."

William Hammett will continue the discussion with formal suggestions for "Meeting IEEE C95.1-1991 Requirements" for RF exposure at 2:50 p.m. Tower specialist **Donald Doty** will discuss his experience with "RF Protective Clothing for the Broadcast Environment" at 3:15 p.m.

Dave Baron of "Haladay Instruments" will offer advice in "Taking Meaningful RFR Measurements Without Endangering the Worker." "Compliance with Local Radio Frequency Radiation Regulations" is scheduled for 4:30 p.m.

On Wednesday afternoon at 2 p.m. in room N111, consulting engineer **Dane Ericksen** will host the "FCC and FAA Workshop."

Auxiliary insights

Fred Morton, Jr. will offer some valuable insight in the "Satellite and Auxiliary Services Workshop" Wednesday afternoon at 3:30 p.m. Panelists will include **Marti Electronics'** Dan Rau, who will discuss "A Proposal to Reallocate Aural RPU Frequencies for Increased Efficiency."

New digital technologies offer the possibility of dramatically improved quality for radio remotes, but "Using ISDN, T1 and Switched 56" can be a real challenge. Various panelists will address these technologies during the Thursday morning session, which begins at 9 a.m.

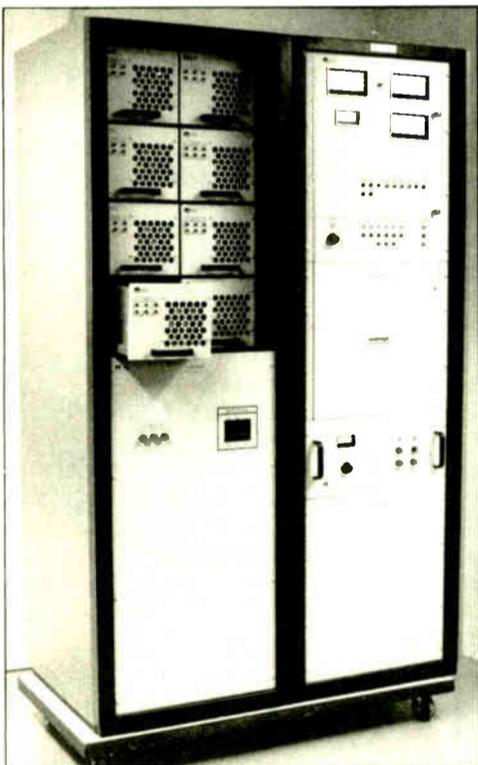


Superior Electric's automatic voltage regulator

Look for the new off-air FM modulation analyzer, Model 530, from **Inovonics**, along with a new RDS

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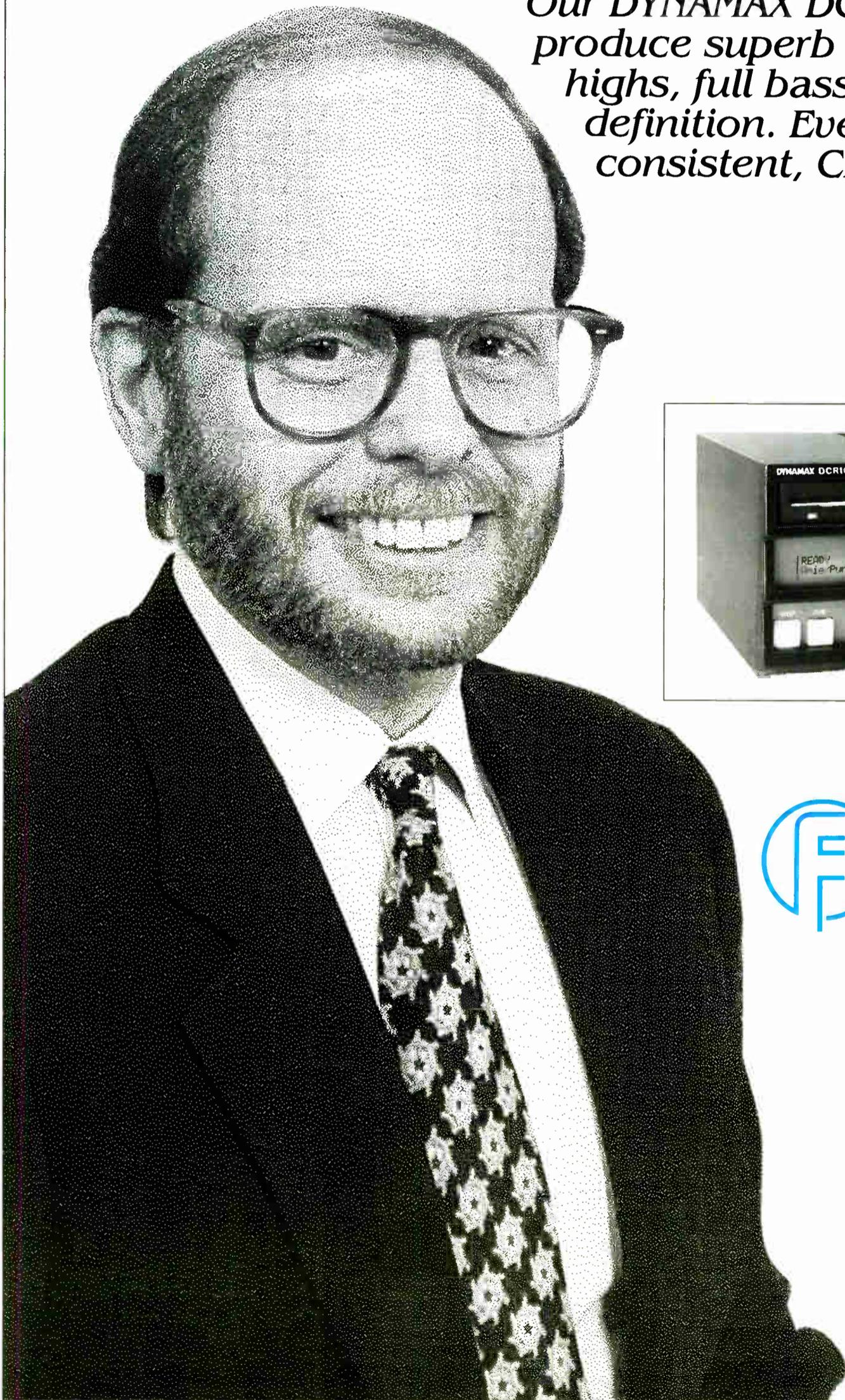
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Radio's Automated Future Is Here

LAS VEGAS Ranked among the topics to be most talked about at this year's NAB for radio along with DAB and RDS is station automation.

The rapid advancement of this relatively new technology for U.S. radio is quite astonishing. Products expected on the exhibit floor brings the developments into perspective.

Among the exhibitors with new products is **Radio Computing Services (RCS)**, which will show the digital Master Control system for live assist or full automation. The hard-disk storage system, which uses MUSICAM compression, is designed for music, commercials and or features; a CD jukebox is optional.

RCS also will show its existing software packages including Selector, Songtrack, Musicbase, Prorate, and Traffic—all part of the R.C.S. Works system. The Traffic package for commercial scheduling and billing is the former Decision Inc. Broadcast System III that RCS recently purchased.

Full range of products

At **Harris Allied**, there will be a variety of digital automation systems including the Gentner Audisk system. Harris said it has sold more of these systems than any other suppliers combined. **Gentner** will also have the system at its own booth plus unannounced introductions.

AKAI Digital will introduce the DD QMACII, Macintosh software to control its DD1000 magneto-optical disk recorder. The company will also introduce the DD1600 Version 3.0 software, for the company's DD1000, DD1000i and DD1000s.

BASYS will show the D-Cart multi-user digital audio recording/editing system and the Newsroom Automation System.

TM Century will promote its Version 2 of the Ultimate Digital Studio package, a card cage for various interfaces.

Computer Concepts will introduce a new feature for its Digital Commercial System (their on-air automation system). The FlexKey is a digital counter that allows up to 18 "soft" keys to be assigned to virtual cart functions.

Broadcasters General Store will exhibit automation systems including the **Rodman/Brown & Associates Desk Jockey**, while at a separate booth Rodman/Brown will also show the Desk Jockey Lite version.

New from **Broadcast Programming** will be the FS-Link system for multiple facility linking for group ownership applications and LMAs. Also on display will be the Sentry System total automation system with hard-disk audio, and CD control of user's choice ranging from a jukebox to a consumer six-pack player. The exhibit will have a broad range of interfaces for music and traffic systems.

A-Ware will highlight its MusicScan music scheduling and inventory system (distributed in the U.S. and Canada by **Tapscan**) with new features including improved policy flexibility for unlimited format level combinations; hour rotation for titles, artists, and versions of the same song by different artists; enhanced scheduling of "two-fers" and other special sets; and new library-wide editing options.

Automation systems

Concept Productions will demonstrate the Computer Assisted Programming System (CAPS-CD), a complete storage and playback system for live or automated radio operation. Music is on CDs; spots,

liners, PSAs and voice tracks are on digital hard disk. PC-based software is easy to use and menu driven with single key commands. It interfaces easily to popular traffic and music scheduling systems.

From **Register Data Systems (RDS)** will be the new Phantom digital audio automation system. It provides complete recording, scheduling and play back of all commercials, liners, jingles, IDs, PSAs, promos and other material that goes on air. The system automatically switches between satellites, rotates voice elements, schedules liners and IDs in the appropriate voice and plays all the spots.

Arrakis will highlight its DigiLink

Digital Audio Broadcast Workstation and Network.

Broadcast Electronics (BE) will show the AudioVAULT digital audio storage device and the CORE Program Automation System.

Enco Systems will show a new version of the DAD486x Digital Audio Delivery System. New features include improved dual channel capability that allows simultaneous playback and record on a single hard drive, new digital signal processor options that allow increased configuration flexibility, and enhanced operational, automation and interface capabilities.

Alden Electronics will promote the

ALRAD II software, a DOS-based program for receiving, storage and display of all National Weather Service WSR-88D Doppler Weather Radar NIDS product.

Datacount will release its multi-station version of DARTS that addresses a single system for operation of up to eight stations. It is tailored exclusively for multiple station ownership.

Time Logic will exhibit the AirWave radio automation system for fully automated or live assist that can be combined with satellite feed as well. There is unlimited walk-away with 576 CDs on line, 64 cassette players and digital audio record/playback from hard disk.

Among the products to be shown by **Radio Systems** will be RS-1000 DAT machines designed for use with automation systems.

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Transmitters to Debut on Show Floor

LAS VEGAS Always a large component of the NAB, many manufacturers of RF gear will converge at the convention again this year with their new and established products on hand. The products this year range from transmitters and exciters to tube rebuilding services, dummy loads, and even encode/decode equipment for the recently adopted Radio Broadcast Data System.

New from Bext for this year are the L and D series FM amplifiers, TEX 100 FM exciter with powers to 100 W and the PJ501 MOSFET FM amplifier. Bext will also be showing its extended line of FM

exciters and amplifiers, STLs and the HPT exciter/translator/booster.

The **Broadcast Electronics** booth will include the new AM-2.5, a 2.5 kW solid state AM transmitter, as well as the established AM transmitters, 1 kW to 10 kW, and FM transmitters, 1 kW to 20 kW.

New transmitters

Energy-Onix will introduce a new line of FM broadcast transmitters with power outputs of 30 W, 100 W, 300 W, 500 W, 1 kW, 2 kW, 2.5 kW, 3 kW, 4 kW, 5 kW, 8 kW and 10kW.

A new line of single tube zero bias triode

amplifiers with power outputs from 1.5 kW to 35 kW are also set for display by the company. These units utilize solid state drivers featuring **Motorola** MRF 151G MOSFETs. Two tube single ended output transmitters are also available to produce up to 50 kW. A lightning-proof 1 kW AM broadcast transmitter will be displayed, as well as updated versions of the Energy-Onix 5, 10, 25 and 50 kW AM broadcast transmitters.

New from **CCA** will be a 45 kW FM transmitter, a high-performance exciter and a solid-state FM transmitter, along with the company's established line of FM, AM

and shortwave broadcast transmitters.

Continental Electronics will display its complete line of AM and FM transmitters, towers, antennas and other related RF equipment. New products will also be at the company's booth, but information was unavailable at press time. The company is expected, however, to show the **Omni-tronix** line of AM transmitters, in addition to its own FM transmission products.

Harris Allied has a host of new RF products to display, including the Harris DX 15, a 15 kW digital solid state medium wave transmitter. This 15,000-watt transmitter provides typical overall AC to RF efficiency of 86 percent.

Solid state products

The Harris DX 150FA, a 150 kW frequency-agile digital solid state medium wave transmitter, will also be at the convention. The 150,000 watt transmitter features front-panel controls allowing frequencies to be changed over the medium wave band in less than one minute, and it has an overall AC to RF efficiency of 83 percent.

Also set for debut is the Harris DT 20FM, a new 20 kW FM transmitter which will be displayed with the Digit, Harris' new 50 watt digital FM exciter.

Established products from Harris Allied will include the Harris PT 5FM, a 5 kW solid state FM transmitter. The transmitter, also available in 2, 4, 8 and 10 kW models, features an FET solid state design.

Harris will also display the Harris GATES FIVE FA, a 5 kW frequency-agile solid state medium wave transmitter; the Harris HT 10FM, a 10 kW single tube FM transmitter; and the Harris HT 1FM, a 1 kW solid state transmitter.

JT Communications will introduce the FMT-15, an FM broadcast transmitter, and the RTU-1, a remote-controlled AM/FM tuner. Established products set for display by the company include the PLFM-100, a replacement oscillator for FM transmitter upgrades; the CSG-10, a stereo generator replacement PC module with composite clipper; and the BIA-1, an Optimod I/O interface kit.

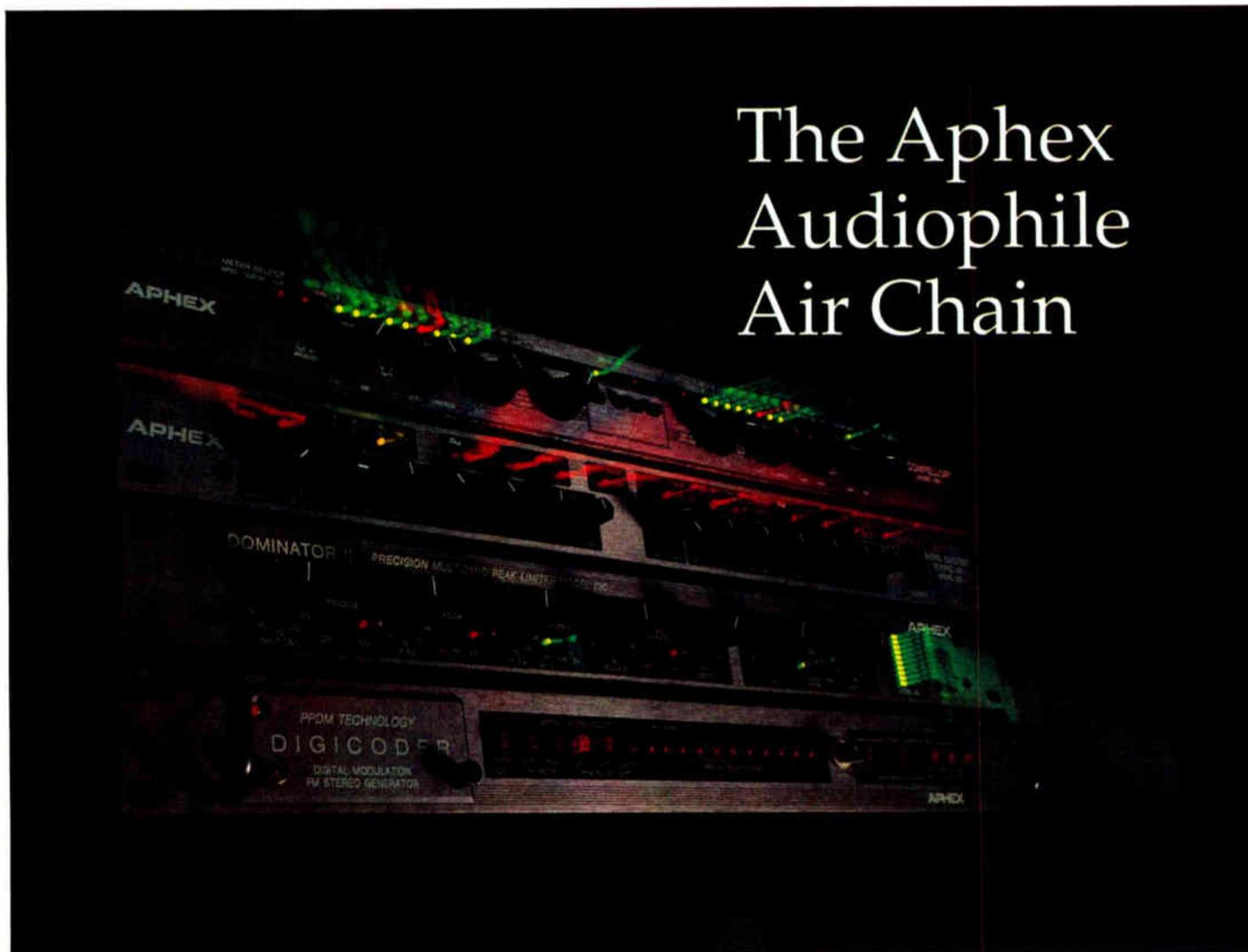
Nautel plans to debut the AMPFET FM10, a solid state 10 kW FM transmitter. Established products from the company include the AMPFET ND1 1 kW AM transmitter, the AMPFET ND5 5 kW AM transmitter, the AMPFET ND25 25 kW AM transmitter and the AMPFET FM4, a 4 kW FM transmitter. All the products are of solid state design, and many of the Nautel AM transmitters have a built-in C-QUAM AM stereo exciter.

A new solid state modular FM transmitter is expected to be unveiled by **QEI**, which will also show its complete line of "New Reliables" FM transmitters with power levels from 100 watts to 35 kW.

Other new products from **QEI** will be the Model QX-50 FM exciter, with adjustable power level from 3 to 50 W, and the Auto-Mod, a modulation control system that is inserted into the composite modulation path ahead of the exciter to provide standard modulation monitor peak flasher indication.

Television Technology Corp.—otherwise known as **TTC**—plans to unveil the FMS5000, a 5 kW solid state FM transmitter. Also available for inspection from **TTC** will be the rest of the FMS series of solid

continued on next page ▶



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► continued from previous page

state FM transmitters, the XL-FM series of FM translators ranging to 250 watts, the FMS-100 100 watt transmitter/amplifier, and the S1A series of AC line surge protectors.

Thomson-LGT will display a wide range of solid state and tube transmitters, including FM products ranging from 1 W to 10 kW.

Ancillary products

Not all the exhibitors in this category of equipment will be providing transmission products. Many will also be offering services such as tube rebuilding, transmitter maintenance and RF dummy loads and heat exchangers.

Econco, for example, will provide information on its tube rebuilding services, and will be collecting life experience information on various types of transmitting tubes.

EEV will highlight some of its established products, including 5 kW, 15 kW, and 35 kW power tetrodes for AM/FM transmitters, with improved mesh filament designed for longer life, reducing noise and eliminating warm-up variations.

On hand at the Penta Laboratories display will be a variety of transmitting tubes, including 5CX1500C, PL2020CL, PL382 and 4-1000CG. The company offers a complete line of electron tubes for transmitters.

RCA Broadcast/GE Support Services will display replacement parts and repair/maintenance services in support of RCA transmitters and studio equipment.

Altronic Research is scheduled to feature the 25 kW model of the self-contained heat exchangers. The 5800 series can operate through 800 MHz and as low as DC.

Electro Impulse Lab will also highlight RF gear with its RF dry, forced-air FM dummy loads, RF calorimeters and attenuators.

Superior Electric will exhibit its STABILINE® Series of power protection equipment, including the WHR Series of Automatic Voltage Regulators and the UPSY Series of Uninterruptible Power Supplies.

The recently introduced Radio Broadcast Data System (RBDS) standard set by the National Radio Systems Committee has prompted a variety of manufacturers to venture into this new category of subcarrier

Model 700 RDS encoder. The company also will have the Model 530 off-air AM modulation analyzer on display.

Modulation Sciences will introduce the Model RDS-1 RDS System Generator. Its PC compatible plug-in board and software can turn any PC into a complete RDS generator. The generator provides the complete feature set of both the U.S. and CENELEC RDS standards, and it offers easy programming.

RE America will be represented with the RE 533, an RDS/RBDS coder. Its slim profile and fair pricing will allow stations to take advantage of RDS-compatible

MUSIC digital audio compression module, as well as the NU002 VHF FM modular exciter transmitter system.

Although unconfirmed at press time, RDS products are also expected to be shown by a variety of other companies, including Itelco, Sage Alerting, Teli and VG Electronics.

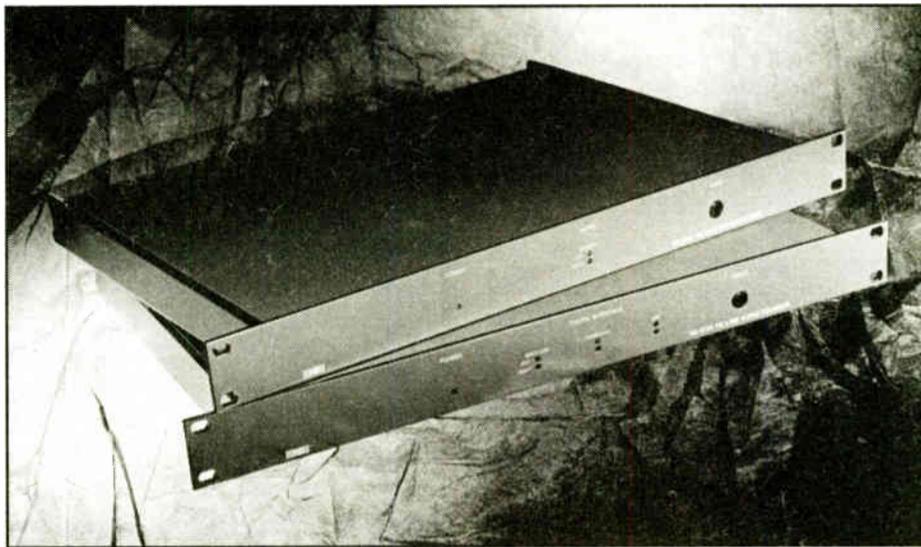
Digital transmission

Established products to be highlighted at the NVISION booth include the NV1000 Terminal Equipment, NV2000 Digital Audio Transmission System, the NV3512 Series Digital Audio Routing Switch and the NV4448 Digital Audio Sample Rate Converter.

Comark Communications will debut the new IOXTM television transmitter line featuring IOT technology for NTSC and D-HDTV applications. It includes a new exciter with proprietary, patented linearity correction systems, full IEC 215 safety features, flexible HVPS configurations with an internal AC distribution system, Class A solid-state drivers and optically isolated CMOS control logic.

Established products on display by Comark include an IOT equipped DUAL USE™ UHF television transmitter. Comark's field proven "S" series transmitter systems have over 3,000,000 cumulative inductive output tube hours of operation and have demonstrated high power D-HDTV compatibility.

NUCOMM will introduce two heterodyne transmitters and receivers configured as IF, repeaters or as terminal transmitters and receivers complete with IF modulators or demodulators, and up to four audio sub-carriers.



RE 8720/8730 Tie-Line Audio Codec

transmission products. Whether referred to by the manufacturers as RBDS or RDS, the products each deliver a digital data stream along a 57 kHz FM subcarrier.

New from Inovonics for this year is the

"smart radios."

Rohde and Schwarz will also show a variety of RDS products, including the DMC01 and DMC01C RDS coders. The company will also be exhibiting the

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Workstations Grow in Numbers, Drop in Price

LAS VEGAS Digital audio workstations (DAWs) and related recording products are no longer the new technology on the block. This year's NAB offerings indicate a rapid maturing of hard disk-based recording and editing products introduced as recently as last year.

Although strictly speaking not a DAW, Tascam is expected to show its DA-88 eight-track digital multitrack recorder. Using an 8mm cassette transport that records on Hi-8 videotape, the DA-88 records at 44.1 kHz or 48 kHz. Up to 16 DA-88s can be locked together, for a possible 128 tracks. The unit is available with the optional RC-848 remote control.

Micro Technology Unlimited will release version 2.1 of its MicroEditor recording, editing, mixing and playback software for its MicroSound DAWs. Enhanced capabilities include recording new tracks within a mix file while playing the mix or a single audio segment, 8-bit and 16-bit .WAV file writing, mixing and playing for multimedia mastering, split segment and more random access playing features.

Hard-disk packages

Digital Audio Labs will debut its version 3 of the EdDitor, a PC-based hard disk recording and editing package that runs under Windows 3.1. Edit operations are now mouse-driven, and new editing tools have been added. Sample Reversal, for example, reverses the order of audio samples in a selected region, and Gearshift

simulates the speeding up or slowing down of an audio tape, with the sound changing in both pitch and playback speed. Gain Change enables easy changes to the audio level of a selected region, and Normalize automatically adjusts the gain to maximum level without clipping.

The company will also demonstrate its CardD System hard disk recording and editing system for IBM compatibles.

Digidesign is expected to have the Sound Tools ProMaster 20 digital mastering system on hand. Also available from the company will be the Digidesign Intelligent Noise Reduction software and the Digidesign Pro Tools 2.0. Digidesign offers open system architecture, allowing cards from other manufacturers to be added to the company's CPU.

Software upgrades

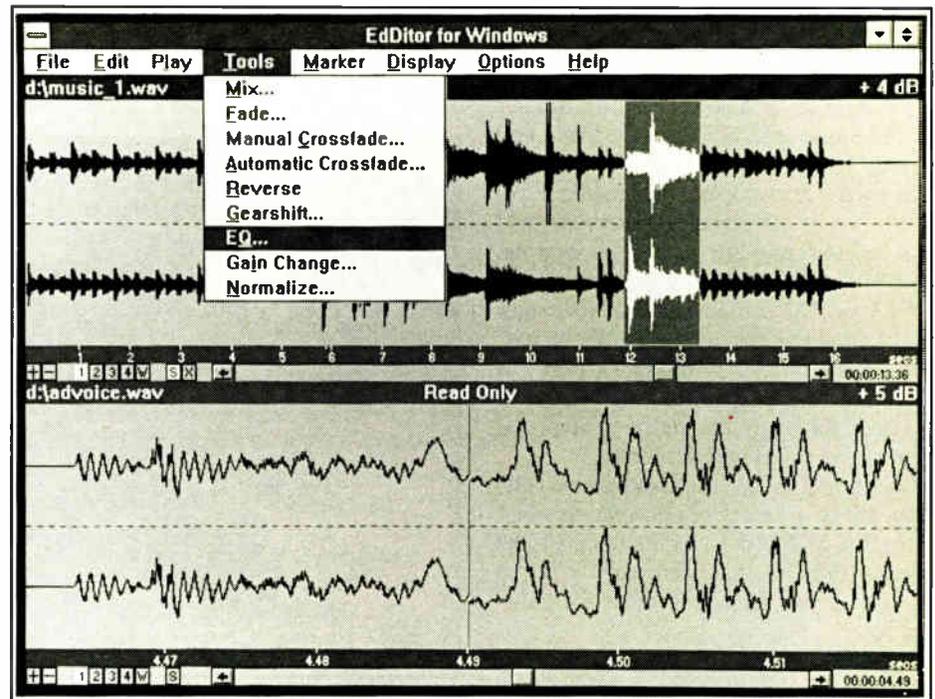
Korg is also expected to be on hand at the NAB, showing the newest software for its SoundLink random access digital audio production system. The system allows sample rate conversion from 44.1 kHz to 48 kHz or 48 to 44.1, permitting the use of sounds recorded at a different rate than the session in progress.

Otari's exhibit plans include the newest software upgrade for the ProDisk 464 digital recording/editing system. The software revision includes Otari's GUIDE (Graphical User Interface for Digital Editing) screen operating system and visual display system.

Akai Digital's booth will feature the DR

4d, a four-channel digital hard disk recorder with 18-bit, 64x oversampling A/D and 18-bit, 8x oversampling D/A. Up to four units may be linked for 16 tracks. The DR 4d features AES/EBU digital I/O, balanced analog I/O, full editing features,

frame edge lock to any source of non-synchronous time code and provide accurate synchronization over any amount of time. Another DM-80 addition to be introduced will be the SM-80-S Multitrack Manager control software for Macintosh computers. Also on display will be the SRC-2 dual sample rate converter with two inputs and one output on XLR, coax and optical connectors, the AR-1000 digital announce-



Digital Audio Labs' Editor for Windows

and optional SMPTE and MIDI interfaces.

Akai will also introduce a host of new processing products. Among them are the S3200, S3000 and S2800 16-bit, 32-voice digital samplers, S2800 Studio sampler with 8MB memory, CD3000 16-bit, 32-voice sample playback unit with built-in CD-ROM player, DD QMacII Macintosh software to control the DD1000 magneto-optical disk recorder and DD1000 version 3.0 software with enhanced editing and DSP functions.

Among **Roland's** newest offerings will be the DM-80-L Resolver, which allows the company's DM-80 multitrack hard disk recording and editing system to accurately

ment recorder that is capable of recording and playing back up to 500 separate voice announcements, the FG-1000 music timer for music playback according to a user programmed time schedule and the FM-40 channel mic/line mixer.

Studer Revox plans to exhibit the Dyaxis II multitrack DAW with "Plug and Play" and "Autoconform" features. Plug and Play allows the use of magneto-optical media alone or in combination with fixed disks by using data reduction standards. Optional hardware is available for Dolby AC-2 data reduction.

Harris Allied's NAB booth will bring its

continued on next page ▶



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Digital Gains a Foothold in STLs

LAS VEGAS STL, telco and remote equipment manufacturers are sending out signals loud and clear; there will be plenty of new and upgraded gear to look over at this year's NAB.

TFT Inc. will bring a variety of new products, including the DMM92 digital STL modem and multiplexer, the 9100/9107 composite STLs, and the model 911 emergency information manager for new EBS technology. The company also will display its established line of mono STLs.

CCS Audio Products is introducing the CDQ-1000 codec that sends 10 kHz digital audio over one Switched 56 or ISDN line. The company's established products on display include the CDQ-2000, the Micro 56 codec and the Micro 66i codec.

Dolby Laboratories will introduce accessories for and versions of the DSTL®

digital aural STL system, as well as the Dolby Spectral Processor, a professional two-channel dynamic equalizer. Established products on display include the DSTL® digital STL with plug-in digital stereo generator, the DP-90 digital encoder and DP501/502 encoder/decoder, the company's line of noise reduction products and SDU4 Dolby surround decoder.

Remote capabilities

Burk Technology will introduce enhanced speech and computer options for its ARC-16 transmitter remote control system. The company will display the ARC-

16 and LX-1 six-input stereo selector.

AEQ will display a digital telephone hybrid (AEQ-TH-02) as well as its multi-conferencing telephone system (AEQ-SYSTELE-3000) and identification line unit (AEQ-SSR-10).

Rodman-Brown & Associates will display its new EBS Central, a remote-access device that allows unmanned stations to comply with EBS regulations.

ComStream will display its established line of products, including the Digital Audio Distribution Network featuring the ABR200 Digital Audio Receiver using IPO/MPEG compression. Two new fea-

tures have been introduced: a 64 kbps QPSK operating mode and a higher speed in-band data channel.

QEI will introduce the Auto-Mod, a modulation control system in a stand-alone package. The unit allows any station to maintain a desired total modulation level at any remote or unattended location. QEI also will display Q-MAXX, the latest addition to its CAT-LINK STL/TSL. The plug-in module allows any CAT-LINK system to transport ultra-high quality 15 kHz discrete audio channels over DS-1 phone circuits in a real-time environment.

Among its product introductions, **Avocet Instruments** will feature an addressable DTMF decoder containing three channels, addressable to channel and each unit's ID.

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DAWs Grow In Availability

▶ continued from previous page

full line of reasonably priced digital editors, including the Roland DM-80, Arrakis Trak*Star, Tascam DA-88 and AKG DSE 7000.

Multi-track machines

Broadcasters General Store will also display the Tascam DA-88 digital multitrack machine.

Arrakis will showcase its Trak*Star 8 (TS-8) and Trak*Star 2 digital mixer-editor-recorder products, which the company says it has designed specifically for radio commercial production.

The TS-8 provides two audio input and output channels with comprehensive playback and editing of up to eight tracks simultaneously from disk. The base system includes the rack-mounted digital hard disk controller with 120MB storage, color VGA monitor, keyboard and trackball. Options include a built-in mic preamp for stand-alone overdub operation and multistudio capability to enable users to operate from up to seven different studios. The Trak*Star 2 is a two-track long form program editor featuring scrub, independent level adjust for each audio segment, and automatic and manual fade/splicing.

Available from **Pacific Recorders & Engineering** is the ADX workstation system, featuring eight-track recording, editing and fully automated production console interface for complex production.

Unconfirmed as an exhibitor at press time is **Digital F/X**. In 1992, the company acquired the assets of WaveFrame and Hybrid Arts. The company is expected to be on hand at the NAB show, and is likely to show products from both companies, including the Digital Master E/X, a four-channel, 16-track digital recorder and editor.

Also unconfirmed at press time is **Turtle Beach Systems**, which is likely to show its 56K digital recording system, with upgrade for SMPTE chase/lock and time compression.

Studio Technologies plans to introduce the StudioComm Series, a set of products designed to work with digital audio workstations. The Series includes the Model 50 central controller, Model 35 talent amplifier and Model 51 control console. The company's aim in bringing these products to market was to address the communications and monitoring needs of those with smaller consoles lacking such capabilities.

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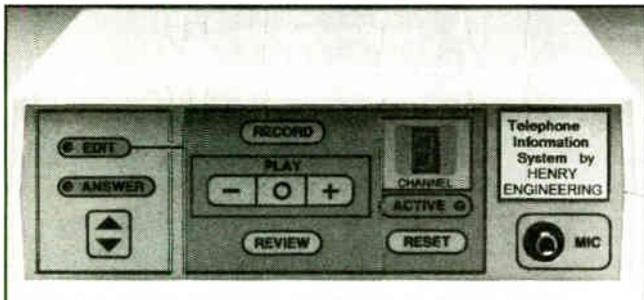
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Digital Gains a Foothold in STLs

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The decoder is designed to custom control



Henry Engineering's Telephone Information System

circuits and remote control of any equipment. Also on display will be the Pro-Line 102, a pro channel receiver for applications in the field of news coverage and remote control telemetry.

Looking ahead

Look for **RE America** to showcase its new RE533 RDS/RBDS coder, a slim profile unit designed to take advantage of RBDS compatible "smart radios." Also from RE America is the Musicam 660/661 coder/decoder used for satellite and terrestrial networks. It can use two Switched 56/54 circuits or 112-128 kbps operation.

The company will also display the RE 8720/8730 tie line audio codec, a product developed for numerous applications, including STLs, studio to studio and others.

360 Systems will display a new Series 1000 Digital Message Player. The playback unit features full bandwidth to 10 kHz and stores four different messages for a total of three minutes play time. The messages can be played in any sequence and allow for local and remote start control.

Among the new products from **Telos** will be enhancements to the company's multi-line multi-caller talk show systems and new versions of the Telos ONE digital telephone hybrid.

Radio Systems Inc. will feature the T1-101 telephone interface, recently acquired by the company from Symetrix.

Broadcast Microwave Services will display its line of remote and on-site steerable pedestals, ground and airborne autotracking systems, STLs, ENG systems, portable transmitters and receivers, antennas and various microwave accessories.

Computers everywhere

Broadcast Software Ltd. will introduce the SVS Computer Interface Remote Control System and BSL Guardian Software. The software also supports the Burk and Gentner units, allowing for a "mix and match" of any of the units.

Harris Allied will display a new digital remote control system, available in three models. The PC-based system offers capabilities ranging from 16 to 128 control/status/analog channels.

Henry Engineering is planning to introduce the Digicord, digital audio recorder. The unit stores up to 16 messages making it suitable for news delay, translator identifier, recording EBS alerts for logging, etc. Also new from Henry Engineering is the Telephone Information System, a multi-message system for giving out information via telephone.

Look for **Gentner Communications Corp.** to make new product announcements at NAB. The company will also display its line of established products, including the VRC7000 transmitter remote

control and IFB interfaces.

J.N.S. Electronics will introduce the RFL-7000 series 1.5 to 2.3 GHz digital microwave link, providing E1 or T1 structure for D-Mux or similar uses, and the D-Mux MC 501/502 automatic change over system, for use with D-Mux series 500 digital multiplexing system.

Marti Electronics will display its established STL-10 STL system. The company will feature its new SC-48

stainless steel four-inch parabolic STL antenna, and established line of remote pick-up transmitters, receivers and antennas.

Moseley Associates will introduce a number of new products at this year's NAB, including the DSP 6000, selectable high spectral efficiency option for the DSP 6000 digital STL system; the CDQ 2000; the Master-Touch, touch screen interface for Master Controller for MRC 2 and MRC 1620 remote control products, and the MRC 1620 LP flash reprogramming option, low power option and intelligent RS232 interfaces for MRC 1620. Moseley will bring along a new

PCL 6000 16-channel STL.

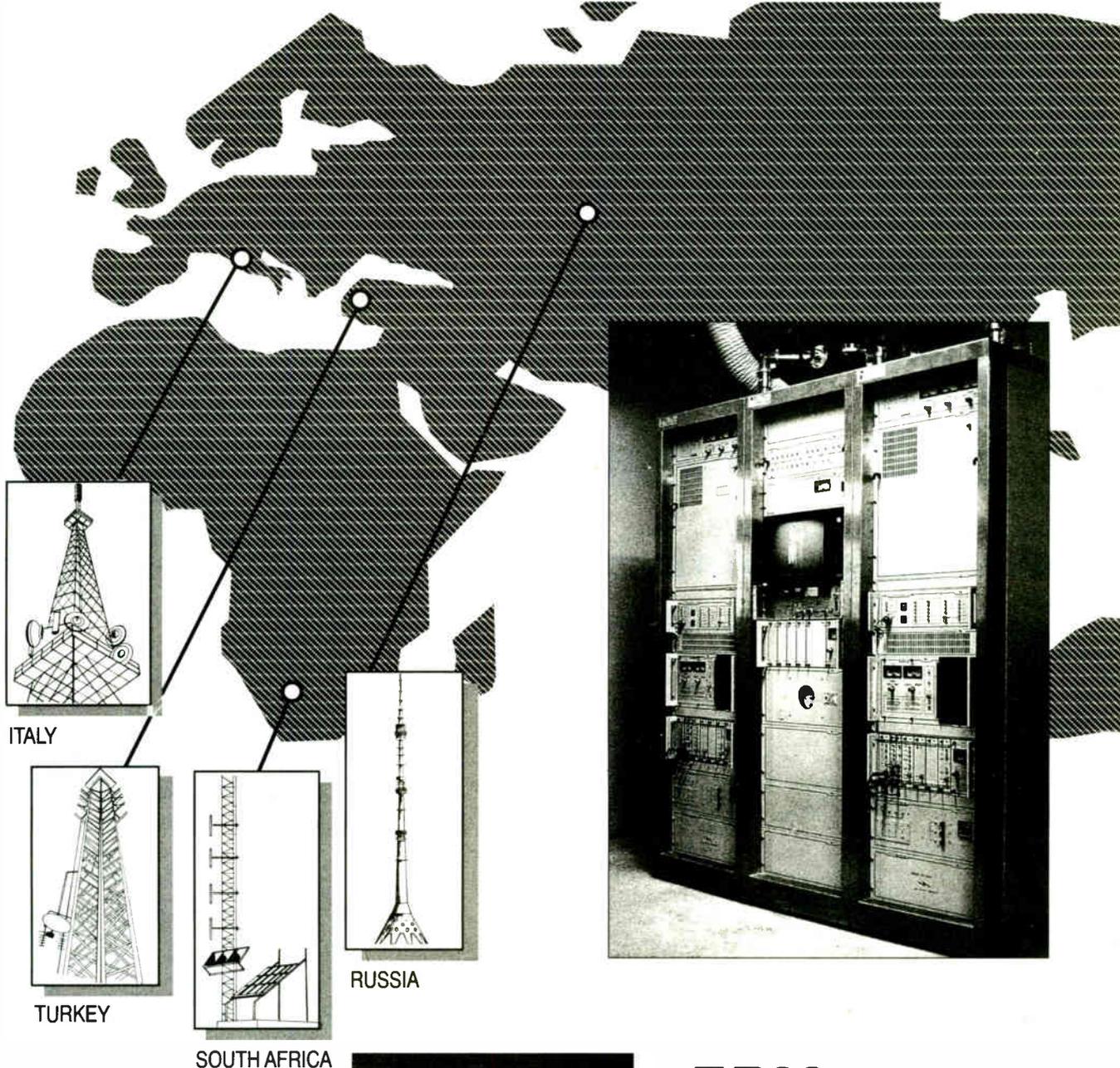
Satellite services

IDB Broadcast will introduce its FM "squared" service featuring full coverage of North America, as well as its new service to Europe via IDB's France IDAT (International Digital Audio Transmission) Service.

Scientific-Atlanta will display a prototype model of its new Encore DSR-3000 series digital satellite receiver. The receiver comes with a SEDAT™-compatible digital audio decoder in one rack-mountable unit.

NPR Satellite Services will showcase its full range of domestic interconnection services to radio broadcasters. Available services include fixed and transportable uplinking, SCPC audio transmission, downlinking, digital fiber optic audio channels and service to Galaxy and Satcom.

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L-Band Can Circumvent Multipath

by James Careless

OTTAWA Canadian field tests have concluded that the Eureka-147 digital audio broadcasting (DAB) receiver can extract a usable signal in conditions where two transmitters overlap on the same L-band frequency.

The interpretation of test results suggest that it is possible to establish a wide-area DAB "single frequency network" on radio. (There will be a presentation on Canadian DAB at NAB.)

The Canadian test results, presented earlier this year at CCIR meetings in Los Angeles, are based on extensive tests by the "Task Force on the Introduction of Digital Radio." The Task Force is drawn from the federal Department of Communications (DOC), the Canadian Broadcasting Corp. (CBC—the public broadcaster), and the Canadian Association of Broadcasters (CAB), which represents the vast majority of Canadian commercial broadcasters.

The Task Force conducted the tests using two, high-power L-band transmitters; one mounted on the CN tower in Toronto, the other located 83 kilometers north on the CKVR television tower at Barrie.

During the tests, the two towers transmitted both unmodulated carrier waves and the

Eureka-147 DAB signals on 1468.75 MHz. The carrier-only broadcasts were staged to measure propagation; the other was made to assess the performance of a second-generation COFDM Eureka receiver.

Although the CN tower antenna remained fixed at 300 meters, the Barrie transmissions were broadcast from two heights: 97 and 230 meters to compare the difference height makes to L-band propagation.

The gain of the signal output also was varied, from 6.2 kW ERP on a 120 degree beam to 17.4 kW ERP on a 40 degree beam.

The signals themselves were received and measured using a specially-equipped mini-van. It was driven back and forth between the two transmitters on Ontario's Highway 400.

The point of the experiment was not only to measure Eureka's performance in a "single frequency network" environment, but also to see if the theory of "DAB gap filling" works.

"The main thing was to experiment with filling in the gap between (areas of good signal reception) because in our previous tests we've discovered that when you get about 40 kilometers north of Toronto, the terrain does produce a gap," said CAB technical advisor Wayne Stacey.

"Backfilling it from Barrie meant that

those holes didn't exist anymore," he explained.

Because the Canadians succeeded in getting overlapping coverage in their Toronto-Barrie test corridor, however, does not automatically allow the second-generation Eureka set to receive perfectly all of the time.

