



USER REPORT

'After MidNite' Poses Engineering Challenge

by Matthew A. Connor
Director of Engineering
After MidNite

LOS ANGELES There is perhaps a shared trait among broadcast engineers—the thrill of a challenge. Rarely do things remain the same from day to day, resulting in an endless variety of challenges off of which many of us feed.

I have been fortunate enough to oversee the design and implementation of several major-market studios. They include WNEW-FM in New York, where I served as chief engineer, and Scott Shannon's "Pirate Radio" (the former KQLZ-FM) in Los Angeles, where I oversaw the construction of the morning show studio. Regardless of the station's individual financial successes, maximizing the funds allotted for engineering has always been of paramount importance.

strong as your weakest link. Given the grand scale of a nationally syndicated show, careful research and evaluation were a must.

I spent weeks evaluating every console on the market. The focus was on finding a console that provided us the performance of a Ferrari but with the price tag of a Chevrolet. In the end, only one console made the grade: the Broadcast Electronics (BE) Mix Trak-90.

With the hands-on assistance of Dave Buck and Bob McDonough at BE, we were collectively able to construct a studio that effectively answered all of the show's needs. The budget was set at \$10,000, with no additional room to play. As Buck and McDonough understood so well, every bit of fat had to be trimmed.



Pictured in the studio are Matthew Connor (l) and After MidNite CEO Ron West

Photo by Dan Chapman

The MT-90 was the unanimous choice, thanks to its modular mainframe. This allows for future digital expansion, including automation if it is desired. Many of the console's features were matched only by other much higher

priced consoles.

Every input is a programmable differential circuit which can accommodate any type of gear. Further, each input is equipped with VCA-controlled Penny & continued on page 49 ▶

After MidNite

At no time has this concept been as important as it was eight months ago, when I oversaw the design of the facilities for the "After MidNite with Blair Garner" show. My engineering philosophy has always been that you are only as

by Randy Sukow

Third in a series

WASHINGTON Many radio station owners and the National Association of

EEO Violations Likely to Affect Renewals

Broadcasters expect alleged violations of the FCC's Equal Employment Opportunity (EEO) regulations to be the most common grounds for license renewal challenges, once the commission begins reviewing radio licenses next year.

EEO challenges are nothing new. Historically, complaints about hiring practice have been common points of conflict at renewal time. But broadcasters may have a tougher time next year.

Many station owners and managers are confused about details of the latest changes in FCC EEO policy adopted last winter. The likelihood of even more changes before this time next year adds to the confusion.

Fluid situation

The FCC is in the process of preparing an EEO status report for Congress, due in October, which will touch on topics including possible changes affecting small-market broadcasters (RW, May 18).

At the same time, NAB is challenging last winter's EEO enforcement changes before the commission, as well as the FCC's current proposals to expand its regulatory schemes. It may be aided by a recent U.S. Appeals Court ruling that the FCC cannot make major, complex changes in its rules through informal "Policy Statements," but must put them through the regular process of public notices and comments (see story, page

11).

The effect of that ruling may be to void last winter's EEO Policy Statement, leaving the FCC with no specific enforcement policy. At press time, however, the policy is unchanged, and the prudent course of action for stations facing

renewals over the next three years is to comply with the current rules as they now read. So far, the high-

est concern for broadcasters attending NAB license-renewal seminars has been the commission's new requirement that broadcasters must recruit women/minority job candidates for at least 66 percent of open positions during the current license period.

Stations must not only send notices of job openings to sources where likely to draw women/minority applicants but must also keep track of the number of referrals resulting from each source and expand or change the source list if it yields inadequate results.

Small stations that have only a handful of job openings over a license period may be especially vulnerable to the rule, although the fine may be reduced for some small-market stations, depending on the situation. The base fine of \$12,500 also is upwardly adjustable for large-market stations or especially "egregious" violators.

In the short term, a licensee does not have to fear an automatic fine if the station is not in compliance with the 66-percent

continued on page 7 ▶

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NEWSWATCH

SESAC Implements New Music Tracking Systems

NEW YORK The first usage-based music licensing systems in the U.S. was put into effect by SESAC on July 1. According to the company the first category was Spanish-language music and other formats will follow.