The problems occurred in the area where the Toronto and Barrie signals not only overlapped, but also when the signals were more than 32 microseconds out of phase with each other.

The Task Force had anticipated such problems. In fact, it set out to minimize the problems by synchronizing the transmitter outputs.

The logic behind doing this is that the time delay for the synchronized signals to travel to the midpoint would be equal. Thus, the time differences between the two would be minimized, if not eliminated.

Of course, the realities of propagation, including multipath, combined with the mini-van's changing position on Highway 400, meant that out-of-phase signals did arrive at the Eureka receiver.

The second-generation set could deal with signals that were up to 32 microseconds out-of-synchronization, according to Royce Trenholm of the DOC.

But when this limit was exceeded, there were interference problems, according to Trenholm. Specifically, there was a decrease in usable incoming signal strength.

Interference notwithstanding, the Canadians feel pretty good about these test results. In fact, Stacey said the tests not only prove that DAB L-band transmitters can match FM for cost-efficient performance, but when ganged in "single frequency networks," such equipment could be attractive to coverage-minded AM broadcasters as well.

Since DAB has multiple channel capability, the cost of establishing such a network could be split by up to six AM stations who could essentially "share" the network facility.

As a veteran of the DAB scene, Stacey said this last option is a potent argument for Eureka-147, one that might help win some support among U.S. AM operators where broadcasters want an in-band system.

"Our understanding is that the AM broadcasters in the states are counting on promises about what an in-band system will do for them," he said. "We have a great deal of difficulty seeing how those promises can be met. On the other hand, the needs of the AM broadcasters can be met with the L-band systems that we're looking for here."

Despite the recent return of their second-generation Eureka equipment to Europe, the Canadians plan to continue L-band tests for the foreseeable future. For now, the emphasis will revert to propagation, but that will change when third-generation Eureka technology is delivered—sometime later in '93, Stacey said.

□ □ □

James Careless covers radio in Canada for RW from Ottawa.

10

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The Golden Age of Wireless Microphones

LAS VEGAS In the field of microphones and monitoring gear, new and familiar companies alike will exhibit a variety of product introductions at NAB 1993.

Among the innovations for this year is a resurgence of interest in wireless microphone products. Many manufacturers will show wireless products, for applications

Among the innovations for this year is a resurgence of interest in wireless microphone products.

including electronic newsgathering (ENG), electronic field production (EFP) and other remote broadcasting uses. Microphone accessories, including pre-amplifiers and mic mixers, will also be shown.

Wireless is hot

New from Shure will be the EC series of wireless mics, featuring digitally-controlled, frequency-synthesized design. The Beta87 premium electret condenser mic will be shown in wired and wireless models, as will the L2/87—a wireless version of the Shure SM87 condenser mic. The VP64 omnidirectional ENG handheld mic and the L Series of wireless mics will be on hand, as will the company's FP 410 portable automatic mixer featuring Shure

IntelliMix™ circuitry.

New from Audio-Technica for this year is the Engineered Sound™ line of miniature condenser mics, featuring the AT933 MicroLine™. The company will also exhibit its established line of professional wireless and wired microphones, teleconferencing systems, mixers and audio accessories.

An extensive line of wireless microphone products will also be on exhibit at the Nady Systems booth. New products include the Nady 950 UHF mic in handheld, lavalier and instrument versions, and the Nady 950 GS UHF. Established Nady products to be shown include the Nady 2000 VHF, Nady 750 VHF, Nady 650 VHF, Nady 401 VHF, Nady RW-1 VHF and Nady RW-3 UHF wireless microphone systems.

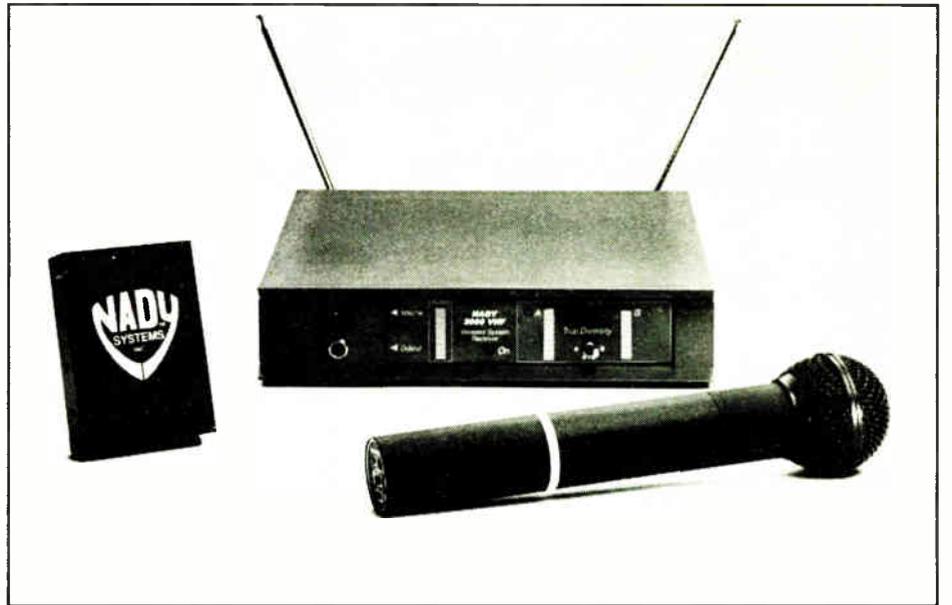
VHF and UHF wireless systems for all applications, including ENG-type work, will be unveiled at the Samson Technologies exhibit. The company also plans to show its UHF synthesized wireless system, which will be on the market this spring.

Telex Communications will show its brand of headsets, microphones and intercoms, as well as the RTS brand of intercom products.

New this year from Vega are the LM-210 and LM-210X microphones—subminia-

ture lavaliers for a wide range of applications—and the RMT-14 wireless IFB four-channel transmitter with PL-2 two-channel mini bodypack IFB receivers. The Vega 600 series UHF wireless microphone sys-

tem which can interface directly to two-way radios, hardwired intercoms and telephone systems. The company is also offering rental of the Lectrosonics 195 series of UHF wireless mics.



Nady 2000 VHF Wireless System

tem and the Vega IFB Private-Line wireless system will also be on display, as will the company's new Vega UHF Q-Plus wireless intercom system.

Systems Wireless will feature the Series 800 UHF wireless intercom at NAB 1993. The Series 800 is a full duplex UHF inter-

Studio Technologies Inc. will display its PreEminence mic, a two-channel microphone preamplifier.

Mics and headphones

The beyerdynamic booth will feature a continued on page 58 ▶

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Consoles Packed With Latest Enhancements

LAS VEGAS Console manufacturers will make a strong showing at the NAB convention this year, as many companies will introduce new products or upgrades for existing ones.

Auditronics has announced it will highlight its latest on-air console, the AirMaster 90. The board uses thick-film hybrid technology, has a user-programmable logic

Series units as well as the SC Series consoles.

From **Audioarts Engineering** will come the debut of the MR-40 combination four-track and on-air production console, which features four- and two-track bus assigns, three-band EQ, start/stops, cue speaker, and an on-air type monitor section.

Established products from Audioarts will include the R-30 modular audio console,



Wheatstone's A-500 On-Air Console

control system, and stereo-balanced VCAs. All of the unit's push-button controls are electronic, with LED indicators. Mainframe sizes are eight, 12, and 16 inputs.

Meanwhile, **Fidelipac Corp.** plans to unveil the DYNAMAX MX Series modular audio console line. Billing it as a series of "cost-effective on-air mixing consoles," the company reports the units feature VCA mixer and monitor control, active balanced line inputs, transformer isolated mic inputs, and a count-up event timer. The consoles come in either rotary or linear faders, in six-, eight-, 10-, and 12-channel configurations.

Several console models will be shown by **Arrakis**, including the 10,000 and 12,000

the R-10 small-format console, and the A-50 console (with eight-, 12-, and 18-input configurations).

Industry mainstay **Radio Systems** reported it would be showing its RS Series on-air and production mixing consoles. The series has six-, 12-, 18-, and 24-fader combinations.

Headlining the new products to be introduced by **LPB Inc.** will be the company's 7000 Series stereo audio consoles, featuring P&G linear faders, three stereo output busses, a mono mixdown or mix-minus option, and all front panel switches rated for 5 million operations.

LPB will also showcase its established

continued on next page ▶

Golden Age of Wireless

▶ continued from page 57

number of new products on display, such as the DT190 sportscaster headset/mic combo, the MC834 large diaphragm condenser mic, the MEM86 shotgun mic system, the MCE50 series miniature clip-on mic, the M424 control room talk-back mic and the company's new VHF and UHF wireless mic systems.

Sennheiser will be showing the MKE-44-P stereo recording microphone and the HMD250 broadcast monitor headphone, as well as the HD440 dynamic headphone.

Electro-Voice plans to show the 635A/B and RE50/B mics for ENG and EFP. The CO100 and CS 200 lavalier mics will also be on hand, as will the 635A, RE50, RE20 and RE27N/D microphones.

New from **Crown International** will be the CM-311 head-worn microphone, which features a pickup pattern similar to the CM-310 differoid handheld mic. The LM-301 dual gooseneck microphone and the PCC-170 boundary microphone will also be on display at the Crown booth.

Neumann USA is manufacturing a limited number of the classic U67 tube microphone, to be shown at the company's booth at the NAB show. Other Neumann products include the KMR 81 and KMR 82 shotgun microphones, the RSM 191 stereo shotgun mic system, and the U87ai, U89i and KM 100 miniature microphones.

Altec Lansing will display its Model 1674C automatic mic mixer, a multiple microphone system for hands-off operation and gain sharing.

AIR Corp. plans to exhibit a prototype of its new studio/production mic processor. The company will also show its established Model 500ph radio microphone.

The **AKG Acoustics** group of companies will show a variety of mics and related products. In addition to microphones stands, headphones and accessories from AKG, the model 760X microphone preamplifier and the BSS line of mic splitters will be on display.

A wide range of microphone accessories will be on hand at the **Benchmark Media Systems** booth, including audio distribution products, mic pre-amps, interface devices and line amps. The company's MPS mic pre-amp products include various mic pre-amp packages, featuring the MP-4 mic pre-amp card. The MicroFrame series of line amps and mic pre-amps in a single rack-unit package, as well as the

System 1000 modular frame series of audio DAs and mic pre-amp DAs will also be displayed.

A newly redesigned digital diversity receiver for handheld and lavalier mics will be displayed by **Swintek Communications**. The company also plans to show its Mark QDC ENG microphone systems and the Mark 200 series of intercoms.

New in monitors

In the category of monitors, manufacturers are also exhibiting some new products, both in studio near-field monitor as well as headphone designs.

Tannoy will show its PBM5 playback monitor featuring a 3/4-inch soft-dome HF unit, rear porting and a gold-plated five-way binding post, for power levels up to 100 W.

Yamaha Corp. of America's display will feature the MS101 II and MS202II powered audio monitor speakers, as well as the MS60S powered monitor speaker.

Genelec, a Finnish company, is expected to exhibit at this year's NAB show. Although unconfirmed at press time, the company manufactures a variety of powered monitors, including the 1031A, a two-way system designed for the U.S. market.

JBL Professional plans to show several new monitoring products, including the 4400A series of studio monitors, the Control 8SR control monitor and the MPA series of power amplifiers, as well as the Models 4206 and 4208 Multi-Radial sculptured baffle studio monitors.

R-Columbia Products Co. will introduce the Model RL-100, a wireless 1FB/talent cue headphone, and the Model TR-470 long-range wireless intercom headphone. A range of other headphones, intercoms (both wired and wireless) and wireless mics also are expected to be exhibited by R-Columbia Products.

Shure will show the FP22 stereo headphone amplifier, designed to provide headphone feeds from a wide variety of audio inputs.

Electro-Voice will show its established line of Sentry 100A monitors.

Stanton Magnetics plans to show its announcer/newscaster earphones.

On hand at the **Wohler Technologies** exhibit will be a digital input option of AES/EBU and S/P DIF for the company's single rack space and two rack space audio monitors. Also available will be the AMP-1A and AMP-2 stereo monitor speakers.

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Console Manufacturers To Display New Wares

► continued from previous page

line of Signature III Series rotary fader audio consoles in six-, eight-, 10- and 12-channel models.

AEQ will showcase its mixing console and portable mixer.

Amid its varied line of broadcast radio equipment, **Broadcast Electronics** also confirmed it would spotlight its established line of audio consoles.

Pacific Recorders & Engineering Corp. plans to display its Radiomixer on-air console, its production mixer console, BMXII and AMX consoles as well as its systems integration services, studio furniture, newsmixer and stereo mixer consoles.

Autogram Corp. said it would introduce the radio community to the MM-8A console with eight slide pots, called by the company a "low-priced updated MM8." Look for it alongside the established AC-8 (eight rotary pots; 26 stereo inputs) and PM1644 (16 slide pots; 44 stereo inputs) consoles.

As reports **Wheatstone Corp.**, the company will introduce new air and production consoles and will show its established radio console designs.

Attendees who stop by **Soundcraft's** booth will be able to witness the debut of the company's B-100 broadcast console alongside another new console, the Folio compact console. Soundcraft's Sapphyre post production console will also be on display, as will the company's BVE 100, audio-follow-video console.

As for **Neotek Corp.**, the company said it would have on hand the Esprit audio mixing console.

ATI (**Audio Technologies Inc.**) announced it would have for display its established Vanguard Series of six-, eight-, and 12-mixer dual stereo on-air consoles.

Turning to **GML Inc.**, the company said its new all discrete Model 9100 rack mountable 10-input/four-output line level mixer would make its debut.

The new Stelladat four-channel mixer will premiere at the **Stellavox Digital Audio Technologies** booth.

Studio gear

A number of companies will be exhibiting different gear designed to be the building blocks of any studio. **AMCO Engineering** will display its full line of enclosures for monitoring-type applications. The company offers three distinct styles of frames to build upon as base units. AMCO will showcase its full line of studio accessories, including drawers, pull-out and stationary shelves, writing surfaces, internal mounting equipment and cooling devices.

Arrakis will display its line of Modulux modular studio cabinetry and Modulink studio prewired systems as well as the new, Digidesk digital studio cabinetry.

Industrial Acoustics Co. will showcase its line of studio environment materials designed to provide the proper absorption, diffusion and noise reduction.

Radio Systems Inc. plans to display its new line of programmable micro-processor timers and clocks—programmable for event timing and master clock systems.

The **Sonex** division of **Illbruck Inc.** will be exhibiting Sonex acoustical materials for

the sound treatment of studios. Also featured will be Sonex ceiling tiles, pyramids, ProSPEC sound batteries and composites.

The **Winsted Corporation** will introduce a new ergonomic series of multimedia workstations for desktop editing featuring recessed monitor well, adjustable shelves in one-inch increments and an extra deep back panel with two wire management trays for cord control.

The company will also showcase its established line of modular components and

accessories designed to allow you to custom build a console to fit your needs. Winsted offers tape storage, rack slide kits,



Selco's Collet Control Knob

and duplication racks.

For console peripheral items, how about a

new control knob design from **Selco Products Co.** For applications that demand a spin wheel or crank control knob, the company's new Collet control knob (\$470, 47mm, diameter) comes in a flat version as well as a cap with a finger recess or crank. The caps come in standard colors, though custom colors are available on request.

Emcor Products/Crenlo Inc. will display its line of modular electronic enclosure systems, which gives users many possible console configurations. The company also will offer a full range of component accessory items to complete the system.

Look for **Murphy Studio Furniture** to again display its line of Avante-Garde and Elite series furniture.

The Express Group is expected to display its 6000, 5000 and 4000 series furniture for the studio.

When looking for a digital audio system for automation of satellite programing or live assist, there would appear to be many choices. But if you're looking for a system which is flexible enough to give you total control without sacrificing your sanity, there is only one choice. The Phantom by RDS.

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The PHANTOM Digital Audio Automation

The Phantom ends the confusion of automation by keeping everything organized. The Phantom simplifies your daily operations by keeping information such as input changes, voice changes, and clock changes in their own individual schedules rather than in the log. You can leave those liners and other voice drops out of the log because the Phantom will do them for you. The Phantom allows you to date new schedules to begin weeks, months, or even years in advance. When your satellite network informs you that there will be a voice substitution on Thursday, two weeks from today, you can prepare for it today.

The Phantom can retime spots to fit them cleanly into a satellite break without inserting silence, overlapping, or running late. The Phantom

LOG	TIME	LINE	DESCRIPTION	DURATION	CODE
	3:20:00		3 Optional Break	240:00	0
		5251	action Chevrolet Corp.	57:00	
		4081	colson Pepsi Cola	57:00	
		8210	medco St. Paulers	57:00	
		7301	Flore PFD-Scientific Sup	57:00	
	3:37:00		4 Mandatory Break	120:00	MF
		6317	Feret South Saba Furniture	30:00	
		9236	metel Hotel 6	60:00	
	3:43:00		Jewel Stegler's Jewelers	30:00	
		0512	3 Optional Break	240:00	0

Station: Magi 101	Source: The Touch
Timer: 6:15:00 (Line Relay)	Voice: Nancy Johnson
5:01 Exp Log Profile Rpt. 02/12/93	Line: Mandatory Break
5:03 Exp Expired Last Rpt	Legal ID: Clock Sync
5:04 Exp Edited Voice Sched 8:1:1	Optional Break: Magic Call

Friday 02/12/93 THE PHANTOM 5:04:43pm

can create reports to keep you informed on a number of topics, from a list of expired spots to an analysis of potential mistakes in your log. The Phantom also maintains a history of system activity.

The Phantom has the features that others would want you to believe are theirs exclusively. The Phantom remains completely functional during recording, sensing relay closures and starting breaks as easily as it does when it is not recording. The Phantom can fill incomplete breaks with spots from a list you specify without ruining product separation.

While other systems tie your hands and limit your flexibility by only offering 3 or 4 inputs, the Phantom gives you 6 stereo inputs, using its AMX-84 solid state switcher, with the option of increasing the number of inputs to 14 or more. If your station is News/Talk, you know how important this can be.

The Phantom allows you to change the sampling rate, digital format, and stereo/mono settings at will to meet your needs for an individual spot. The Phantom offers a number of digital formats, including the new Dolby AC-2 format, as an option.

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We're located in Grand Rapids, Michigan, the contract furniture capital of the world and where crafting fine furniture is a centuries-old tradition. Because of our location we can employ master craftsmen who practice skills unique in the furniture world. This craftsmanship, ingrained in the hearts and hands of our people, gives the studio furniture you specify unsurpassed quality, function, economy and value.

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- Solid oak trim
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- Smoked plexiglass panels for unused spaces
- Choice of colors

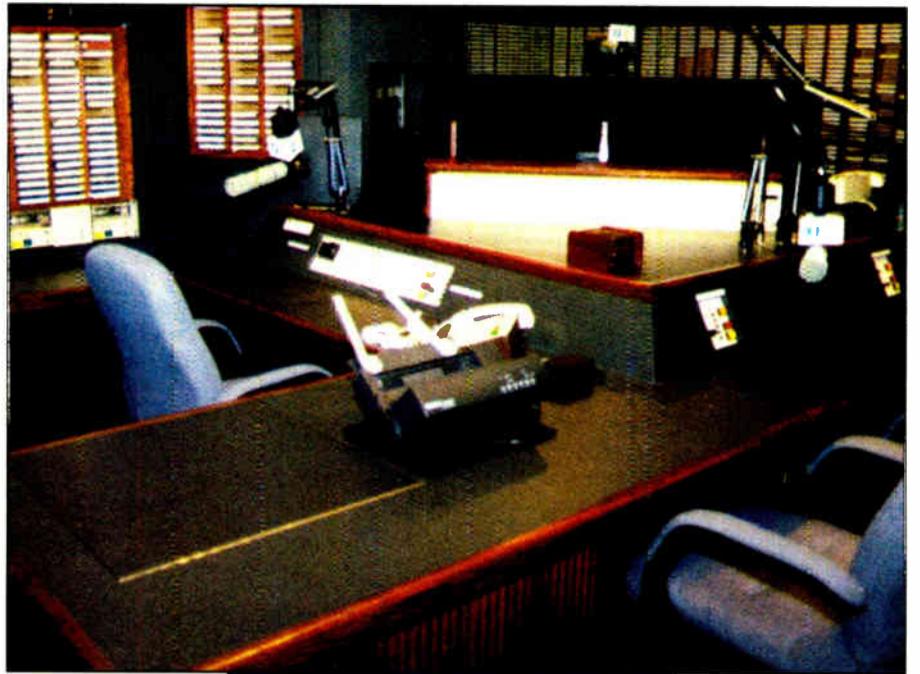
Audio began studio furniture design and manufacturing in the late 70's. To date, over 250 systems have been delivered and installed in all areas of the United States.

"ANY SIZE, ANY SHAPE . . . INDIVIDUALLY BUILT TO YOUR SPECIFICATIONS."

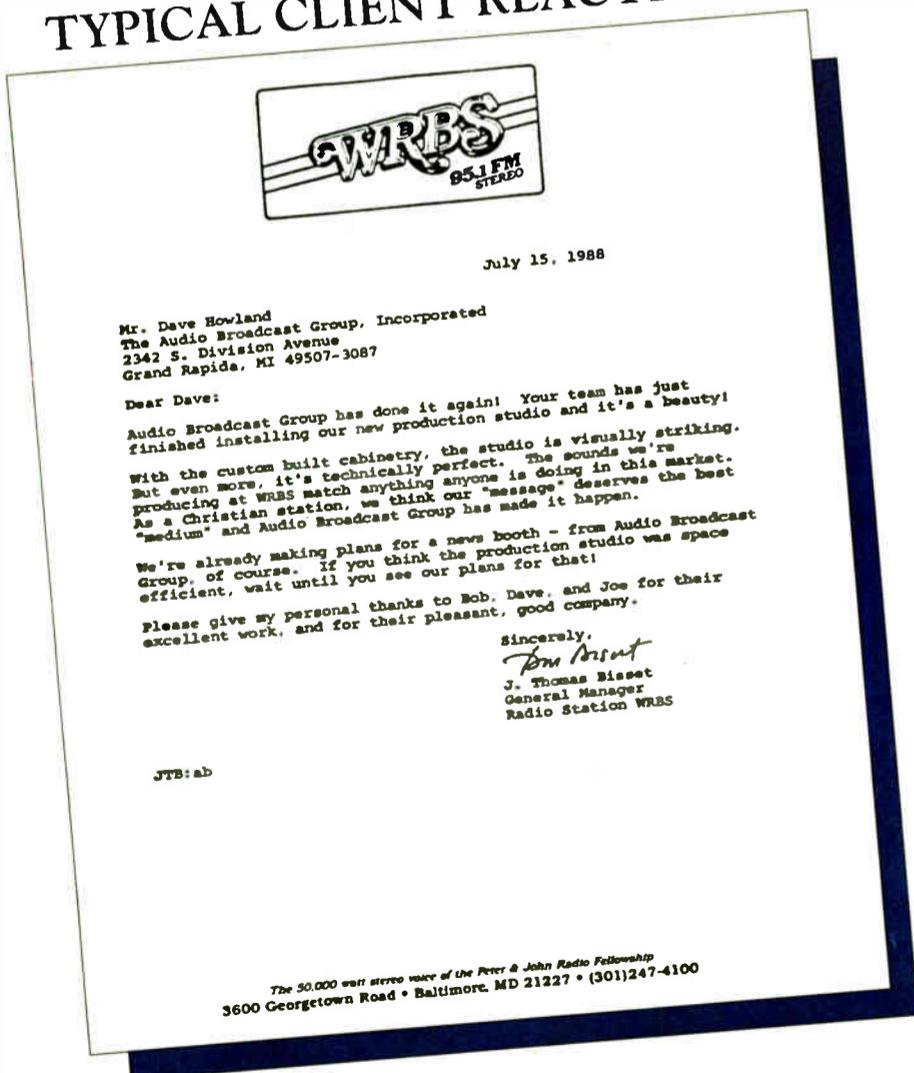
Many studios require specialized furniture that is out of the norm. Specify any size or shape required and we'll build it.

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Complete prewire installation services are also available by our trained technicians to insure complete system satisfaction and reliability in the years ahead.



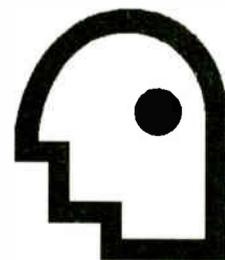
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Correcting Equalization Difficulties

Simple But Effective Noise Generators Can Be Made With Special ICs and Discrete Components

by Tom Vernon

HARRISBURG, Pa. When we left off last month, we had equalized our telco lines to the transmitter for a flat response, and I promised to talk about how these equalizers could be misadjusted to try and correct for other problems.

Most of the familiar tests for frequency response involve a signal generator with discrete tones and a VTVM. When

testing several sections of an audio chain this can become a time-consuming process, sometimes involving several overnights. A more rapid procedure involves a noise generator in conjunction with a spectrum analyzer or third-octave RTA.

Simple but effective

Many engineers, with low budgets, avoid these tests due to the perception that the necessary equipment is too

expensive. This is just not true. Simple but effective noise generators can be fabricated with specialized ICs and a

Assuming flat response from telco lines or STL, and flat response from limiters, failure to make proofs means there's a problem in the transmitter.

few discrete components. And while audio spectrum analyzers are quite

expensive, used third-octave or octave RTAs frequently show up in surplus test equipment catalogs for very reasonable prices.

When using a noise generator for response runs, it's important to match its characteristics with the measuring

device you're using. Pink noise will produce a flat response when using a third-octave or octave RTA. White noise must be used when measurements are done with a spectrum analyzer.

Last month we said that audio equalizers at the transmitter site are sometimes juggled to give a flat curve when the transmitter frequency response won't quite make it. A little HF boost and the proof looks fine. Yes, but that's cheating. Assuming flat response from telco lines or STL, and flat response from limiters, failure to make proofs means there's a problem in the transmitter.

How good a response...

Both AM and FM transmitters can develop problems that manifest themselves through poor frequency response. Older FM exciters have high Q stages after the modulator. Mistuning of any of these stages will produce a narrow bandpass, and poor frequency response. Proper broadband tuning of these stages is essential for flat response.

Verify proper operation of the exciter by doing a response run into a dummy load. If the problem persists, connect the transmitter to a dummy load and repeat the procedure, adjusting driver and PA tuning and loading controls for wide-band response. If response is flat with the transmitter running into a resistive load, and skewed when measured off-air, suspect damaged transmission line or antenna elements. This may or may not reveal itself through poor VSWR readings. If your station doesn't own a spectrum analyzer, it may be worthwhile to rent one to make quick work of this sometimes tedious procedure.

In a similar fashion, bandwidth problems in AM transmitters can reveal themselves through poor frequency response.

Many of the tuning procedures described in manuals (particularly for older transmitters) were written before noise testing became popular, and are intended to maximize overall efficiency. It should be remembered that settings for best efficiency and best sound (broadband response) are often different. By using the noise generator/spectrum analyzer combination, it is possible to see the bandpass while adjusting the tuning and loading controls for flat-test response.

As with FM transmitters, problems may persist, and it might be necessary to substitute a dummy load to determine whether there are bandwidth problems in the transmitter or phasor.

□ □ □

Tom Vernon divides his time between consulting and completion of a Ph.D. He can be reached at 717-367-5595.

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Look for New Antenna Products at NAB

LAS VEGAS RF equipment will permeate the NAB exhibit floor as manufacturers line up the latest in antennas, towers, transmission line and obstruction lighting gear.

Electronic Research Inc., ERI, will showcase the new SHPX and LPX series of FM antennas. The models feature increased control with the Lambda support system and enhanced impedance bandwidth. Also shown will be a full scale 1080 series antenna similar to the one used for the Empire State Building project.

A variety of models

Shively Labs will unveil its new MMDS-ITSF antenna, as well as an internal-fed, single-element, normal-mode helix antenna, a new panel antenna, and a new transformer that is tuneable under pressure and power.

The company will also display its full line of side-mount and panel FM broadcast antennas, and related gear.

Dielectric Communications will showcase its line of ring and panel style antennas, as well as transmission lines, RF terminations, switches, etc.

LDL Communications will show its FMAC series of FM broadcast circularly polarized antennas, designed to be side-mounted, as well as the low windload Spearhead FM CP antenna, designed for multiplex operation of several FM stations.

Look for **Jampro Antennas'** new JHD, JYA and JUHD antennas. The line JYA YAGI antennas is available for FM, UHF and VHF in both horizontal and circular polarization.

Clark Wire & Cable will be exhibiting its new line of patch bays (both Bantam and quarter-inch) and interface panels which can be prewired to users' specifications.

S.W.R. Inc. will unveil a new line of antennas for all power segments, including FM. S.W.R. also will have on display its rigid transmission line with patented thermo-coupler, self-aligning flanges.

Comtech Antenna will display its transportable 3.8-meter fly-away antenna system for SCPC downlink and the Offsat antenna for SCPC uplink. Also on display will be the new ECS microprocessor satellite antenna control unit.

Utility Tower will display information about its AM, FM, TV, CATV, LPTV and microwave communications.

Earth stations

Antenna Technology will demonstrate its lines of satellite earth stations and related electronic components. The company plans to display new and refurbished transmit and receive antenna sizes from 1.2-meter to 32-meter. On hand will be the recently upgraded Simulsat 3.5-meter and seven-meter multi-beam antennas, capable of simultaneously receiving 35+ C- and Ku-band satellites, within a 70 degree arc. Look for the Vanguard Instruments VI 2.0 satellite receiver, and the PROLine digital audio satellite system.

Micro Communications Inc. will introduce new broadband dipole antennas, as well as 7/8 and 4 1/16 coaxial switches, low/medium power channel combiners and bandpass filters. **Cablewave Systems** will

display its line of microwave parabolic antennas, its Flexwell foam dielectric copper corrugated coaxial cable and RF connectors, rigid line and components, mounting hardware, FM antennas and STL and AML parabolic antennas.

Look for **Kintronics Labs** to display its rapidly tunable AM/MW antenna matching networks and other established products.

Cables and plugs

Switchcraft will display its line of switches, jacks, plugs, connectors, jackfields, patch panels, power cords, EAC power receptacles and molded cable assemblies.

Canare Cable Inc. will introduce the DA206 cable, a 110Ω line for AES/EBU digital audio gear capable of running up to 300 meters. Also on display at Canare's booth will be established company products such as the L-4E6S "Star Quad" microphone cable and snake systems, and the BCJ-XJ-TR 110Ω-75Ω impedance transformers for AES/EBU digital audio equipment.

Myat Inc. will show its new adjustable quarter wave stub 2nd harmonic filter, as well as its line of rigid coaxial transmission line products and components, 7/8 inches to 9 3/16 inches.

Tennaplex Systems is expected to display its line of broadband panel antennas for television and FM radio. The company has an established line of combiners and filters for transmitters.

Andrew Corp. will highlight the HRLine, a rigid transmission cable designed to increase reliability by 800 percent, as well as its line of earth station antennas and ESA systems.

Audio Accessories Inc. will have available audio jacks and panels, prewired audio patch panels, patch cords and holders, and Polysand.

Nemal Electronics will roll out new composite audio/video cables in round and flat constructions, flexible audio snake cables and custom interface panels.

Wireworks Corp. will introduce the TEN-4 speaker cable tester for cables terminated with Neutrik speaker connectors or phone plugs. Also new from Wireworks will be the Broadway Latching System designed for Multicable Components Group products sized three to 27 channels, and the G5/160i multi-pin interconnect standard for audio cabling of up to 50-channel systems.

Support towers

Antenna support towers will be introduced by **Central Tower**, available in loading-based product series, heights up to 500 feet, and wind loading capacities from 70 mph to 90 mph. Look for the company's welded section guyed towers to be on display as well.

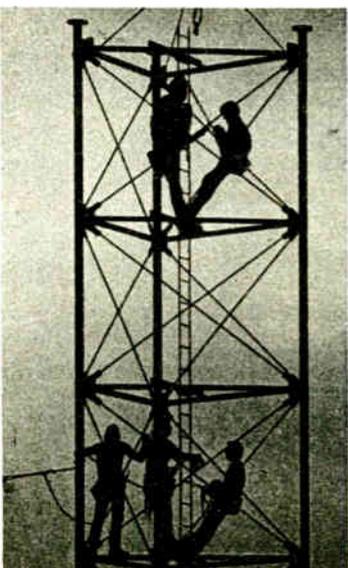
Gepeco International Inc. will be on hand with its new rack-mountable chassis, triaxial connectors and AES/EBU compatible
continued on page 64 ►



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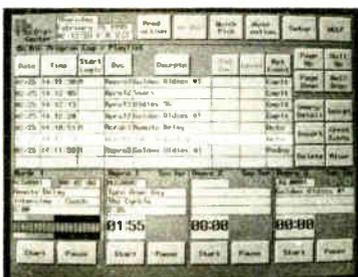
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Digital, Analog Source Gear Abounds

LAS VEGAS Source equipment for broadcasters offers variety and flexibility for almost any use. At the 1993 NAB show, look for an ample mix of the ever-expanding line of digital and analog products.

Radio Systems will demonstrate its new RS-6700 DAT recorder/ player. It features front panel LEDs, easy EOM programming, and one-closure function for taping satellite feeds. The company also will show the existing RS-1000 and RS-2000 DAT machine lines.

Stellavox plans to exhibit the new Stelladat pro DAT recorder with time code. This Swiss-made unit is metal-con-

structed to withstand field operation abuses and offers time code and AES-EBU interface.

Digital source gear

AKAI Digital will introduce a series of digital source products at this year's show. The AKAI DR 4d is a four-channel digital hard disk recorder with 18 bit 64x oversampling A/D, and 18 bit 8x oversampling D/A. Up to four units can be linked for 16 tracks and each unit features AES/EBU digital I/Os.

The company will also introduce the S3200, a 16-bit, 32-voice digital sampler, the S3000, a 16-bit, 32-voice sampler, the

S2800, an entry level 16-bit, 32-voice sampler, the S2800 studio, a 16-bit, 32-voice sampler that also includes an 8 Mb memory, SCSI, and AES/EBU digital interfaces, and the CD3000, a 16-bit, 32-voice sample playback unit with a built-in CD-ROM player.

Stanton Magnetics will introduce the CD-33 dual CD player. The control options include pitch (plus or minus 12 percent), forward and reverse, variable speed scan and search, 10-selection memory, pitch blend, and instant cue. The company also will display its full line of turntable cartridges for broadcast.

LPB Inc. will unveil a PC-based digital

audio storage and retrieval system.

Studer Revox America Inc. will feature its new line of third-generation CD-players with improved functionality, AES/EBU connections and reduced power consumption.

Look for **Broadcast Electronics** line of source products including its line of cart machines, including the digital Disc Trak, and the analog Phase Trak, and the AudioVault digital audio storage machine.

Registered Data System (RDS) plans to debut its Phantom, a digital audio automation system that provides recording, scheduling and play-back of all commercials, liners, jingles, IDs, etc. The Phantom also automatically switches between satellites.

RDS's established line will include the DigiCorder, "the digital alternative to the cart machine."

Broadcast uses

Harris Allied will show a new Audiometrics personal computer designed for broadcast applications as well as their full line of established source products.

Audi-Cord will be at NAB with its product line including the Audi-Cord DL and S-series of cart machines.

Along with some new console products, **Fidelipac** will have its DCR1000 cart machine series, now on the air in more than 30 radio facilities around the world. Fidelipac will also display its line of standard analog cart machines and cartridge tape products.

In among its new line of digital processors and equalizers planned for introduction at NAB, **Yamaha** will show the YPDR-601 CD recorder.

Accurate Sound will introduce its Model AS-4010, 24-hour cassette logger. The logger will record one or two channels continuously over 24-hours on a standard 90-minute analog cassette. The

continued on page 66 ▶



If you're not using the **Telos 100 Delta**, you could get into a heap of trouble.

After all, the **100 Delta** has our exclusive digital dynamic equalizer to improve the quality of caller voices in a way never before possible. The EQ is so advanced, you won't find it in any other broadcast audio product.

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Look for New Antenna Fare

▶ continued from page 63

110-Ω digital audio cables.

Stainless Inc. will showcase its new G-36 tower, a triple-face welded section design for AM or FM and featuring tabs for transmission line.

Will-Burt Co. will showcase its line of pneumatic telescoping masts, capable of attaining heights of 134 feet.

Magnum Towers Inc. will show its lines of radio and television towers.

EG&G Electro-Optics will exhibit its lines of aviation warning beacons, including the FlashGuard medium-intensity white strobe, flashing red and dual red/white systems.

SSAC Inc. will unveil the new SCR430T tower and obstruction lamp failure alarm relay, which monitors one to four beacon or side lamps and provides a contact closure should one or more lamps fail.

Flash Technology Corp. of America will debut the FTS 2100 SMART (System Monitoring And Reporting Telemetry), which controls, monitors, diagnoses, anticipates, stores and communicates system events of high-intensity obstruction lighting without human intervention.

Cortana Corp. will show its Stati-Cat lightning prevention system, and **Belden Wire and Cable** will display its product line.

New Processing Boxes to Be Unveiled

LAS VEGAS NAB attendees will see a fair share of new audio signal processing gear this year, as numerous companies unveil new lines of amplifiers, mixers, D/As and routers.

AKG Acoustics will introduce its new Project I series, which includes the 266 dual compressor/gate, the 274 quad/expander gate and the 296 dual spectral enhancer. Also available will be the new 120XP subharmonic synthesizer and the 172 Supergate, the 760X mic preamp and the 1024 buffer amp.

The AKG booth will feature the company's established products, such as the **Orban** broadcast and studio line, the **dbx** audio signal processors, and the **BSS** specialty audio processors and mic splitters.

Next generation

Studio Technologies Inc. will display the Mic-PreEminence two-channel mic pre-amp, as well as its line of simulator systems, such as the Generation II and AN-2 stereo simulators and the ISS integrated simulator system.

ATI, Audio Technologies Inc., will unveil its expanded line of System 1000 modular amplifiers: the LA1000 and the MA1000. Also on hand will be the Micro Amp and Encore series of mic, line, turntable, distribution, power and IHF interface amps.

Eventide Inc. will display the DSP4000 Ultra-Harmonizer, as well as its BD980, 941 and 942 broadcast delays and the H3000 line of Ultra-Harmonizers.

Audio/Digital will have available the TC-4 broadcast profanity delay, as well as the PAD300 audio delay.

Benchmark Media Systems will display the Junior Audio Director, an audio mode controller that provides output source selection and independent gain control of each channel from a stereo source. Also available will be the Senior Audio Director that controls four channels of audio from VTRs, satellite down links, as well as other four- to two-channel applications.

Datatek Corp. will show its D-2540 digital audio router for 10x10 to 40x40 systems. Also on hand will be the D-2700 AES/EBU digital switcher, the D-2400 analog router, the D-2500 stereo switcher and the D-890 digital and D-800 analog modules.

The StereoMaxx spectral image processor will be shown at the **Modulation Sciences**



Eventide's Ultra-Harmonizer, the DSP4000

Inc. booth. The company's CP-803 composite processor will be available also.

Maximum stereo

From **Dolby Laboratories**, there will be the new Dolby Spectral Processor, a two-channel dynamic equalizer that raises low-level signals by as much as 20 dB without affecting high level signals. Dolby will also show the DP 90 digital encoder, the DPP501/502 encoder/decoder and the SDU4 Dolby Surround decoder.

ADC Telecommunications Inc. will introduce the Digital Audio Patch Bay Family, the first digital-ready audio patching system. Also available will be the RS422 Patch By Exception nine-pin bay.

From **GML Inc.**, there will be the all-discrete Model 9100 rack-mountable 10x4 line level mixer, which boasts a 20-bit noise floor equivalent. Also available will be the HRT-9100 all-discrete line level mixer.

J.N.S. Electronics Inc. will show a number of additions to the 8000 series rack frame unit, including Version 2 of the SDA.8075 audio distribution amp, the new SDA.8225 distribution amp, Version 3 of the MA.8711 monitoring amp, and the VCA.8292 voltage-controlled amp. J.N.S. will also display two of its existing routers,

the 8300 series and the 9000 series.

On the cutting edge

Cutting Edge will demonstrate several enhancements to the Unity 2000 FM processor, including a linear response algorithm for a more musical high end. The company will also show its Dividend composite filter.

Radio Systems Inc. will unveil its new line of microprocessor timers and clocks that are programmable for event timing and master clock systems. The company will also show its RS₂ noise reduction system featuring

Dolby S that increases S/N ratios by 24 dB.

Altec Lansing will show the 8553B tamper-proof programmable equalizer, as well as the 1674C automatic mic mixer, a hands-off, gain-sharing multiple mic system.

Asaca/Shibasoku Corp. will have on hand its line of distribution amps, as well as audio routers and encoders/decoders.

Samson Technologies Corp. will showcase a line of stereo mixers and other items from its new audio products division.

Excalibur Electronics Inc. will include the CDA-1 composite distribution amp, the CD-1 and CD-2 unidirectional interface amps, the IA-1 bi-directional interface amp, the DA1-5C and DA2-5C distribution amps

and the APA-1 all-purpose amp.

FM Systems Inc. will showcase the Audio Level Master 673, a stereo or dual mono level control system.

UREI will debut its UREI platform, a modular signal processing system consisting of mic and line mixers, compressors, gates and EOs. Also available will be the LA series of compressor/limiters.

Air Corp. will show a prototype studio/production microphone processor.

Arrakis Systems Inc. will show the RS series of routers.

Broadcasters General Store Inc. will have on hand the new CRL TVS stereo TV audio processor.

Mark IV Pro Audio Group (formerly Pinnacle Audio) will show its line of Klark Teknik equalizers, compressors, gates, digital delays and cross-overs.

Digital generation

Aphex Systems will introduce the DigiCorder™, a digitally controlled stereo generator and the Aphex Aural Exciter™ designed to provide a "powerful" low end with little or no increase in peak output and reduced overload distortion.

Look for **AEQ** to display its power amplifier and portable mixer along with its console and STL products.

The **Yamaha Corp. of America** will display its new SPX990 digital simul-effect audio processor, its new Q1131 1/30 graph-

continued on page 66 ▶

So Simple.



DAVID is the uncomplicated FM-Stereo Processor/Generator. Yet, like its namesake, it can more than hold its own against the bigger (and *far* more expensive!) competitors.

DAVID is not a compromise. It features gated, "gain-riding" AGC, split-spectrum compression and limiting, active overshoot compensation and digital synthesis of the composite multiplex output. DAVID makes RDS easy too, with a clean output spectrum, an internal combiner and a pilot sync port.

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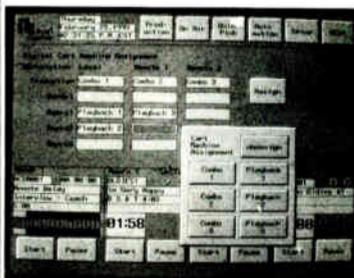
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Processing Boxes Debut At NAB '93

► continued from page 65

ic equalizer and its new GQ2015 stereo graphic equalizer.

Symetrix Inc. will introduce the 421-AGC leveler, the 601 digital voice processor, and the 402 dual output room delay. **Inovonics** will showcase its entire line of signal processing equipment, including stereo generators, tape and film recording electronics and broadcast instrumentation products.

Look for a new MOSFET FM amplifier from **BEXT Inc.**, as well as L and D series amplifiers, and a new FM exciter. The company will display its established line of FM exciters and amplifiers as well.

FOR.A Corp. will display an audio mixer for audio-follow-video systems. The unit has a parallel switcher/editor interface capability.

ADM Systems is expected to display its line of stereo and mono audio distribution systems. Look for **OpAmp Labs** to showcase its line of network feed boxes, routing switchers and amplifiers.

Radio Design Labs is expected to exhibit its line of amplifiers (line-, headphone- and distribution-type), preamps and dividers and attenuators.

Digital and Analog Gear Abounds

► continued from page 64

bi-directional system also can be configured as a four-channel recorder with 16-hours of recording time or eight-channels using eight hours. The company will show its line of tape duplicators, too.

In source-related products expect numerous companies to show their line of recording media, tape degaussers, bulk erasers and other accessories.

Audiopak will display its broadcast carts including black



Garner Industries' Type II Degausser

A-2, dark blue AA-3, and light blue AA-4.

Sony's booth will include its Pro DAT Plus professional DAT series videocassettes, quarter-inch and half-inch digital audio tapes. The company's CDK-3600 jukebox will be on display at the TM Century booth.

DIC Digital will offer its established line of DAT tapes, the Professional MQ Series in lengths ranging from 15-122 minutes, as well as a non-abrasive DAT cleaning cassette. The

company will also exhibit its recordable compact disc in 63-minute or 74-minute lengths.

New and improved

Look for new degaussers from **Garner Industries**. The company will introduce the model CF 750 Type II and the model 1400 degausser, 120 VAC 60 Hz.

Research Technologies is another company introducing new degaussers at this year's show.

Tentel will show its full line of audio and video tape head tools and gauges including the Tentelometer cart tape tensioner.

Success Specialty Sales will display its line of splicing, hold-down, leader, sensing and stage tape.

There are a number of companies expected to exhibit their line of source products at this year's NAB. **Denon** produces the DN-951FA CD cart player, as well as a CD changer. **Pioneer** is expected to showcase its CD changer.

3M is expected to display its line of magnetic film tape (unveiled at last year's NAB) and its line of professional tape and accessories including the 3M 275 digital audio mastering tape, 3M PRO DAT and 3M AUD DAT cassettes, as well as its floptical disk drive.

Digital Broadcast Associates produces the dB-Cart, a unit that employs apt-X compression and "Floptical" disc technology. The dB-Cart uses a 3.5-inch, 21 megabyte diskette.

The DigiCart, from **360 SYSTEMS**, has been augmented this year with a gigabyte disk drive, storing almost eight hours of stereo audio.

The **Panasonic** display will likely include its well-established line of DAT recorders, among them the SV-3900 computer-controlled recorder, the SV-3700 professional recorder and the SV-255 portable recorder.

Look for **JVC's** line of DAT gear and the CD recorder from **Marantz**. **Maxell** is expected to display its line of tape products.

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NAB '93 EXHIBITOR LISTINGS

The 1993 Exhibitor Directory is a listing of information provided by exhibitors who responded to an **RW** NAB questionnaire. Past and potential NAB exhibitors were asked about new and established products scheduled to be shown at NAB this year. Questionnaires returned by the deadline are included here. N/A for booth number means a booth assignment had not yet been made

COMPANY **BOOTH #**

360 Systems **4015**
Intro: DigiCart/II digital audio recorder. On-Screen software. Series 1000 digital message player.
Also: Model AM-16 audio crosspoint switcher.
Contact: Doug Leighton
18740 Oxnard St
Tarzana, CA 91356
818-342-3127

3M Magnetic Media Division **16605**
On Display: Models 393 and 395 full coast magnetic film. Models 996, 226, 227, 806, 807, 808 and 809 audio mastering tapes. Model 275 digital audio mastering tape. PRO DAT. AUD digital audio cassettes. Models 8206, 8207 and 8614 audio logging tapes. Professional audio cassettes. Audio and video accessory products.

a

Accu-Weather, Inc. **18613-16**
On Display: FeatureFone voice information system.

Accurate Sound Corp. **2704**
Intro: Model AS-4010 cassette logger.
Also: Models 315 and 925 high speed tape duplicator electronics.

Acoustic Systems **13405**
On Display: Prefabricated broadcast and recording studio.

ADC Telecommunications, Inc. **18854**
Intro: Digital Audio Patch Bay Family. RS422 Patch By Exception bay.
Also: Fiber optic transmission and multiplexing systems.

ADM Systems **18454**
On Display: Post-production and stereo audio consoles. Stereo and monaural audio distribution systems. Stereo source selector. Bar graph metering system. Serial controlled interface.

Advanced Instrument Research Corp. **3926**
Intro: Studio/production microphone processor.
On Display: Model 500PH (radio) and 500TV (television) microphone processors.

AEQ **1702**
Intro: Model AEQ-151 power amplifier. Model AEQ-BC-500 and -2000 mixing console. Model AEQ-AM-03 audio monitor. Model AEQ-TL-02 line expander. Model AEQ-MP-10 portable mixer. Model AEQ-TH-02 digital telephone hybrid. Model AEQ-SYSTE-3000 multiconference telephone system. Model AEQ-SSR-10 identification line unit.
Contact: Javier Lizuain
Pol. Ind. Leganés
c/Rey Pastor 36, 28914 Leganes
Madrid, Spain
011-34-1-686-1300

A.F. Associates **17353**
On Display: Turnkey systems. Engineering consulting services.

Akai Digital **5420**
Intro: Model DR4d digital hard disk recorder. Model S3200 digital sampler. Models S2800, S2800 studio and S3000 voice samplers. Model CD3000 voice sample playback. DDQMacII and Version 3.0 software packages.

AKG Acoustics **2806**
Intro: Project 1 Series: Model 266 dual compressor/gate. Model 274 quad/expander gate. Model 296 dual spectral enhancer. Model 120XP sub-harmonic synthesizer. 172 Supergate. Model 760X microphone preamplifier. Model 1024 buffer amplifier.
Also: Microphones, stands, headphones, and accessories.
Contact: Mary Stevens
1525 Alvarado St.
San Leandro, CA 94577
415-351-3500

Alden Electronics, Inc. **18610**
Intro: ALRAD II software.
Also: Lightning protection and tracking service.

Alpha Audio Acoustics **13620**
Intro: Fabric covered fiberglass panels.
Also: Pyramid and Sonex acoustical foam. Soundtex acoustical fabric. AudioSeal sound barriers.

Alesis Corp. **5127**
On Display: ADAT digital audio recorder. BRC remote controller. RMB remote meter bridge. AT-1 ADAT. AI-2 ES bus protocol interface. Quadverb simultaneous effects processor. MIDverb III simultaneous effects processor. Microverb III digital reverb. Model 1622 mixer. Model MEQ230 dual 1/3 octave precision equalizer. Model 3630 RMS/peak dual channel compressor/limiter. Model RA 100 reference amplifier.

Altec Lansing **15716**
On Display: Model 1674C automatic mic mixer system. Model 8553B tamper-proof/programmable equalizer.

Altronic Research, Inc. **3803**
On Display: Heat exchangers. Air- and water-cooled loads.
Contact: Doug Starkey
P.O. Box 249
Yellville, AR 72687
501-449-4093

Amber Electro Design **2103-4**
On Display: 7000 precision audio measurement system. Low distortion audio signal generators.

AMCO Engineering Co. **13107**
On Display: Enclosures.

Andrew Corp. **15674**
Intro: 12 GHz HDTV broadcast system. 60 kW ALP low power antenna. Hot-Plot and dB Freebie software programs. HRLine transmission line. Earth station antennas. ESA systems.

Also: UHF, VHF, MMDS, LPTV, HDTV, and STL/TSL antennas. Earth stations. Coaxial circular waveguides. Heliac transmission line. ESA systems.

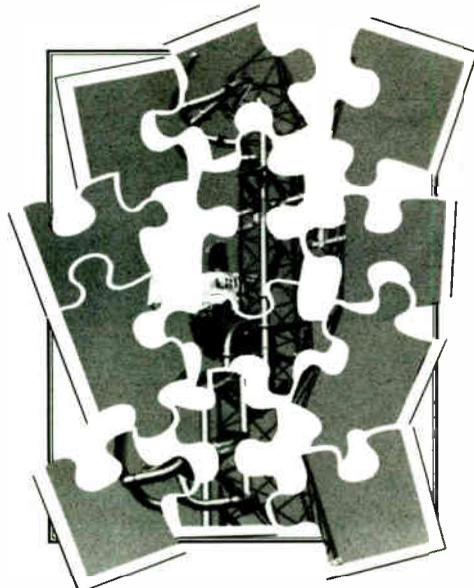
Antenna Technology **13644 - 13744**
On Display: Satellite earth stations. Transmit, receive and multibeam antennas. Receivers. LNAs. LNBs. Jumpers. Cables. Connectors. Heating and switching systems. Test equipment. System design. Consultation.

Apex Systems **4524**
Intro: Digicoder digitally controlled stereo generator. Aural exciter Type C2 with BIG BOTTOM.
Also: Compellor and Dominator II compressor/processors.
Contact: Paul Freudenberg
11068 Randall St.
Sun Valley, CA 91352
818-767-2929

Arrakis Systems, Inc. **5202**
Intro: Trak*Star 8 and 2 digital audio workstations. Digidesk digital studio cabinetry. Also: 10,000, 12,000, and SC Series consoles. RS Series audio routing switchers. Modulux modular studio cabinetry. Modulink studio prewired systems. DigiLink digital audio broadcast workstation and network.

Asaca/Shibasoku Corp. of America **16619**
Intro: Model ADC-920 D1/D2 tape cleaner and rewriter. Model ADR-6000 digital disk recorder. Model ADS-7000 HDTV still store. Model AG31A digital audio generator. Models

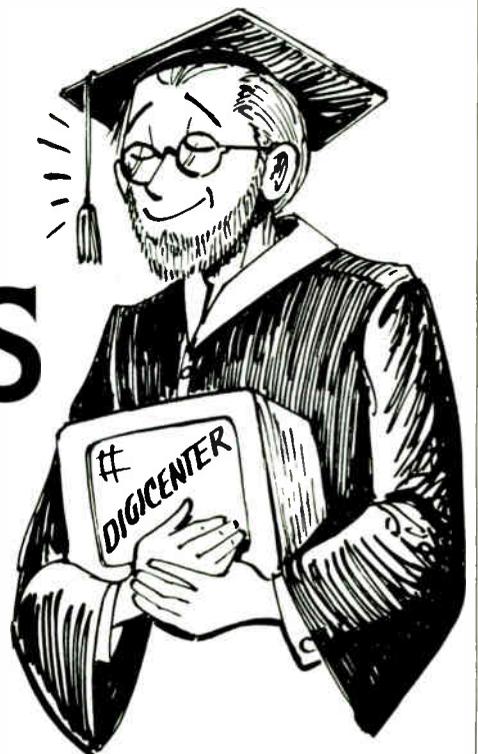
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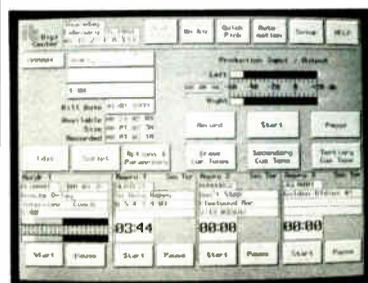
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ASC Audio Video Corp. 11708-9
On Display: Virtual Recorder. CASE editing controller.

Associated Production Music 1367-8
On Display: KPM, Bruton, Sonoton, and Themes production music libraries. "Broadcast 1" and "Broadcast 2." APM "Mini-Package." "The Best of the Best," "Sound FX/The Library" and "SFX" from KPM.

Audi-Cord 3926
On Display: DL and S Series cart machines.
Contact: Andy Rector
1846 W. Hovey Ave.
Normal, IL 61761
309-452-9461

Audio Accessories, Inc. 13844-13944
On Display: Audio jack panels. Jacks. Prewired audio patch panels. Patch cords. Patch cord holders. Video panels. RS-422 patching. Edac connectors.

Audio Animation, Inc. N/A
On Display: Paragon-transmission's FM stereo generator card option. Digital audio transmission processor. Version 2.2 software.

Audioarts Engineering 5108
Intro: Model MR-40 production and on-air console. Also: R-30, R-10, and A-50 audio consoles. Furniture systems.

Audio/Digital 15713
On Display: TC-4 broadcast profanity delay and the PAD300 audio delay.

Audio Dynamics, Inc. N/A
On Display: AD-401 retrofit board for ITC Type 99 cart machines. AD-302 retrofit board for ITC Delta Series cart machines.

audiopak, Inc. 4018
On Display: Black A-2, dark blue AA-3, and light blue AA-4 tape carts.
Contact: Gordon Stafford
P.O. Box 3100
Winchester, VA 22601
800-522-CART

Audio Precision 3215
Intro: ATS-1 audio test set. IEEE-488 GPIB control port option.
Also: System One FASTTRIG software.
Contact: Tom Mintner
P.O. Box 2209
Beaverton, OR 97075
503-627-0832

Audio Processing Technology 4301-2
Intro: Model DSM100 two-channel duplex system.
Also: Model apt-X 100 digital audio data compression system.
Contact: Steve Cheung
21 Stranmillis Road
Belfast ZZ BT9 5AF North Ireland
023-266-2714

Audio Services Corp. 3906
Intro: DAT products: Fostex, Stella Vox, Sony, Panasonic. Sennheiser shotgun Series. Sennheiser Lectronics infrared systems. Time-code conversion for NAGRA IV-S. Soundcraft, Mackie designs, CAD, Nakamichi, UREI, dbx,

Symetrix, Klark Teknik, Hafler, BSS, Lexicon, Aphex, Shure HTS, Otari, Carver Pro, JBL, Auratone, Wohler Tech, Digitec, 360 Systems, GW, Yamaha, Rane, Drawmer, AKG, Crest, QSC, Tannoy, Bose, Microtech.

Audio-Technica US, Inc. 11906
Intro: Engineered Sound miniature condenser microphones.

Also: Wireless and wired microphones. Teleconferencing systems. Mixers. Audio accessories.

Audio Technologies, Inc. 12902-3
Intro: System 10000 modular amplifiers: LA10000 and MA10000. Plug in mic and line amps.
Also: Broadcast stereo consoles: Vanguard Series. Audio amplifiers: Micro Amp and Encore Series microphone, line, turntable, distribution, power and IHF interface. Microphone and line processors. Emph'a Sizer. Studio metering systems. Noise generators.
Contact: Samuel Wenzel
328 W. Maple Ave.
Horsham, PA 19044
215-443-0330

Audio-Video Engineering Co. N/A
On Display: Video Hum-Stop coils, Models HSC-1 and HSC-2.

Audiotronics 1002
Intro: AirMaster 90 Radio On-Air Console. Also: 210, 800, 850, and 900 Series broadcast, production and workstation consoles. 1900 Series IFB/Mix-Minus System.
Contact: Murray Shields
3750 Old Getwell Rd.
Memphis, TN 38118
901-362-1350

Autogram Corp. 4021-22
Intro: MM-8A. 8-slide pots.
Also: AC-8 8-rotary pot. PM1644 16-slide pot.

AVCOM of Virginia, Inc. 13430
Intro: Model NASA-1000A network and spectrum analyzer. Model SDM-42A spectrum display monitor.
Also: Models PSA-65A, PSA-37D and PSA-35A portable spectrum analyzers. Models MSG-1000B, MSG-1750A and MSG-5 microwave sweep generators. Model PTR-25A portable test receiver. Models SCPC-2000E, SCPC-300E, SS-1000 and SCPC-500-70 SCPC satellite receivers and demods. Satellite video and SCS receivers. Microwave video links.
Contact: Charlie Odum
500 Southlake Blvd.
Richmond, VA 23236
804-794-2500

Avocet Instruments 1918
Intro: Model TV-2 TV subcarrier receiver (SAP/Pro). DTMF decoder.
Also: Pro-Line 102 pro channel receiver.

A-Ware Software 2227
Intro: International MusicScan. MusicScan Format Complete. CloseLine.
Also: RealTime.

b

BASYS Automation Systems 19247
On Display: Newsroom automation system. D-Cart multi-user digital audio recording/editing system.
Contact: Kristin Schleiter
Five Odell Plaza
Yonkers, NY 92054
914-376-4800

Belar Electronics Laboratory 2015
Intro: AMMA-1 digital AM modulation analyzer. FMRR-1A and FMRR-4 FM rebroadcast receivers.
Also: FMM-s/FMS-2 FM modulation monitor set. FMMA-1 digital FM modulation analyzer.
Contact: David Hirsch
P.O. Box 76
Devon, PA 19333-0076
215-687-5550

Benchmark Media Systems, Inc. 11321

Intro: Junior and Senior Audio Directors audio mode controllers. Model APA-102 System 1000 module.
Also: System 1000 Modular Frame Series audio DAs, mic pre DAs, routers and audio modules. MicroFrame Series line amps and mic pre amps. MPS Mic-Pre products.
Contact: Mark Potterbaum
5925 Court St. Rd.
Syracuse, NY 13206
315-437-6300

BEXT, Inc. 2112
Intro: L and D Series FM amplifiers. TEX100 FM exciter. PJ501 mosfet FM amplifier.
Also: FM exciters and amplifiers. HPT exciter/translator/booster. UHF and VHF amplifiers.
Contact: Dennis Pieri
739 5th Ave.
San Diego, CA 92101
619-239-8462

beyerdynamic 1912
Intro: Model DT190 Sportcaster headset/mic combo. Model DT150 monitoring headphone. Model MC834 large diaphragm condenser mic. Model MEM86 set shotgun system. MCE50 Series miniature clip-on mic. Model M424 control room talk-back and VHF and UHF wireless systems.
Also: Microphones, headphones, headsets, wireless products, stands and booms.

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Bradley Broadcast Sales 4224
On Display: Middle Atlantic Work Series equipment racks. AKG DSE 7000. Middle Atlantic rack accessory product line. Telos products.

Broadcast Electronics, Inc. 2115
Intro: AM-2.5, 2.5 kW solid state AM transmitter. Model VMC-16 voice remote control system.
Also: AM 1-10 kW transmitters. FM 1-20 kW transmitters. Digital and analog cart machines. Audio consoles. AudioVAULT. Digital audio storage device. CORE program automation system.
Contact: Kim Winking
4100 N. 24th St.
Quincy, IL 62305
217-224-9600

Broadcast Micro. Services, Inc. 12302-4
On Display: Microwave transmitters, receivers and antenna systems. Ground and airborne autotracking systems. Central receiver antenna pedestals. ENG helicopter systems. Amplifiers. Duplexers. Microwave accessories.

Broadcast Programming 4218
Intro: Sentry Systems' FS-LINK multiple facility linking. Today's Country, Digital Memory Music and Pure Country libraries.
Also: Sentry Systems' Model FS12/DS-1 automation system. Sentry Systems' FS SAT FS-12 with satellite interface capabilities.

Broadcast Software, Ltd. 11356, 57
Intro: SVS computer interface remote control system.
Also: BSL Guardian software.

Broadcaster's General Store, Inc. 5212-16
Intro: Tascam DA-88 digital multitrack. CRL TVS stereo TV audio processing.
Also: 360 Systems Digicart. Rodman/Brown Desk-Jockey. Tailor, SMO and Sine Systems News Director. California Digital's Digimod 2000.

Broadcast Supply Worldwide (BSW) 1620
Intro: Audioarts MR-40 production console. Digital Audio Labs Card D digital editor. Tascam DA88 digital recorder.
Also: 360 Systems Digicart.
Contact: Tim Schwieger
7012 27th St. W.
Tacoma, WA 98466
800-426-8434

Broadcasting Systems, Inc. N/A
On Display: TV 1-5 kW BEXT transmitters.

Bruel & Kjaer Instruments N/A
On Display: B&K 4000 Series studio microphones.

BSS, a division of AKG Acoustics, Inc. 2806
On Display: FCS 928 digital controlled parametric equalization system. Graphic and dynamic equalizers and limiters. Speaker systems. Phase checkers. Specialty audio processors. Mic splitters.
Contact: Mary Stevens
1525 Alvarado St.
San Leandro, CA 94577
415-351-3500

Burk Technology 4506
Intro: ARC-16 enhanced speech/computer options.
Also: ARC-16 transmitter remote control systems. LX-1 6-input stereo selector.
Contact: Phil Halter
7 Lomar Dr.
Pepperell, MA 01463
508-433-8877

Cablewave Systems 15708
On Display: Microwave parabolic antennas. RF connectors. Rigid line and expansion components. Flexwell coaxial cable. Elliptical waveguides. RF connectors. Mounting hardware. Pressurization equipment. FM and truncated antennas.

Canare Cable, Inc. 11118-21
Intro: 110SL cable.
Also: BCJ-XJ-TR 110SL impedance transformers. L-4E65 Star Quad microphone cable.

Capitol Production Music TBD
On Display: The Professional production music Series.

CCA Electronics, Inc. 2508
Intro: 45 kW FM transmitter. High performance exciter. Solid state FM transmitter.
Also: AM/FM shortwave broadcast transmitters.
Contact: Steve McElroy
360 Bohannon Rd.
Fairburn, GA 30213
404-964-3530

Central Tower, Inc. 2506
Intro: Antenna support towers.
Also: Guyed towers. Welded sections.
Contact: Nancy Ryan
2855 Highway 261
Newburgh, IN 47630
800-264-0595

Circuit Research Labs (CRL) 1918
On Display: Real-time event sequencers. Amigo stereo processing system. AM, FM and shortwave processing products. FM stereo and SCA generators. Dynafex single-ended noise reduction systems. Programmable four-band stereo processing systems. Programmable microphone processors.

Clark Wire & Cable 13262, 13362
On Display: Mini mic cable. Super-flex R659 triax cable. Neutrik audio connectors. In-house termination services. RGB video and microphone snakes. Audio and flat ribbon wires. 2-, 3-, and 4-channel audio snakes. Microphone, video, ENG, and production cable.
Contact: Susan Clark
1801 Holste Rd.
Northbrook, IL 60062
708-272-9889

Clear-Com Systems 18011, 18111, 18211, 18311, 18411
On Display: Models PS-22 and PS454 power supplies. Models CS-222 and MS-222 2-channel master stations. 2-, 4-, and 8-channel wired, wireless party line intercoms. Belt packs. Speaker stations. Headsets. Digital intercom systems. Model AMS 1021 stereo speaker systems.

Coaxial Dynamics, Inc. 1610
On Display: RF measurement and termination equipment. Water-cooled and heat exchangers.

Columbine Systems, Inc. 16038
On Display: Master control automation system. Spot and media scheduling, logging. Inventory management. Sales analysis.

Comark Communications, Inc. 15746
Intro: IOX television transmitter line.
Also: IOT and the S Series transmitters.

Communication Graphics 4206-7
On Display: Satin cloth concert patches. Screen printed decals. Bumper stickers. Pocket folders.

Communications Data Services 5114
On Display: Propagation workstations. Land use and land cover data.

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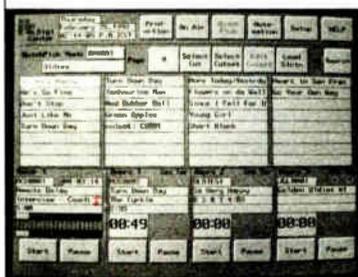
Industrial Monitoring Systems, Inc. Austin, Texas



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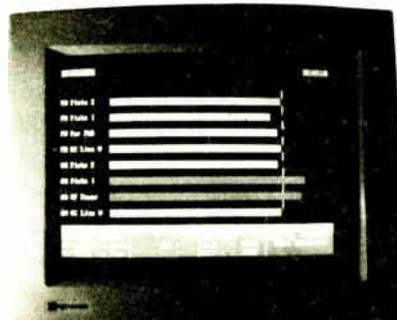
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TECHNOLOGY

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Circle (4) On Reader Service Card

Computer Concepts Corp. 4508
Intro: FlexKey digital control counter.
Also: Digital Commercial System.
Contact: Della Northcutt
8375 Melrose Dr.
Lenexa, KS 66214
913-541-0900

Comrex Corp. 12506
On Display: Talk Console. Digital audio codes. Frequency extenders. Wireless cue systems. Telephone couplers. Hybrids.
Contact: Lynn Distler
65 Nonset Path
Acton, MA 01720
508-263-1800

ComStream 2100
On Display: Digital audio distribution network with the ABR2000 digital audio receiver.
Contact: John Puetz
10180 Barnes Canyon Rd.
San Diego, CA 92121
619-458-1800

Comtech Antenna Systems 13403-4
Intro: 1.8 meter flyaway multi-panel antenna system on wheels.
Also: Satellite antenna systems.
Contact: Tom Christy
3100 Communications Rd.
St. Cloud, FL 34769
407-892-6111

Concept Productions 4521, 22
Intro: CAPS-CD computer assisted programming system.
Also: CAPSAT computer assisted programming system. Voice-tracked radio formats.

Connectronics Corp. 13628
On Display: Wire and cable. Patch bays. Cable reels.

Continental Electronics Corp. 3418
Intro: TBA.
Also: AM and FM transmitters. TranStat. Towers. Antennas. RF equipment.
Contact: Steve Claterbaugh
P.O. Box 270879
Dallas, TX 75227
214-381-7161

Cooper Industries/ Belden Div. 19169
On Display: Wire and cable.
Contact: Craig Snyder
P.O. Box 1980
Richmond, IN 47375
317-983-5200



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- **DISTANCE TO CONTOURS** plots projected coverage
- **POPULATION COUNTING** to determine potential listening audience
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Corporate Computer Systems 3000
Intro: CDQ-1000 codec. PACE digital audio editor.
Also: CDQ-2000, Micro 56 and 66i codecs.
Contact: David Lin
33 W. Main St.
Holmdel, NJ 07733
908-946-3800

Cortana Corp. 4814
On Display: Stati-Cat lightning prevention system.

Crouse-Kimzey Co. 1606
On Display: Pro audio and RF products.

Crown International, Inc. 4812-3
Intro: Model CM-311 head-worn microphone.
Also: Model LM-301 dual gooseneck. Model PCC-170 boundary.

CTE International 4000
On Display: Model VL-1000 FM amplifier 1000 W. Model KT-24 FM exciter. Model KT-3000 FM transmitter 250 W. Model S-500 500 W FM amplifier. Model DIP-2 FM antenna. Model YAGI-900 antenna. FM broadcast equipment. Model VL-5000 5W linear amplifier FET devices. Models VL-30 and S-22 FM exciters. Model RX-10 STL receiver. Model TX-02 STL transmitter.
Contact: Enrico Antoniazzi
Via Sevardi, 7
Reggio Emilia zz 42100 Italy
052-292-1212

Custom Business Systems, Inc. 1624
Intro: Digital Universe digital audio storage system.
Also: Software tools. "Just What You Need" and Elite traffic/billing systems. InterAcct general ledger/accounts payable system. Sales Analyzer. CustomNet.

Cutting Edge Technologies 1026
Intro: Unity 2000 FM processor enhancements.
Also: Dividend composite filter.
Contact: Frank Foti
2101 Superior Ave.
Cleveland, OH 44114
216-241-3343

d

Dalet 1326-27

Datacount HS
Intro: DARTS multi-station version of software.
Also: DARTS software.

Datatek Corp. 13814
Intro: D-2540 digital audio routing switcher.
Also: Switchers: D-2700DAS AES/EBU digital, D-2400 analog audio routing, and D-2500 stereo. Audio modules: D-890 Series digital and D-800 Series analog.

Dataworld 4818
Intro: International database. AM and FM allocation mapbooks. LMA and duopoly maps.
Also: AM, FM, TV, LPTV and wireless cable databases. Directories, allocation and interference studies. Population counting. FCC Flag service. Terrain evaluation retrieval.
Contact: Jack Neff
4827 Rugby Ave., Ste. 200
Bethesda, MD 20814
800-368-5754

dbx, a division of AKG Acoustics, Inc. 2806
On Display: dbx Production, Performer. 900 Series signal processing equipment. Audio signal processors.
Contact: Mary Stevens
1525 Alvarado St.
San Leandro, CA 94577
415-351-3500

Decision, Inc. 3402
On Display: Version 6.0 of Broadcast System III. Broadcast System III.

Delta Electronics, Inc. 2224
On Display: ASE-2 AM stereo exciter. AM stereo monitor. NRSC measurement equipment.

Denon America, Inc. 5003-4
On Display: DN-951FA CD cart player. Model DN-950FA. Model DN-970FA production CD cart player. Model DN-7700R CD recorder.

DIC Digital 15166
Intro: Betacam SP metal particle tapes.
Also: MQ Series DAT tape. Cleaning cassettes. Recordable compact discs. 4mm and 8mm computer back-up cartridges. 8mm video cassettes. Mirror Master Tape.
Contact: Kevin Kennedy
222 Bridge Plaza S.
Fort Lee, NJ 07024
201-224-4344

Dielectric Communications 15179
Intro: Model 7000 Series calorimeter.
Also: FM and television RF products.
Contact: Colleen Mitchell-Foster
P.O. Box 949
Raymond, ME 04071-0949
800-341-9678

Digidesign 3212
On Display: Sound Tools II. Pro Tools.

Digital Audio Labs 1620
Intro: EdDitor recording and editing package Version 3.
Also: CardD recording and editing system.

Digital Broadcast Associates 3926
Contact: Jeff DeBry
826 N Victory Blvd.
Burbank, CA 91502
818-567-2873

Discreet Logic 15669
On Display: FIRE high speed paint system. INFERNO digital editing system. Film, HDTV and video applications software systems.

Dolby Laboratories, Inc. 3908
Intro: Spectral Processor equalizer. DSTL® digital aural STL system.
Also: DSTL® digital STL system. Model DP 90 digital encoder. Model DP 501/602 encoder/decoder. Noise reduction products. SDJ4 Surround decoder.
Contact: Kevin Tam
100 Potrero Ave.
San Francisco, CA 94103
415-558-0200

Don Elliot Creative Services N/A
Intro: The Legend CD promo and commercial music library. 90's News and Newsical instrumental news/production packages.
Also: Consulting, seminars, production and research.

Dorrough Electronics 19113-14
Intro: AES/EBU digital reading audio level meter.
Also: DAP 610-A Model 1200 stereo signal test set. Dual parameters audio meters. Video level meter.

Doty Moore Tower Service 20181
On Display: RF radiation protective suit.
Contact: Don Doty
1570 W. Beltline Rd.
Cedar Hill, TX 75104
214-293-1200

e

Econco 3704
On Display: Transmitter tubes.
Contact: Debbie Storz
1318 Commerce Ave.
Woodland, CA 95776
916-662-7553

Editing Machines Corp. 19755

EEV, Inc. 16640
On Display: AM and FM 5/15/35 kW power tetrodes.

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- AM stereo generators and monitors.

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- Air Trak 90™—affordable linear consoles.
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EG&G Electro-Optics 4621
On Display: Aviation obstruction warning beacons.
Contact: Pamela Harrington
35 Congress St.
Salem, MA 01970
508-745-3200

Electro Impulse Lab, Inc. N/A
On Display: RF dry, forced air FM dummy loads. Calorimeters. Attenuators.

Electro-Voice 15716
Intro: 635A/B & RE50B ENG/EFP mics. CO100 & CS200 lavaliers.
Also: 635A, RE50, RE20, RE27N/D and Sentry 100A monitors.



ESE's Time Controller

Electronics Research, Inc. 3015
Intro: Antennas: SHPX and LPX Series FMs. 1080 Series and 1090 Series panel. Side mount FMs.
Also: Band-pass and notch filters. Lambda antenna mounting system.
Contact: David Davies
108 Market St.
Newburgh, IN 47630
812-853-3318

Emcor Products/Crenlo, Inc. 16069
On Display: Electronic enclosure systems.

ENCO Systems 5221-22
Intro: DAD486x digital audio delivery system.
Also: DAD version 2.
Contact: Don Massa
1866 Craigshire Dr.
St. Louis, MO 63146
315-453-0060

Energy-Onix 3800-1
Intro: FM broadcast transmitters. Single tube zero bias triode amplifiers.
Also: Lightning proof 1 kW AM broadcast transmitter. Updated versions of 5, 10, 25, and 50 kW AM broadcast transmitters.
Contact: Ernie Belanger
752 Warren St.
Hudson, NY 12534
518-828-1690

ESE 13401
Intro: Model ES-215HP2 stereo audio level indicator. Model ES-215P6 rack-mounted tri-stereo audio level interface. Model ES-770 computer-based time controller system. PC family of black burst generators. Audio and video DAs.
Also: Master clock systems. Master timer systems. Digital clocks and timers. Audio level and impedance interfaces. Audio level indicators. Audio and video distribution amplifiers. SMPTE time code generators, readers, inserters, comparators and converters.
Contact: Brian Way
142 Sierra St.
El Segundo, CA 90245
310-322-2136

Event Marketing N/A
On Display: Turnkey event production. Sales consultancy.

Eventide, Inc. 4809-10
Intro: Model DSP4000 Ultra-Harmonizer®. Model VR240 digital audio logger.
Also: BD980, BD941/BD942 broadcast delays. H3000 line of broadcast/post production Ultra-Harmonizers.
Contact: Gil Griffith
One Alsan Way
Little Ferry, NJ 07643
201-641-1200

Excalibur Electronics, Inc. 4224
Intro: HC-1 handi-coupler.
Also: Amplifiers: Model CDA-1 composite distribution. Models CD1 and 2 unidirectional interfaces. Model IA-1 bi-directional interface. Model DA1-5C and DA2-5C distributions. APA-1 all purpose. "H" pads.
Contact: Bill Ashley
4604 Sand Rock Ln.
Chantilly, VA 22021-2468

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Feral Industries N/A
On Display: Model C-100 time base corrector/synchronizer. Hamlet waveform/vectorscope. Model YEM CVS-980 Scan Converter. Video International DTC 1504. Models 6119 and 6119Y/C production switchers.

Fidelipac Corp. 1920
Intro: DYNAMAX MX Series modular audio consoles.
Also: DCR1000 Series digital cart machines. Analog cart machines. Cartridge tape.
Contact: Bob McNeill
97 Foster Rd.
Moorestown, NJ 08057
609-235-3900

FirstCom 13614-16
On Display: Direct Results Radio. Sound Designer Library. Custom Production Library.

FM Systems, Inc. 18664-65
Intro: VM771 video master.
Also: VVM video volt meter. Model ALM 673 audio level master.

Flash Technology 1618
Intro: FTS 2100 SMART (System Monitoring And Reporting Telemetry).
Also: High intensity strobe obstruction beacons.
Contact: Larry Montuori
55 Lake St.
Nashua, NH 03060
615-377-0600

Focal Press 18310,18410
On Display: Books: "The Broadcast Century", "The Art of Digital Audio", 2nd edition, "Broadcast Technology Worktext", "Creative Radio Production", "Selling Radio Direct", and "Practical Radio Promotions". Videotapes: "Basic Field News Coverage" and "Behind the Scenes at the Local News".
Contact: Kate McElheney
80 Montvale Avenue
Stoneham, MA 02180
617-438-8464

FOR. A Corp. 18938
Intro: Model VPS-300 video production system. Model MF-300 MULTIFEX 3D digital effects generator. Model UDP-500 and UDP-2000 digital processors. Model DVM-400 digital component video mixer. Model PAM-300 audio mixer.
Also: Model EC-780 edit controller. Model HMC-1022 high definition still capture system. Models MV-91C and CSS-200 compact still stores.

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Fort Worth Tower Co., Inc. 4521
 On Display: Guyed and self-supporting towers. Turnkey services. Installation. Communications. Mobile buildings. Standby power systems. Antenna mounts.

Fostex Corp. of America 15743
 On Display: Model PD-2, portable timecode DAT recorder. G Series multitrack recorders.

Gotham Audio Corp. 4209-10
 On Display: SPOT 90 version 2.0 software. MicroTech Gefell microphones. SPOT 90 compact disc production system. Harmonia Mundi Acustica digital processors. Microtech Gefell microphones. DSP Workbench FFT analyzer. CEDAR Audio and Audio+Design analog & digital processing.

Graham-Patten 12447
 On Display: D/ESAM 400 digital edit suite audio mixer. D/ESAM Series digital edit suite audio mixers. Audio delay option. D/MEM PLUS memory management and storage enhancement. Version 2.0 of D/ESAM 800 software and DATS digital interface converters.

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Hallikainen & Friends 1712
 On Display: DRC200 programmable multisite transmitter control system. Model TEL171 digital telemetry adaptor for Moseley TC-15A. ITO177 computer interface for TEL171. DRC190 programmable multisite transmitter control system. TVA Series rack-mount audio mixers.
 Contact: Harold Hallikainen
 141 Suburban Rd.
 San Luis Obispo, CA 93401-7590
 805-541-0200

Harris Allied 2218
 Intro: Transmitters: Harris DX15 15 kW digital solid state medium wave, DX 150FA, 150kW frequency-agile digital solid-state medium wave, and the DT20FM. Audiometrics personal computer. Digital editors, automation and remote control systems and RBDS equipment. Also: Transmitters: PT 5FM 5 kW solid state FM, Gates Five FA, HT 10FM 10 kW single watt and tube FM, HT 1FM 1 kW solid state FM.
 Contact: Martha Rapp
 P.O. Box 4290
 Quincy, IL 62305-4290
 217-222-8200

Henry Engineering 2700
 Intro: TIS telephone information system. Digicord digital audio recorder. Also: Digistor telephone information line. Matchbox stereo and Logicconverter interfaces. USDA mini DA. Micromixer line mixer. Twinmatch dual stereo interface. Mixminus Plus interface. Superelay, Telecart II, and Net Commander network switchers.
 Contact: Hank Landsberg
 503 Key Vista Dr.
 Sierra Madre, CA 91024
 818-355-3656

g

Garner Ind. 13622-23
 Intro: Models CF750 and 1400 degaussers. Also: Models 682 video tape and 4000 metal particle tape degaussers.
 Contact: Scott McLain
 4200 N. 48th
 Lincoln, NE 68504
 402-464-5911

GE American Comm. Inc. 16601
 Intro: GE-1 hybrid satellite. Also: Radio and TV satellite communication services.

Gefen Systems 4915, 16
 Intro: M&E Windows database software. Sony CDK3600 360 CD autochanger. Also: M&E organizer sound effects database and retrieval system. CDJ PRO broadcast music management software and system. Touch-the-Music picture database and Pioneer, NSM and Sony CD changers.

General Electric Co. N/A
 On Display: Replacement parts and repair/maintenance services in support of RCA radio and TV transmitters and studio equipment.

Gentner Comm. Corp. 3406
 Intro: TBA. Also: AUDISK hard disk audio storage/retrieval system. PeopleLink telephone system. VRC2000 transmitter remote control. Audio processing products. IFB interfaces. Telco couplers.
 Contact: Angela French
 1825 Research Way
 Salt Lake City, UT 84119
 801-975-7200

Gepco International, Inc. 20055
 Intro: Rack mountable chassis. Triaxial connectors. AES/EBU digital audio cables. Also: Audio and video cable products.

Ghielmetti 1324
 Contact: Rick Ordarfer
 30961 Agooura Rd. #309
 Westlake Village, CA 91361
 818-707-1134

GML 1700
 Intro: Discrete Model 9100 rack mountable line level mixer. Also: GML Series 2000 moving fader automation systems. HRT-9100 Series line level mixers. 8900 Series dynamic gain controllers. 8200 Series parametric equalizers. 8300 Series 4-channel microphone preamps.

Gorman-Redlich 1711
 Intro: Off-site EBS monitor. Also: Models CM and CMR digital antenna monitor. Model CEB Emergency Broadcast System encoder-decoder.
 Contact: Jim Gorman
 257 W. Union St.
 Athens, OH 45701
 614-593-3150

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Halland Broadcast Services 2700
Intro: The Eighties Plus AC/CHR music library. Also: Rock 'n' Roll Graffiti oldies library. The Seventies AC/CHR gold library.

Holiday Industries, Inc. 11607
Intro: Field strength meters. RF magnetic field sensors. Also: Isotropic broadband RF field strength meters. Body current meter. Contact: 14825 Martin Drive Eden Prairie, MN 55344 612-934-4920

Hughey & Phillips, Inc. 4404
Intro: 300mm red lens beacon. Medium intensity strobe light. Single red obstruction light. Alarmed A-1 control. Also: Guyline and Guardian ice protection. Tower light monitoring system.

IDB Comm. Group, Inc. 5002 & 15766
Intro: IDAT and FM "Squared" services. Also: Domestic and international transmission facilities. Multi-station remote packages.

Industrial Acoustics Co. 13841
On Display: Studio environments.

Inovonics, Inc. 2306-8
Intro: Model 700 Off-air FM modulation analyzer. Also: Sentinel Model 550 monitor receiver. DAVID Model 715 FM processor/generator. Audio signal processing equipment. Stereo generators. Tape and film recording electronics. Broadcast instrumentation products. Contact: Jim Wood 1305 Fair Ave. Santa Cruz, CA 95060 408-458-0552

International E-Z Up 19851, 19951
Intro: World's Fastest Shelter free-standing canopy. Also: Instant Shelter canopy. Contact: Marty Dotterweich 5525 E. Gibraltar Ontario, CA 91764 909-466-8333

International Tapetronics Corp. 4602
Intro: DigiCenter digital audio measurement system. Model DPR-612 digital program repeater. Also: Series 1, 2, 99B and Delta analog tape cart machines. Contact: Bruce Helling P.O. Box 241 Bloomington, IL 61702-0241 800-447-0414

Intraplex, Inc. 4906
On Display: Model T1 "Smart MUX." Model TDM-163 T1 Multiplexer Terminal. Model TDM-165 T1 drop/insert terminal. Model PT/PR-150 stereo/dual program audio codec. Model 4500 MDAC digital audio codec. Model 3800 VRM variable rate multiplexer. Contact: J. Peter Eadie 80 Taylor Street Littleton, MA 01460 508-486-3722

James Grunder & Associates, Inc. 15733
On Display: Model C-100 time base corrector/synchronizer. Hamlet waveform/vectorscope. Model YEM CVS-980 scan converter. Video International DTC 1504. Feral Industries 6119 and 6119Y/C production switchers.

Jampro Antennas, Inc. 3424, 11254
Intro: JHD, JYA and JUHD antennas. Also: Antennas: broadcast; low, medium, and high power FMs; VHF and UHF television. Contact: Marlene Young 6340 Sky Creek Dr. Sacramento, CA 95828

JBL Professional 15713
Intro: 4400A Series studio monitors. Control 8SR control monitor. MPA Series power amplifiers. Also: Models 4206 and 4208 Multi-Radial sculptured baffle studio monitors. Control Series monitors.

Jensen Tools, Inc. 13406
On Display: Fluke Model 97 Scopemaster. Model JTK-5000 networking and computer maintenance kit. Fluke Model 87 DMM digital meter. Model JTK-48 field engineer's kit.