A new digital technology computer-based system, developed by Broadcast Data System, automatically gathers "highly accurate" data on music airplay of Spanish radio and TV stations.

"Now broadcasters can pay for actual music aired, as opposed to an approximation,"

SESAC Chairman Ira Smith said. For many years, there have been adversarial proceedings on the concept of blanket and so-called per program licenses. Now this more precise system will balance the needs of broadcasters who feel they overpay for the music they do not use against the needs of song writers, music publishers and proprietors of music copyrights who feel they are not getting a fair share due to inaccurate reporting of songair-play.

Commissioners to Appear At NAB Radio Show

WASHINGTON FCC Commissioners Andrew Barret, Rachelle Chong and

Susan Ness will attend the World Media Expo's NAB Radio Show in Los Angeles, October 14. The show is scheduled for October 12-15, and the commissioners will be featured in a policymakers breakfast.

FCC Chairman Reed Hundt already is scheduled to speak Thursday Oct. 13 at 2 p.m.

FCC Ruling Would Allow Prototype Demonstrations

WASHINGTON The FCC has proposed amending Part 15 rules to permit limited marketing and operation of RF products at trade shows prior to completion of equipment authorization procedures at the Commission.

The Electronic Industries Association

(EIA) initiated the Petition for Rulemaking in order to "facilitate manufacturers promotion and introduction of new products for the CES show," but the NAB and other broadcast shows also would be affected.

The existing rules permit only limited exhibition of non-approved products and prohibits operation of the devices. The rules also require a conspicuous notice that the devices cannot be sold until it meets FCC approval.

The amended rules would allow operation of the device, but still require the conspicuous notice.

AFCE Officers Elected

WASHINGTON The Association of Federal Communications Consulting Engineers (AFCE) recently held elections for officers for 1994-95. The officers are: John F.X. Browne, Jr., president; L. Robert duTreil, Sr., vice-president; Carl T. Jones, Jr., secretary, and Sudhir K. Khana, treasurer.

Members of the executive committee are: Warren P. Happel, Steven J. Crowley, R. Morgan Burrow, Jr., Donald G. Everist and Robert D. Culver.

When looking for a digital audio system for automation of satellite programming 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.

You will see the difference as soon as you see the Phantom in action. The display provides you with all of the information you need to see in a clean, concise manner, without the crowded look that you'll find in other systems. If you are familiar with the most popular software on the PC, then you may already know how to use the Phantom. The Phantom's pull-down menus guide you through all of the steps involved in setup and daily operation, from creating and scheduling clocks to creating and editing logs.

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The Phantom can retime spots to fit them cleanly into a satellite break without inserting silence, overlapping, or running late. The Phantom



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.

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New Level Of Control

DALLAS Scott Studios recently installed its 100th touchscreen-controlled digital audio system with the installation of its new Sports/Talk model at "The Fan," Shamrock's WDFN in Detroit.

Scott Studios' new talk model features three touchscreens. Air talent, sports and newsroom people and telephone call screeners can control what's on the air from three different studios. Scott Studios' "hot keys" on the three touchscreens turn on and off 14 mics, phones, networks, remote lines and digital audio, with levels controlled by a Pacific Recorders BMX console. Other hot keys instantly start 26 sets of 18 "always ready" digital recordings and access 10 databases containing thousands of recordings available at a touch from any studio. The log and events can be changed on the fly.

Dave Scott, CEO of Scott Studios, said: "The Scott touchscreen let WDFN hire TV and newspaper sports experts and research people. Only two of their people had any radio experience. WDFN air talent concentrates on program content because the Scott System handles so many of the technical details. It plays station bumpers, theme music and sound effects at a touch from the 10 talk-oriented databases.

The Scott System automatically records various news and sports network feeds for unattended delayed playback. Several Wire Ready editing stations record news actualities with Cart Ready that play on the air through the Scott System. Ⓢ

Some Transmitters Exceed NRSC-2

by John Gatski

WASHINGTON The NAB has asked the FCC to exempt stations using Harris MW-1 and MW-1A and Continental 317 AM transmitters from having to meet the NRSC-2 RF occupied bandwidth limit for one more year in order to allow the companies more time to research possible compliance upgrades. The NRSC-2 requirement went into effect June 30.