JT Communications Stardust Hotel
Intro: Model FMT-15 FM broadcast transmitter. Model RTU-1 remote controlled AM/FM tuner. Also: Model PLFM-100 replacement oscillator. Model CSG-10 stereo generator replacement PC module. Model BIA-1 optomod I/O interface unit. Contact: Jim Trapani 579 NE 44th Ave Ocala, FL 34470 904-236-0744

J.N.S. Electronics, Inc. 2306-8
Intro: RFL-700 Series digital microwave link. D-Mux MC 501/502 automatic change over system. 8000 Series rack frame system additions. Amplifiers: Model SDA.8705 mono/stereo audio distribution, Model SDA.8225 stereo audio distribution, Model MA.8711 stereo audio monitoring, and Model VCA.8292 voltage controlled. Model DFM.8252 stereo detector/alarm. Also: D-Mux 500 Series stereo/mono audio multiplexing systems and RFL-700 Series digital microwave link. The 8000 Series, the 'FRAME' audio and video amplification modules. The 8300 and 9000 Series audio routing systems. Contact: John Leonard P.O. Box 32550 San Jose, CA 95152 408-729-3838

Kintronic Laboratories, Inc. 4824
On Display: AM/MW antenna matching networks. HF open wire transmission line switch. HF balun. HF open wire feedline. HF feedthrough panel. AM/MW multiplexed antenna systems and tuning units. Air-cooled dummy loads. AM/MW directional antenna phasing system. Open frame and vacuum RF contractors. Rigid transmission line. RF patch panels. Equipment racks. Isocouplers. Fixed and variable inductors. Meter jacks and plugs. Coaxial cable clamps. Static drain chokes. Lighting chokes. Contact: Tom King P.O. Box 845 Bristol, IN 37621-0845 615-878-3141

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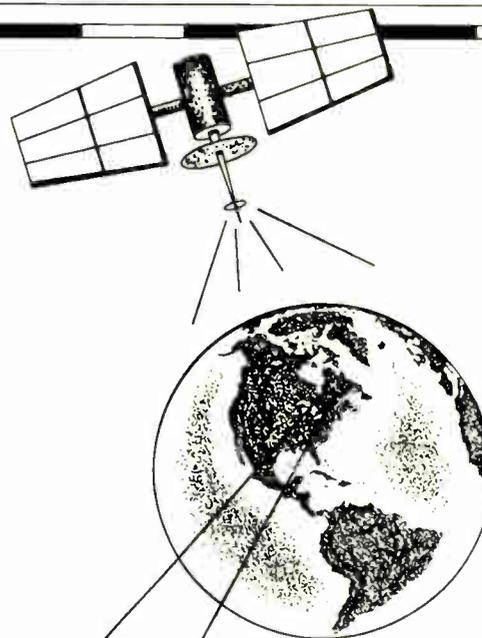
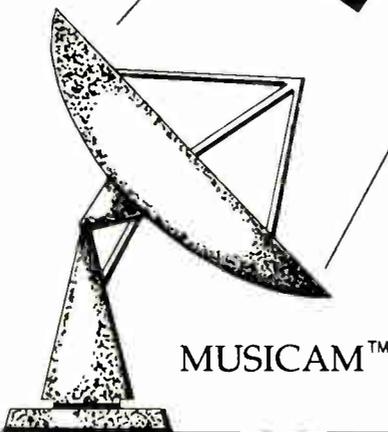
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Karl Heitz, Inc. 13631
On Display: Microphone fishpoles. Clamp adapter.

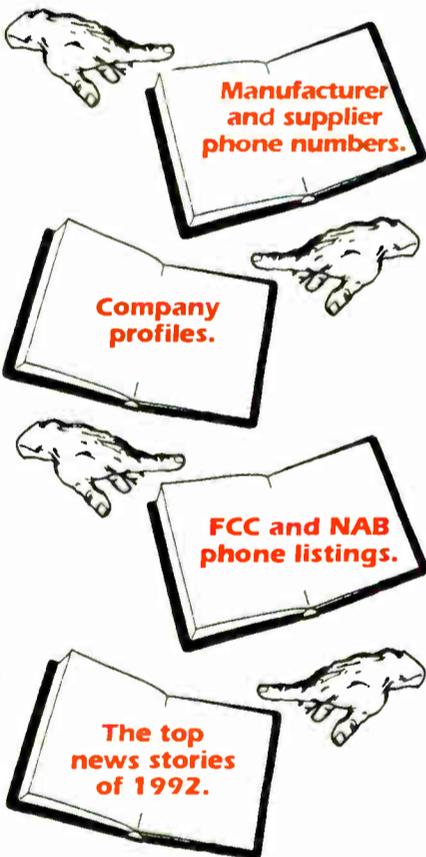
Klark-Teknik 1000
On Display: Midas XL88.

Lester Audio Labs 4400-1
On Display: Model DAS-3000 fiber transmission system.

LDL Communications 19734
On Display: FMAC Series FM broadcast circularly polarized antennas. Low windload spearhead FM CP antennas. FM band pass combiners.
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Laurel, MD 20707
301-498-2200

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On Display: Designers/builders of broadcast, recording and production facilities.
Contact: Carl Yanchar
9272 Jeronimo Rd, Irvine, CA 92718
714-770-6601

Leitch, Inc. 19739
On Display: Distribution amplifiers: Models UDA-680, VDA-681, ADA-885, VSE-6800. Clocks and timecode equipment: Models DAC-5012-24, UDT-5701, GTC-5701. ADC-5100 Series. Sync and test generators. Digital distribution systems. Clock system and timecode equipment. Routing switchers.

Lightning Eliminators & Cons. 12901
On Display: Lightning prevention, grounding and power/signal line conditioning counseling. Dissipation array systems. Chem-Rod grounding electrodes. Surge and transient preventors.

Lightning Master Corp. 12062
On Display: Lightning Master transient voltage surge suppression equipment. CTI tower & site inspection services. Accu-Scan electrical environment monitors. Ground alert ground bed monitoring systems. Strobe-Master strobe light monitoring system. Lightning Master structural lightning protection products and systems.

Logitek 1424-26
On Display: Bright-VU LED audio meter. Mariner on-air console. Rackmount console. TR2 12-channel rackmount console. Pre-10 10x2 switcher. Mon-10 10x1 switcher.
Contact: Tag Borland
3320 Bering Dr.
Houston, TX 77057
713-782-4592

LPB, Inc. 1924
Intro: LPB 7000 Series stereo audio consoles. FM stereo radiating cable systems. Travelers Information System. Telephone Access Remote Controller. The Message Manager. PC-based digital audio storage and retrieval system. Also: Signature III Series audio consoles.
Contact: John Devecka
28 Bacton Hill Rd.
Frazer, PA 19355

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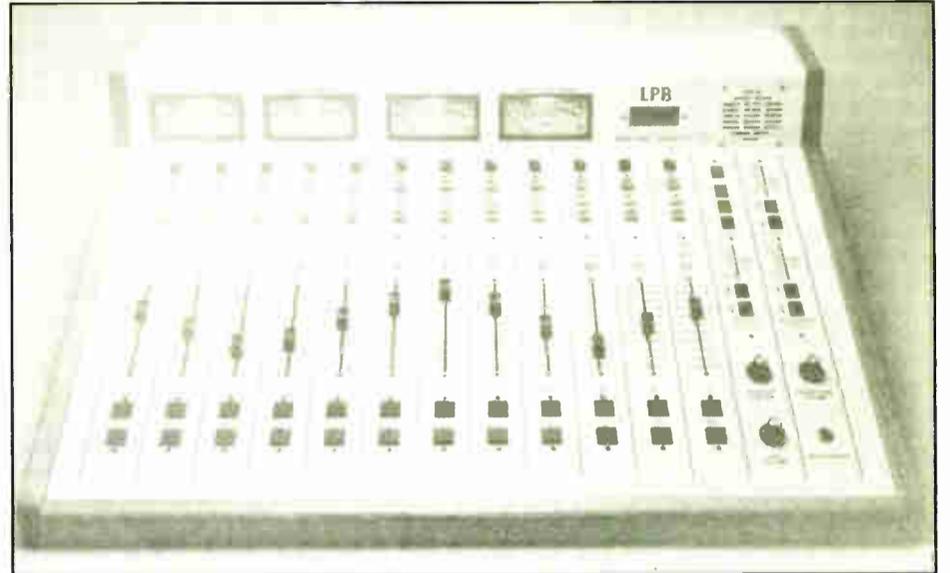
Magnum Towers, Inc. 4309-10
On Display: Radio and TV towers.

Manhattan Production Music 13629
Intro: 5 CD Audiophile Sound Effects Series. Chesky Records Classical Series. Also: 42 CDs of production music.

Mark IV Pro Audio Group 1000
On Display: Klark Teknik's 300 Series graphic and parametric equalizers. 400 Series parametric equalizers. 500 Series compressors and gates. 700 Series digital delays. 800 Series crossovers. DDA's QMR, PROFILE and INTERFACE consoles. MIDAS' XL3-16 broadcast remote console.

Micro Technology Unltd. N/A
Intro: MicroEditor 2.1. MicroSound rack digital audio workstations.
Contact: Mike Stierhoff
156 Windchime CT, Raleigh, NC 27615
919-870-0344

Midas 1000
On Display: DN 300 Series graphic equalizers. DN 400 Series parametric equalizers. DN 500 Series dynamic processors. DN 700 Series digital processors.



The new LPB 7000 Series: Model 7012

Marti Electronics 3921-22
On Display: STL-10 system. Remote pickup transmitters, receivers and antennas.
Contact: Dan Rau
1501 N. Main, Cleburne, TX 76031
817-645-9163

Media Touch 1006

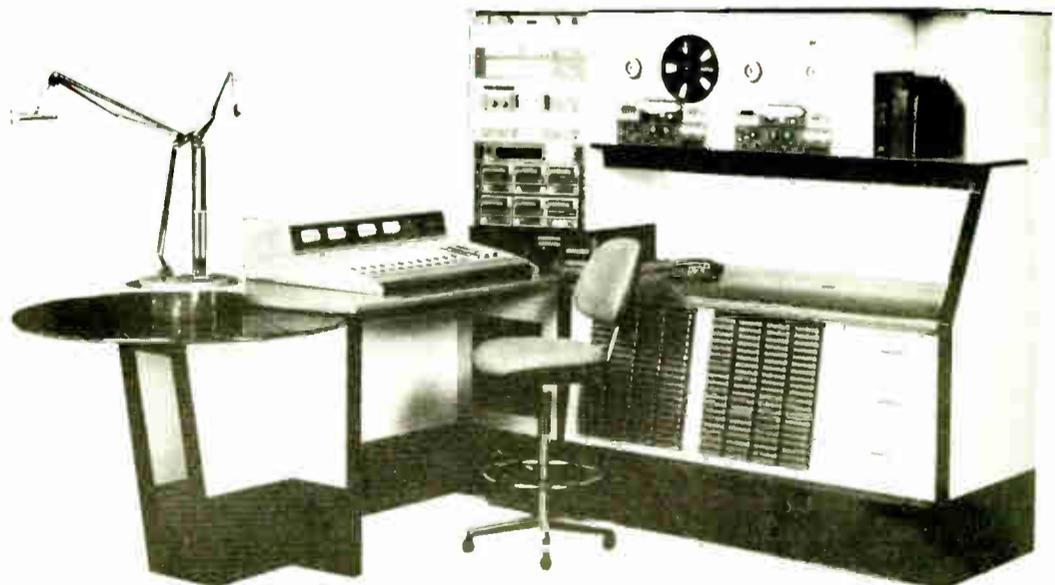
Micro Communications, Inc. 18946
Intro: 7/8" EIA and 4 1/16" EIA coax switch. Broadband dipole antennas. Low/medium power channel combiners. Bandpass filters. Also: Coax switches. Directional couplers. Harmonic filters. Panel antennas. High power channel combiners.
Contact: Jennie Allen
P.O. Box 4365
Manchester, NH 03108-4365
603-624-4351

Modulation Sciences, Inc. 5118, 19
Intro: RDS-1 system generator. Also: ModMinder modulation analyzer. StereoMaxx spectral image processor. Model CP-803 composite processor. Sidekick audio and data subcarrier generators. Wired STL systems. Composite D/As.
Contact: Eric Small
12A World's Fair Dr.
Somerset, NJ 08873
908-302-3090

Motorola 4527
On Display: AMAX receiver demo. AM stereo broadcast equipment.

Murphy Studio Furniture 1920
On Display: Premier Series Studio Furniture. Intro: Stealth Series
Contact: Dennis Murphy
4153 N Bonita St., Spring Valley, CA 92077
619-698-4658

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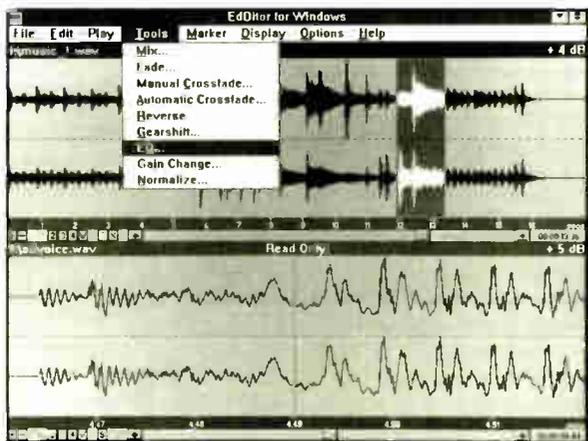
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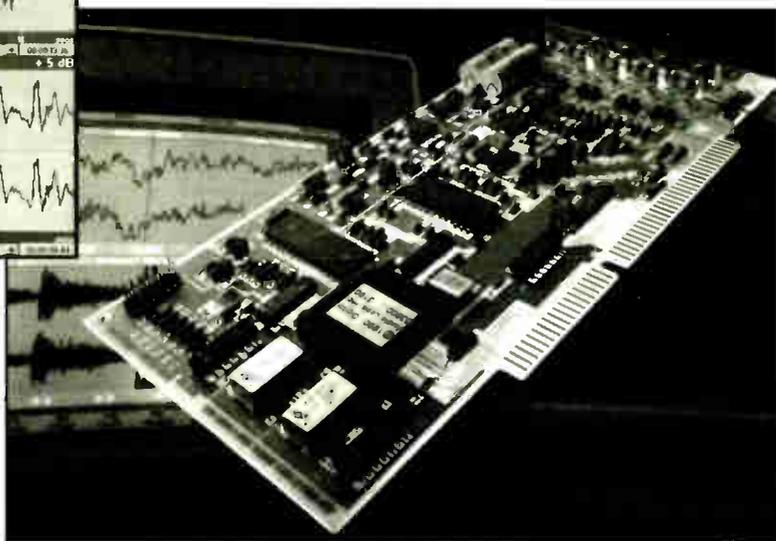
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Moseley Associates, Inc. 2824

Intro: DSP 6000 and CDQ 2000 high spectral efficiency options. MRC 1620 LP flash reprogramming option. Master-Touch interface. PCL 6000 STL. Also: STLs: PCL 6000 Series, DSP 6000. MRC 1620 & MRC 2 remote control products. Taskmaster 20 and Mastercontroller software. RPL 4000 remote programming links. Contact: Jamal Hamdani
111 Castilian Dr.
Santa Barbara, CA 93117
805-968-9621

MYAT, Inc. 3701-3

Intro: Adjustable quarter wave stub second harmonic filter. Also: Rigid coaxial transmission line products and components. Contact: Bill Cindrich
380 Chestnut St.
Norwood, NJ 07648
201-767-5380

n**Nady Systems 11327**

Intro: Models 950 and 950GS UHF wireless microphone systems. Also: Models 401, 650, 750 and 2000 VHF. RW-1 and RW-3 wireless microphone systems.

National Public Radio Satellite Services (NPR) 4807-8

On Display: Domestic interconnection services. Contact: Miriam Lenett
2025 M St., NW
Washington, DC 20036
202-822-2613

National Supervisory Network 4308

On Display: Model ABR200 digital audio VSAT network. Off-premises control systems and services. Contact: M. Montemayor
Box 578, Avon, CO 81620
303-949-7774

Nautel Maine, Inc. 1915

Intro: AMPFET FM10 solid state 10 kW FM transmitter. AM products. Also: AMPFET ND1 1 kW, ND5 5 kW, ND25 25 kW and FM4 4 kW solid state AM transmitters. Contact: Jorgen Jensen
201 Target Industrial Cir.
Bangor, ME 04401
207-947-8200

Nemal Electronics, Inc. 11562

Intro: Composite audio/video cables. Audio snake cables. Custom audio/video interface panels. Also: Audio/video cable and patch cords. RF connectors and adaptors.

Neotek Corp. 4912

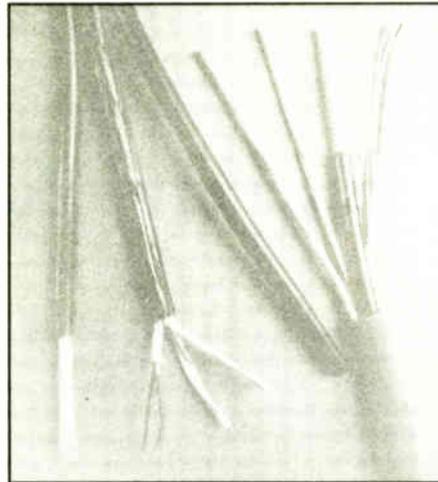
On Display: Esprit audio mixing console.

Network Music 13123

On Display: Libraries: Network Production Music, Sound Effects, ShockWave, Primrose Music.

Neumann USA 17976

Intro: U67 tube microphone. Also: Microphones: KMR 81 and 82 shotguns. RSM 191 stereo shotgun system, U87ai, U89i and KM 100 miniature system.



Nemal's composite cables

New England Digital N/A

On Display: MultiArc Macintosh-based audio editing software. PostPro SD digital audio workstations. DSP option digital mixer and signal processor.

NUCOMM, Inc. 13341

Intro: Heterodyne transmitters and receivers. Also: Single and multiband portable transmitters and receivers.

NVISION 17726

Intro: NV3064 Series digital audio routing switches. NV5000 universal sync generator. Also: Model NV1000 terminal equipment. Model NV2000 digital audio transmission system. NV3512 Series digital audio routing switch. Model NV4448 digital audio sample rate converter.

O**Omnimusic 13643**

On Display: Libraries: Professional Broadcast Series, and OMNI-FX Sound Effects.

OpAmp Labs, Inc. 17573

On Display: MS/8x8/SA stereo audio/video matrix switcher. Network feed boxes. Audio and video distribution systems. RGBS systems. Switchers: routing, matrix, monitoring, assigning. Amplifiers: audio, video, VCA, mic line and power amps.

Optical Disc Corp. 16072

On Display: LaserDisc recording systems and Recordable Laser Videodiscs (RLVs).

Orban, a division of AKG Acoustics, Inc. 2806

On Display: Model 460 compressor/limiter. Model 8200 FM digital processor. Optimod-AM, FM & TV audio processing systems. FM and TV stereo generators. Studio compressor/limiters. Equalizers. De-essers. Programmable microphone processor. Digital sound editor.

Contact: Mary Stevens
1525 Alvarado St.
San Leandro, CA 94577
415-351-3500

Otari Corp. 4612

On Display: Models AL-662 and AL-632 audio-tape loading systems. Model DTR-7 R-DAT.

P**Pacific Recorders & Engineering (PR&E) 3812**

Intro: ADX digital audio workstation. Also: Consoles: Radiomixer on-air. Production mixer. BMXII, AMX, Newsmixer and Stereomixer. Peripheral products. Systems integration services. Studio furniture. Contact: Michael Dosch
2070 Las Palmas Dr.
Carlsbad, CA 92009
619-438-3911

Panasonic Bdct & TV Systems 18019, C101

On Display: WR-S4400 Series 12-, 16-, and 24-input mixers. WP-1000 Series class H power amplifiers. Model SV-3900 studio DAT. Model SV-3700 studio DAT recorder. Model SV-255 portable DAT. Models WS-A70 and WS-A10.

Penta Laboratories 2703

Intro: 5CX1500C, 8F76R, PL2020CL, PL382, 3CX1500A7, and 4-1000CG transmitting tubes. Also: Eletron tubes.

PEP, Inc. 19101-3, 19105

See listing under Mark IV Pro Audio Group.

Pinnacle Audio 1000

Intro: 1700 Series transmitter and remote control interface products. Also: Antenna monitors. Audio test systems. Remote control systems. Field strength meters. Controllers. AM monitor receivers. Program audio analyzers. Contact: Guy Berry
932 Philadelphia Ave.
Silver Spring, MD 20910
301-589-2662

Pristine Systems 2700

On Display: MMCS, Music Management and Commercial Control System. Contact: L. Boyce Williams
8489 West Third St. #1017
Los Angeles CA 90048
213-852-0737

ProMusic, Inc. 13043

On Display: Producer's Sound Effect Library. Production music libraries.

Prophet Systems, Inc. 3002

On Display: "Wizard". 10-track digital editing production system. CD automation system.

q**QEI Corp. 4220**

Intro: Model QX-50 FM exciter. AUTOMOD modulation control system. Q-MAXX addition to CAT-LINK STL/TSL system. Also: FM transmitters. Model 691 modulation monitor/test set. Model 710 digital stereo generator. Model FMQ-3500, FMQ-5000, FMQ-10000, and FMQ-3000B power amplifiers. Contact: Jeff Detweiler
P.O. Box 805
Williamstown, NJ 06094
800-728-2020

r**R-Columbia Products Co., Inc. 13145**

Intro: Model RL-100 wireless IFB/talent cue headphone. Model TR-470 wireless intercommunication headphone and intercommunication systems. Also: Headphone/microphones. Intercom systems. ENG/IFB telephones. Wireless microphones. Base station interfaces.

Radio Computing Services 4012

Intro: Digital Master Control hard disk storage. RCS Works. Also: RCS Works. Broadcast System III. Contact: Lee Facto
2 Overhill Rd.
Scarsdale, NY 10583
914-723-8567

Radio Design Labs 5406-7

On Display: "Stick-On" Series. Model ST-PA2 utility power amp. Model ST-PA6 audio power amp. Model ST-MLX3 mixer. Model STM-3 mic preamp. Model ST-AMC3 active mic combiner. Model ST-VP1 voice-over/paging controller. Model ST-EQ3 3-band equalizer. Model ST-CL1 compressor/limiter. Model ST-ACR1M audio controlled relay. Model ST-SSR1 solid state "relay." Model STA-1 electronic transformer pair. Model STA-1M line amp. Model ST-SH1 headphone amp. Models ST-MX3 and ST-MMX3 mixers. Models ST-DA3 and STM-DA3 distribution amps. Models STM-1 and STM-2 mic preamps. Model ST-MPA2 mic phantom adapter. Model ST-PH1 phono preamp. Model ST-VCA1 voltage controlled amp. Models ST-GCA1 and ST-GCA2 gain control amps. Models ST-LCR1 and ST-LCR2 logic controlled relays. STD series divider/combiners. Model STP-1 variable attenuator. Model STR-19 rack system. Model ACM-2 AM noise monitor.



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Radio Systems, Inc. 2012
Intro: TI-101 telephone interface. Micro-processor timers and clocks. RS2 noise reduction system.
Also: RS Series mixing consoles. RS-1000 DAT machines. RS-2000 cart machines.
Contact: Paul McLane
110 High Hill Rd.
Bridgeport, NJ 08014-0458
609-467-8000

RCA Bdct/GE Support Services 18663
On Display: RCA radio and TV transmitter replacement parts. Studio equipment.

RE America Science/Tech Hall
Intro: RE 533 RDS/RBDS and Musicam 660/661 codecs.
Also: RE-8720/8730 audio codec.
Contact: Andrew Bosworth
31029 Center Ridge Rd.
Westlake, OH 44145
216-871-7617

Redwood Marketing N/A
On Display: EELA audio broadcast and studio products.

Register Data Systems 4820
Intro: PHANTOM digital automation system.
Also: DigiCorder. Computerized sales, traffic, billing and accounting systems.
Contact: Thomas R. Mead
P.O. Box 1246
Perry, GA 31069
912-987-2501

Richardson Electronics 12806-8
On Display: MMD FM broadcast modules. Amperex 3-500Z power triodes. AM, FM, TV, and SW power grid tubes/rectifiers. Power grid tubes/planar triodes for UHF translators/transposers and transmitters. AM, FM, VHF, and UHF cavity amplifiers. Klystrons and TWTs for studio transmitter links. Vacuum capacitors. RF transistors.

Rodman-Brown & Associates, Inc. N/A
Intro: EBS Central remote access device. Studio One automated front-end system.
Also: Desk-Jockey and Desk-Jockey Light digital automation systems.

Rohde & Schwarz 13829
Intro: Model DMC01 and DMC01C RBDS coder. MUSIC Musicam module. Model NU002 VHF FM modular exciter transmitter. Model NR420R1 VHF FM tube transmitter. Model NR410T1 VHF FM solid state transmitter. Model ADS/SMHU.58 waveform generator. VNA video level and noise meter. SFZ satellite TV test signal generator. SAF HDTV signal generator.
Also: EMFT TV/CATV demodulator. CATV software. FSM microwave spectrum analyzer. FMAV modulation analyzer.

Research Technology International (RTI) 14046
Intro: Magnetic media degaussers.

Roland 1213
Intro: Model SRC-2 dual sample rate converter. Model AR-1000 digital announcement recorder. Model FG-1000 music timer. Model FM-40 4-channel mic/line mixer. Model DM-80-L resolver. Model DM-80-S multitrack manager. Model TAP-10 audio producer.
Also: Model DM-80 multitrack hard disk recording and editing system. Model SN-550 digital noise eliminator.

Rosco Laboratories, Inc. 19466-7
On Display: Permacolor glass filters. Glass designer patterns.
Cinegel color correction filters. Roscolux color effects filters. Pin connectors and panel mounts. Ultimatte and Chroma Key Videopaints. Fog/Smoke simulation systems. Studio floor tiles. "Lighting in the Real World" videotape.

RRN, Inc. 5410
On Display: Radio, TV, and cable marketing programs. SMARTcash™ retail marketing system. Instant Auction System programs. Seed Money CHALLENGE cause marketing program. Flashfacts System.

Russco Electronics Mfg, Inc. N/A
On Display: Mark VI turntable. Model MA75 75 W power amp. Model MA25 25 W power amp. Model CD100 compact disk adapter. Models HA10 and HA20 headphone amplifiers. Studio Master mixer. Telemote 321 remote audio mixer. Fidelity Pro preamp. Model DA28116 distribution amp.

S

Samson Technologies Corp. 11541
Intro: Portable mixers. Stereo amplifiers. Powered mixers. Headphone amp.
Also: VHF and UHF wireless systems.

SCA Data Systems, Inc. 4402
On Display: RD-57 combined RBDS/paging generator. Broadcast monitor receiver. 9600 bps subcarrier data system. Music 4/Data 4 four-channel audio and data system. Model PG 57-3 phase-locked paging generator.

Scala Electronic Corp. 15729
On Display: Antennas. Boosters. Translators. STL and RPU systems. Telemetry systems. Preamps.

Scott Studios Corp. 4904
On Display: MediaDISK Mass Storage Digital Audio System. OmniPLAY station automation/live assist system. OpLOG.
Contact: Dave Scott
4125 Keller Springs
Dallas, TX 75244
214-221-3100

Selco Products Co. 4806
Intro: S470 Collet control knob.
Also: VU and PPM meters. Audio level indicators.
Contact: Celeste Favata
7580 Stage Rd.
Buena Park, CA 90621
714-521-8673

Sentry Systems N/A
On Display: DS-1 digital audio recorder. Format Sentry PC-based automation.

Sennheiser Electronic Corp. 17976
On Display: MD422 upgrade. Model HMD25 supra-aural broadcast monitor headphone. Model HMD250 circumaural studio monitor headphone. MKH-MS system. Model MD441-U supercardioid dynamic microphone. Model MKH40-P48U3 cardioid RF-condenser microphone. Model KE4032-P3 supercardioid back electret condenser mic. Model HMD224 closed headphone/supercardioid boomset. Model HD25 studio monitor headphone.

Sescom, Inc. 13601-3
Intro: Multimedia interface products.
Also: 350 audio products. Catalog.
Contact: Franklin Miller
2100 Ward Dr.
Henderson, NV 89105-4249
702-565-3400



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Scientific-Atlanta, Inc. 13818
On Display: Analog and digital transmit and receive products.

Shively Labs 1209
Intro: MMDS-ITFS antenna. Matching transformer.
Also: Side-mount and panel FM broadcast antennas. Multi-station combiners. Rigid transmission line. Pressurization equipment. Pattern work.
Contact: Jonathan Clark
19 Harrison Rd.
Bridgton, ME 04009
207-647-3327

Shook Electronic Enterprises A101
On Display: Model 20-36 TV production truck.

Shure Brothers, Inc. 11901
Intro: Microphones: L5 portable wireless receiver, the EC Series wireless systems, Beta87 electret condenser, L2/87 Model SM87 wireless condenser. Model FP22 stereo headphone amplifier. Model FP32A portable stereo mixer.
Also: Model FP410 portable automatic mixer. Model VP64 ENG handheld microphone. The L Series wireless systems.
Contact: Davida Rochman
222 Hartrey Ave.
Evanston, IL 60202
708-866-2542

Siemens Audio, Inc. 2302
On Display: AMS Logic 2 digital recording and mixing console.
Audio processing system. AMS SoundField Mk V microphone. Mitsubishi X-880EX multi-track digital audio recorder. Mitsubishi X-8620E master recorder.

Somich Engineering N/A
On Display: HPX PRO high performance headphone amplifier. DBE-1000 dynamic baseband enhancer. PL-1 Pilot-Lok for stereo pilot. Model OSC-1 overshoot clipper.

Sierra Automated Systems 4002
On Display: APC-88 and ANC-8 alphanumeric control panel. DCA-8 digitally controlled audio input lead amplifier. Model SAS 32000 mixing and switching system. CPI-80 console mount control panels. ARC-8 alpha X-Y control panels. GPI 1600 Sabro interface sequencer.
Contact: Al Salci
2112 N Glenoaks Blvd.
Barbank, CA 91504
818-840-6749

Smarts Broadcast Systems 4020
On Display: Smartcaster digital audio. Smartcart digital cart machine. CD-based digital audio.
Contact: John Schad
PO Box 293
Emmetsburg, IA 50536
800-747-50536

Sonex 4826
On Display: Acoustical materials.

Sony Business and Prof. Group 11711
Intro: Digital Betacam-compatible VTRs, players, multicassette machines and digital switchers. Effects processors and editors.
Also: A D-2 composite recorder peripheral device.

Sony Recording Media 11711
Intro: BCT-D Digital Betacam videocassettes. V1-KQ 1" videotape.
Also: Videocassettes: D2 Series, BCT-MA Betacam-SP Broadcast Master, BCT-G Betacam Oxide, SBT Betacam-SP, HMEX Professional Hi8 Metal Evaporated, HMPX Professional Hi8 Metal Particle, MQST Professional S-VHS, Pro DAT Plus Professional, XBR and BRS Series U-Matic Series, KSP Series U-Matics. V1-K 1" videotape. MDU Digital Audio U-Matic audio cassettes. D1/4 1/4" and D1/2 1/2" DASH digital audiotapes. 1" Dub Pack. VHS, Beta and 8mm cassettes and 1/2" "Pancake" duplicators.

Soundcraft 15713
Intro: B-100 broadcast console. Folio compact console.
Also: BVE 100 audio-follow-video console. Sapphire post production console. VSA 24 audio-for-video interface.

Sound Ideas 12803
On Display: General Series 6000 digital sound effects library. General Series 1000 and 2000. Ambience Series 3000. Hollywood Series 4000. Wheels Series 5000. Lucasfilm Sound Effects Library. Production Music Library. Sampler Library.

SSAC, Inc. TBD
Intro: SCR430T monitor.
Also: Tower lighting. Monitoring controls. FS155-30T beacon lamp flasher. PCR11 photo control.

Stainless, Inc. 16113
Intro: G-36 tower.

Stanton Magnetics, Inc. 2210
On Display: CD-33 dual CD player. Announcer's/Newscaster earphones. 310B phono preamplifier/equalizer, cartridges and styli.

Stellavox Digital Audio Tech. 5408-9
Intro: Stelladat 4 channel mixer. Stelladat portable professional R-DAT.
Also: Stelladat standard portable professional R-DAT.

Strata Marketing N/A
On Display: Computer software. Arbitron, Scarborough, Media Audit, Simmons, and MA*RT presentations. Customer service.

Studer ReVox 1218
Intro: Dyaxis II digital multitrack audio workstation.
Also: CD players. 2-track tape recorders. 4-track analog tape recorders. 48-track digital tape recorder. Model 961 console.
Contact: Tom Jenny
1865 Air Lane Dr., Ste. 12,
Nashville, TN 37210
615-391-3399

Studio Technologies, Inc. 13627
Intro: StudioComm Series: Model 60 Central Controller, Model 35 Talent Amplifier and the Model 51 Control Console.
Also: IFB Plus Series components. Generation II and AN-2 stereo simulators. ISS integrated simulator system. Mic-PreEminence microphone preamplifier.

Studio Technology 1924, 2012, 1926
On Display: Furniture, drawings, and hardware.
Contact: Mitch Handman
4 Pennsylvania Ave, Malvern, PA 19355
215-640-1229

Success Specialty Sales Corp. N/A
On Display: Splicing, hold-down, leader, console, sensing, gaffers and stage tapes.

Superior Electric 4526
Intro: STABILINE Series power protection equipment.
Also: WHR Series AC voltage regulators. WHR cabinet and rack mount units. Binding posts and Supercon electrical connectors.
Contact: Ted Gladis
383 Middle St., Bristol, CT 06010
203-582-9561

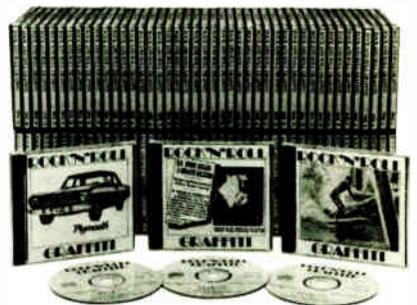
Swintek Communications 12805
Intro: MARK IL digital diversity receiver.
Also: MARK 200 Series intercoms and MARK QDC ENG microphone systems.

Switchcraft 4909-10
Intro: Video patch panels and cords.
Also: Switches. Jacks. Plugs. Connectors. Jackfields. Jack panels. Audio and video patch panels and cords. Power cords. EAC power receptacles. Molded cable assemblies.

S.W.R., Inc. 16043
Intro: TV and FM antennas.
Also: Transmission line.
Contact: Bob Edmiston
Industrial Park Rd., Box 182
Ebensburg, PA 15931
814-472-5436

Symetrix, Inc. 3920
Intro: Model 421 AGC leveler. Model 601 digital voice processor. Model 402 dual output room delay.
Also: Model 528 voice processor. Model 425 compressor/limiter. Model 564E quad expander/gate. Model 524E multi-mode crossover. Model 571/572 SPL computer.
Contact: Julie Held
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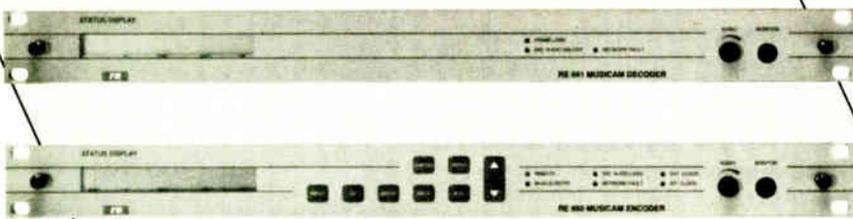
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Available through Harris Allied and Broadcasters General Store

Systems Wireless Ltd. 18563
Intro: Series 800 UHF wireless intercom.

t

Tannoy-TGI North America, Inc. 4302
Intro: Bruel & Kjaer Series 4000 microphones. Omni, hi-intensity omni and cardioid designs. Also: System 8 NFM reference near field studio monitor.

Tapscan 4306-7
On Display: Ratings analysis software, MusicScan music scheduling software.

Tektronix, Inc. 17119
On Display: VM700A, Option 21 automated camera measurement set. VS210 NTSC video synchronizer. Model VM700A video measurement set. TSG-100 Series test signal generators. Model 760A stereo audio monitor. Model TSG-1001 programmable generator. Models TSG-1050, 1125, 1250 HDTV generators. Model SPG1000 HDTV sync generator. Model 2467BHD oscilloscope. Model 1730HD waveform monitor. Serial digital video interface option. Avanzar Video System. Synchronizers, generators, component/composite waveform monitors and vector scope systems.

Television Technology Corp. 13806

Intro: The FMS5000 5 kW solid state FM transmitter.
Also: FMS Series solid state FM transmitters, XL-FM Series FM translators, the S1A Series AC line surge protectors and the FMS-100 transmitter/amplifier.
Contact: Russ Erickson
650 S. Taylor Ave.
Louisville, CO 80027
303-665-8000

Telos Systems 1026

Intro: Telos ONE digital telephone hybrid enhancements. Call Screen Manager software Version 2.0.
Also: Telos 100 Delta digital hybrid. ONE plus ONE dual hybrid.
Contact: Nancy Galish
2101 Superior Ave.
Cleveland, OH 44114
216-241-7225

Telex Communications, Inc. 19414
On Display: Headsets. Microphones. Audio tape. Duplicators. Intercoms. RTS intercom line.

Tennaplex Systems Ltd. 15729

On Display: TV and FM broadband panel antennas. Transmitter combiners and filters. Wave splitters. High power non-inductive coaxial bullets. Antenna pattern computing program.
Contact: Marvin Crouch
21 Concourse Gate, Unit 1
Nepean Ontario zz K2E 7S4 CANADA
613-226-5870

Tentel 13408-9

Intro: Digital video head tip wear and protrusion gauge.
Also: Tentelometer tape tension gauges.

TFT, Inc. 1908

Intro: Model DMM92 digital STL. 911 emergency information system manager.
Also: Reciter and synchronous FM booster systems. IF interface STL.
Contact: Darryl E. Parker
3090 Oakmead Villiage Drive
Santa Clara, CA 95051
408-727-7271

The Express Group 1002

On Display: Series 6000 and 5000. Series 4000 and 5000 furniture.
Contact: Byron Andrus
3518 3rd Ave
San Diego, Ca 92103
619-298-2834

Thomson-LGT 15746

On Display: Solid state and tube transmitters.

T.C. Electronic of Denmark N/A

On Display: Model M5000 digital audio mainframe. DARC™ digital audio reverb co-processor. Model TC8201 AES/EBU digital audio interface test generator and analyzer.

TM Century, Inc. 1926

Intro: Ultimate Digital Studio Version 2. Modular Card Cage. Sony CDK-3600 Jukebox. Libraries: TM Mix, TM Country GoldDisc3 NoNoise, and MegaMusic Production. Jingle packages.
Also: Ultimate Digital Studio Version 1. Jingle packages. TV production. GoldDisc and GoldDisc3 Music Libraries. HitDisc weekly music service. PowerPlay music scheduling software.
Contact: P. Craig Turner
14444 Beltwood Pkwy.
Dallas, TX 75244
800-375-1026

Time Logic 19172

Intro: AirWave Radio Automation System.
Contact: Cindy Spencer
11992 Challenger Ct.
Moorpark, CA 93021
805-529-1155

Transamerica International Bdctg N/A

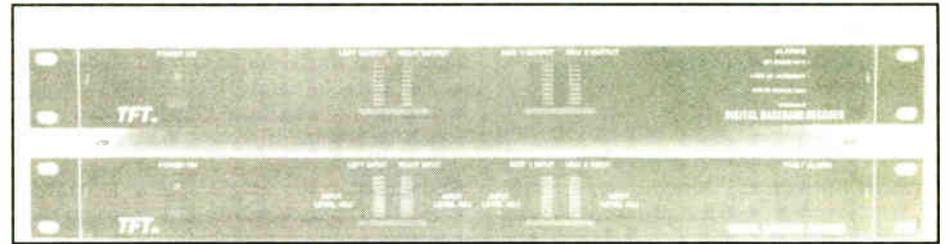
On Display: FM radiolinks, and low and high power exciters/transmitters. TV low and medium power exciters/transmitters. TV microwave antennas. FM/TV antennas.

Trompeter Electronics, Inc. 12801

On Display: RF and video patching products. Standard and miniature patch jacks. "Normal through" jacks. Paralleling jacks. Patch plugs. Patch cords. Cable assemblies. 50/75 ohm BNC connectors. 20 series coax. Wrench Crimp.

TWR Lighting, Inc. 1504

On Display: Towers aviation obstruction lighting. Controllers, parts and service. FAA-approved beacons, sidelights and strobes.



TFT's digital baseband decoder and encoder.

u

UREI, a division of JBL 15713

Intro: The Platform modular signal processing system.
Also: LA Series compressors/limiters.

Utility Tower Co. 3924

On Display: Samples of tower sections for AM, FM, TV, CATV, LPTV and microwave communications.

v

Valentino, Inc. 12203-4

Intro: CD-ROM products. Interactive and VIS computer applied technology.
Also: 60+ CD and Sound Effects libraries additions.

Varian Associates 16101

On Display: 4CX20, 000A, and power tetrode Eimac power grid tubes.

Vega Wireless 1000

Intro: Models LM-210 and LM-210X subminiature lavalier microphones. UHF Q-Plus wireless intercom system.
Also: 600 Series UHF wireless microphone system. IFB private-line wireless system.

Video Associates Labs 13607-9

Intro: AudioPort external sound peripheral.
Also: PC peripherals.

w

Ward-Beck Systems Ltd. 12501

On Display: D8212 distribution amplifier systems. MicroCOMM II digitally controlled programmable communications system. R Series radio consoles. ST Series stereo television audio consoles.

WaveFrame Corp. N/A

On Display: Time compression/expansion. Digital mixer. CD recording interface. WaveFrame 400 and 1000.

Wheatstone Corp. 5108

Intro: A-500 Radio On-Air Audio Console.
Also: Air and production consoles. Smart Select audio switcher. Digital audio hard disk. Rackmount signal processing gear. Modular studio furniture.
Contact: Ray Esparolini
6720 V.I.P. Parkway
Syracuse, NY 13211
315-455-7740

Will-Burt Co. 19201-2

Intro: NightScan remote control elevated lighting system.
Also: Pneumatic telescoping masts.

Winsted Corp. 11927

Intro: Ergonomic Series multimedia workstations. Expanded System/90 Series post production consoles.
Also: Modular components and accessories. Tape storage, rack slide kits, and duplication racks.

Wireworks Corp. 13604-5

Intro: TEN-4 speaker cable. Broadway latching system. G5/160i interconnect standard.
Also: Multicables components group products. Microphone cable assemblies. TE-3 mic cable tester.

Wohler Technologies 18566-67

Intro: AES/EBU and SPDIF digital input options.
Also: Models AMP-1A and AMP-2 rackmount powered stereo monitor speakers. ARS Series audio routing switchers. MSM (Multi-Source Metering Series.)

y

Yamaha International Corp. 13840

Intro: Model SPX990 digital simul-effect audio processor. Model MC1203 mixing console. Model Q113 1/30 graphic equalizer. Model GQ2015 stereo graphic equalizer. Model MS101 II and MS202 II power audio monitor speakers.
Also: Model PM4000 mixing console. Model DMC1000 digital audio mixing console. Model YPDR601 professional CD recorder. Model NS10M monitor speakers. Model MS60S powered monitor speaker.

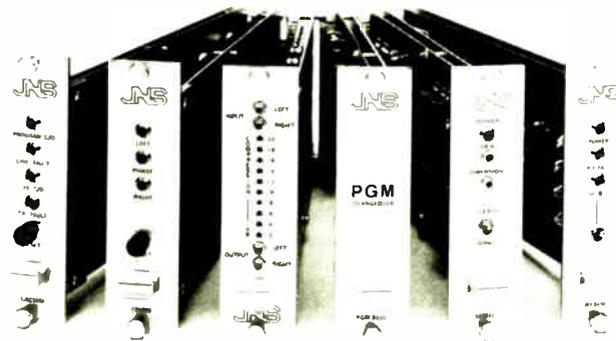
z

Zero Stantron N/A

On Display: Wood-trimmed consoles. Epoch 2000 racks and consoles series.

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USER REPORT

KCQL/KKFG Automate with the DCS

by Dan Kelley
Operations/Technical Director
KCQL(AM)-KKFG(FM)

AZTEC-FARMINGTON, N.M. On April 1, 1992, J. Thomas Development of New Mexico, Inc. signed a LMA agreement (with purchase option) to provide programming and sales support to then-country music simulcast KCEM-AM-FM.

Under the LMA, the AM station would shift format to Unistar's satellite-fed Oldies format. The FM would remain locally-programmed during the day, but would use Unistar's Hot Country satellite format nights and weekends.

After previous experiences of executing a satellite format using standard cart machines, book tapes and minimum-wage board operators with inconsistent results, the decision was made to automate using digital audio PC-based systems that have appeared on the market in recent years.

The right stuff

The company president and I traveled to the 1992 NAB with the intention of purchasing a digital audio system for the stations. After visiting several exhibitor booths, we arrived at the Computer Concepts' exhibit. We were introduced to its Digital Commercial System (DCS) by company CEO and DCS designer Greg Dean.

I presented our format plans to Greg, and he demonstrated how DCS could do what we required and more. A decision to purchase was made immediately.

The KCQL(AM)-KKFG(FM) DCS installation is somewhat unique in the fact that we didn't purchase a separate "production" unit. Because each DCS features the ability to play up to two separate stereo or mono audio cuts while simultaneously recording another audio cut, we dedicate one of our DCS machines to both on-air and production duties.

With our KCQL utilizing the Unistar feed 23 hours a day, we elected to physically locate its DCS in our production room. While the AM DCS is playing IDs, liners and spots on command from various satellite relay closures, our staff is also using the machine to record all commercial and other recorded material for both KCQL and KKFG.

Complete usage

The KKFG DCS is located in the FM air studio and is used for playback of commercials, liners and promos during our locally-originated programming (6 a.m. to 6 p.m.) as well as complete satellite automation (6 p.m. to 6 a.m.).

As this schedule makes normal production work impractical with this machine, its record functions are used to automatically DB feeds from a news network for the AM station. Once recorded by the FM DCS, designated audio cuts are rout-

ed to the AM DCS for later play.

Digital editing is provided in the "production room" area of DCS. This enables a user to cut and splice audio cuts electronically and with precision.

At this writing, Computer Concepts is working on an update that will also provide this feature in the control room area.



KCQL/KKFG use one of their Digital Commercial Systems for both on-air and production duties.

In our "two control room" configuration, this will be a great enhancement.

The local voice

The two units are connected to each other via RG-62 coax through a file-server. In addition to the DCS units, a workstation in our traffic department is connected to the file server for loading

commercial logs to DCS.

The beauty of new-generation PC-based automation is it allows a local programmer the flexibility to take a national satellite feed and really localize it. In addition to the standard liners and IDs you hear on most "satellite" stations, one can take the concept a few steps beyond with a system like DCS.

On our AM, the Unistar AM drive talent gives our local time...to the hour and minute several times an hour. With each local top-of-the-hour ID, the "current voice" also gives the local time ("news is next, it's 7 o'clock!").

Each personality also intros our weather person. And if a shift changes, we can tell DCS instantly (or days in advance) that "today Bill Michaels is substituting for Bruce Chandler" and "instead of using Bruce's liners and time checks, use the ones Bill recorded instead." Of course, we're prepared for these situations and already have the liners loaded into the DCS.

Our top-of-hour sequence typically includes playing the ID, rolling our own news theme, switching out of the Oldies Net to a separate news network for two minutes, followed by 60 seconds of local

spots and then weather.

Of course, should the weather or spots be short, or even missing or outdated, DCS will use designated filler material to "fill out the break." In our case we have filler cuts that run as short as four seconds (quick station promos) to as long as 60 seconds (PSAs).

Hard drives

An initial miscalculation on our part was ordering our DCS units with hard drives that were a bit small for our needs. With the exception of dry voice liners, IDs, etc., we record nearly all our local production in full 15 kHz stereo, which requires twice the disk space as 15 kHz mono. Even with DCS using a 4-to-1 data reduction, we quickly ran low on drive space.

My only criticism is directed at the DCS documentation, which hasn't appeared to be updated as quickly as the operating software. Still, any questions can be answered with a toll-free phone call.

DCS has more than met our expectations at KCQL/KKFG. Under the new duopoly rules, our company has purchased another AM/FM combo in our market and will soon operate four stations under one roof.

Of course this means at least two more DCS units added to our existing file server. And as this is being written, we're installing Computer Concept's own traffic and billing system that communicates directly to DCS.

□□□

For information on the DCS, contact Mark Bailey in Kansas at 913-541-0900; fax: 913-541-0169.



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INTRODUCING THE SHURE FP410; THE "HANDS OFF" MIXER THAT DELIVERS PERFECT SOUND AUTOMATICALLY.

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The secret: Shure IntelliMix — the patented operational concept behind the revolutionary FP410. It thoroughly shatters existing standards for portable mixer performance and ease of operation.

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□ Its Noise Adaptive Threshold activates microphones for speech but not for constant room noise, such as air conditioning.

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USER REPORT

The Desk Jockey Does It All at WCMI

by **W. Richard Martin, Jr.**
General Manager
WCMI-AM-FM

ASHLAND, Ky. To become a more mean and lean product in the market, WCMI decided to venture into the field of satellite music during the spring of 1991 with digital automation.

The first decision, regarding music service, was a relatively easy one to make. But the second decision, regarding digital automation, took us all over the Eastern United States. After making hundreds of phone calls, going to demonstrations, listening to different stations and seeing their automation in action, we decided to go with **Rodman-Brown's** Desk Jockey, a decision with which we are extremely pleased.

Glitch free

The system is capable of running our entire radio station 24 hours a day, seven days a week without a "glitch." From our drive times of news, sports, weather and heavy commercial clusters, to the night and overnight shifts of music, music and more music, we are able to leave our system unattended for hours upon hours.

The savings are just incredible! No more absentee problems, morale problems, personal problems—we just let the Desk Jockey sit here and continue to do its job.

With the capability of satellite music and unlimited other audio sources (networks, phone inputs, other satellite inputs, etc.), the Desk Jockey has more than met our needs at the radio station. And the quality of the Desk Jockey is outstanding.

Our set-up required a companion system in another studio, and the Desk Jockey was able to fit our needs. The companion system alongside the main system gives us the ability to accomplish more at basically the same time.

With the Desk Jockey's more than capable hard disc drive, we are very satisfied with the heavy-duty computer built specifically for continuous use. From the dual cooling system to the power supply and monitors, the Desk Jockey is built with commercial-grade machines specifically designed for the broadcaster.

Nerve central

The Desk Jockey's Audio Control Unit (ACU) is the "nerve center" of our satellite-programmed station, with the capability of being live-assist if necessary. The ACU is capable of switching to different "sources" without missing a beat.

Our use of the Desk Jockey requires that the automation rotate liners, IDs and magicalls, change announcers, and run local news, network news, sports, weather and commercials. The Desk Jockey answered all our needs to be fully automated, triggered by the SMN announcers.

The Desk Jockey's operating overhead is virtually nil. With low maintenance and long-term reliability, the Desk Jockey can and will cut your expenses drastically, while supplying you with a great product. Our weekly maintenance consists of dedicating 30 minutes each week to software, and practically nothing to the hardware because of its heavy-duty machines.

Getting started

Our experience with service from Rodman-Brown and Associates has been nothing short of marvelous. Yes, there have been times that the machine malfunctioned, more often than not from human error. Ted Brown and his staff have always been very prompt in correcting the mistake and getting us back on track, literally in a matter of minutes.

During the first few weeks of operation, our main concern with the Desk Jockey was its problem of losing time. This mal-

function would throw everything off and cause us to periodically lose stop-sets.

So we had to manually set the time about every 12 hours. With the addition of a new program (at no cost to us), the problem has been alleviated.

And the installation of the Desk Jockey was a breeze. Ted Brown arrived on Tuesday morning, and by that afternoon

we were up and running. Over the next few days, Rodman-Brown trained and fine-tuned our system to match what we wanted.

I can honestly say that Rodman-Brown puts its money where its mouth is. Reliability, features, service and best of all, affordability, make the Desk Jockey the best digital automation system available today.

□ □ □

For information on the Desk Jockey, contact Doug Thompson by telephone fax at 708-983-0977.

USER REPORT

Arrakis Proves to Be Key Link

by **Geoff E. Carter**
Corporate Engineer
Sandab Communications

HYANNIS, Mass. When the station owners looked to me to move our stations into the '90s with digital audio, I turned to the **Arrakis Digilink** system.

We needed a system that could act as a CD automation system on our FM, a satellite automation system on our AM and a digital editing system for our production department. After several months of deliberation, I decided the Digilink system was the only one that could meet all of the specifications and not force the stations into Chapter 11.

FM-AM power

On our FM side, WGYL in Vero Beach, Fla. and WQRC in Hyannis, Mass., we run the Arrakis in CD automation mode with 32 Pioneer PDM-450 six-pack CD players for a total of 192 CDs on line.

Commercials, PSAs, and liners are recorded onto the system's hard disk drive at a 2:1 audio compression ratio. An optional extra hard drive gives us six hours stereo, or 12 hours mono, hard disk audio that allows the system to play back event after event without any re-cue time.

The system has the option of using a

4:1 compression ratio for even more audio storage time, but we found the audio quality to be unacceptable. The FM digilink controller is connected via a LAN (Local Area Network) to both the AM system and our production system, thus allowing audio to be transferred anywhere in the digital domain.

Most of our commercials are recorded into our production system and then transferred, but the jocks can also record into the system from both the AM and FM studios.

The AM station, WTTB in Vero Beach, runs a 24-hour news/talk format, which used to be a major headache. But running the Arrakis Digilink in satellite mode has handled this engineering nightmare flawlessly since the day we put it on the air.

Our station receives programming from CBS, Daynet, Talknet, Mutual, Florida Radio Network, EFM, The Peoples Radio Network and others. We needed a system that could switch audio from 12 different sources.

We also needed a system that could take our commercial and feature feeds from the networks and play them on the air automatically. Once again, the Digilink came through.

Editing capabilities

In our production room, we installed the Arrakis Trakstar-8, an eight-track digital editing system that is fully compatible with the Digilink on-air systems. The Trakstar system allows the user to cut and paste, copy, move, mix, and fade audio on eight digital tracks.

The system also has a "scrub" mode that allows the user to "rock" the audio back and forth, similar to rocking a tape on a reel to reel machine, for finding splice points with unbeatable precision.

The editing session can also be saved on 3.5-inch computer disks for later revision. For example, if a client wanted to change the date of a sale while still keeping the music and sound effects, all our production director would do is pull the session off the disk, change the voice track and send it to the on-air machine, without having to reproduce the entire spot.

Easy installation

The Digilink system is also compatible with our music scheduling (RCS Selector) and our traffic (Datacount DARTS) systems. Once our program director has completed the music log, he hands a disk to our traffic manager who merges it with the commercial log and downloads both to the Digilink system. The Digilink can be programmed with logs for up to 14 days in advance, but unfortunately, our

continued on page 90 ▶



FP410 Mixer shown actual size.

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For a closer look at the world's first portable automatic mixer, call for more information including the article "Why Use An Automatic Mixer?"

We think you'll agree: The Shure FP410 is automatically a classic.

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The ultimate solution to talk show problems.

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USER REPORT

TM Century Remains Ultimate for KPER

UDS Poises FM for Next Generation of Technology While Keeping Expenses Down and Local Voice Alive

by Scott Roberts
Program Director
KPER-FM

HOBBS, N.M. With an increasing number of signals entering the market, we felt KPER needed a local 'edge' that was impossible with the satellite format we had since 1981. At the same time, we knew the system would need to compete with the low overhead of the satellite operation.

TM Century's design and support personnel are former broadcasters, so they understand the needs and concerns of radio.

Comfortable in minutes

With UDS' flexibility, we're able to use an air staff of just two full-time announcers. KPER now airs live programming during the morning and afternoon drive, and automated segments the rest of the day.

The UDS Voice Tracking feature

allows jocks to pre-record automated segments daily, or weeks in advance. Live assist programming is a breeze. Announcers with no previous computer experience are usually comfortable on the system in a matter of minutes. With UDS, you can also use the level of control the operators are allowed.

The utilities included with the Ultimate Digital Studio make programming the unit nearly foolproof. It's almost impossible to load a schedule that contains an error. These utilities greatly simplify programming special events—remote broadcasts, countdown shows, etc. The utilities are nearly all of the 'point-and-shoot' variety, making them simple to execute.

The Ultimate Digital Studio has given KPER more local involvement than ever, while keeping programming expenses well within budget.

Audience and advertiser support has been tremendous. With a completely digital facility, we feel KPER is well positioned to enter the next century and the next generation of radio.

□□□

For information on the UDS, contact Craig Turner at 800-937-2100; fax: 800-749-2121.

... many of TM Century's design and support personnel are former broadcasters, so they understand the needs and concerns of radio.

In TM Century's Ultimate Digital Studio, we found a system with the flexibility, economical operation and technology to take KPER into the era of digital radio.

Multiple configurations

TM Century offers a variety of Ultimate Digital Studio configurations. KPER chose a mid-line system with two Sony CD Jukeboxes and two 360 Systems Digicarts, one with a 400-megabyte hard disk for control room playback and another with Bernoulli disk-drive only for production. This gives a total capacity of 120 CDs plus about three and a half hours of non-music audio.

One of the selling points of the UDS was TM Century's complete package. The company provided KPER with not only the digital studio equipment, but with computerized traffic and music scheduling software, music service on CD and new digital production libraries.

While these services greatly simplify operation of the UDS, none are necessary for its operation, so you're not locked into using TM Century's products.

Another key point to us is that many of

allows jocks to pre-record automated segments daily, or weeks in advance. Live assist programming is a breeze. Announcers with no previous computer experience are usually comfortable on the system in a matter of minutes. With UDS, you can also use the level of control the operators are allowed.

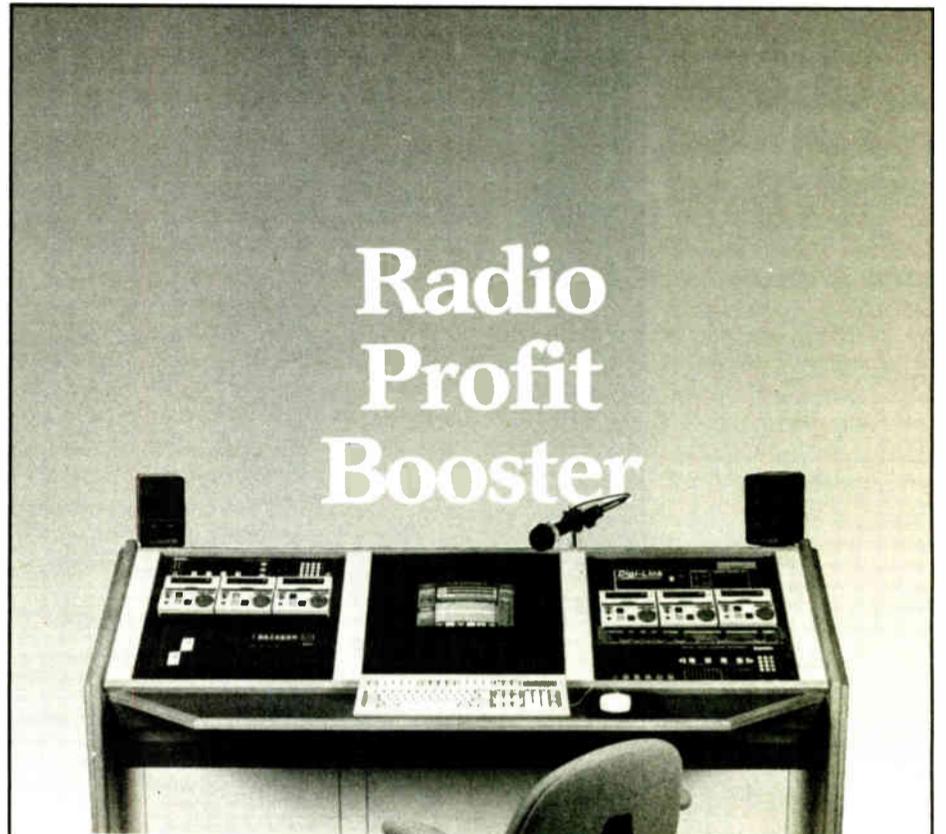
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These utilities greatly simplify programming special events—remote broadcasts, countdown shows, etc. The utilities are nearly all of the 'point-and-shoot' variety, making them simple to execute.

Support team

Since the UDS has been in service at KPER, we've had only a few minor problems. The computer monitor failed, but we installed a standby in a matter of minutes, and TM Century had a replacement in our hands the next day.

A little more serious was a hard-drive failure on our control-room Digicart. We were able to use the production room unit for playback of the necessary elements, such as IDs and a few commercials, until a new drive arrived the



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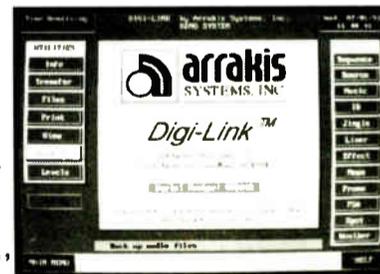
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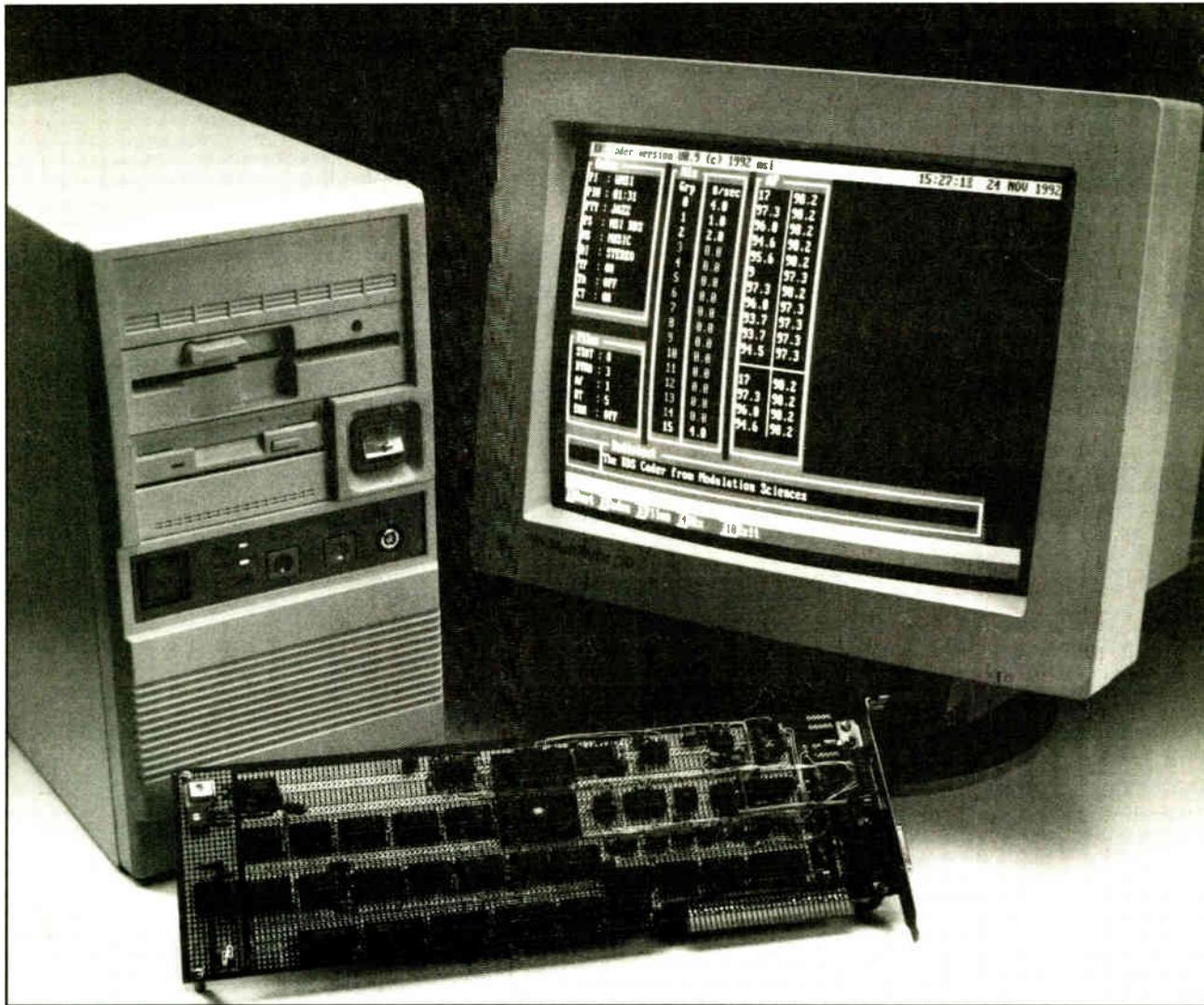
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USER REPORT

BE Answers WGEM's Call to Automate

by Leo T. Henning
Station Manager
WGEM-AM-FM

QUINCY, Ill. WGEM Radio has had four different automation systems in the past 20 years. Broadcast Electronics (BE) and Harris Allied are both located in Quincy, and the stations have always been fortunate to test and purchase state-of-the-art equipment.

After helping BE with field tests for the CORE 2000 Automation System, WGEM decided to purchase it and two AudioVAULTs when the station needed a new system in early 1992.

Finding the answer

The stations had been airing news/talk on the AM and country on the FM with two Harris Allied 9003s, purchased in 1983. These two systems were very reliable, but the playback source equipment was due for replacement in 1987.

We decided to wait and see what developed in digital audio before replacing the equipment. The stations were looking for an integrated approach to automation and digital audio.

The new system would need to lower operating overhead, increase employee productivity, provide for future software enhancements, and execute programming and commercials flawlessly in a fully-automated or live-assist mode. WGEM found its answer in the CORE 2000 and AudioVAULT from BE.

Each station has its own CORE 2000 Automation System for on-air control. The automation program runs on two separate 386 computers located in the AM and FM studios. These computers are linked to individual switchers located in master control.

One rack contains the source equipment used exclusively by the AM station, including two Sony CD Jukeboxes and a reel-to-reel deck for deadroll. The FM

rack contains the Core Switcher and a reel-to-reel for sun outages.

A third rack contains the AudioVAULTs shared by both stations. The commercial AudioVAULT has four 198-minute drives. Audio addressed to it is loaded from a PC located in a separate production studio. The AM or FM Core Automation retrieves audio from the AudioVAULT as needed.

A second AudioVAULT with two 120-minute drives is used for jingles, liners and recorded network news programs. This AudioVAULT has control points from PCs in the FM studio and in master control.

The purchase of the system has reduced operating expenses and streamlined operations.

The master control AudioVAULT PC is only concerned with recording incoming network feeds.

Safe keeping

The switcher moves to any one of nine selected national and regional news networks; the AudioVAULT records incoming feeds and deposits them at predetermined addresses in the AudioVAULT. When the feed is complete, audio is trimmed and cued automatically. The AM or the FM Core Automation retrieves these programs as needed.

The Core/AudioVAULT capability in automatic record/playback of multiple network feeds was the main selling point for WGEM. Drive-time programs had been using studio producers because of the switching complexity. The system eliminated this need, resulting in a substantial reduction in operating costs.

WGEM runs all programming through

the automation system, including live studio organizations. The AM uses TalkNet overnight and the FM is tied in with the Satellite Music Network, except for AM drive. The Core/AudioVAULT does an exceptional job switching these programs. The stations run the Cubs, Cardinals, Bears, Bulls, Blues, and about 185 local sports broadcasts each year.

Meeting challenges

The installation at WGEM was particularly challenging. Space limitations and station wiring grids made it impossible to continue use of the old Harris system until the Core/AudioVAULT was installed.

Automation had to be abandoned entirely for about three weeks. The complexity of the new system presented unforeseen challenges. The WGEM configuration is controlled by 24 separate microprocessors.

Getting the hardware programmed and networked was not easy. Once the installation was complete and the staff had a chance to absorb the radical change in operations, the system performed well.

In September 1992, the station was hit by lightning. Equipment throughout the facility suffered a great deal of damage. Surprisingly, the Core/AudioVAULT did not sustain much damage. One of the controlling PCs was destroyed, but a spare was taken off the shelf, and in less than an hour

the stations were back up on the system.

The combination of Core and AudioVAULT still requires a lot of data entry. And there is an added problem created when announcers and traffic personnel are trying to load vital data through the same PC.

Bottlenecks have occurred as staff members attempt to gain access to PCs for data entry. This problem could be solved with a software enhancement that allows other PCs to network with the system.

WGEM's use of Core 2000 and AudioVAULT has been made easier by continuing service support from Broadcast Electronics. There has been regular contact on Core and AudioVAULT operations from BE service engineers.

The purchase of the system has reduced operating expenses and streamlined operations at WGEM. It has allowed the stations to maintain a high-quality product with real walkaway time.

The system has proven to be as effective in live-assist applications as it is in full automation. The marriage of Core 2000 Automation and the AudioVAULT systems provides a comprehensive approach to WGEM's complex automation needs.

□□□

For information, contact Dave Buck in Illinois at 217-224-9600; fax: 217-224-9607.

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Circle (10) On Reader Service Card

LPB Helps Station Return to Airwaves

► continued from page 29

stations then monitored a station in a nearby community to get their EBS information.

The KDJI staff couldn't return until the next day. They found that the water had receded, but it had left behind plenty of mud and silt. Roberts said the residual debris was so extensive that the local fire department hosed out their offices to remove it.

Despite the sandbags, the water had risen to three feet in the transmitter room and two feet in the studios and offices. KDJI lost the transmitter, the satellite receiver demod unit, three cart machines,

the AP demod, and some tower equipment. Roberts estimated the total damage at \$85,000, "which to a station of our size and our market is a lot of money." Insurance covered a few pieces of equipment, and KDJI is applying for a Small Business Administration loan to rebuild its studios.

Futile repair attempts

Roberts said they tried to repair the transmitter. "Our transmitter suffered heavy water damage to the transformers. We took them out, completely cleaned them, dried them, oven baked them. We did everything. We talked to a lot of people who had suggestions."

After about two days, Roberts realized that it was not repairable. "The main thing was that the three feet of water had pretty much engulfed the high voltage power supply and the modulation transformer."

He ordered a new 5 kW transmitter, but the order was to take several weeks. In the meantime, Roberts contacted John Devecka at LPB in Pennsylvania to look for an emergency backup. "John was unbelievable. He immediately sensed our situation. He got one built as quickly as he could. He sent it to us for two weeks rent and the cost of shipping because we were organizing our finances at that time too, and preparing for what might have been a long layoff. Immediately after the two weeks, we purchased it in full, but he got it here as quickly as he possi-

bly could and that got us on the air."

Devecka said it was important to get KDJI on the air quickly—particularly since it was an EBS control station. "Normally, we don't have rental units, particularly something that is that far up in our price line, but we have done it

"Three feet of water just isn't going to do anything . . . next time."

before in an emergency, and it seemed like a awfully good thing to do for them.

"We pulled a couple of guys off production of some of the other equipment and got them to build the transmitter in about a third of the time it normally would have taken, bench tested it, and got it out as quickly as we could, which I think was five days."

Roberts stressed the importance of hav-

ing a backup transmitter. "Believe me, I know a lot of small market broadcasters who don't. It's a matter of money, no question, but the one that we got was not very expensive, I didn't even know it was on the market."

Coverage area

The 100-watt LPB managed to cover about 30-40 miles, according to Roberts.

The station's tower is located in one of the lower spots. Roberts said the maximum water level was nine feet in the tower area. In mid February, the tower still was standing in two to three feet of water. The level was low enough that engineers were able to broadcast with their temporary transmitter, but it was still too dangerous to repair the tower lights.

KDJI now is incorporating flood precautions into the design of their repaired facility. Roberts said they have brought in a mobile unit that is on pillars, and they have separated their block studio from the office trailer and have built blocks for it.

"It's almost like a seawall. Three feet of water just isn't going to do anything except wash out our driveway next time."

Arrakis Proves to Be Key Link

► continued from page 85

sales department cannot.

Installation of the Digilink systems took almost no time at all. The production unit was in place in less than an hour—with a stereo audio input, stereo audio

output, the network cable, monitor, keyboard and trackball.

With the AM Digilink system, I mounted the expanded switcher right next to the main console and paralleled all of the satellite sources with the console.

The FM system basically just plugged together once I mounted all of the CD players, and it was ready for air in a weekend.

Although we have encountered a couple of software glitches, the people at Arrakis were very receptive to our problems and needs. They were usually able to correct the problems within the same day and feed us a software revision over the phone using a modem.

The manuals for the system were easier to read for operators with a computer background, but as it says in the beginning of the manual, the system is best learned by using it.

Service from the system and the manufacturer has been excellent, and both staff and management are extremely pleased with the operation and cost effectiveness of the Digilink and Trakstar systems.

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For information on the Digilink, contact Bob Groome in Indiana at 800-622-0022; fax: 317-962-8961.

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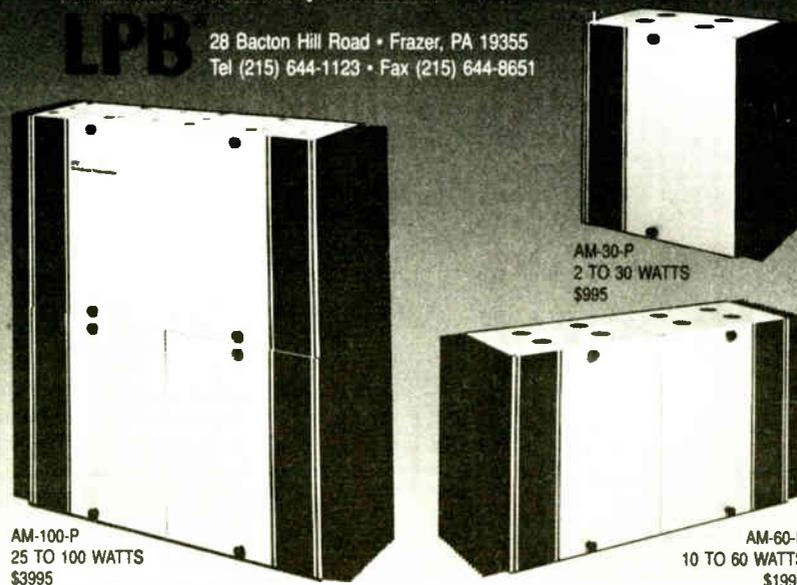
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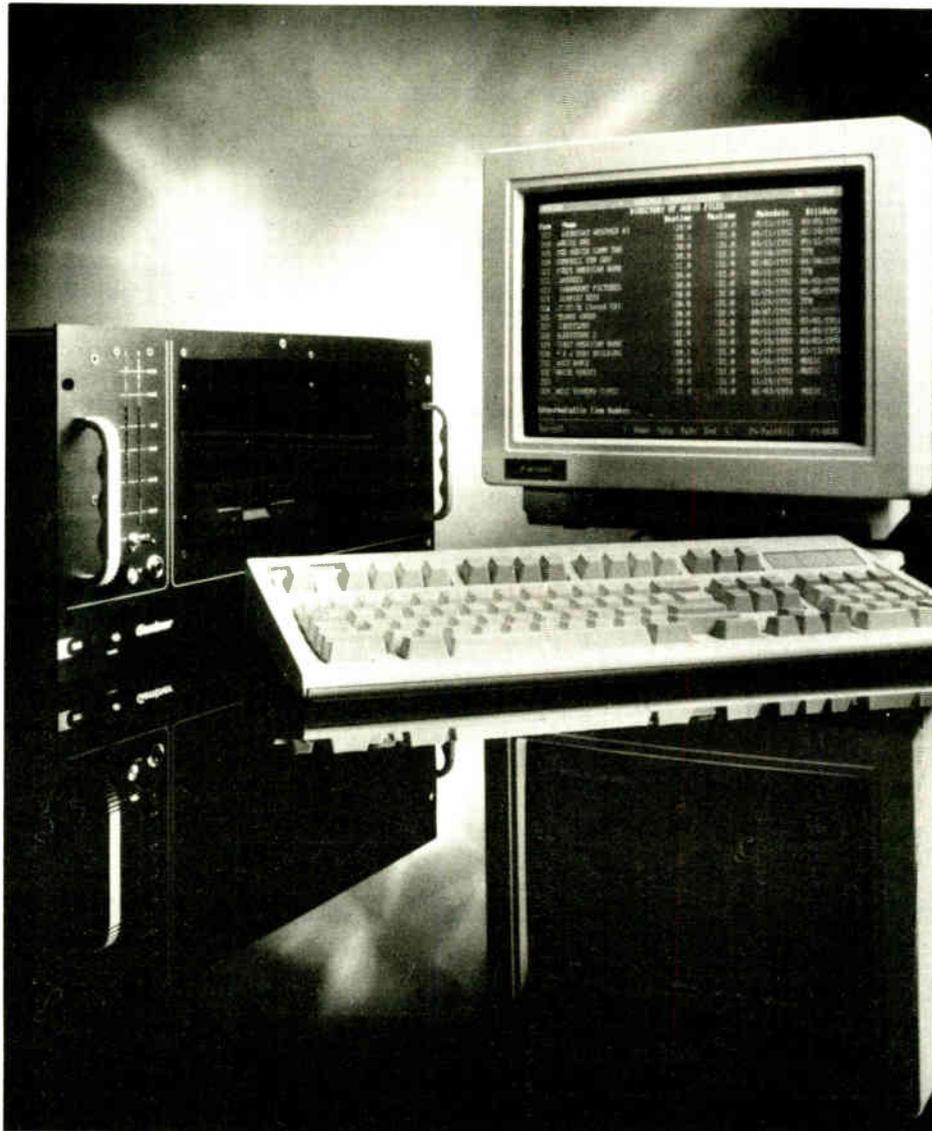
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USER REPORT

WPLK's Encounter with Phantom Power

Register Data Systems Provides Walk-away Operation, Break Retiming and Flexibility in Operating Systems

by **George Duck**
Chief Engineer
WPLK(AM)

PALATKA, Fla. Imagine competing with the metro markets in a small town market, and cutting operating costs at the same time. Impossible?

We have an operating system that costs no more than some tape-cart systems, yet does everything except determine whether the EBS alert is for real or just the weekly test. The Phantom from Register Data Systems is just such a system.

The best for less

Early in 1992, WPLK(AM) went looking for new ways to give listeners the quality they had come to expect while increasing profitability at the same time.

Automation of some kind seemed to be the answer. The search for a satellite music service and delivery system was not too difficult. Because the existing format was Country Music, Satellite Music Network's Coast to Coast Country filled the bill nicely.

Any new operating system must be capable of handling all local spots (both commercial and PSA) and simplifying the production of spots, liners and IDs. It must also allow for things we must continue to do, including going live at any time for locally produced shows (local remotes, coverage of breaking news, etc.) and scheduling local news breaks, local weather insertions and live assists to other networks for coverage of special events (sports, etc.).

The RDS Phantom gives us the flexibility to do anything we want at any time with just a few keystrokes. Yet, it can be programmed to operate for days at a time unattended. The Phantom hardware is a

modified PC with a 500 megabyte hard drive, and SVGA color monitor.

Compatible software

The software developed by Register Data Systems works in conjunction with

The RDS Phantom gives us the flexibility to do anything . . . with just a few keystrokes.

most computer-based traffic systems. The system records all audio stereo material onto the hard drive in digital format, which means that playback is exactly as recorded. (No more wow, flutter, recording over splice, start-stop cue failure, etc.) The only dubbing necessary is audio material supplied by third parties.

Installation should be relatively easy for most technicians once they've decided on a configuration. The hardware consists of the CPU with the hard drive and a floppy disk drive (3.5-inch or 5.25-inch) in the same cabinet, which can be located conveniently or rack-mounted.

The keyboard and monitor fit nicely in the space those old tape carts once occupied. The input/output interface matrix is contained on one 2.5-inch by 19-inch rack panel. Installation was started after our 11 p.m. sign-off and completed before the regular 5:30 a.m. sign-on.

The input/output matrix is connected to the CPU by means of a 64-conductor ribbon. The output of the Phantom can be fed directly to the limiter, thus freeing up the console for production while programming is being supplied from the

bird (satellite service).

The software operates under DOS 5 and features pull-down menus. Programming is designed around the program clock (called Flex Clocks by SMN). The Flex Clock provides for four, three-minute local option breaks per hour, a total of five drive time.

When recording, the Phantom provides a stereo audio level indicator on the color

screen. Break Retiming is an interesting and useful feature of the software.

Flexible Programming

Break Retiming allows the software to expand or shrink the material programmed by a small percentage, to exactly fit the three-minute break so that production is always tight. In addition, there's the capability of recording to the Phantom while providing programming without any conflict.

Produce a program log on the traffic system computer, and transfer it to a floppy disk. Copy that floppy to the Phantom and you're in business. The Phantom provides all program elements by means of cue tones from SMN: music and news (SMN), liners, magic calls, station IDs, commercials, weather breaks, etc.

If you decide to do a live show, with a few keystrokes you can transform the Phantom into a cart player. This system can also be programmed manually, which allows for last minute changes to the log. If you hit a snag, just pull down the HELP menu.

After six months in operation, our confidence in the system has reached the point

where we no longer keep backup tapes.

The control room is less crowded and tape-cart racks are gone—only one tape cart is left. By the way, there are four fewer people messin' up the snack room.

The only problem we have encountered so far is if a power failure lasts longer than the next scheduled program sequence—then the Phantom must be reset. We could cure this by installing a UPS.

□□□

For information on the Phantom, contact Brad Harrison in Georgia at 912-987-2501; fax: 912-987-7595.



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USER REPORT

Easy Operation with Format Sentry

KYYK Utilizes Sentry Systems' Unit with Hands-off Operation and Complete Programming Capabilities

by **Wayne Hall**
Chief Engineer
KYYK-FM

PALESTINE, Texas The first time I heard about the Format Sentry by Sentry Systems, I thought, 'Here's another try-to-sound-alive—and-then-flop system.' Was I in for a pleasant surprise!

The Format Sentry is indeed a complete programming system, capable of walk-away operation. The system supports compact disc, R-DAT, reel-to-reel, satellite, cartridge, network and live inputs, and with the Digital Sentry hard drive system, the Format Sentry can be a total digital source of programming.

Unattended operation

Our system employs 20 Pioneer PD-M501 CD players, each with six trays and the Digital Sentry DS-1 750 Mb hard drive. All commercials, jingles, drops and liners are contained on the hard drive.

We also have remote access to the system through a computer and modem. This is great for last minute changes during unattended operation without having to go back to the station.

During unattended hours, FCC compliance is achieved using a dial-up remote control for the transmitter. A local answering service is equipped with an EBS receiver and a telephone interface, which allows for program interruption, EBS tone activation and the ability to make voice announcements via the telephone. The service also monitors transmitter operating parameters.

Configuring the Format Sentry for your particular application is made simple through the use of a menu-driven configuration and setup program which allows you to select between the different sup-

ported audio sources, silence sense time, same source override, logging devices and other user selected variables.

Log programming

Programming the system is accomplished by merging your music logs and traffic logs onto a user-written skeleton log. Sentry Systems has available software interfaces for most major music scheduling and traffic software systems. Our skeletons are built with 60 available events per hour including music, commercials, jingles and system updates.

The skeletons are set up with non-variable items such as IDs, jingles, music clusters and updates as standard events. The system updates serve to keep the Format Sentry "on time" so that IDs and stop sets fire when logged.

Music is merged into the skeleton in the order that your music scheduler has them arranged, and commercials are merged according to the time and order that your

Very little training is actually needed for daily operation due to the complete menu system used.

traffic software has them scheduled. The complete Format Sentry log is then placed in the system via the disk drive in the controller computer and loaded via the Format Sentry software.

Manual creation and loading of the daily log is also possible, but this could prove to be a time-consuming, though not impossible, task.

Operation of the system is via keyboard and monitor at the operator position. The monitor screen shows the event that is

airing, upcoming events and several menus for operation of the system.

Editing of the logs can be accomplished by the duty operator so that commercials may be added or deleted. Music selections can also be added and deleted as desired.

The system is very user-friendly, and



The Format Sentry has the capability to automatically record and playback network feeds.

once operators overcome the initial "stage fright" of having something new to work with, they can operate it smooth-

ly and efficiently. Very little training is actually needed for daily operation due to the complete menu system used.

Hard-driving system

The Digital Sentry DS-1 hard drive is one of the best automation production systems that I have seen or worked with. The system is completely interactive with the Format Sentry and may be configured in either monaural or stereo according to individual requirements.

Over nine hours of audio may be stored in the monaural mode and over four and a half hours in the stereo mode. This is more than sufficient for most stations.

The operator location includes a keyboard and monitor. The monitor screen has LED-style VU meters to indicate

record and playback levels. One of the more convenient features of the system is its ability to start recording at the start of audio. No more having to have three hands to start audio sources in the production studio.

You may also audition recorded audio in the production studio using the playback feature. Audio quality is excellent. Complete disk defragmentation and compression is included.

The Format Sentry also has the capability to automatically record and playback network feeds and start outside sources (such as the coffee maker).

Support for the system is outstanding through Sentry Systems in Seattle, Washington. The staff is always willing and able to answer any questions concerning the system, its applications, its limits and the true meaning of life in general. I have found that even "dumb questions" are readily

answered without the usual "it's in the manual...read the (bleep) thing!" attitude that seems to be the norm today.

The possibilities that the system presents are endless, considering the many different configurations that are available. For the station that wants to give the live air talent more time to concentrate on presentation, it frees the jock from the task of selecting music and pulling commercials from the cart rack.

For the station wanting "live" sound without a full air staff, the ability to program intros, outros and liners makes the system sound fully staffed.

The price of the system varies according to configuration, but is well within what a good jock or two would cost in a year. Plus it never asks for a raise! If someone would have told me 25 years ago when I entered this business that radio could be this easy, I would never have believed it! The Format Sentry system has been one of the best things for the business in years.

□ □ □

For information on the Format Sentry, contact Bob Arnold in Washington at 800-426-9082; fax: 206-441-6582.

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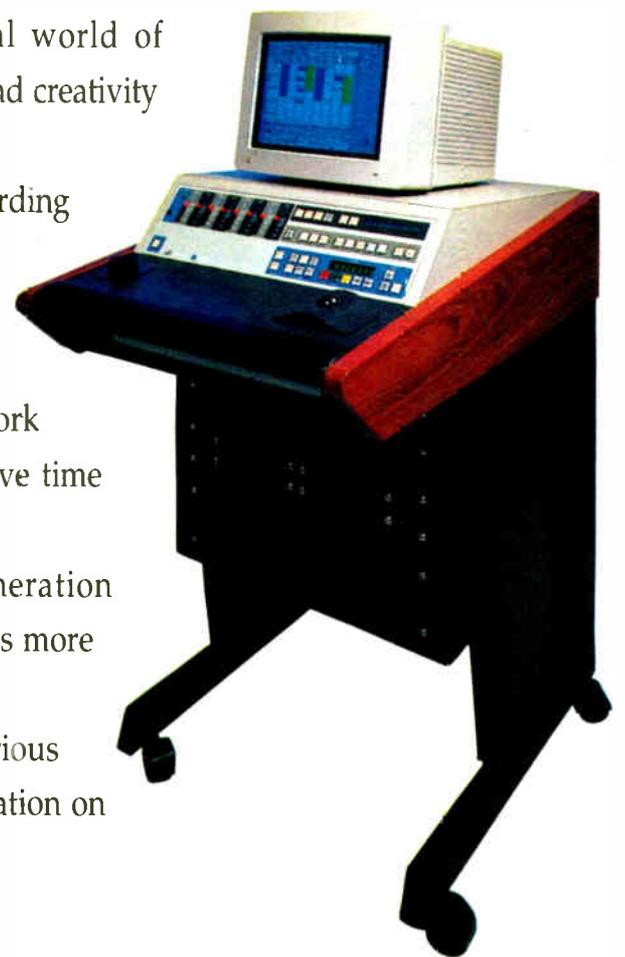
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USER REPORT

The Management Rules at WKCX

by **Tom Barclay**
Assistant GM
WKCX-FM

ROME, Ga. Tough economic times have forced many small-market radio stations to consider changing to a satellite format as a way of cutting costs.

Here at WKCX-FM (K-98), we were able to make that change without sacrificing our community-involved image, thanks to the flexibility of **The Management's "Digital D.J."**

After looking at several different PC-based digital audio automation systems, we chose

Transferring logs and getting reports from the Digital D.J. is a breeze.

the Digital D.J. for a number of reasons. We liked the number of features available for the price, the flexibility of not needing a second machine for production, its ease in running in both automated and live-assist modes and the ability to interface with our computerized traffic system.