According to the NAB, about 600 1 kW MW-1 and MW-1As are still in use, and another 300 stations are using the Continental 317, a 50 kW transmitter. The companies said they are uncertain how many do not meet the NRSC-2 specification. Harris said it has taken about 30 calls from stations that do not meet the occupied bandwidth limit.

At press time in mid-July, Richard Smith, chief of the FCC's Filed Operations Bureau, said a decision about granting the NAB request for extension was probable by late July.

Although a number of the transmitters are meeting the NRSC-2 occupied bandwidth limit, "some users are now finding it virtually impossible to attain full compliance with Section 73.44 of the Rules at certain frequency ranges removed from the carrier," a letter from NAB to the FCC said. "Specifically, the section 73.44(b) requirements that 'emissions removed by more than 75 kHz must be attenuated at least $-43+10\text{Log}$ (power in watts) or 80 dB below the unmodulated carrier level, whichever is the lesser attenuation...'"

The inability to meet occupied bandwidth limits appears to be confined to the transmitters transmitting on 1200

kHz or higher frequencies. And, according to NAB, some of the non-complying transmitters just barely miss the mark.

NAB Manager for Regulatory Technical Affairs John Marino said a low cost upgrade would be a relief for AM stations since they would not have to buy new transmitters. Many AM stations operate close to financial margin, and having to

Some of the transmitters may only need to be retuned to meet the NRSC specification.

buy a transmitter—\$15,000 to \$50,000—would be a hardship.

Some of the transmitters may only need to be retuned to meet the NRSC specification, Marino added.

Because of the large number of transmitters, it is likely the FCC will accord stations at least some type of consideration if theirs do not meet the NRSC mark, Marino said.

Harris Allied Customer Service Director Dave May said the MW-1 and MW-1A solid state transmitters were sold from

1974-1982, about 850 in total. At presstime, he said that Harris engineers were close to coming out with a retrofit package that may cost only about \$200 that would allow the transmitters to be in compliance with NRSC-2.

With regard to the probable low cost of the compliance modification, May said: "Everything is modular." It's a very simple transmitter."

Although Harris said it will offer the upgrade kit once it determines that it is workable, May told customers in a letter in late June that stations should "please bear in mind that it is the responsibility of the station to maintain conformance to all applicable regulations and standards; therefore, we cannot assume responsibility for old products meeting changes in regulations unless required by law."

In a letter to its customers, Continental also said that, although it will try to accommodate its customers in trying to get its transmitters to meet the NRSC-2 rule, stations are ultimately responsible for compliance.

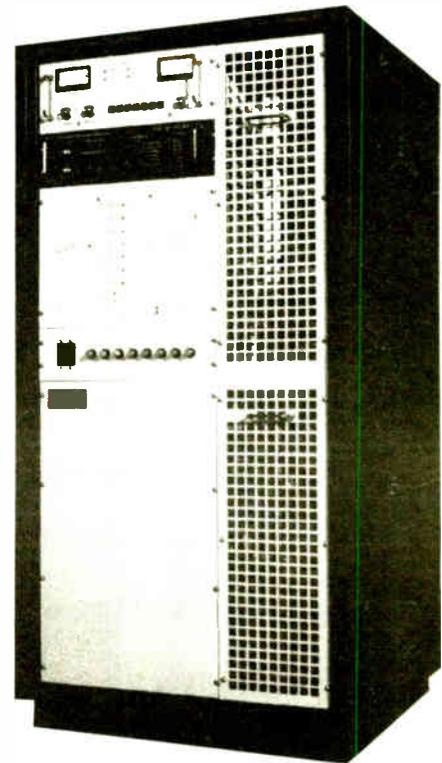
In 1989, AM stations were given five years, June 30, 1994, to meet the NRSC-2 criteria and make measurements to assure their compliance. Many stations waited until late in the spring to make the measurements, the NAB said. Ⓢ

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Industry Seers Predict Ad Boom

WASHINGTON The first order of business this time out is to correct a mistake I made in the July 13 issue of *RW*. I reported that Andy Butler had left the NAB to join the folks at Broadcast Electronics in Geoff Mendenhall's old job. I misunderstood. Rick Carpenter filled that position last year (director RF and studio equipment). Andy joins BE as manager of RF and studio marketing. Sorry about the confusion.