Storage room

The Digital D.J. consists of a 386-based IBM-compatible personal computer with a large hard disk to store audio, a color monitor, track ball and 8-channel stereo switcher. You choose exactly how large a hard disk you need and what sampling rate you want for your audio.

Installation involves wiring your main audio sources and satellite contact closures to the switcher, and connecting the audio input and output jacks on the back of the Digital D.J. to the appropriate sources.

In our case, we first installed the D.J. in our production room to dub all of our commercials, jingles, satellite liners and PSAs onto the hard disk.

When that was done, it was just a matter of installing the computer in the main studio, connecting it to the switcher, setting a few levels and loading up the first log. It wasn't long before we were getting compliments over our new "sound" and the new announcers we hired!

With the flexibility of the Digital D.J., we can still maintain a format that includes live network news each hour. It can even handle live remotes without anyone at the studio! And it comes with an option to record network feeds at one time for playback later.

One important feature of the

Digital D.J. is its ability to substitute filler material (such as PSAs and promos) for commercials that are missing or outdated. The D.J. also has a way to handle spot breaks that run too long or too short.

Perfect fit

It can automatically add short jingles to spot breaks that fall a few seconds short and can bring the satellite up under the end of

a final spot that's running long.

We were most pleased that we could increase our capabilities with the Digital D.J. on a "step-by-step" basis. At first, we transferred logs from our traffic computer to the D.J. using floppy disks. A few months later, we installed a Lantastic LAN system to hook our traffic system to the Digital D.J. directly. Now, transferring logs and getting reports from the Digital

D.J. is a breeze.

When our 105 Mb hard drive got close to capacity, it wasn't difficult to add another hard drive to the computer.

It's still amazing to me that we can leave the station unattended for 12 hours each weekday and all weekend long. Just two short visits on Saturdays and Sundays to update the weather is all it takes.

Of course, nothing is perfect. The documentation that comes with the Digital D.J. is far from all-inclusive, and it's dated in some instances. The Management tells me they're working hard to

correct that. On the plus side, though, the company's top-notch support team has gotten me through every problem we've encountered—including an after-hours emergency on a Sunday afternoon.

We're proud to show off the Digital D.J. to visitors and have helped sell a number of them to nearby stations. For its price, features and flexibility, the Digital D.J. can't be beat!

□□□

For information on the Digital D.J., contact Adrian Charlton in Texas at 800-334-7823; fax: 817-624-9741.

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USER REPORT

Venturing into FM the SMART Way

by Carl Wilson
General Manager
KAJO(AM)-KLDR(FM)

GRANTS PASS, Ore. After years of full-service AM broadcasting, our venture into FM radio has been a fascinating experience. We attribute much of this to the SMARTCASTER by SMARTS Broadcast Systems of Emmetsburg, Iowa.

The SMARTCASTER has shown us how to save labor costs, yet broadcast FM programming that is truly reflective of our wishes.

The SMARTCASTER is a personal

computer (IBM clone) with the ability to do a number of tasks. It can act simply as a cart machine or something much more than that—the heart of an entire broadcast studio.

Seamless blending

Our configuration is called the Jock-in-the-Box system. The SMARTCASTER is linked to an upright rack containing six Pioneer CD players. During automation, the SMARTCASTER fires the CD players and plays back commercials and liners.

We've even programmed time signals into the SMARTCASTER because we

know that the news ends three minutes after the hour. Friends think I work around the clock, because my voice gives the time signals overnight.

The SMARTCASTER blends all the audio, both announcements and music, into a seamless blend. You can make your station sound as local as you like, depending on your energy or creativity levels. We do, however, operate in the live-assist mode from 6 a.m. to 9 a.m. and from noon to 5 p.m.

We have Rush Limbaugh from 9 a.m. till noon. During live-assist hours, the SMARTCASTER acts as a cart machine

only, and the announcers manually cue the CD decks. At 5 p.m. each day, we go to automation and close the doors till 6 a.m. We walk away on weekends from 10 a.m. Saturday, only coming in to update the weather forecast during the remainder of the weekend.

Select programming

I love programming music with the SMARTCASTER and if you'll read on, I think you'll catch my enthusiasm! You see, one of the pluses of the SMARTCASTER Jock-in-the-Box system is that you have "satellite" economy while playing the music you have chosen.

What's more, the music rotates the way you've asked it to. After databasing your music library into the system and categorizing it according to the parameters you have set, you can, by a keystroke, make your station sound the way you want in any day part. Again, it plays the music you have approved and entered into your system.

Thanks to the SMART's music software, adding new songs and CDs into the system is easy. I carry a very large music inventory and keep a constant flow of CDs entering and leaving the system on a weekly basis. Burnout is non-existent.

The SMART's software composes a new playlist for me weekly, reflecting the changes I make in data each Monday morning. However, you must make sure that you actually input the right discs on the correct trays as reflected in your data changes, or the system will not operate.

Flawless performance

Our traffic logs are fed into the SMARTCASTER on a floppy disc each weekday. The commercial traffic appears on the SMARTCASTER screen just as it appears on your "paper" log.

This commercial traffic data calls up the indicated commercials and liners that are recorded on the SMARTCASTER's hard drive and plays them precisely when and where needed. Performance live assist and automation has been flawless.

Problems? There have been a few, but they've been mostly our fault. Loose RCA connectors will cause improper commands between the SMARTCASTER and the CD players. You must check the connections weekly, otherwise false commands will cause your CD players to become confused and misfire randomly.

Make sure you install wheels on the bottom of the CD rack before you assemble and use the unit. It sure makes it easier to check the connections regularly if it is against a wall. The rack is heavy when fully assembled, but well constructed.

We've also had a power supply go bad in the SMARTCASTER and one audio card. Both problems were quickly handled by the people at SMARTS. Incidentally, the company is great to deal with, and the people are very responsive when you need assistance. The 24-hour toll free number is a great help early on. I don't call it much anymore. Now and then, something will happen that I don't understand, but not often.

I've only described a few SMARTCASTER uses. It can do much more! It takes some time to learn, but it is well worth it. And it's a heck of a way to do full-time broadcasting.

□ □ □

For information on the SMARTCASTER, contact John Schad in Iowa at 800-74-SMARTS; fax: 712-852-3061.



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USER REPORT

AUDISK: Tackling Daily Radio Tasks

by Steve Keating
Independent Consultant
Keating-Dahlin Tech. Services

SAN DIEGO Imagine a wall of carts of varying time lengths, say 200 that are 40 seconds, 300 or 400 that are 70 seconds, 100 that are two-and-a-half minutes, 150 that are three-and-a-half minutes, and so on.

Now let's say you need to "stack" commercials, PSAs, promos, and music for a four-hour morning show. This might work out to 100 carts that need to be pulled from the cart rack.

As you do each break, you load in the required carts to the number of cart

virtually made obsolete the storage of full 15 kHz bandwidth stereo audio on tape cartridges. The AUDISK system replaces analog tape storage media and all of the inherent problems associated with them through the use of modern computer technology.

The basic AUDISK system consists of the main unit, which houses the analog to digital and digital to analog converters, audio amplifiers, the 386 system processor and associated circuitry, expanded range dual bargraph LED V.U. indicators, a headphone monitor select switch and volume control feeding a front panel stereo phone jack, a 3.5-inch floppy disk drive, and up to

for playback in both production and the on-air studio.

Instead of the messy process of removing the old cart label and then typing and

quickly.

In systems with "dual outputs," it's possible to "audio overlap" any two successive segments on the air. The "cue" for

The AUDISK system replaces analog tape storage media and all of the inherent problems associated with them through the use of modern computer technology.

sticking a new one on, you just enter in the name of the production on the screen.

Some of the more advanced features offered by the system are the virtually instantaneous access to an audio "file." A file may be a standard 30 or 60 seconds in length, or any length chosen in the "config" process.

Depending on the number of audio files you have, which is directly related to the storage capacity, (i.e. number and size of hard drives), you may have the capability of storing music on the system, as well as other recorded elements.

Digital dubbing

"Dubbing" or copying program material from one audio file to another is done digitally, so there's no quality degradation and it's accomplished very

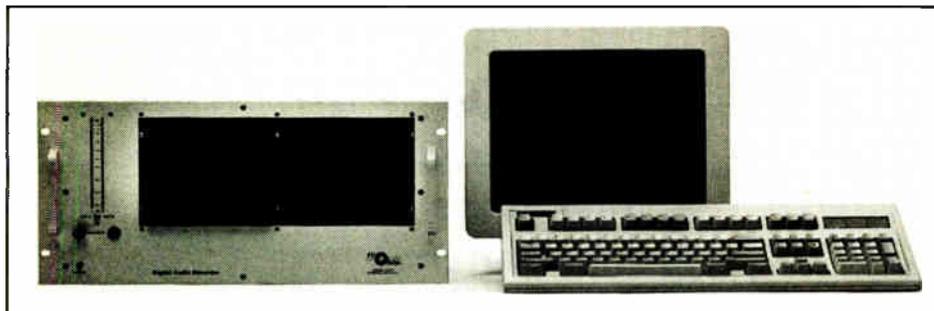
telling the next source to start playing is the "E.O.M." cue, which is placed on the previous file at the touch of a keystroke.

Perhaps the best way to think of the AUDISK system is as a large electronic cart storage rack, with complete random access.

Whether your facility is a single daytime morning-only, or the origination point for the armed forces radio/television stations worldwide network, the AUDISK system can meet any task from a few morning drive time hours of live-assist, or it can program your entire broadcast day, every day of the week.

□□□

For information on the AUDISK, contact Bob Schellenberg at 801-975-7200; fax: 801-977-0087.



An advanced feature of the AUDISK includes almost instantaneous access to an audio "file."

machines available in the air studio. When they've finished playing, you have to put them back in the racks.

Now just to make it interesting, let's say one of your playback decks dies, so where you might have had five decks, now you only have four. Let's also say that a couple of the decks haven't seen a new pinch roller for quite some time, or had new playback heads for a while, and they may be sounding a little muddy. A typical scenario—up to now.

Modern technology

With approximately 350 installations worldwide, the AUDISK system by Gentner Communications Corp. has

four half-height hard drives, or two full-height drives.

An expansion chassis with power-supply will hold from one to four drives for additional memory.

In the typical production-to-air process, the spot, PSA, or other announcement is dubbed from reel tape to cart. With the AUDISK, an open file is selected. This may be a never-before-used slot if the system is new, or a slot currently containing a file which has exceeded its expiration date.

The AUDISK unit is put into the ready to record on the start of audio mode. The tape machine with the source material is started, and 30 or 60 seconds later, the spot is available virtually immediately

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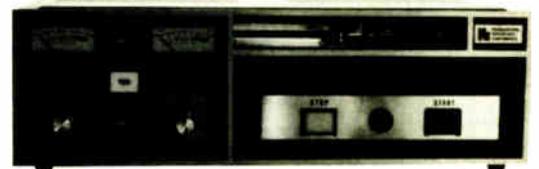
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Mike Callaghan, KISS-FM, Los Angeles CA

"CAT-LINK has held up through extreme heat, a hostile RF environment and nasty summer lightning storms."

Dick Byrd, WZGC-FM, Atlanta GA

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CAT-LINK digitizes the entire composite signal with no data compression, so you can run the stereo generator and processing at the studio, where they really belong. At the same time, CAT-LINK sends and receives up to four customized auxiliary channels with no crosstalk—SCAs, control channels, voice communications, RS232 data, AM audio, transmitter readings and satellite or remote program feeds. What's more, CAT-LINK gives you extra capabilities like transmitter building surveillance via closed circuit TV and an analog telemetry channel.

Transparent digital transmission

CAT-LINK encodes the fully processed composite signal, then decodes it at the transmitter. You always get full stereo separation, without the phase or amplitude variations that plague two-channel STLs. Dynamic range is up to 84 dB, and your processed composite signal can use virtually all of it. You hear clear, clean, undistorted audio—all the time.

No audible delays

CAT-LINK's real-time digital encode/decode process doesn't introduce audible delays as data compression can. Jocks can monitor on-air without problems.

Flexible signal path options

- 23 GHz

Stations across the country are avoiding 950 MHz problems by using 23 GHz with CAT-LINK. They've stopped worrying about frequency congestion and interference, repeater-induced signal degradation, and fresnel zone clearance fading. 23 GHz dish sizes also reduce wind loading and tower space requirements.

- DS1 (T1) Data Line

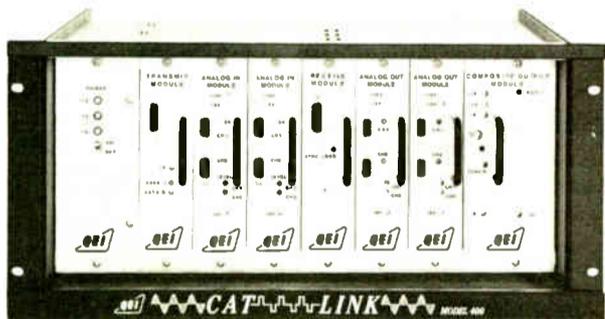
CAT-LINK is cutting phone bills for stations that don't have a clear microwave path. With CAT-LINK, a single bidirectional DS1 line replaces multiple Class A telco lines, providing multi-channel STL and TSL over the same link. Already available virtually anywhere, DS1 service is getting cheaper every day.

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USER REPORT

WKJR Selects ITC as System Building Block

DigiCenter Matures into Digital Management System

by Jay Martin
Owner/Station Manager
WKJR-FM

SULLIVAN, III. We put ITC's DigiCenter on-air in our FM facility over two years ago as part of an original field testing program.

DigiCenter has grown in capability substantially since that time, with a great amount of broadcaster input incorporated over the last several years.

A true system

WKJR has seen this system grow to a true "digital audio management system." Our first DigiCenter, modestly equipped for live-assist, has grown into today's system, equipped with a touchscreen in our main studio for live-assist, a workstation in our production room and a second workstation running our satellite format. And they all work at the same time with one DigiCenter.

A digital system, like any other part of a studio, must deliver tangible benefits that equate to improved performance and increased profitability. Anything else is simply a costly toy.

DigiCenter is the only system we found capable of interaction with most existing facility equipment. We've been able to put our system in without tearing out the

rest of the station.

DigiCenter provides us with immediate and simultaneous access to multiple stereo cuts for either recording or playback in the main studio, and production or satellite interface. In fact, we can record a cut in the production room and have that cut air immediately, anywhere in the station.

Network-ability

That's well beyond anything else we've seen that's currently available. Most recently, ITC has added programs to link the DigiCenter to our traffic and billing system, as well as our music scheduling system.

I especially like the way DigiCenter is offered in both a heavy duty rack-mount and workstation chassis, and a no-nonsense power supply that far exceeds normal "computer" requirements.

The DigiCenter is flexible and

quite expandable. WKJR started off small and grew the system over several years, so our initial investment was both protected and made more valuable as we expanded. If you're looking seriously at digital audio management, now, or down the road, talk to the folks at ITC.

□ □ □

For information on the DigiCenter, contact Bruce Helling in Illinois at 800-447-0414; fax: 309-828-1386.

DigiCenter provides us with immediate and simultaneous access to multiple stereo cuts for recording or playback.

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INDUSTRY ROUNDUP

User Demands Help Fuel Trend to CD Automation

by Mary Ann Dorsie

WASHINGTON The level of sophistication in automation equipment and software for radio stations can be simple enough for live-assist products or complex enough to allow walk-away operation. This course toward more centralized, more convenient and technologically-driven systems than ever before is being fueled by both user demand and supplier ability.

CD automation is a major component of these automation systems of today, and it will most likely dictate the future as well, many companies said.

CD bargain

The move to CD automation has been the recent push for Rodman Brown and Associates and the company's Desk Jockey, said Doug Thompson, sales/marketing manager.

"It's a way to lower your costs and maintain control over your radio station without giving it up to Dallas or Los Angeles or Nashville, or someplace like that, and still make money," Thompson said.

When the Desk Jockey was first introduced in 1990, everything was satellite-oriented, he said. CD automation was talked about by 1991, but by 1992 "there was a hot and heavy interest," he said.

Thompson attributed this to the fact that digital automation has grown in acceptance, and users have become more educated.

Automation systems, which generally run between \$20,000 and \$25,000, may cost a station the staff's yearly budget to run a show live or live assist, Thompson said. But the long-term benefits outweigh the immediate costs, he said.

"They're shooting their lot in one month, but the rest of the year is gravy," he said. "Then the following year, it's paid for."

Surpassing expectations

Pete Charlton, president and owner of The Management, agreed with

Thompson about the CD automation trend.

"It gives them more control of music and it gives them more flexibility with format," Charlton said.

He said there are three general categories of digital automation: satellite, CD and combination formats. The new systems allow stations to broadcast a wide variety of material, rather than restricting themselves to just music or just satellite, he said.

"Digital automation can do everything, where in the past, it was more limited," Charlton said.

"I think generally speaking, digital automation has—compared to the old, traditional automation—surpassed the capabilities that anyone ever expected," Charlton said.

Dave Buck, Broadcast Electronics audio sales manager, said he sees a trend toward "paperless studios."

"A lot of people want it to be so their music log, commercial log and all kinds of exchanged information are all on the computer," he said.

Having a system that actually works and does everything as advertised is important for TM Century, said Craig Turner, president and CEO.

"We've focused our attention on having a highly reliable system," Turner said.

All in one

Bob Arnold, Sentry Systems manager, also said people are interested in integrated solutions.

"Customers don't want to have a collection of different problems—dealing with traffic, dealing with production, dealing with on-air," Arnold said.

He said this change can be traced to when carts began to be replaced by hard disk audio.

"The economics of radio today have forced this changeover to move much faster than people would have originally thought, because people are under real pressure to reduce expenses," Arnold said.

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- Digitally synthesized stereo generator with separation exceeding 60dB at 1 KHz, and typically 55 dB at 15 KHz.
- Dual composite outputs for feeding main and auxiliary transmitters or STL's.
- Separate Pilot output for composite processor interfacing.

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Circle (50) On Reader Service Card

Appointments

Brad Harrison was appointed to the newly created position of Sales Manager at **Register Data Systems**.

Harrison previously was a regional sales manager with GLW, Inc., manufacturer of Harrison audio mixing consoles.

ENCO Systems has appointed **Don J. Massa** to the position of Vice-president, Marketing.

Massa was previously with Ampex Corporation as Vice-president of Marketing, and Television Technology Corporation, where he was Director of Marketing.

Javelin Electronics has appointed **John Jolley** to the position of South East regional salesman.

He will be responsible for systems sales, including the new OMNI "Q" Series products featuring PC-based CCTV system management.

Company Information

Audio-Technica U.S., Inc. has appointed two independent sales representative firms to service the Canadian market.

Only Audio of Armsdale, Nova Scotia is responsible for servicing the Provinces of Nova Scotia, New

Brunswick, Prince Edward Island and Newfoundland. A&K Marketing of Port Moody, British Columbia will represent the Provinces of British Columbia and Alberta.

Sennheiser has established a new branch office in Southern California. Sennheiser Electronic Corporation of California opened at 4116 West Magnolia Boulevard, Suite 100, Burbank, CA 91505.

Radio Systems Inc. has obtained the rights to man-

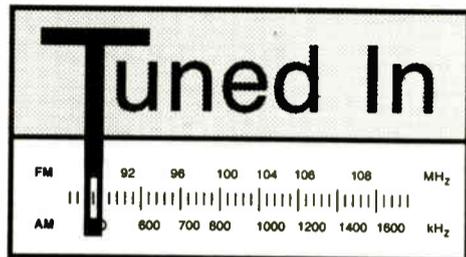
ufacture and market the TI-101 telephone interface, formerly manufactured by Symetrix.

The product will be named the Radio Systems TI-101 Telephone Interface.

New Program

Dataworld has introduced the CONFLICT program, designed to enable broadcast engineers or attorneys to determine whether a potential broadcasting client would generate a "conflict of interest" with an existing client.

The heart of the service is Dataworld's proprietary broadcast databases for AM, FM, TV and ITFS/MMDS facilities.



A Broadcast Industry

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Mono Record Play
\$1290

Stereo Record Play
\$1480

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- Half Inch Thick Aluminum Deck with Stainless Steel Overlay
- Air-Damped Solenoid with Telfon™-Coated Plunger
- Direct-Drive Capstan Motor
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DL Series

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Circle (56) On Reader Service Card

TECHNOLOGY UPDATES

WHEATSTONE

NSHD Offers Simultaneous Functioning Of Three Outputs and a Stereo Record Input

SYRACUSE, N.Y. The NOT SO HARD DISK (NSHD) by Wheatstone is an audio hard disk device providing two stereo outputs and a stereo record input. Another stereo output can be added to the standard system; the three outputs and the stereo input can all function simultaneously.

Wheatstone clears up the confusion in

the control room by eliminating a computer keyboard and providing an easy-to-understand and operate "On-Air" disk control panel.

This panel has "Start/Stop" controls for two stereo outputs and single push-button access to the directory of all items stored on the NSHD system. Last minute changes to the playlist can be done with

three button strokes. There is no personal computer "icon" or "window" selecting used on the disk control panel of the NSHD, just simple push buttons.

A single system can support one production terminal and two on-air disk control panels for facilities with AM and FM control rooms. The network option connects additional NSHD systems for more record and multiple playback locations required at major news gathering/network programming operations.

NSHD avoids small display windows requiring operators to constantly scroll for selections, instead providing a color video monitor display. This monitor fits in a counter top rack or turret and shows a large portion of the play list so the operator can see upcoming selections.

The NSHD can be commanded from the on-air audio control console's channel On/Off buttons. When a selection has begun to play, the NSHD automatically increments to the next selec-



tion on the playlist and waits for the console command.

Boot-up of the NSHD system is from pre-burned ROMs to make startup easy and for greater reliability, no floppy disks are required. The production terminal handles administration and recording tasks—both password protected.

For information on the NSHD, contact Ray Esparolini in New York at 315-452-5000; fax: 315-452-0160.

SCHAFFER DIGITAL

DigiSat 'NT' System Designed for News Talk

SACRAMENTO, Calif. Today more than ever, cutting expenses and running a lean operation is essential. Schaffer Digital can assist you in turning your station into a profit center. For example, the DigiSat II is designed to help you cut expenses without sacrificing quality.

Another example is the recently intro-

duced DigiSat 'NT.' This digital automation system is designed exclusively for use in automated stations that carry a news/talk format.

The system is completely programmable and features a variety of capabilities through the use of the DigiSat 'X' software release. 'X' utilizes computer techniques to give you the capabilities necessary for a news/talk operation.

For information, contact Kathryn Wymore in California at 800-831-1021; fax: 916-646-3493.

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Digital Audio Workstations

Delivering Your Expectations

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This broadcast-ready CD player features cartridge autolock, programmable EOM indicator, instant start with music, and true broadcast standard construction.

The CD 10 won't let you mess up on the air. The cartridge is secure within the machine until you make a conscious effort to remove it.

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HARRIS ALLIED

BLU ELECTRONICS

DigiStation's Hard Disk Automation Does Not Sacrifice On-Air Performance

CLEARWATER, Fla. The DigiStation digital hard disk automation system is designed to handle the needs of today's broadcaster. Although hard disk automation is an infant product category, **BLU Electronics'** DigiStation has been evident in large and small markets since 1990. It features easy operation without sacrifice to on-air performance.

DigiStation was designed with details to make your radio station sound like radio veterans are making the decisions and punching the buttons.

Timing is everything if your station is a satellite operation, and DigiStation brings many special features to make the timing of your breaks, liners and net joins sound not just OK but excellent.

While price competitive, DigiStation offers full features and Dolby® AC 2 for hard-to-beat data compressed audio.

For information on the DigiStation, contact Ben Umberger in Florida at 813-442-1665.



SCOTT STUDIOS CORP.

Computer ROM Holds More Songs than CDs, with No Jukeboxes Required

DALLAS Computer ROM for music storage is the latest offering from **Scott Studios Corp.** Computer ROM is designed to reduce expenses and improve a station's capabilities. Computer ROM holds at least four times as many songs as a CD and does not require a jukebox.

Current hits can be played from our multi-studio digital audio hard drive. Two computer ROM six-disk players hold 800 oldies.

The complete package of Scott Studios Multi-Studio Digital System, with 500 safe-list songs on ROM and two Pioneer computer ROM six-disk players, sells for \$19,995.

The package also includes 350 minutes (5.8 hours) mono or 175 minutes (2.9 hours) of stereo hard disk digital audio for current hits and spots.

For information, contact David Gerety in Texas at 800-330-3004; fax: 214-931-0707.

KINGDOM TECHNOLOGY

Full Automation Ability, Digital Audio Recording Come Standard with DAS

FORT WALTON BEACH, Fla. Kingdom Technology's Digital Audio System (DAS) offers digital audio recording with full automation capability.

This hard based audio system uses pre-cached information off the hard drive for instant access to audio, and it offers a variety of options for flexibility and expansion.

The quick-access technique makes DAS less dependent on the hardware. The next audio file resides in memory, so there is no waiting for hard drive access.

The system combines specialized software on an IBM AT 486 33MHz with one or two audio boards. DAS offers high-capacity playback capability and can run mono and stereo cuts in the same stop-set. The unit's audio comes from dual 16 bit Delta-Sigma A/D converters, which use 64x oversampling. Frequency response is -0.25 db in the 20 Hz to 20 kHz range.

DAS has the ability to crossfade audio files and randomly select within a group of files. As the software tightly controls stop-set length, it uses adjustable cross fades to compensate for spots that are either too short or too long. This same feature allows DAS to handle the segway demands of any format.

A dual playback option offers simultaneous, unattended recording. This simultaneous record/playback can eliminate the need for two systems.

For information, contact David Benoit in Florida at 800-695-4643; fax: 904-864-3195.

Quality That Inspires Confidence!

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Gentner Communications Corporation
Professional Audio Products
1825 Research Way / Salt Lake City, Utah 84119 / (801) 975-7200 / FAX (801) 977-0087

Labels in the diagram: REMOTE CONTROL, AUDIO PROCESSING, DIGITAL STORAGE, AUDIO ROUTING AND DISTRIBUTION, FREQUENCY EXTENSION, TELEPHONE INTERFACE.

AUDISK's proven digital storage technology streamlines your station's operations. Feel the confidence that comes from owning a system that's easy to use and built to last.

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CART MOTORS REBUILT to quiet flutter-free perfection shafts resurfaced
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Same day turnaround

Replacement heads and motors available

REEL TO REEL SERVICES:

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ASSEMBLY ALIGNMENTS

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For peak performance from your recording equipment, call

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READER SERVICE NO. 92

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Price US\$2400.00 2 Towers
Will operate with any remote control equipment.



Price US\$1780.00 2 Towers

For AM directionals with studio located at transmitter site.

These monitors are state-of-the-art instruments of unequalled accuracy (.5% or better on ratio and .5° or better on phase) and stability. With typical modulation the true ratio readout of these monitors is a factor of 10 more stable than instruments that measure normalized amplitude, and their phase readouts are rock solid. Phase sign is automatic, no extra operation. In addition to the analog DC outputs for remote control the Model CMR has a multiplexed BCD digital output which can be used to drive the Remote Indicator Model CMR-1. RF inputs have dual protection. Gas discharge tubes across the sample line terminations plus relay protection.

GORMAN REDLICH MFG. CO.
257 W. Union St. Athens, Ohio 45701
Phone 614-593-3150 • FAX 614-592-3898

NAB BOOTH 1711

READER SERVICE 120

DJ-Lite™ Digital Satellite System \$2,995.00!

SMN - JSA - UNISTAR

DJ-Lite replaces all your old audio Cart sources with high quality digital audio from a computer hard disk. It's simple: We supply the digital audio cards and console hardware and software, you supply a 386 PC computer and color monitor. Wire up to your satellite receiver and console audio in and our and you're on the air.

DJ-Lite doesn't have a lot of bells & whistles. It's designed for 24 hour satellite music operation with limited live assist and simple audio new insertion on closures.

Multi-day Satellite programming is a snap. Full ID, Jingle, Magic Call & Liner rotation and live assist options. Auto spot Set fill, Subs for illegal spots. Real Time operation with auto update after power failure. Easy installation and operation.

- ↳ Multi-day walkaway on Satellite music formats
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READER SERVICE NO. 40

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NAB BOOTH 15719

READER SERVICE 52

NEW!!! from AVCOM PSA-65A Portable Spectrum Analyzer & SCPC-2000E Single Channel Per Carrier Receiver



PSA-65A Portable Spectrum Analyzer - \$2855

AVCOM's PSA-65A Portable Microwave Spectrum Analyzer covers a frequency range from less than 2 MHz to 1000 MHz. The broad frequency coverage and high sensitivity of the PSA-65A make it ideal wherever a low cost, compact spectrum analyzer is needed. The light weight, battery or line operated PSA-65A Portable Spectrum Analyzer from AVCOM is the perfect instrument for field testing of RF systems, classroom instruction, satellite system alignment, electronic countermeasures, cable TV maintenance, cellular and production use.



SCPC-2000E SCPC Satellite Receiver - \$1875

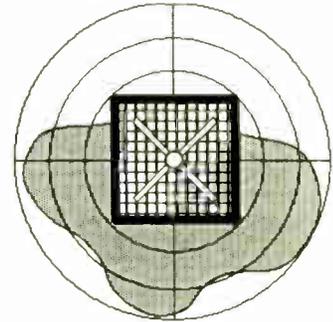
AVCOM's Single Channel Per Carrier Receiver, model SCPC-2000E, has been developed for the reception of FM SCPC signals from satellites operating in the 3.7 to 4.2 GHz band. The SCPC-2000E is a complete receiver that can tune up to 4 specific crystal controlled audio or data channels from a given transponder and adapt to a variety of de-emphasis requirements. The SCPC-2000E is available in either wide or narrow band models and may be used with the SS-1000 (\$1027) Slave for simultaneous reception of additional channels.

AVCOM OF VIRGINIA 500 Southlake Blvd., Richmond, VA 23236 U.S.A.
Bringing High Technology Down to Earth Phone 804-794-2500 / Fax 804-794-8284

NAB BOOTH 13430

READER SERVICE 140

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For your full turn-key or individual components needs... ADC/LDL supplies a full range of product and services for the FM broadcaster. RF transmission products include low power, side-mount antennas as well as high power, broadband, multi-channel antennas and combiners.

LDL COMMUNICATIONS INC.

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FAX: 301-498-7952

ADC (USA) INC.

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NAB BOOTH 19734

READER SERVICE 9

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READER SERVICE NO. 134

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WEATHER RADIO

Model CRW



Price \$540.00

Sensitivity .28 microvolts for 12 dB quieting. All 3 frequencies. Alert tone demutes receiver, closes relay and gates audio to 600 ohm rear terminals. Another set of rear terminals has continuous 600 ohm audio output. Double conversion crystal controlled, crystal filter in first I.F., ceramic filter in second I.F. Dual gate MOS FET front end. 50 ohm coaxial input. Adjacent channel (j25 kHz) down to 70 dB. 19" rack mount, 3 1/2" H, all metal enclosure. In stock—available for immediate delivery.

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NAB BOOTH 18310

READER SERVICE 68

AD2100 Audio Synchronizer



The AD2100 provides from 0 to 5.4 seconds of stereo audio delay (10.8 sec. monaural) for talk show censoring, lip-sync error correction, or to compensate for video processing delays. Delay can be set manually, or controlled by a frame sync, standards converter or other device for automatic delay tracking.

Pressing the "Dump" button causes an instant zero delay (censoring any offensive audio in memory) and then auto-increments to restore the required delay. Advanced processing reduces or eliminates audible pitch variations when the delay changes.

The AD2100 uses 16 bit sampling at 48 kHz for maximum transparency (custom sampling/delays available).

For more information, call Pixel Instruments today.

PIXEL

INSTRUMENTS CORP.

718 University Ave., Suite 210 • Los Gatos, CA 95030
Phone: 408-354-9122 • Fax: 408-354-0122

READER SERVICE NO. 191

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UNIVERSAL SPC 300-C COMMERCIAL AUDIO RECEIVER

SPECIFICATIONS

Frequency agile, C and Ku Band, stable microprocessor-controlled tuning, variable band widths, 3:1 and 2:1 companding built in. Transponder tuning, LNB supply, polarity control, tunes all SPC frequencies 50 to 90 MHz, readout on LCD display, 50-channel memory, line output, de-emphasis select, muting system, phase lock loop for stability, LNB calibration set up, 2 frequency synthesizers, digital AFC and more.

INTRODUCTORY PRICE: \$1345.⁰⁰ plus S & H.

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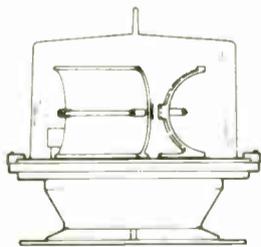
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NAB BOOTH 2506

READER SERVICE 158

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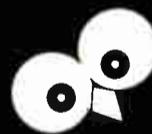
Nobody brings technology to tower lighting like EG&G. Our innovative FlashGuard and StrobeGuard systems cut installation, maintenance and power costs to give you the most cost-effective systems on the market today. FAA and Transport Canada approved/certified by ETL Laboratories. To learn more, call 1-800-950-3441.

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NAB BOOTH 4621

READER SERVICE 55



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MARKETPLACE

A compendium of new and recently introduced radio broadcast products

Universal SCPC 300-C

The new Universal SCPC 300-C is a high-quality, microprocessor-controlled audio broadcast receiver by Universal Electronics.

No extra frequency boards are needed to put you on any SCPC frequency, as the SCPC 300-C is fully frequency agile and fully transponder agile with a push of a button. No coding schemes are used for selection of its parameters and features.

Full readout of SCPC frequency,



transponder, bandwidth, de-emphasis, companding and memory channel in use are displayed on an easy-to-read, super-twist LCD display of two lines with 20

characters per line.

For information, contact Universal Electronics in Ohio at 614-866-4605; fax: 614-866-1201.

AM-16/R Remote Control Station

The AM-16/R Remote Control Station is an "intelligent" remote controller for 360 Systems' AM-16/B Audio Crosspoint Switcher.

A single AM-16/R will provide control of 16 inputs and outputs (stereo or mono) for up to four separate levels of audio. Multiple AM-16/R Remotes may be used to control a central switching matrix from several different locations.

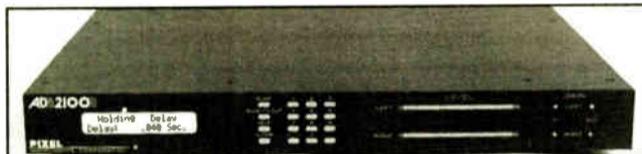
Switching of individual crosspoints is accomplished with X-Y type pushbutton operation. Illuminated buttons quickly advise you of existing connections and confirms your new selections.

The AM-16/R also allows you to recall stored programs from the AM-16/B master switcher for fast and convenient salvo switching.

For information, contact 360 Systems in California at 818-342-3127; fax: 818-342-4372.

AD2100 Audio Synchronizer

The new AD2100 by Pixel Instruments is a high performance, variable stereo audio delay processor.



Delay is adjusted on the front panel or via remote control, and audio input and output levels can be varied on the front panel. Dual LED bar graph indicators provide monitoring of the input levels.

For information, contact J. Carl Cooper in California at 408-354-9122; fax: 408-354-0122.



Model 7200 Calorimeter

Dielectric Communications has introduced the Model 7200 Calorimeter. It may be used with any existing fluid-cooled load, and offers an easy method of accurate RF measurement.

Fluid specifics are input by the user, and can be manually re-entered if the fluid is changed. The unit can be utilized with virtually any cooling fluid, and it self adjusts for changes in fluid temperatures.

The LCD display can show power in kilowatts, kcal/h or MJ/h, flow rates in liters/sec or gallons/min, and temperatures in degrees Celsius or Fahrenheit.

For information, contact Rolf Olsen at 800-341-9678; fax: 207-655-7120.

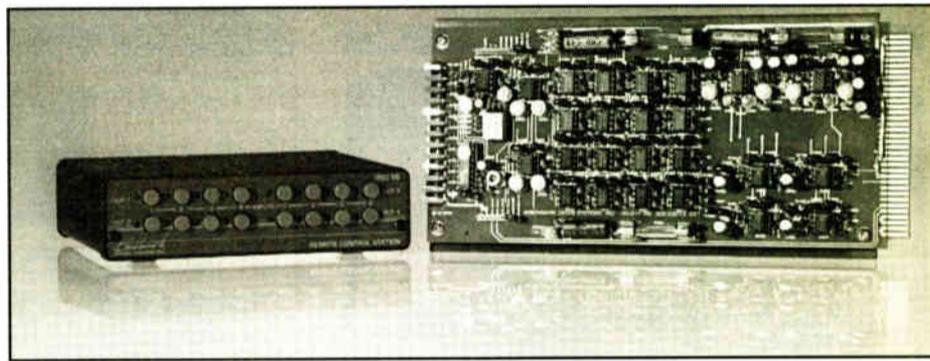
Benchmark Routing Switcher Module

The new RS-414 from Benchmark is a four-in by four-out routing switcher module that works with the Benchmark SYSTEM 1000 card frame series.

The module will handle routing of the four audio outputs from a VTR, or outputs from satellite sub-carrier demods.

Individual crosspoint addressing permits the module to also mix the route audio. The RS-414 can be controlled remotely by computer with the proper interface hardware or.

For information, contact Rory Rall in New York at 315-437-6300; fax: 315-437-8119.



Garner's Power Change

Garner Industries has changed its Model 1400 degausser to feature the power requirement of 120 VAC line voltage.

The Model 1400 will erase audio formats of 710 Oersted to -90 dB in fifteen seconds. It can erase a variety of format sizes such as cassettes, cartridges and reels.

For information, contact Scott A. McLain in Nebraska at 800-228-0275; fax: 402-464-6960.



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The FMM-2/FMS-2 series monitors provide an even greater degree of precision measurement than ever before... You can measure S/N below 90 dB, You can measure crosstalk below 85 dB, You can measure separations of better than 70 dB, You can measure frequency response to better than 0.25 dB, You can measure distortions to lower than 0.01%, and much more... Our uncluttered panels and autoranging voltmeters make these measurements a dream.

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- creating reference disks
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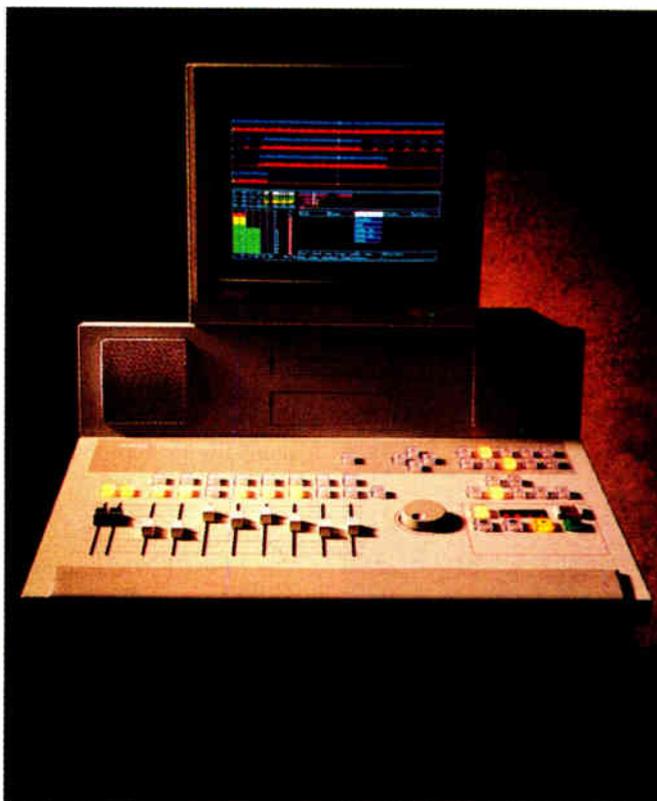
Since 1990, radio stations in every music market have been more creative, more efficient and more profitable with the



DSE 7000. In order to increase profits in the competitive

radio environment of the '90s, general managers have been asking more from their production directors, who in turn have had to do things faster and cheaper. Clearly, the trusty 8-track recorder wasn't going to lead radio stations through this new era.

Since it was impossible to become more efficient at tape splicing, astute production types contemplated digital technology. They found out



about a company with over 40 years experience manufacturing professional audio products, who was already shipping a digital sound editor for radio production. Not coincidentally, this system had many of the same controls and functions they were used to.

They tried a demo of the DSE 7000 and realized they

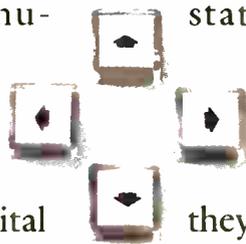


could produce spots in one-third the time. Which meant they had time for a certain luxury called creativity.



The DSE's UNDO button gave them room to experiment. And its audio quality raised their standards to an entirely new level.

Today, hundreds of radio stations are making more money producing radio commercials, because they're pushing buttons on the DSE. Now it's time to push some buttons on your telephone and call AKG.



DSE 7000 • THE NEW SPEED OF SOUND™



AKG Acoustics, Inc. 1525 Alvarado Street, San Leandro, California 94577, USA, Tel: (510) 351-3500, Fax: (510) 351-0500

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PRISTINE SYSTEMS

Music Management and Commercial Control System Handles Up to 48 Multi-Disc CD Players

LOS ANGELES Although there are many new players in the field of automation and software products for radio, **Pristine Systems** has been in operation since 1984. The Pristine Music Management and Commercial Control System, now with over 160 users, is a PC-based digital automation system.

The system controls up to 48 multi-disc CD players or DAT machines, in addition to digital audio production

and playback.

Pristine can also program satellite-delivered networks and conventional automation equipment. The Pristine Music Management and Commercial Control System works in live-assist and automated modes and can interface with most traffic systems.

Pristine's latest addition is Pristine MUSIC PLUS, a music scheduling system with a variety of features.

A Pristine Music Management and

Commercial Control System (including one computer for on-air playback and another for production, scheduling and backup), along with software, two digital processors, a CD controller, and 16 CD players, typically costs between \$15,000 and \$20,000.

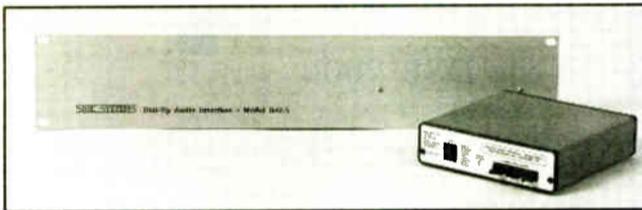
For information, contact Boyce Williams in California at 213-852-0737; fax: 213-655-6207.



SINE SYSTEMS

DAI-1 Dial-Up Audio Interface Helps Solve Technical Traumas

NASHVILLE These days, station automation usually means "walk-away time." This creates some challenging technical problems for the broadcaster.



The model DAI-1 Dial-Up Audio Interface, made by Sine Systems, solves some of these problems.

The DAI-1 is usually installed at a sta-

tion's studio and is connected to an ordinary telephone line. After calling the DAI-1 and entering the security code using the telephone keypad, the user can do things like monitor the air signal, monitor an EBS receiver, trigger the EBS generator, start cart machines, go on the air, and so on.

The DAI-1, priced at \$699, even has a dial-out function that can call up to four telephone numbers. The DAI-1 is ideal for use in an EBS system or for doing telephone "remotes" with no one at the studio. An optional 50-millisecond delay board prevents DTMF tones from going on the air.

For information on the DAI-1, contact John Pate in Tennessee at 615-228-3500; fax: 615-227-2367.



RADIO SYSTEMS

RS-6700 Allows DAT Machine Integration with Automation

BRIDGEPORT, N.J. Radio Systems, Inc. provides two models of automation-capable digital audio tape decks.

Commercials, news, music and local drop-ins for satellite feeds all can be recorded digitally and played later.

The new RS-6700 and the established RS-1000 are both based on Sony transports, with a lower chassis added. The chassis provides large front-panel buttons, balanced audio connectors and other user controls.

The RS-6700 can be used as a sequen-

tial playback source, and it will capture satellite-fed programs. (It will engage in recording mode with a single relay closure.)

The RS-1000 DAT machine, by comparison, is a full automation source, with serial connectors and special logic proms that communicate with most automation controllers. It can be addressed by machine number and cut number, and programmed to play cuts in any sequence.

Some broadcasters use Radio Systems' DAT machines to supplement CDs or other digital sources. Others rely solely on DAT for all audio in their systems.

For information, contact Paul McLane at 800-523-2133; fax: 609-467-3044.

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SPECIFICATIONS

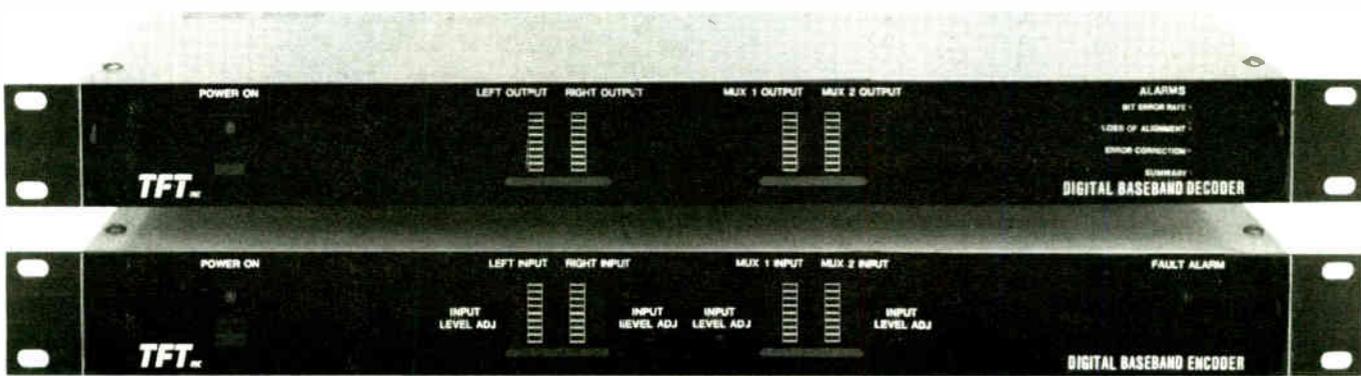
Frequency agile, C and Ku Band, stable microprocessor-controlled tuning, variable band widths, 3:1 and 2:1 companding built in. Transponder tuning, LNB supply, polarity control, tunes all SCPC frequencies 50 to 90 MHz, readout on LCD display, 50-channel memory, line output, de-emphasis select, muting system, phase lock loop for stability, LNB calibration set up, 2 frequency synthesizers, digital AFC and more.

INTRODUCTORY PRICE: \$1195.⁰⁰ plus S & H.

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(614) 866-4605 FAX (614) 866-1201



DIGITAL STL BREAKTHROUGH



Introducing the TFT DMM92: The Better Digital STL System

Would you like to extend the fade margin of your existing analog STL by 20 dB or more? Extend Signal-to-Noise Ratio by at least 10db? Extend STL distance by miles? All with the bandwidth efficiency of 15-level duobinary modulation? There's just one digital STL system that lets you do it all— TFT's new DMM92. It works with your existing composite STL to give you vastly extended performance, and a whole lot more:

◆ **More Channels** —

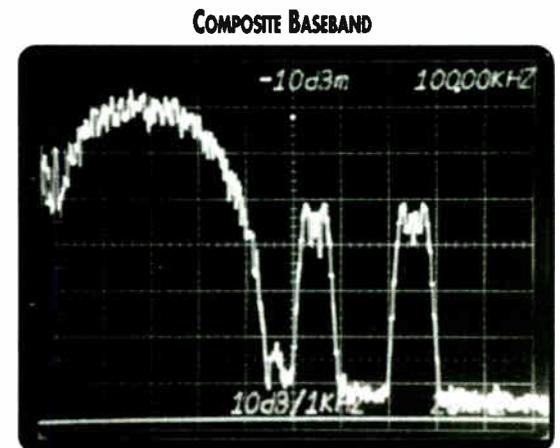
- ◆ Six audio channels, 4 program and 2 voice
- ◆ Co-exists with FM SCA/MUX channels
- ◆ AES/EBU and 32 kbps data channel available

◆ **More Flexibility** —

- ◆ Internal, or external **apt-X** DIGITAL COMPRESSION, MUSICAM & Dolby audio codecs
- ◆ Instant plug-in installation with virtually **any** STL
- ◆ Useable for LMA's and duopoly applications

◆ **More Useable RF Spectrum** —

- ◆ Six audio channels in a 250kHz RF slot
- ◆ Perfect for highly congested markets
- ◆ Tolerant to co-channel interference

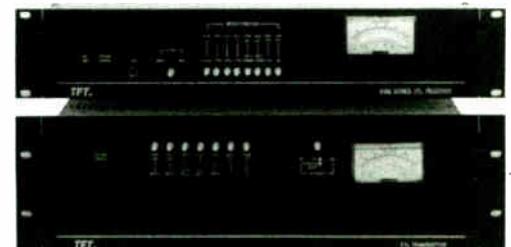


2 x 15 kHz, 2 x 7.5 kHz, 1 x 9600 baud RS232, 110 kHz and 152 kHz Subcarriers.

to complete the system:

New TFT 9100 Composite STL

- ◆ Ideal for use with DMM92
- ◆ Frequency-synthesized, field-programmable Tx and Rx
- ◆ Patented IF Modulation for superior performance
- ◆ Very sharp cavity RF filter, phase linear IF SAW filter



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DENON

**DN-1200F Disc Changer
Ready for Shipping**

PARSIPPANY, N.J. Denon will begin shipping its 200 disc CD changer, the DN-1200F, at the NAB convention in Las Vegas.

With the same reliability as the DN-951FA CD cart player, the company is giving broadcast automation the around-the-clock dependability radio stations have come to expect from Denon.

Denon is also addressing the difficulties programmers had with other machines. For instance, the DN1200F will fit in a standard rack space, and two removable CD trays provide easy change out of any CD in a matter of a



few seconds.

Up to 16 machines (3200 CDs) can be accessed from one computer. Proprietary 20-bit Advanced Super

Linear Converters deliver Denon's audio quality.

Several companies have already incorporated the DN-1200F into their automa-

tion systems, including ITC, Gefen Systems and TM Century. Many others will have Denon's DN-1200F on line in the near future.

For information on the DN-1200F, contact Michael Stelts in New Jersey at 201-575-7810; fax: 201-808-1608.

RADIO COMPUTING SERVICES

**MASTER CONTROL Upgrade
Provides Digital Storage
And Playback Capabilities**

SCARSDALE, N.Y. MASTER CONTROL from Radio Computing Services can now provide fully integrated digital audio storage and playback capabilities. MASTER CONTROL has a host of features and functions making it appropriate for use in a live-assist operation.

MASTER CONTROL stores and plays music and commercials with full digital audio quality. You can even assign frequently-used audio elements to "hot keys" for instant access at the touch of a button.

The system interfaces with the Pioneer CD Autochanger for direct playback of your compact disc library.

Paper clutter in the control room is eliminated with MASTER CONTROL. An "electronic log" shows a precise, chronological schedule, and live scripts appear on a scrolling video display.

The system is easy to use, because it interfaces directly with your on-air console, so station staff can operate it just like any other audio device. A graphics-based wave form editor makes "cut and paste" editing a snap.

The system integrates with all the other products in the RCS software line. Radio Computing Services has applied its field experience and technical knowledge to create a complete digital audio system for radio.

For information on the MASTER CONTROL, contact Kenny Lee in New York at 914-723-8567; fax: 914-723-6651.

BASYS

**Reel-to-Reel, Cartridge Tape
Machines Replaced by D-CART**

YONKERS, N.Y. D-CART by BASYS is a multi-user digital audio recording, editing and playback system designed to replace reel-to-reel and cartridge tape machines.

The broadcast system offers simultaneous, random access to a large selection of audio material by large numbers of users, and is suited to both news/talk and music formats. It is designed to record, edit, replay, playlist and store audio material without using tape.

Record and replay functions can be controlled at standard computer terminals, PCs or by a range of studio interfaces, according to the needs of the system owner. Rapid and accurate editing takes place at the screen, assisted by an edit wheel that imitates the back and forth movement of the traditional tape recorder.

With the D-CART, not only can single systems support an extraordinary number of people independently using it at the same time, but all could be editing or auditioning the same audio item simultaneously.

For information on the D-CART, contact Kristin Schleiter in New York at 914-376-4800; fax: 914-376-0865.

Ultimate Digital Studio



THE ULTIMATE DIGITAL STUDIO IS A POWERFUL BROADCAST TOOL THAT SAVES YOU TIME AND MONEY. THE UDS CONTROLS MUSIC FROM CD JUKEBOXES OR CONSUMER-TYPE COMPACT DISC PLAYERS AND COMPUTER AUDIO HARD DISC SYSTEMS SO THAT ALL YOUR MUSIC, COMMERCIALS, JINGLES AND VOICE TRACKS CAN BE VIEWED AND SCHEDULED ON ONE SCREEN. TM CENTURY HAS ALSO DEVELOPED INTERFACES FOR A WIDE VARIETY OF MUSIC AND TRAFFIC SCHEDULING SYSTEMS.

TM CENTURY HAS DELIVERED OVER 200 ULTIMATE DIGITAL STUDIO SYSTEMS WORLDWIDE. THE HARDWARE AND SOFTWARE THAT COMPRISE THE UDS IS HIGHLY DEPENDABLE AND PROVEN. BOTH THE NEW GENERATION OF SONY CD CHANGERS AND THE EXTREMELY RELIABLE CDK-006 JUKEBOX ARE AVAILABLE TO TM CENTURY. PARTS AND SERVICE WILL BE SUPPORTED UNTIL THE NEXT CENTURY. PRICES START AT UNDER \$8,200.

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REFERENCE GUIDE

Automation Systems

MANUFACTURER	MODEL NUMBER	OPERATING PLATFORM	SAMPLING RATES	COMPRESSION	SERVICES PROVIDED	SATELLITE INTERFACE	LIVE ASSIST OR WALKAWAY	EDITING CAPABILITY	BASIC SYSTEM PRICE
Arrakis Systems Bob Groome 800-622-0022	DL2-360	Proprietary hardware; 766 Mb and up	32 kHz, with 6 hours storage; others available	None, 2:1, 4:1, selectable by each cut; Arrakis algorithm	Input to files from music and/or traffic systems; logging, schedules, maintenance	Yes	Both	Yes; varispeed function optional	\$7,995
Broadcast Electronics Dave Buck 217-224-9600	AudioVAULT 904 9102; CORE 908-9000	386DX33 or DX40 compatible; 702 Mb or 1.2 Gb(AudioVAULT)	44.1 kHz only; 1 hour/702 Mb (AudioVAULT)	None	Integrates with existing music scheduling, traffic and billing systems, provides system logging	Yes	Both	Limited (AudioVAULT)	\$23,000 (AudioVAULT); \$6,000 (CORE)
Computer Concepts Mark Bailey 913-541-0900	Digital Commercial System	IBM compatible; 238 Mb to 1.6 Gb	32 kHz; 8 Mb/minute storage; others available.	User-selectable, 1:1, 4:1 (APT-X); 3:2	Traffic, billing, accounts receivable, script/music management and others	Yes	Both	Yes; satellite compensates varying length audio	\$8,295
ITC Bruce Helling 309-828-1381	DigiCenter	CPU is 386SX at 25 MHz(proprietary hardware); standard HD is 1.2 Gb	32 kHz, with 135 minutes for a 1.2 Gb hard drive; others available	Uncompressed only	Program Automation, TAB, Live-Assist	Yes	Both	Simple editing; VariTime function	Custom configured
Kingdom Technology David Benoit 800-695-4643	Digital Audio System	80486 CPU PC compatible, 33 MHz; 600 Mb	32 kHz, with 5 hours storage; others available	1:1, 2:1 multi-band propriety algorithm	Programming, logging	Yes	Both	Yes; varispeed option	\$6,800
Radio Computing Services 914-723-8567	MASTER CONTROL Digital Audio System	Three 486/33 computers(PC compatible); 1 Gb and others	32 kHz at 13.5 kHz bandwidth, 774 minutes of storage; others available	WB48SBC, 8:1 (MUSICAM LEVEL II optional at 44.1 kHz rate)	Music Scheduling, Traffic Scheduling and Billing, Audio Logging and more	Optional	Both	Yes; varispeed function	\$25,000 and up
Register Data Systems Brad Harrison 912-987-2501	The Phantom	Propriety hardware; 200 Mb and up	32 kHz, with 1.5 hours storage; others available	ADPCM, 4:1; Dolby AC-2, 6:1 at 48 kHz; selectable	Traffic, billing, accounting and others	Yes	Both	Simple editing; time squeeze	\$9,950
Rodman-Brown & Associates Doug Thompson 708-983-0977	Standard or Lite	386/33 MHz processor (PC compatible); 670 Mb	32 kHz, with about seven hours storage; others available	PCM, ADPCM, user selectable; 4:1	Compatible with several Traffic and Music Scheduling Systems	Yes	Both	No	\$10,005 to \$14,995
Scott Studios David Gerety 800-330-3004	MSDS	Proprietary hardware	32 kHz, with 2.9 hours storage; others available	APT-X, Dolby AC-2	Music libraries on computer ROM	Yes	Both	Yes, varispeed function	\$19,995
Sentry Systems Bob Arnold 800-426-9082	FS-12/DS-1	IBM compatible; 760 Mb	32 kHz, 5.5 hours storage; others available	ADPCM-E, 4:1; Dolby AC-2, 6:1 at 44.1 kHz	Traffic and Music interface utilities	Yes	Both	No	\$15,400
SMARTS Broadcast Systems John Schad 800-74-SMARTS	SMARTCAST-ER SP, SMC, SMC-2	80386 33 MHz processor PC compatible	32 kHz, with 6 hours 40 minutes storage; others available	6:1 for Dolby, 4:1 for non-Dolby systems, and upper end models can run uncompressed	Billing accounting and traffic package, and music rotation software	Yes	Both	Yes; time squeeze	\$4,999 to \$10,999
Systemation Bernie Brobst 217-428-7101	Owik Disk	386 computer supplied (proprietary); 120 Mb, up to 2.4 Gb	32 kHz, with 2 hours storage; others available	Variable from 1:1 to 6:1; proprietary algorithm	Traffic, billing, logging and CD music logging	Yes	Both	No	\$6,000
The Management Adrian Charlton 800-334-7823	Digital DJ	386/25SX PC compatible; from 120 Mb to 2 Gb	32 kHz, with 2 Mb/min storage; others available	APT-X (4:1); ANTEX SX-20; ANTEX SX-8/10 (4:1 with ADPCM mode)	Three separate Traffic and Billing systems and a Music Log playlist generator for CD-based systems	Yes, and a CD music interface	Both	Not available at this time	\$2,995(for software audio card, controller) and up
TM Century Craig Turner 214-934-2121	UDS	386 CPU-B 80 Mb and up	32 kHz; 8 Mb/minute storage; others available	Uncompressed only	Interfacing with all major music management programs; traffic interfacing	No	Both	None	\$10,495 to \$16,995

The following are standard for the automation systems:

-Recording capabilities double when using mono only.

-The frequency response when using the FM broadcast sampling rate of 32 kHz is 20 Hz-15 kHz ±0.5 dB.

Radio World

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Circle (25) On Reader Service Card

AMPLIFIERS

Want To Sell

Crown Micro-tech 600LX stereo pwr amp, \$600; DC 300A stereo pwr amp, \$450; Southwest Tech stereo pwr amp, \$175, exc cond. D Lundy, 606-546-6650.

Shintron 220 1x6 DA card, new w/manual, \$30. D Bailey, Rock Shoppe, 3422 Beech St, Rowlett TX 75088.

Gates MO 2696 rack mount prof mon amp, circa '50s, \$200. R Franklin, 215-646-7788.

Dynaco ST120, gd cond, BO. R Robinson, TNA Rcdg, 10 George St, Wallingford CT 06492. 203-269-4465.

Gates MO-2696 tube-type, rack unt, 6L6s, \$200. R Franklin, Franklin Studios, 1004 Dekalb St, Norristown PA 19401.

Dynaco Dynakit Stereo 70. K Heyne, Feral Enter, 149 Dominica Ave, Fairfax CA 94930. 415-453-4084.

Dynaco ST120, fact bit, gd cond, BO. R Robinson, TNA Rcdg, 10 George St, Wallingford CT 06492. 203-269-4465.

ATI (4) preamps, \$75 ea. N Doshi, WQCD, 220 E 42nd St Ste 2812, NY NY 10017. 212-210-2771.

New 250 W solid state amp, \$1800. Call for details. Bill Hoffman, 518-583-9490.

RCA, Altec, Dynaco tube amps, sell of trade. Tracy Eaves, 615-821-6099 (evenings before 10PM EST).

Want To Buy

McIntosh/Marantz, Fairchild 670/602. K Gulzke, 612-866-6183.

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ANTENNAS & TOWERS

Want To Sell

Phelps-Dodge FMC-2-LP 2-bay, circ polar, FM tuned to 98.3, gd cond; Kintronics PS-1 pre-sunrise/post-sunset cutback, 1 kW max in; Collins phasor for DA-1, 10 kW in 2 cabs & components for ATUs. E Hoehn, KFMZ, 1101 Walnut, Columbia MO 65201.

FM - ANTENNAS

Designed and built for your frequency. Choose from 1 to 12 bays and five power levels. Financing available. Call Jimmie Joynt at S.W.R. 214-335-3425

ERI FMXL-2E (2) bays on 92.1 MHz w/1/4 wave stub, BO/trade for Rohn 55 170' or (12) bays on 92.3 MHz. R Whitlock, KITE, 838 G Sidney Baker, Kerrville TX 78028. 512-792-4560.

Jampro JND-40FMS 2-input diplexer, 20 kW ea w/patching & DL, \$4850+s/h. L Young, WJCT, 100 Festival Park Ave, Jacksonville FL 32202.

Dear AM Broadcaster...Is your antenna system old? Need repair? New system too costly? Is copper theft a problem? New design offers cost savings & less maintenance. Send description of your situation, requirements & budget. It's worth the stamp. ENGINEERING ETC., Frank Patka, 10300 S Cicero #174, Oaklawn IL 60453.

Circle (2) On Reader Service Card

Phelps-Dodge CFM LP2 2-bay, circ polar w/radomes on 105.5, \$750. B Walters, WASE, POB 2087, Elizabethtown KY 42701. 502-769-1055.

Scala PR450U (3) pararectors on 950 MHz, \$300 ea. R Thompson, KLON, 1288 Bellflower Blvd, Long Bch CA 90815.

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Fax: 416-421-3880

Scala HDCA 10 yagi, 102.3 MHz w/75-50 xlr, \$150; Silco FM rcvr, \$150. D Rose, KAAA, 2534 Huala Pai Mtn Rd, Kingman AZ 81401. 602-753-2537.

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Andrew 1061 90 degree, 1 5/8" elbows, (2), BO. B Ladd, WNRN, 108 1/2 E Main, Bellevue OH 44811.

200' 6" hard line, low loss 72 ohm, for TV/FM, \$4700. C Hwait, WTNN, 13206 Buttermilk Rd, Knoxville TN 37932.

Jampro JSCP-12 12-bay FM on 100.3 MHz, exc cond. T Toenjes, KTOP, 715 Harrison, Topeka KS 66536. 913-437-6549.

CCA Watchdog II VSWR protection/ alarm w/manual, gd cond. M Rice, Cont Media, 222 Indacom, St Peters MO 63376.

Shively 6-bay, K Stone, KLTD, 12710 Research Blvd #390, Austin TX 78759. 512-331-9191.

Want To Buy

FM 103.3 2-bay, pref ERI, 100' cable w/conns & access; 100' free-standing. 305-292-5009.

Rohn 55 in 10' sections, nd 17-20 sections; 12-bay on 92.3 MHz, low pwr, any make, will pick up/pay s-h. R Whitlock, KITE, 838 G Sidney Baker, Kerrville TX 78028. 512-792-4560.

AUDIO PRODUCTION

Want To Sell

Cinema Aerovox 6517-E filter, \$40; Sparta A15B mixer, \$40. R Thompson, KLON, 1288 Bellflower Blvd, Long Bch CA 90815.

SAVE \$300 ON T T 144 POINT PATCH BAYS
brokers of fine and coarse used equipment
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Symetrix 501 limiter/compressor (rms & peak limiter, simultaneously), new, \$250; Alesis Quadraverb Plus multi-effects processor, new, \$350; BBE 422A Sonic Maximizer (spectral enhancer), new, \$200. R Payne 313-786-1767.

Prewired studio w/5-chnl, 12-input LPB console, mic/arm, (2) ITC R/P carts, (2) TT w/tone arm & preamps; Sony MCI 2-trk R-R, mon spkr, \$3500. UREI 1178, dual, \$400 ea; Dictaphone logger w/2 mo tape sply, \$1000 ea+s/h. N Doshi, WQCD, 220 E 42nd St Ste 2812, NY NY 10017. 212-210-2771.

Studio Sound S305 filter sets, matched pr, rackmount, rare, \$250 ea/BO. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

Prophet 600 synthesizer, \$450; Spectro Acoustics rk mnt 200 W amp, \$150; Crown VFX2 elect crossover, \$125. W Gunn, 619-320-0728.

Roland SPH323 phaser, \$75; Rockmann sustainer & stereo chorus/delay, \$350/both. W Gunn, 619-320-0728.

AKG 414 P48 like new, \$675; Dynaco 410, 400 W amp, \$400; dbx 1BX expander, \$135. W Gunn, 619-320-0728.

TT (Bantam) ADC patchbays, 144 pts, 1 rack sp, \$129; Tannoy HPB385A 15" coaxial mon pair in cab, \$1750; Altec 436A tube compressors, Daven attn, both \$700. W Gunn, 619-320-0728.

Ampex MX10 or MS 35 mixers. W Gunn, 619-320-0728.

WANTED:

Pultec EQ's; Fairchild, Teletronix, dbx, UREI, Sontec Limiters. Neumann, Telefunken, AKG and RCA mics. MacIntosh or Marantz Gear; Lang, Neve and API gear. Misc old tubes and guitars.

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1340 Mission Street
San Francisco, CA 94103
(415) 252-7102
FAX: (415) 864-7512

Circle (124) On Reader Service Card

Fairchild 600 conac or 602 Conex high freq limiters. J Gangwer, 942 32nd St, Richmond CA 94804. 415-644-2363.

AUTOMATION EQUIP

Want To Sell

SMC ESP-L (2) Carousels, (3) carts, (3) SMC tape decks, \$7500. M Pulley, KYOO, 304 E Jackson, Bolivia MO 65613. 417-326-5259.

IGM RAM 2K mem, 6 inputs w/Instacart interface, books, spares, gd cond, BO. C Gennaro, WJMS, 222 S Lawrence, Ironwood MI 49938.

Go-Carts (2) 42-tray, (1) 78-tray, exc cond, BO. R Fess, WLRB, POB 250, Macomb IL 61455. 309-833-5561.

SMC DP1 w/(2) side by side racks & (3) SMC 250 Carousels & (1) dual play & stereo switcher, \$2800. J Coursolle, WPKR, POB 3450, Oshkosh WI 49034. 414-236-4242.

IGM EC (3) 24-slot Carousels, (4) Audicord carts; ITC 770 open reel, cabinets, PC, printer & latest software; Wegener SAT rcvr for Unistar AM w/TMZ switcher & printer, exc cond, \$10K/BO. D Igou, Bdct Eng Cnsits, 8435 Twisted Oaks, Garden Ridge TX 78266.

IGM (5) 24-slot stereo Go-Carts, \$500 ea; IGM-EC switcher, \$750. B Walters, WASE, POB 2087, Elizabethtown KY 42701. 502-769-1055.

SMC 250, \$100; TS2S tone sensor, \$50; Extel printer, \$50. D Rose, KAAA, 2534 Huala Pai Mtn Rd, Kingman AZ 81401. 602-753-2537.

Cetec Schafer 7000 Lvl 2 VEL printer, (3) audio file/2A 48-tray, \$4000. C Gillespie, WBDY, POB 5009, Bluefield VA 24605.

SMC ESP-1 1982 mdl, exc cond w/PDC-5 clock, DS-20A switcher, Extel printer & manuals, \$1500/BO. B Christie, Grand Radio Grp, POB 907, La Grande OR 97850.

Sentry Format w/software, switcher, (2) 48-tray Instacarts, \$6000. G Katz, POB 7568, KCEZ, Chico CA 95927. 916-342-2200.

SMC RSC-100 random access selector, \$250; SMC 350-RS Carousel, \$200. R Miller, WCNL, POB 68, Virden IL 62690. 217-824-3395.

IGM Instacart (2) 48-tray, stereo, \$4900 ea. T Hicks, KUGN, 4222 Commerce St, Eugene OR 97402.

Cetec 7000 5046 event, video term, 4 random Carousels, \$3500; source rds, \$150 ea. E Moody, KJEM, 216 N Main, Bentonville AK 72712. 501-273-9039.

Harris/Gates 1971 auto detector controls, mon amp, dist panel, time pulse gener; 1979 McMartin AM EBS rcvr; 1979 Triad pwr sply, BO/trade. J Wilsbach, WMSS, 214 Race St, Middletown PA 17057. 717-948-9136.

TM Cent UDS syst w/controller, Digicart, CD plyrs, mon, printer, cables & conns, 5 mos use, \$14995. T Hodgins, KLYK, 14 E Main St, Walla Walla WA 99362. 509-529-7094.

Cetec 7000, brain only, controlled R-R PBs & Audiophile cart stacks, \$1600; Orban 222A stereo spatial enhancer, unused, \$500. C Kner, KCNA, 139 SE J St, Grants Pass OR 97526.

SMC ESP-1 w/(4) SMC R-R stereo tape PB, (3) SMC Carousels, Bdct Auto Carousel w/rks, gd cond, BO. A Beau-lieu, WCWC, POB 156, Ripon WI 54971.

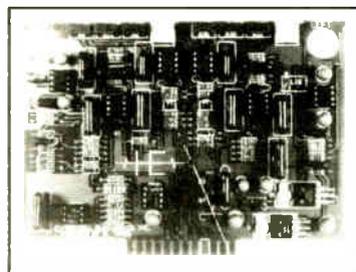
Systemation X7/D w/brain, 2 controllers, 8mm Sony decks, little use, \$8500/BO/part out. C Windsor, WWMC, POB 20000, Lynchburg VA 24506.

Harris SC-90/9000, working, several, BO. R LaFore, WQPW, POB 1327, Valdosta GA 31603.

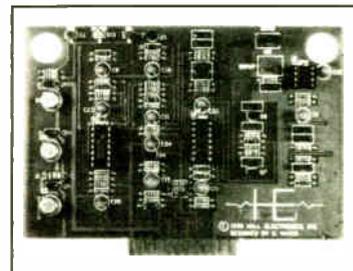
SMC (4) mono Carousels, \$500 ea; MEI SaliMaster, not working, w/extra chips, parts, BO. T Pancoast, WMTK, POB 106, Littleton NH 03561. 603-444-5106.

Harris Syst 90 w/(7) SMC 350 Carousels, (5) ITC 750 R-Rs, \$3500. H Gauthier, WSAR, POB 927, Fall River MA 02722. 508-678-9727.

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Harris 9000 w/kybd, mon, disk drive & (4) Carousel plyrs; (3) Gates mono ct plyrs, BO. A Russell, WNL, 90 Foster Rd, Waterford CT 06385. 203-442-5328.

CAMERAS (VIDEO)

Want To Sell

Norelco PC-70 (2) 3-tube systs w/4 lenses & pan hds, cbls, spares & rks. J Krepol, JVK Studios, 7 Dustin Dr, Wilmington DE 19703. 302-798-4076.

Pana WV RC-30 for Pana 777 color camera, 50' of cable, \$500+s/h. D Hurd, Harding Univ, 805 Park St, Searcy AR 72149. 501-279-4017.

Hitachi FP 15 (2), 1 1/2" & 4 1/2" viewfinders, rear servo zoom & manual focus cntrls, rem cntrl units & cables, extra pwr sply, extra cards; 10:1 Hitachi zoom; \$2500 both + s/h; FP21 w/1 1/2" viewfinder, Anton battery bracket, plate, VTR cable, \$1500+s/h; (3) Pana 777, EFP, Anton battery bracket w/out case, \$750 ea+s/h, all are color, 3-tube Saticons w/cases, manuals, extra cards. D Hurd, Harding Univ, 805 Park St, Searcy AR 72149. 501-279-4017.

Want To Buy

JVC BY 110U with RS 110U rem cntrl, VF 400U viewfinder, manual & servo cntrl, lens 10:1/16:1, cbls & access. J McLean, Stagedoor 1, 9915 MacArthur Blvd, Oakland CA 94605. 510-562-4818.

CART MACHINES

Want To Sell

Sparta 4010, \$50; 40110, \$50. R Thompson, KLOM, 1288 Bellflower Blvd, Long Bch CA 90815.

ITC RP, stereo; Audicord mono, \$1000 both. D Rose, KAAA, 2534 Huala Pai Mtn Rd, Kingman AZ 81401. 602-753-2537.

ITC R/P, mono w/3 tones, desktop, exc cond w/cases, \$600+s/h. J Emmer, Paragon Bdcers, 509 3rd St, Peckville PA 18452. 717-383-1118.



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ITC R/P, \$200; Harris III mono triple-stack, gd cond, \$400. K Thomas, KZUS, POB 568, Toledo OR 97391. 503-336-2126.

Spotmaster 505 PB, recond, new paint, works great, \$250; Tapecaster 700 R/P, mono w/sec cue tone gen & detector, new cond, \$750. R Franklin, Franklin Studios, 1004 Dekalb St, Norristown PA 19401.

BE Spotmaster 500C R/P, gd cond, \$300/BO. R O'Kelly, KORE, 2080 Laura St, Springfield OR 97477. 503-747-5673.

ITC Delta (2) mono PB, exc cond, \$1000 ea. T Pancoast, WMTK, POB 106, Littleton NH 03561. 603-444-5106

ITC Delta (2) stereo, play, exc cond, low hrs, \$2000 ea/BO; (2) BG Engrg BGE-T1 dig count up-limer, exc cond, \$150 ea/BO; BE 2100 CPS stereo, play, exc cond, low hrs, \$2000/BO.

New Fidelipac CTR124 stereo cart, \$2490. 801-262-3601.

Audicord DLPS (5), stereo, PB, \$450 ea/\$2000 all; Mdl SL-RS, stereo, R/P, little use, \$800; (6) Mdl E31R, mono, PB, gd cond, \$200 ea/\$1000 all.

ITC Delta III stereo play & ITC Delta I stereo w/Delta IV rec amp, exc cond, \$2000 ea/BO. J Pierce, KWNR, 1515 E Tropicana Blvd, Las Vegas NV 89119. 702-595-5705.

ITC Delta stereo R/P, 3 yrs old, very gd cond, \$2200; R/P/B, mono, \$300. C Knerr, KCNA, 139 SE J St, Grants Pass OR 97526.

ITC SP-0005 PB, mono w/tones, \$400; Harris PB, \$200. R Mayhugh, KLOA, 731 N Balsam St, Ridgecrest CA 93555. 619-375-8888.

BE 5300C tripledeck, stereo, PB, mint less than 50 hrs, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

BE 3200 mono R/P, \$650; (2) BE 3100P mono PB; (3) ITC SP stereo PB, \$600 ea, ITC stereo R/P, \$750, ea w/1 tone; ITC stereo R/P w/3 tones, \$800, \$750. D Hood, WXXP, POB 151, Anderson IN 46015.

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Want To Sell

Ampex ATR-700, exc cond, \$500/BO. L Houck, Rollin Rcdg, 210 Altgelt, San Antonio TX 78201. 512-736-5483.

Otari MTR-12 1/4" 2-trk audio w/center trk time code, showroom cond, \$7575; MRI 2" 24-trk audio test tape, new, \$250. A Pomponio, Legend, 42 Belmont Ave, Belleville NJ 07109. 201-751-9528.

Roberts 990 old tube-type 4k stereo w/amps & mon spkrs, nds work, BO+s/h; Ampro Scully 10 1/2" w/2-chnl stereo elect, BO+s/h. J Emmer, Paragon Bdcers, 509 3rd St, Peckville PA 18452. 717-383-1118.

MCI JH 16 24-trk w/Autolocator II, \$7500/BO+s/h. J Jackson, Sound Recorders, 9136 Mormon Bridge Rd, Omaha NE 68152.

MCI JH 110A, 7 1/2, 15 & 30 ips, \$1500; Otari MX 5050 Mark III, \$2250; Otari MX 50, \$1100; ITC 750, \$350, all 2-trk, stereo, exc cond. D Lundy, 606-546-6650.

Otari ARS1000 DC OB, 5 yrs old, exc cond, \$650. B Walters, WASE, POB 2087, Elizabethtown KY 42701. 502-769-1055.

Tascam Mdl 32 2-trk, exc cond, \$975; Mdl 32-2B, 2-trk, gd cond, \$500; Studer B-77, 2-trk, gd cond, \$395. Frontier Radio Ntwk, POB 9292, Austin TX 78788. 512-258-7505.

3M M64 1/2-trk, 1/4" stereo, exc cond, 7 1/2, 15 ips, \$1350. J Wells, Sound Arts, 8377 Westview, Houston TX 77055.

Ampex ATR700 2-chnl, 2-sp, rec/plyr, gd cond, \$700. B Kidd, Video Prods Intl, 510 W 2nd, Rayville LA 71269.

TEAC X1000R, recond, clean, \$400; Ampex ATR700, gd cond, low hrs, \$700; TEAC A3340, \$800; Pioneer RT1020L, low use, \$300; TEAC A3300SX, new, \$300. J Parsons, Parsons Sound, 2781 Fayson Cir, Deltona FL 32738. 904-532-0192.

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Nashville, TN 37203 (615) 244-6892

Roberts 990 old tube-type 4k stereo w/amps & mon spkrs, nds work, BO+s/h; Ampro Scully 10 1/2" w/2-chnl stereo elect, BO+s/h. J Emmer, Paragon Bdcers, 509 3rd St, Peckville PA 18452. 717-383-1118.

Pentagon C4322 duplicator, VU meters, \$300. P Russell, Bowdoin Coll, Sils Hall, Brunswick ME 04011. 207-725-3066.

Otari MX 5050-8HSD 8-trk in roll-around console, rem ctrl, 8 new reels; Tascam M50 12x8x2 mixing, low hrs, exc cond w/manuals, \$4800 both. G Jones, SW Medicast, 110 Sierra Rd, Kerrville TX 78028.

Sony TC-377 1/4-trk, stereo, open rl, gd elects, \$35. J Slite, 404-534-1000. Otari ARS-1000 (5), gd cond, \$700 ea; Audi-Cord stereo rec PB, very gd cond, \$750; (2) IGM Go-Cart 24, gd cond, \$700 ea; Harris 9001, brain, switcher, pwr sply, CRT & kybd, gd cond. R Wynne, 503-882-4656.

Ampex ATR700, exc cond w/rack rails, \$500. L Houck, Rollin Rcdg, 210 Altgelt, San Antonio TX 78201. 210-736-5483.

Scully 280, \$200. D Wheeler, WJLY, POB 456, Ramsey IL 62080.

Studer 807 2-trk, 2 yrs old, 3-sp, shuttle whl, \$2950. D Matyis, KLTR, 10333 Richmond #6937, Houston TX 77042. 713-780-0937.

Tascam 32, 2-trk w/rack ears, new in perfect cond, \$1080/BO. R Payne 313-786-1767.

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1131 Virginia Ave.
Campbell, CA 95008
(408) 866-8434

Ampex 30960-02 R/P, tube-type for parts, circa 50s, BO. R Franklin, 215-646-7788.

Studer C270/2 2-trk analog mastering, \$2950/BO; HS77 MK IV full-trk mono, 10 hrs use, \$875/BO/trade; port case for A77 w/mon spkrs & pwr amps, exc cond, \$375. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

Otari MS-80 24-trk, little use, \$16K; Stephens 811D 4-trk, 1/2", \$1700. M Lineff, Your Place, 1600 Las Flores Dr, Glendale CA 91207. 818-244-1909.

EMPLOYMENT

To place ads in this section, use the ActionGram form. To respond to box numbers write Radio World, PO Box 1214, Falls Church, VA 22041. Attn: _____

POSITIONS WANTED

Exper & successful grp exec, frm GM wants to return to station/grp from consulting, will take on problems/interim mgmt. 305-935-5057.

Bdct Tech w/8 yrs exper seeking Asst Chief pos, new construc exper & strong rem exper at your disposal, AASEET/SBE cert pending. 219-489-4284.

GM for Fla med/lrg mkt, 29 yrs exper in sales/prog/engrg, turnarounds/star-tups, avail immed. 813-849-3477.

I'm your new voice: young, energetic, quick, witty, great pipes, loaded w/raw talent, exper & good looking. Nelson, 704-542-1089.

December grad sks sports/news pos, public & commercial exper, pref Midwest, will relocate. Rob. 2743 St. Rd. 161, Centralia IL 62801.

Talented radio pro w/25 yrs exper, NW stations, will be GM/OM/ PD/ prod/tech help. Ron, 503-649-1568.

Give me a break? College grad interested in sports announcing pos, radio/TV/newspaper bckgmd, will relocate, exc refs. D Ranieri, 107 Jarrett Dr, Syracuse NY 13219. 315-487-2910.

Exper in radio & prod, produced own show w/my 60s/70s collection. Ed, 214-986-7006.

PD/morning man looking for med mkt, on-air pos, will relocate, any format, resume & tape upon request. Sean, 717-928-8205.

Talk show host, exper prof, extensive contacts, conversant, call-in, monologue, interview, mkt size open, salary nego. Michael, 704-632-4621.

Exper broadcaster seeks board oper/prod/air position at CA easy listening/AC/oldies/C&W/talk. 714-632-8243.

15 yrs exper, announcer in all formats except classical, 5 yrs mgmt exper, willing to relocate, pref s.e. market. Tape & resume upon request. Mike, 703-728-2323.

Articulate, Dynamic radio talk show host seeks position NY metro area, reliable team player. Write to: Radio World POB 1214, Falls Church VA 22041. Attn: Box # 93-03-02RW.

33 yr old college prof w/15 yrs MD/PD exper, volunteering to assist/run music dept, college/altern station, will improve your servicing, no fee/salary. Rich, 609-232-8427.

Construction & fix it engr will go anywhere, anytime, avail by day/week/project, exc refs, US/foreign. 813-849-3477.

Denver Chief Engineer yearns to return to music radio. Strong on new AM methodologies and directionals. 14 years engineering, 12 years on-air. Lifetime license, B.A., other talents. Prefer Contemporary and Country formats. Available now. Reese Hull, 303-623-8313.

Sales & Mktg experts, sensational exper & plan to add \$30K/month min to any station w/decent signal & population cvg. 813-849-3477.

28 yr old w/7 yrs AT exper, 4 yrs PD/MD, some prod, CHR/urban/dance, will relocate, any mkt. Bill, 919-793-4376.

Better 1/2 of AM team sks new pos w/22 yrs exper in all mkts. Jim, 915-235-5617.

Looking for Chief Engineering pos, or two contract positions in close proximity, in New England, or NE. Major market experience, high power, all facets and years of experience. Write to: Radio World, POB 1214, Falls Church VA 22041. Attn: 93-03-01RW.

Exper AT seeks FT air shift in any rated midwest/southeast mkt, C&W/AC/oldies/AOR/classic rock. Jack, 414-242-4357.

8 yr pro w/pipes, prog & prod, can organize your station into smooth running oper, TV & computer exper. Jim, 313-234-0899.

Engr w/many yrs exper, flea pwr to 50 kW, freelance avail, studio & xmtr construc, DA fld work. 412-942-4054.

Announcer w/20 yrs+ exper would like to do commercials, free, sml mkt, on-going basis/exchange for spot time. Steve, 508-831-9863.

GM for Fla med/large mkt, 29 yrs exper in sales, prog & engrg, avail immed. 813-849-3477.

5 yrs exper DJ, prod, copy writing, any shift/format, flex w/style, high energy/relaxed. 703-914-8995.

December grad sks sports/news pos, public & comm exper, pref midwest, will relocate. Rob. 618-533-2851.

Exper symphonic music prog/announcer w/extensive CD library seeks creative volunteer pos w/public station in US, new station OK. Jerry, 808-966-6543.

Radio engr w/12 yrs exper, AM direc, 100 kW FM, computer, dig & heavy maint, seeking FT/PT pos, coastal. Dan, 206-387-3558.

Want 1 or 2 contract engrg positions in New England, any mkt, major mkt exper, high pwr AM/FM/dirc, 20 yrs+ exper. Peter, 318-221-8874.

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MANAGEMENT
Station Manager needed for KJEL-KIRK, Lebanon, Missouri. This is part of the Shepherd Group. 5000 watt AM on 750 kHz, 100,000 watt Class C FM. Contact Jerrell Shepherd, Moberly, MO.
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HELP WANTED: Any company or station can run "Help Wanted" ads for \$1.50/word or buy a display box for \$55/column inch. Payment must accompany insert, use your MasterCard or VISA; there will be no invoicing. Blind box numbers will be provided at an extra charge of \$10. Responses will be forwarded to listee, unopened, upon receipt. Call 800-336-3045 for details.

POSITIONS WANTED: Any individual can run a "Position Wanted" ad, FREE of charge (25 words max), and it will appear in the following 2 issues of Radio World. Contact information will be provided, but if a blind box number is required, there is a \$10 fee which must be paid with the listing (there will be no invoicing). Responses will be forwarded to the listee, unopened.

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PO Box 1214, Falls Church, VA 22041
Attn: Simone Mullins

CASSETTES..WTS

Revox A-700 stereo w/1/4- or 1/2-trk, 3 spds, overhauled, warranty, \$750. J Stemke, Studio Sonics, 450 W Rand Rd, Mt Prospect IL 60056. 708-670-0025.

Otari MX5050 8-trk, custom console, demo, 1/2" tape, \$2500/BO; 8-trk, Ruslang console, new, 1/2" tape, \$3500/BO; 4-trk, custom console, demo, 1/4" tape, \$2000/BO; (3) Technics RSM-65, new, \$250 ea/BO; Sony TC-228 8-trk, new, \$150/BO; Sony TC-777-4, mint, 1/4" trk & tape, \$250/BO. J Diamond, Blue Diamond, Box 102C Chubbick Rd RD1, Canonsburg PA 15317. 412-746-3455.

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Ampex 351 (3) full-trk mono, 7 1/2, 15 ips in Ruslang rollabout ea w/Inovonics & Ampex elects, \$500 ea. 908-249-2600.

Lyrec tape timer 7 1/2, 15 ips, \$50; Yamaha QX5 hardware MIDI sequencer, \$150; Yamaha MDF-1 disk drive, \$150. P Cibley, Cibley Music, 138 E 38th St, NY NY 10016.

Revox PR-99 MK II (4) 1/2-trk, stereo, play w/25 Hz sensor, \$1100 ea; Nontronics CH3-R sensor tape hds, \$10 ea/\$50 for 8. D Peluso, KJUL, 2880 E Flamingo Rd Ste E, Las Vegas NV 89121. 702-732-2200.

Otari MX-5050 MK III 8-trk audio, less than 50 hrs use, exc cond, \$3200. E Thompson, E Thompson Prods, 962 Hymettus Ave, Encinitas CA 92024. 619-436-2112.

Revox PR 99 MKII (2), \$1600 ea. H Gauthier, WSAR, POB 927, Fall River MA 02722. 508-678-9727.

ITC PD2 (2) mono, R/PB, gd cond, \$200 ea. K Thomas, KZUS, POB 568, Toledo OR 97391. 503-336-2126.

Tascam/Fostex 8-trk w/(2) Sony CDs, TEAC double cass, (2) Technics SL1200 MKII patch panel, Fostex EQ, Shure SM5 mic, road case, Delta Lab effects, little use, \$4000. D Rose, KAAA, 2534 Huala Pai Mtn Rd, Kingman AZ 81401. 602-753-2537.

Otari Mark II-IV 1/2" 4-trk, multi-trk, mint, less than 50 hrs, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

Scully 280 parts. R Robinson, TNA Rcdg, 10 George St, Wallingford CT 06492. 203-269-4465.

Revox A-77 mint cond w/3.75, 7.5 ips, 1/4-trk, \$325; Ampex 600 & (2) Magnecord PT-6s, BO. C Siegen-Ithaler, KSIW, 612 S 19th Ave, Yakima WA 98902. 509-453-5492.

Ampex 850 (2) xport w/Inovonics elcts, for pas \$100 ea; (3) Scully capstan mtrs, new, \$20 ea/\$50 all; (2) Scully 275-2 w/xport & cab, w/o meter bridge, \$40 ea. R Thompson, KLOA, 1288 Bellflower Blvd, Long Bch CA 90815.

Tascam 32 rec/repro, \$895. J Blodgett, WGTF, 308 Westgate Pkwy, Dothan AL 36303.

Ampex 440C-8 1", 8-trk, 15-30 ips, roll around, rem, manual, mint cond, \$3500/BO. B Ganslen, Ganslen Audio, 1250 Valencia, Lewisville TX 75067. 214-436-2206.

Otari MX5050 (3) B2-2; Nagra 4S mic pre w/leather case, gd cond, \$4000/BO. R McMillen, Super Duper Audio, 1634 Salder St, Portland OR 97205.

ReVox A-77 (8), \$100-\$600. R Mayhugh, KLOA, 731 N Balsam St, Ridgecrest CA 93555. 619-375-8888.

Studer C270 2-trk, analog mastering, \$2950/BO; HS77 MK IV full-trk, mono, 10 hrs use, \$875/BO/trade; A77 case w/moon spkrs & pwr amps, exc cond, \$375. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

Tascam MS 16, 1", 16-trk w/16 chnls, dbx 150x, roll around stand & AQ65 autolocator/rem, \$5000. J Trevino, Blue Cat Rcdg, 327 Cumberland Rd, San Antonio TX 78204. 512-341-2979.

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708-670-0025

Telex Copier 1 & 2, duplicating, fact return, gd cond, \$300. P Russell, Bowdoin College, Sills Hall, Brunswick ME 04011. 207-725-3066.

ReVox A-77 (2) 2-trk stereo R/P, \$350 ea. D Hood, WXXP, POB 151, Anderson IN 46015.

Ampex AG440B 2-trk, fair cond; AG440B, mono, parts; AG440B 8-trk, parts; Scully 280 4-trk, exc cond, BO all. B Patrick, ARCA, 100 N Rodney Parham, Little Rock AR 72205.

Tascam 32 2-trk & 38 8-trk, like new, \$2000/both; Teac 3340 4-trk, 1/4" deck, \$375; Tascam 80-8 8-trk never really used/perfect, \$1600. W Gunn. 619-320-0728.

ITC 850 full-trk, mono, \$600/BO; Scully 280 2-trk, both in roll around consoles, \$750/BO. R Hedrick, WNU, 118 Wright Pkwy, Walton Bch FL 32548. 904-243-6188.

Technics RS-1520, \$1000; RS-1506, \$800; Tape-a-Thon 900, \$100. J Patrych, 212-367-5385.

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Tascam TSR-8, mint condition, \$1800; MIDizer MTS-1000 A/V synch, \$1000; IF-1000 interface, \$400. P Bombar, Open Studios, 102 Coleman Ave, Elmira NY 14905.

Pana SV-255 port DAT recorder, \$1100; SAE 5000 impulse noise reducti syst, \$150; Nakamichi MR-1, \$600; Nakamichi 1000I, \$200, all gd condition. J Patrych, 212-367-5385.

Tascam 40-4 w/dbx & flight case, \$950; Tascam 48 8 trk, excel for sync, \$2950. W Gunn. 619-320-0728.

Tascam 34 4-trk, great cond w/manual, \$1800. M Green, Aug Coll, 639 38th St, Rock Island IL 61201. 309-794-7333.

ReVox PR99, \$2000; reproduce only, \$900. M Persons, KVRP, 402 Buffalo Hills Ln, Brainerd MN 56401.

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Ampex ATR800 mono, like new, \$1200 & AG440-8 1" 8-trk; Otari 7800 1" 8-trk, \$2900. W Gunn. 619-320-0728.

Want To Buy
Nagra 3S/4S w/NAB hds; Sony TC880/8750; ReVox B215. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

Nakamichi LX-5 3-hd. J Mueller, Family Stations, 290 Hegenberger Rd, Oakland CA 94621.

Nagra 3S/4S w/NAB hds; Sony TC880/8750; ReVox B215. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

Otari MK III-8 head bridge with out heads. R Robinson, TNA Rcdg, 10 George St, Wallingford CT 06492. 203-269-4465.

Otari MK III 8-hd bridge w/o heads. R Robinson, TNA Rcdg, 10 George St, Wallingford CT 06492. 203-269-4465.

Pioneer RT 909, good working condition. W Herrmann, WFPS, POB 701, Freeport IL 61032. 815-235-7191.

Wollensak T1500/1515 tube-type, circa 1961, 1/2- or 1/4-trk w/orig mc. J Addison, Stowe Media, 171 Hartford Rd A-7, New Britain CT 06053. 203-827-0325.

Sony TCM 5000 EV, port, \$100-200. W Shoecraft, KIKO, 401 Broadway, Miami AZ 85539.

Tascam CS607B (2) w/roll around cart. S Keefe, WCNI, 270 Mohegan Ave, New London CT 06320.

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Ampex ATR100 taperecorders for parts. Circuit cards, heads, motors, machine parts, or elect parts. Call 818-907-5161.

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Denon 2560/DCD970/DCD660 other w/varispd. R Robinson, TNA Rcdg, 10 George St, Wallingford CT 06492. 203-269-4465.

Denon 2560/similar. R Robinson, TNA Rcdg, 10 George St, Wallingford CT 06492. 203-269-4465.

Want To Sell
Technics SL-P1200 (3), \$600 ea. A Garza, Goster Comms, 2824 Sherwood Way, San Angelo TX 76901.

Audiometrics CD-10, less than 1 yr old, \$1000; many caddies. R Rogers, KSKG, 1217 S Santa Fe, Salina KS 67401.

Nikko NCD 600 CD auto change player with service manual, connects with PCs. R Meyers, Benchmark Comms, 4700 SW 75th Ave, Miami FL 33155. 305-264-5963.

Denon DN-950F (2), \$300 ea. N Doshi, WQCD, 220 E 42nd St Ste 2812, NY NY 10017. 212-210-2771.

TM Century Mellow AC w/optional vocal EZ library, \$2500; (5) Pioneer PDM 450 w/18 CDs ea deck, interlace panel, \$2500. T Hodgins, KLKY, 14 E Main St, Walla Walla WA 99362. 509-529-7094.

COMPUTERS
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RCA APT term, modem, software, dig LA-50 serial bus printer & manual, \$300. R Franklin, Franklin Studios, 1004 Dekalb St, Norristown PA 19401.

DigiDesign Sound Tools II w/DAT I/O mod, sound accelerator card, (2) 640-meg La Cie hard drives, v2.3 software, \$4900. C Baker, Sound Rcders, 9136 Mormon Bridge Rd, Omaha NE 68152.

Yamaha QX5, MDF-1 hardware, MIDI sequencer & matching disk drive, \$150 ea/\$250 both. P Cibley, Cibley Music, 138 E 38th St, NY NY 10016.

Tandy 2000 with software, \$375; Kaypro port, \$200; Texas Instruments 810 printer, \$450. R Robinson, TNA Recording, 10 George St, Wallingford CT 06492. 203-269-4465.

CONSOLES
Want To Sell

Ramko DC 8MS 8-chnl, stereo, exc cond+extras. D Lundy, 606-546-6650.

Sound Workshop Logex 8 16-chnl w/EQ cntrls, BO. D Colfman, WSOR, 940 Tarpon St, Ft Myers FL 33916.

Tascam 15 16x8x2 w/8 input chnls, \$3000/BO+s/h. J Jackson, Sound Recorders, 9136 Mormon Bridge Rd, Omaha NE 68152.

Ward Beck 24-input bdct/prod, fully para EQ, very clean, \$5000/BO. R Friedman, 1137 Rcdg, 1137 Fillmore St, Balto MD 21218. 410-889-4228.

Russco 505M 5-rotary fader mono bd w/2 inputs switchable internally, 1 input line, blt-in mon, cue, hdphone amps, rk Mntable w/desktop case, exc cond, \$600/BO. R O'Kelly, KORE, 2080 Laura St, Springfield OR 97477. 503-747-5673.

Lindy Williams 9-chnl w/2 inputs per chnl, sml outboard pwr sply, one meter defective, \$800. K Thomas, KZUS, POB 568, Toledo OR 97391. 503-336-2126.

Auditronics 110A 14x4, clean w/bock & parts, \$800/BO. G Foidessy, WAKR, 1735 S Hawkins Ave, Akron OH 44320 216-869-9800.

Ramko DC5AR 5-chnl, mono, recon, \$350; Altoc 1592B, 5-chnl, mono, clean w/plug-ins; Grommes Prec M5, 5-chnl, mono, new, \$275. J Parsons, Parsons Sound, 2781 Fayson Cir, Deltona FL 32738. 904-532-0192.

BE 8M250 in excel cond, \$3500; Sparta A16R in excel cond, \$1000. Call Mark at 619-598-3311.

Tascam Mdl 15, 24x8 w/8 input, \$3000; Neotek Series 1, 16x8x2, v. clean, quiet, \$3000. C Baker, Sound Rcders, 9136 Mormon Bridge Rd, Omaha NE 68152.

Tascam M216 16x4x2, 1 aux, 2 yrs old, mint cond, \$875. B Rico, Matrix Syst, 1056 Paula St, San Jose CA 95126. 408-297-6056.

Presto 900 A1 circa 40s disk/tape w/3 mic ins, large VU, spare tubes, \$250. R Franklin, 215-646-7788.

Cetec Centurion 12-chnl, 2 boards, 1 working/1 parts, \$2500/both & spares. E Moody, KJEM, 216 N Main, Bentonville AR 72712. 501-273-9039.

Collins Rock 10 10-chnl w/formica cabs, \$3000; RCA dual-chnl, 5 pot, 15 inputs, \$300. R Mayhugh, KLOA, 731 N Balsam St, Ridgecrest CA 93555. 619-375-8888.

TAC/Amek Scorpion audio w/32 inputs, exc cond w/ext card & spare S1001 input mod, \$8975. A Pomponio, Legend, 42 Belmont Ave, Belleville NJ 07109. 201-751-9528.

Snake (16) phantom-pwr inputs w/ext ps; 250' Belden 19 pr cable, mil conns, ss strain reliefs; 10' Neumann XLR snake mates w/box; Belden snake, exc cond, \$750/BO/trade. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

Gates/Harris Dualux II 8-chnl, stereo, \$3000/BO+s/h. J Hoff, KRED, 5640 S Broadway, Eureka CA 95503.

Gates Yard Board, painted white, \$300; Bogen CSM remote mixer, \$125. W Gunn. 619-320-0728.

Auditronics 110 A-4 12-chnl audio, stereo w/4 output chnls & instruc book. M Rice, Cont Media, 222 Indacom, St Peters MO 63376.

Tascam 216 16-chnl, new cond, \$950. B LeCato, WMYJ, 1508 Market St, Pocomoke MD 21851. 410-957-4300.

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Gates Studioette 5-chnl, tube-type, good condition, \$375; Harris Stereo 80, excellent condition, \$2500/BO. J Schloss, KICD, 2600 N Hiway Blvd, Spencer IA 51301.

Harris Stereo 80 w/manual, \$1500. R Muselman, KTIN, POB 307, Trenton MO 64683. 816-359-2261.

Peavey MK3-16-FC 16-input, phantom pwr, 4-band EQ, stereo mix buss, 2 cue & mon outputs in flight case, \$800/BO+s/h.

Want To Buy

24-32 chnl mon board w/8 sends. B Wilson, 906 W Main, Campbellsville KY 42718.

Ward Beck R1200/R2000 stereo input mods. B Taylor, KISS, POB 292, Miami AZ 85339. 602-425-7186.

RCA BC7B mods: 1A2 syst phone hybrid; A/C & Gold reels w/25 Hz tones. K Haight, KCMX, 820 Crater Lake Ave #213, Medford OR 97504. 503-482-2614.

DISCO & SOUND EQUIPMENT

Want To Sell

JBL 4311 pr spkrs, mint, \$750/BO. J Diamond, Blue Diamond, Box 102C Chubbic Rd RD1, Canonsburg PA 15317. 412-746-3455.

EV SH-1502-ER 2-way mobile loudspkrs, 15" woofer, titanium driver hom in carpet covered cab w/handles, comers & rubber ft, 800 W peak, 200 W pwr capacity, new cond. B Fisher, KPOK, Box 829 Bowman ND 58623.

Digitech VHM5 Vocalist, new in box, sell/trade for studio vocal mic/qual acoustic guitar, \$500. M Miller, 614-533-0636.

Gemco SG-800 (10) 8" JBL spkrs, \$10 ea. P Russell, Bowdoin Coll, Sills Hall, Brunswick ME 04011. 207-725-3066.

Altec 1568A, matched pr, \$950/BO; Marantz 8, \$1450; McIntosh MC240, \$1200; MC225, \$750; MC40, \$600; A116, \$600; Nak Stasis PA7aMk2, \$1750; PA7A, \$1150; NRG PA1, \$4500/BO/trade. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

Eventide BD931 (2) dig delays, mono & 3.2 secs, \$1000 ea. D Hood, WXXP, POB 151, Anderson IN 46015.

UA 1108 (10), \$100 ea; (12) UA 508 EQ, \$65 ea; (4) Angus graphic EQ, \$400 ea; (2) APSI 559 graphic EQs, \$225 ea; (2) APSI 562 param, \$200 ea. M Linett, Your Place, 1600 Las Flores Dr, Glendale CA 91207. 818-244-1909.

Snake, 16-phantom-pwr inputs w/ext ps, 250' Belden 19-pr cbl/ mil conns/ss strain reliefs, 10' Neumann XLR snake mates w/box & Belden snake, exc cond, \$950/BO/trade. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

Dolby 301 A-type stereo, discrete, \$500. W Gunn. 619-320-0728.

dbx 155 4-chnl encode/decode, type 1 noise reduc, \$200. P Cibley, Cibley Music, 138 E 38th St, NY NY 10016. 212-986-2219.

Sound & Light Disco III mixer, like new, \$300. J Stemke, Studio Sonics, 450 W Rand Rd, Mt Prospect IL 60056. 708-670-0025.

Urban stereo synth, \$225; dbx 224 type 2, noise reduc, \$100; UREI 809 time-align studio mons, \$1200 pair. R McMillen, Super Duper Audio, 1634 Salder St, Portland OR 97205.

Tannoy 6.5 spkrs, (3), \$259 ea; (3) Bose 802 II loudspkrs, \$549 ea. P Bombar, Open Studios, 102 Coleman Ave, Elmira NY 14905.

EMT 140 (2) plate reverbs, mono in, stereo out w/motorized damper, rem mels, modern opamps, \$7800 ea. C Baker, Sound Rcdrs, 9136 Mormon Bridge Rd, Omaha NE 68152.

dbx 208 8-channel noise reduction, new, \$1500/BO; 154 & 155 4-channel noise reduction same rack, mint condition, \$600 both/Best Offer; Soundworkshop 262 stereo reverb, new, \$500/Best Offer; ART DR1 & 01A digital reverbs, new, \$750 each/BO; (2) Loft 450 delay line/flangers, new, \$400 each/Best Offer; (2) Nexus 96-part patch bays, new, \$300 each/Best Offer; ADA 2.56i digital delays, new \$750 each/Best Offer. J Diamond, Blue Diamond, Box 102C Chubbic Rd RD1, Canonsburg PA 15317. 412-746-3455.

Rane MP24 mixer/preamp, nice cond, \$800/ BO. Shannon, WRFA, 800 8th Ave SE, Largo FL 34641. 813-581-7800.

TOA SM-60 (6), dual speaker with stands, \$100 each/Best Offer. J Diamond, Blue Diamond, Box 102C Chubbic Rd, Canonsburg PA 15317. 412-746-3455.

AB Syst 301 speaker switcher, new, \$250/BO; (2) 205A stereo pwr amps, 200 W, new, \$500 ea/BO. J Diamond, Blue Diamond, Box 102C Chubbic Rd RD1, Canonsburg PA 15317. 412-746-3455.

Clark Teknik DN 780 dig reverb, new, \$1900; BBE 422A sonic maximizer, excellent condition, \$150. P Bombar, Open Studios, 102 Coleman Ave, Elmira NY 14905.

Want To Buy

Peavey FH-2 (2) bass cabs, good condition with or with out speakers. S Wood, Media Arts, POB 1380, Kailua HI 96734. 808-236-1111.

Crown EQ2 Sony SEQ555ES/333ES; Technics SH9090; dbx 10/20, 20/20, 14/10 EQ; Yamaha REV5/REV7; Burwen TNE7000. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

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CBS Volumax 4110 FM stereo and 4300 AM, \$75 each. 407-423-1365.

Ashley CL50 peak detectors, exc cond, \$125 ea/BO+s/h. J Emmer, Paragon Bdctrs, 509 3rd St, Peckville PA 18452. 717-383-1118.

CRL SMP800 AGC w/filters, \$1000; Optimod 8000, very gd cond, overhauled, \$1500. R Rogers, KSKG, 1217 S Santa Fe, Salina KS 67401.

Aphex bdct aural exciter: CRL SMP 800 & SG 800 stereo gen, BO. J Pierce, KWNR, 1515 E Tropicana Blvd, Las Vegas NV 89119. 702-595-5705.

Gregg Labs 2530 (3) old tri-bands. J Nelly, KHTR, 4187 Wawawai Rd, Pullman WA 99163.

UREI LA-3A (2) universal audio, exc, \$800. D Lundy, 606-546-6650.

Inovonics MAPII AM system w/wide-band AGC, 8-band compression, AM peak, phase rotator & positive asymmetry, needs ext NRSC device, \$400. R O'Kelly, KORE, 2080 Laura St, Springfield OR 97477. 503-747-5673.

Harris/Gates M-6543 w/manual, \$75. T Rosen, KBCG, 1129 Acacia, Bakersfield CA 93305.

ORBAN 9000-AM Optimod NRSC in excellent condition. Call 816-635-5959.

Dorrough DAP-310 audio proc w/AM & FM cards, \$300. D Hood, WXXP, POB 151, Anderson IN 46015.

CRL AM-4, mono, excellent condition, \$1700/ BO. M McNeil, Guardian Comms, 800 Compton Rd #33, Cincinnati OH 45231.

Orban Optimod 8100A-1 w/6-band multiband & sep studio chassis, perf cond, BO; Mod Sci Comp Clipper, perf cond, \$400 B Watson, KSAK, 3352 Honeybrook #7, Ontario CA 91762. 909-947-8440.

CRL SPP800/SEP800/SMP900 AM stereo proc, \$900/BO. Shannon, WRFA, 800 8th Ave SE, Largo FL 34641. 813-581-7800.

Want To Buy

UREI 1176 LN/Teletonix LA2A. J Trevino, Blue Cat Rcdg, 327 Cumberland Rd, San Antonio TX 78204. 512-341-2979.

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EV 635, exc cond, \$50/BO. J Diamond, Blue Diamond, Box 102C Chubbic Rd, Canonsburg PA 15317. 412-746-3455.

Sennheiser 441 (matte), new w/all papers & response curves, \$470; Neumann U87Ai (satin), new w/all papers & Golham box, \$2100. R Payne 313-786-1767.

EV RE-11, \$95; C090 lo-Z, iav condenser, exc cond, \$80. D Lundy, 606-546-6650.

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MICROPHONES...WTS

Telefunken/Schoeps CM61 tube mic, orig ps, new cable, mint cond, \$3475/BO; CR-176 large diaphragm tube, new, \$1250. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

RCA 44BX, gd cond. M Rice, Contemp Media, 222 Indacom Dr, St Peters MO 63376. 314-928-6569.

EV 103 handheld cardioid XLR type (like 635A), \$25 ea; EV 644 shotguns, \$100 ea; also dynamic "nostalgia" mikes from 1940's, '50s; also Shure mixers. Ugly George, Satellite TV, 212-969-0240.

Neumann U67 (2) w/pwr splys & cbls, \$2400; (2) U87s, consecutive, \$1250, all gd cond. J Wells, Sound Arts, 8377 Westview, Houston TX 77055.

Audio Technica 813R cardioid, exc cond w/cases, \$125 each/BO+s/h. J Emmer, Paragon Bceters, 509 3rd St, Peckville PA 18452. 717-383-1118.

Sony ECM-33FP, (2), new, \$200 ea; (6) ECM-22, mint, \$150 ea/BO; (2) C-22, mint, \$150 ea/BO; (6) ECM-21, mint, \$100 ea/BO; Fostex M55RP, new, \$350/BO; (3) AKG D2000E, ball-type w/on-off switch, new, \$125/ea/BO. J Diamond, Blue Diamond, Box 102C Chubbic Rd RD1, Canonsburg PA 15317. 412-746-3455.

Microtech Gefell M71, \$657. P Bombar, Open Studios, 102 Coleman Ave, Elmira NY 14905.

Telefunken M921 dual (2-way, not front/back) nickel caps, cardioid only, classic tube mic; Neumann KM84 pr, mint, \$1100. W Gunn, 619-320-0728.

Telefunken tube mic pre amps V-76, U-73 limiter's; RCA BA-21As, BA-1As; Altec tube mic-pres. Tracy Eaves, 615-821-6099 (eves before 10PM EST).

Telefunken/Schoeps CM 61 tube, rare, new cable, mint condition, \$3475/BO; CR-176 large diaphragm tube, new, \$1250. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

EV 666, \$30; (3) EV RE-85 lavaliers, \$30 all. R Thompson, KOLON, 1288 Bellflower Blvd, Long Bch CA 90815.

EV 676 supercardioid mics 3/\$200; EV RE10 mic, \$125. W Gunn, 619-320-0728.

Telefunken M-250, U-67, 221-A; Neumann U-67, KM-56, UM-57; RCA KV3A-10,0001, 44-BX, 77-DX, BK-4, BK-5, 74-B, vauistics; Altec M-20, M-11, M-30 tube type mics. Trade or sale. Tracy Eaves, 615-821-6099 (evenings before 10PM EST).

Want To Buy

AKG C24. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

CBS/NBC call-ltr plate & antique floor mic stand for RCA 44 mic. M Harrington, POB 7619, Little Rock AR 72217.

77-DX's, 44-BX's, KU-3A's On-Air lights. Top price pd. Fast response. Bill Bryant Mgmt, 2601 Hillsboro Rd, G12, Nashville TN 37212. 615-269-6131.

RCA DX77, top price, cosmetically gd, need not work. E Dachel, WNYC, 1 Centre St 26th flr, NY NY 10007. 212-669-7706.

RCA 44BX, gd cond. M Rice, Contemp Media, 222 Indacom Dr, St Peters MO 63376. 314-928-6569.

AKG C24. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

RCA 77DXs/44BXs ribbon, chrome/ TV grey, gd cond. BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

MISCELLANEOUS

Want To Sell

Alertite 3V on-air warning light, new, \$50. R Franklin, 215-646-7788.

Jennings 650PF vacuum-variable cpctr & xmitter-type cpctrs, inductors. R O'Kelly, KORE, 2080 Laura St, Springfield OR 97477. 503-747-5673.

Up timers w/2" readouts, \$57.50; Sparta audio & RF tech manuals. D Peluso, KJUL, 2880 E Flamingo Rd Ste E, Las Vegas NV 89121. 702-732-2200.

King Mdl 300 audio cass loader mod w/seq ctrls, air & vacuum, \$550. D Lundy, 606-546-6650.

WE 189D, \$35/pr; UTC LS-141 hybrid, new, \$50; UTC LS-33 20W line/line, \$100/pr; Cinema Engrg 64266, \$30/pr; large Anvil rack case w/wheels, 6' high, \$1000. R Robinson, TNA Rcdg, 10 George St, Wallingford CT 06492. 203-269-4465.

WE & UTC (3) RC-111C; (2) REP 111D; (2) LS-10; (2) LS 140; (2) LS-27; (2) LS-30X, \$25 ea. L Smith, WCSS, 6 Genesee Ln, Amsterdam NY 12010. 518-843-2500.

Service/instr mnl (60) on consoles, crts, cameras, BO + s/h. S Dela-hoyde, Box 33063, Phoenix AZ 85067.

WE 189D xformers, \$35 pair; UTC LS-141 hybrid xformers, new, \$50; Cinema Engrg 64266 xtormers, \$30 pair; 6' Anvil rk case w/wheels, \$1000. R Robinson, TNA Rcdg, 10 George St, Wallingford CT 06492. 203-269-4465.

RCA M1-11718-1 lighted studio sign w/on-air glass. M Neff, WARM, Wilkes-Barre Scranton Hwy, Avoca PA 18641. 717-655-2271.

500 ohm line xformers, \$10 ea. B Fulgham, KBRA, POB 148, Freer TX 78357.

Audiolab TD-3 in excellent condition, \$325. Call Mark at 619-598-3311.

Want To Buy

Bogen/Quickset 3067/8 trips & dolies; Clearcom MS-2000C/other intercom syst. J McLean, Stagedoor 1, 9915 MacArthur Blvd, Oakland CA 94605. 510-562-4818.

UTC LS-10X, 12X, LS-15X, LS-18, A-10-12, A-24-26; W Electroacoustic schematic mic #120A; Hycor 4201 passive EQ; Gates Sta-Lvl M5167 limiter schematic; Gates M3529B limiter schematic; CBS Decibel Mtr Mdl 600 schematic. R Robinson, TNA Rcdg, 10 George St, Wallingford CT 06492. 203-269-4465.

Gener xfer switch, 200 amp, 1/3 ph, auto. E Davison 217-787-0800.

Schematic for Sparta Spartamatic mono PB cart. L Johnson, 3928 Red Oak, Doraville GA 30340.

Radio transformers by Chicago, UTC, Triad, Peerless, Freed, Sola, send list. J Gangwer, 942 32nd St, Richmond CA 94804. 415-644-2363.

Jazz record collections, 10" LP/12" LP be-bop, swing, dixie, highest prices pd. B Rose, Program Recdgs, 228 East 10th, NNYNY 10003. 212-674-3060.

UTC LS-10X, 12X, LS-15, LS 15X, LS-18, A-10, A-11, A-12, A-24, A-25, A-26 xformers; W Electroacoustic Labs PA 120A mic schematic; Hycor 4201 passive EQ; Gates Sta-Lvl M-5167 limiter; Gates M3592B limiter; CBS decibel meter Mdl 600 manual & schematic. R Robinson, TNA Rcdg, 10 George St, Wallingford CT 06492. 203-269-4465.

MONITORS

Want To Sell

TFT 763 & 764A, working, \$500/Best Offer. G Foldessy, WAKR, 1735 S Hawkins Ave, Akron OH 44320. 216-869-9800.

Harris AM stereo/mono mod monitor STM-1, excellent condition, \$1000/BO. L Robinson, WPAX, POB 129, Thomasville GA 31799. 912-226-1240.

Belar SCM-1 SCA with 67 + 92 kHz crystals, \$1000; Collins 900 F-1 67 kHz, \$300. M Persons, KVRN, 402 Buffalo Hills Ln, Brainerd MN 56401.

Want To Buy

Belar AMM 1/2, gd cond w/manual. R Miller, KUAU, 490 Ulumalu Rd, Haiku HI 96708. 808-572-5534.

Any older McMartin mod monitors. C Goodrich, 11435 Manderson, Omaha NE 68164. 402-493-1886.

MOVIE PROD EQUIP

Want To Sell

Victor pressure reg, \$50; Inovonics 360 repro amp, \$30; Metrotech transport 400 disassembled, \$50. R Thompson, KOLON, 1288 Bellflower Blvd, Long Bch CA 90815.

Stancil Hoffman 16mm mag recorder with monitor & Scully 280 Series recorder elects w/2nd transport, \$350. C Baker, Sound Recorders, 9136 Mormon Bridge Rd, Omaha NE 68152.

Singer/Graflex 1140A 16mm carbon arc project, \$1500 + shipping & handling. D Hurd, Harding Univ, 805 Park St, Searcy AR 72149. 501-279-4017.

PATENTS AVAILABLE

OFDM TECHNOLOGY:

Patents rights for OFDM digital communications technology are available for assignment. Applications include Digital Audio Broadcast (DAB), Mobile Radio Data Terminal (MRDT) and High Speed Data Rate Subscriber Loops (HDSL). Patents No. 5063574 of Nov. 5, 1991, "MULTI-FREQUENCY DIFFERENTIALLY ENCODED DIGITAL COMMUNICATIONS FOR A HIGH DATA RATE TRANSMISSION THROUGH UNEQUALIZED CHANNELS" is the basic patent. Patent No. 5166924 of Nov. 24, 1992, "ECHO CANCELLATION IN MULTI-FREQUENCY DIFFERENTIALLY ENCODED DIGITAL COMMUNICATIONS" is a continuation in-part of the basic patent. For further information: Mercury Digital Communications FAX: (408) 649-5218

RECEIVERS & TRANSCEIVERS

Want To Sell

Microwave Assoc VR-3X C-band w/mono subcarrier audio card tuned to 5.01 MHz, exc cond, \$200/BO. R O'Kelly, KORE, 2080 Laura St, Springfield OR 97477. 503-747-5673.

AM STEREO RECEIVERS
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Sony SRF-A1 AM stereo Walkman, new, \$89 ea. C Fox, WOLF, 4853 Manor Hill Dr, Syracuse NY 13215. 315-468-0908.

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RCA 40 W FM 700 Series w/mic, nd chnl elements, \$65. B Fulgham, KBRA, POB 148, Freer TX 78357.

REMOTE & MICROWAVE EQUIP

Want To Sell

Moseley 303 (2) xmtrs & rcvrs, working. K Kuenzie, KSLQ, 511 W 5th St, Washington MO 63090. 314-239-6800.

COMREX RENTALS

1, 2 and 3-Line Extenders Switched 56 Systems Call Steve Kirsch for details Silver Lake Audio (516) 623-6114 FAX: 377-4423

Moseley MRC 1600, exc cond, \$2000/BO. J Pierce, KWNR, 1515 E Tropicana Blvd, Las Vegas NV 89119. 702-595-5705.

Intraplex TDM-153 T-1 syst w/2-15 kHz, 3-7.5 kHz, 3 voice mods per side & CSUs, 9 mos use, BO. R Russ, KBLA, 1700 N Alvarado St, Los Angeles CA 90026.

30-pos switch bank for Moseley/RCA PBR-30, unused. M Rice, Cont Media, 222 Indacom, St Peters MO 63376.

Comrex LX-T & LX-R freq extenders, single-line, decoder w/rk mnt, \$650/pair. R O'Kelly, KORE, 2080 Laura St, Springfield OR 97477. 503-747-5673.

Marti STL-10 xmtr & rcvr w/2-4" dishes, 500' of 1/2" & 3/8" coax, \$1500 + assume pymts. C Ratliffe, WADE, POB 1210, Wadesboro NC 28170.

Moseley TRC-15AW w/manuals, exc cond, \$700. T Baun, Criterion Bdcnt Svcs, 5300 W Garfield Ave, Milwaukee WI 53208. 414-449-5300.

Symetrix 108 8-line, 3-hybrid phone syst w/2 consoles, nice cond, \$800/BO. Shannon, WRFA, 800 8th Ave SE, Largo FL 34641. 813-581-7800.

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Frank Grundstein 215-668-6434
Audio/Video Consultants 215-642-0978

Marti RPT-15/similar, 455 MHz. C Crouse, 814-837-9711.

Comrex LX-T & LX-R tele line ext, \$1000 both; Collins 831G-1 FM ext meter panel, \$250. D Hood, WXXP, POB 151, Anderson IN 46015.

Moseley MRC-1600, studio & xmtr units w/radio modems, exc cond, \$1200; Mark 4' grid microwave ants from 940-960 MHz, \$800 ea. T Pancoast, WMTK, POB 106, Littleton NH 03561. 603-444-5106.

Moseley 505 STL, \$500/BO. R Thompson, KOLON, 1288 Bellflower Blvd, Long Bch CA 90815.

QE1 7775 FM ATS, \$800. M Persons, KVRN, 402 Buffalo Hills Ln, Brainerd MN 56401.

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Subcarrier gen & demod for Moseley STL at 7.5 kHz. J Davis, KLSR, POB 400, Memphis TX 79245. 806-259-3511.

ADDS VPT A-2 term. A Tomaszycski, WUSA, 504 Reo St, Tampa FL 33609.

SATELLITE EQUIPMENT

Want To Sell

Sci-All 15 kHz DAT cd, \$150. D Hood, WXXP, POB 151, Anderson IN 46015. Uniden UST 3000 rcvr, \$150/BO. D Hofmann, KGHP, 14105 Purdy Dr NW, Gig Harbor WA 98332.

Schafer Dig w/3 Beta dks, 660 MB hard drive, \$16K. G Katz, POB 7568, KCEZ, Chico CA 95927. 916-342-2200.

Comtech/Fairchild 360 rcvr; spare cards. BO. R Reich, WDXY, POB 1269, Sumter SC 29151. 803-775-2321.

Wegener 1601 mn fm w/pwr sply, 7.44 & 7.04 demod, RF & IF down converter, com cntrl & relay interface SW, \$3500. Jim, KKLY, 715 Horizon #430, Grand Jct CO 81506. 303-243-1230.

TFT 7700 dual/stereo STL, xmtr & rcvr. M Rice, Cont Media, 222 Indacom, St Peters MO 63376.

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Wegener 1606-11 rcvr, nds work, BO. C Knerr, KCNA, 139 SE J St, Grants Pass OR 97526.

Wegener 1601 mnfm w/PS & 1630-01 card. A Daigle, WSJR, 6 10th Ave, Madawaska ME 04756. 207-728-4000.

Microdyne 1100-CSR sat/TV receiver, looks new, BO. R Fess, WLRB, POB 250, Macomb IL 61455. 309-833-5561.

Wegener 1601 w/Satcue 400 switcher, \$3500. J Spenar, KEXO, Box 2450, Grand Jct CO 81502.

Want To Buy

SCPC such as Harris, Adcom, Avcom, 7.5 kHz, narrow bnd, no Wegener. M Sagnelli, Great Lakes Media, 2929 Covington Ct, Lansing MI 48912. 517-371-2142.

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CCA SG-1E composite for CCA FM-40E, working/not OK, papers req. C Dunnam, Linear Rsch Assoc, 5244 Perry City Rd, Trumansburg NY 14866. 607-387-3411.

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3M Brand bridging video switcher, \$500. Call Mark at 619-598-3311.

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Pams Jingles ref tapes, 1951-1976, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625.



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62- & 92-min (100) audio, bulk erased, \$.05 ea. L Houck, Rollin Rcdg, 210 Altgelt, San Antonio TX 78201. 512-736-5483.

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45/78 records & amps. K Gutzke, 612-866-6183.

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Non prof, student-run station seeks equip, will pay s/h. M Wavle, WLHD, E Green Office, Ohio Univ, Athens OH 45701. 614-597-9759.

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Phillips PM6507 curve tracer, \$1475/BO/trade. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

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Ivie 10A freq anlyzr, \$200/BO; 20A pink noise gen, \$150/BO. J Diamond, Blue Diamond, Box 102C Chubbick Rd RD1, Canonsburg PA 15317. 412-746-3455.

Potomac AG-51 audio gen; AA-51 audio analyzer, incl carrying cases & manuals. Like new. Call 800-724-9479.

HP Spectrum Anlyzr 141T, 8552B, 8553B, 8554B, vgc, \$3,000. 407-423-1365.

Want To Buy

Crown RTA2 real-time analyzer; Tek 570 tube curve-tracer; Lambda & HP power supplis. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

Tascam 424 porta studio, \$429; 464, \$708; 488, \$1072; Hafler PRO2400 pwr amp, \$387; Neumann U-47 mic ext cable, \$50; Lexicon LXP-5 & (3) LXP-1, \$384 ea; (3) Lexicon MRC, \$279. P Bombar, Open Studios, 102 Coleman Ave, Elmira NY 14905.

TRANSMITTERS

Want To Sell

RCA BTA-5H whole/parts, BO. F Santore, WELI, POB 85, New Haven CT 06501. 203-281-9600.

Gates BC-5P2, 5 kW, \$3500; AM & FM rectifiers. 912-922-2222.

Gates FM5H, rblt 11/90 w/McMartin BFM-8000 exciter, \$16K. R Miller, WCNL, POB 68, Virden IL 62690. 217-824-3395.

Peter Dahl plate, \$800/BO. P Patton, WWAM, POB 279, Jasper IN 37347. 615-942-1700.

RCA BTF-1D 1 kW FM tuned to 104.3 MHz w/Harris MX-15 exciter, \$8500. D Peluso, KJUL, 2880 E Flamingo Rd Ste E, Las Vegas NV 89121. 702-732-2200.

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Xtal for 910 kHz fits Collins 20V, gd cond, \$100/BO. R Miller, KUAU, 490 Ulumalu Rd, Haiku HI 96708. 808-572-5534.

BE 5400C-900-5401-001, \$2000; (2) 2100C-900-2111-001, \$750 ea; 2100C-900-2110-001, \$550; Prism dig proc, \$1200. H Gauthier, WSAR, POB 927, Fall River MA 02722. 508-678-9727.

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Collins 20V 1000 W AM w/tubes, nice cond, \$1500. R Elm, WWJC, 1120 E McCuen St, Duluth MN 55808.

Bext PJ-100 100 W, on air, broad band, 88-108 MHz, \$1395. R Newton, 105.3, 266 Lantz Rd, Lawrenceburg TN 38464. 615-766-1022.

Acrodyne 1000 W TV, exc cond, \$29K; Microdyne sat rcvr, \$250; out-put notch filter for chnl 52-69, \$500. R Weigner, WAV, 29 Douglas Dr, Meredith NH 03253. 813-542-8042.

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Russco (2) Studio-Pro with Micro-trak tone arms & carts, \$400 both. D Rose, KAAA, 2534 Huala Pai Mtn Rd, Kingman AZ 81401. 602-753-2537.

Technics SP-10 MKII, exc cond w/PS, copy docs, stand & ATP-12T arm, \$700. G Foldessy, WAKR, 1735 S Hawkins Ave, Akron OH 44320. 216-869-9800.

JVC 4DD-5 CD-4 quad disc demod, unused, \$125/BO. D Pulwers, 703-751-9346.

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Canon VR-HF800 HiFi stereo, VHS VCR/editor, mint, \$500/BO; VC-40A color camera stereo mic, title generator, Quasar VHS HiFi 4-head, 3-speed, mint, little use, \$600. J Diamond, Blue Diamond, Box 102C Chubbic Rd RD1, Canonsburg PA 15317. 412-746-3455.

NEC FS-18 frame sync/TBC w/new card, manual, \$5000+s&h; Pana 3/4 edit system, NV9600/NV9240/ NVA960, \$2000. D Hurd, Harding Univ, 805 Park St, Searcy AR 72149. 501-279-4017.

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JVC CR4400 port 3/4" w/power supply & battery, Portabrace case, \$550+s/h. D Hurd, Harding Univ, 805 Park St, Searcy AR 72149. 501-279-4017.

Sony VO 2610 3/4 set w/RM 440 controller. M Gatti, Underdog Studios, 771 Farmington Ave, Bristol CT 06010.

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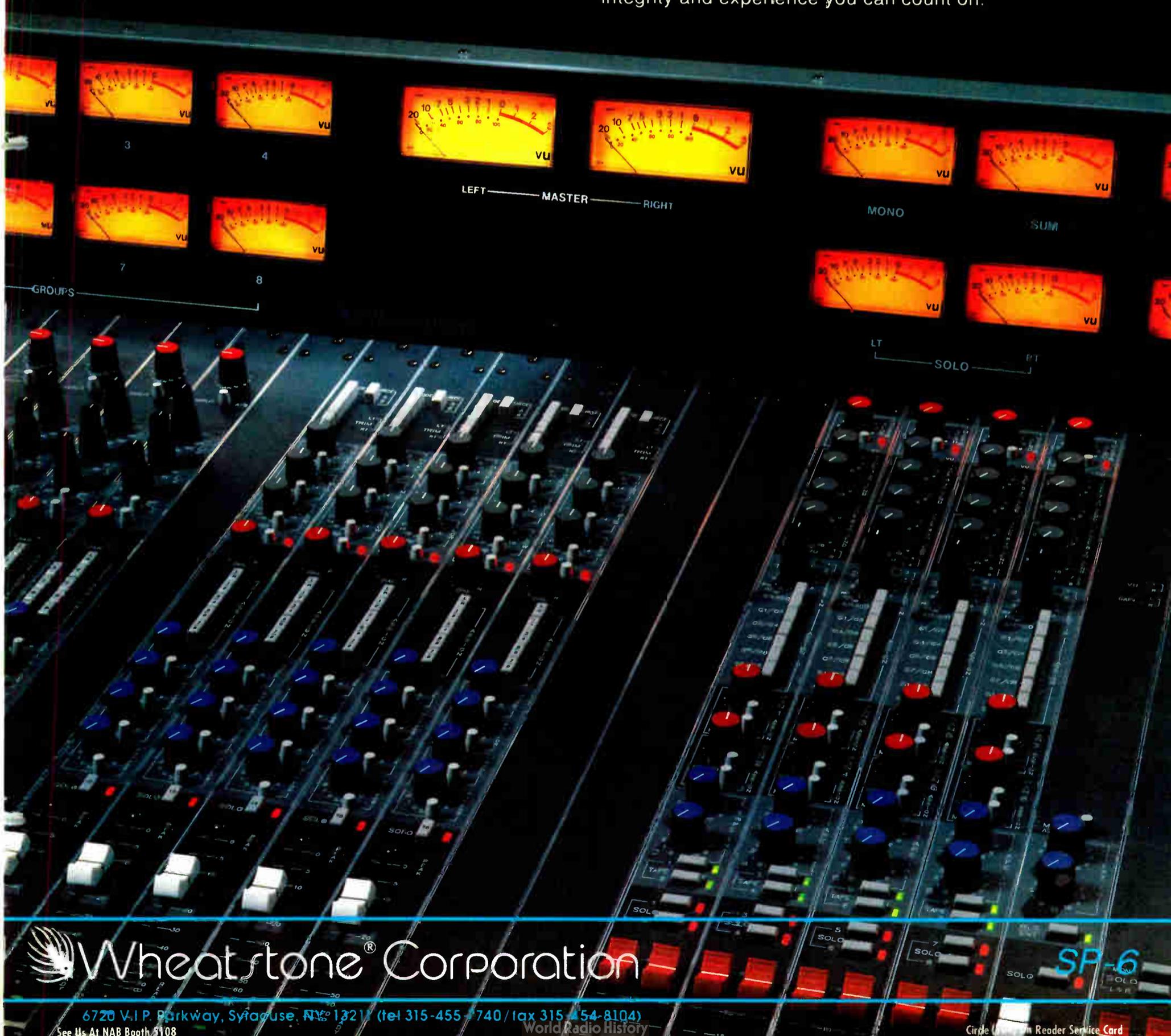
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