★ ★ ★

Last time out I wrote about Charles Herrold, one of broadcasting's forgotten fathers. I have some more information on the subject. According to Mike Adams, the San Jose State University professor who pulled the entire project together, the video will be distributed to PBS stations through one of its syndication services within the year. It was produced at member station KTEH(TV) in San Jose.



You can purchase a copy of the video through the mail as part of a fund-raising effort by Adams' sponsor, The Perham Foundation Electronics Museum. The foundation is building a new museum in San Jose, in the heart of California's Silicon Valley.

The museum's collection includes papers and artifacts by such broadcasting and electronics legends as Lee de Forest, Cyril Elwell of Federal Telegraph, Hewlett-Packard and Eimac. The cost of the video is \$29.95 plus shipping and handling. Contact the Perham Foundation (a non-profit historical trust) at 101 First Street, Suite 394, Los Altos, CA 94022; 408-734-4453.

★ ★ ★

Elsewhere in this issue you will find an article detailing radio's billion-dollar

month of May. We hadn't even finished putting this issue to bed when we received Veronis, Suhler & Associates' forecast for radio. The news is very encouraging for everyone.

The growth rate for total radio advertising will double to 7.1 percent compound annu-



KNIX-FM set up a live broadcast stage at the Arizona State Capitol, site of the Fabulous Phoenix Fourth of July celebration. The record-breaking crowd of 250,000 came out to celebrate with country star Rick Trevino (center) and DJs John Michaels (R) and Bobby Lewis (L). Also performing on the KNIX-FM stage were Trisha Yearwood and Clay Walker.

al rate in the next five years, reaching \$13.2 billion by 1998, according to the eighth annual Communications Industry

Forecast, released by the New York-based investment banking firm.

According to the forecast, radio, spurred by the economy and the renewed interest of advertisers, will outpace all other measured media advertising except for local cable.

The breakdown of numbers is interesting. Specifically, the forecast reports that while television and newspapers will continue to garner the lion's share of local advertising dollars, radio's growth rate, at 7.6 percent, will be higher. By 1998, local radio advertising will reach \$10.6 billion, up from \$7.3 billion in 1993.

National spot radio is expected to more than double. The forecast indicates that advertisers will spend \$2.1 billion on national spot radio in 1998, up from \$1.6 billion in 1992. For 1993-1998, a 5.9 percent compound annual growth rate is projected for network spot, below the anticipated growth for local radio, but better than the 2.6 percent annual increase during the last five years.

Network advertising is expected to reach \$540 million by 1998. During the 1993-1998 period, network radio advertising is expected to increase at a 3.3 percent compound annual rate, more than twice the 1988-1993 growth rate. Although growing at a faster rate over the forecast period, network radio's share will drop to 4.1 percent by 1998.

The forecast highlights several industry trends that Veronis Suhler feels bear watching in the coming years. These include new findings in listening patterns and station format trends.

The growth in popularity of country-formatted stations continues unabated. On 27.9 percent of all stations,

country music is the No. 1 format in the U.S., outpacing adult contemporary, the No. 2 format, on 17 percent of stations.

In the course of the last five years, 340 stations have dropped the top 40 format, while 342 stations have adopted country. Also among the up and coming formats are news/talk stations, up 458 stations, religious, up 150 stations, and sports, up 137 stations.

The forecast also places children's programming on the "to watch" list, as well as adult album alternative, attractive because of its appeal to affluent baby boomers.

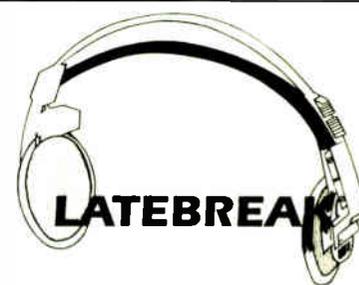
★ ★ ★

Speaking of programming to watch (or listen) for, the sounds emanating from National Public Radio (NPR) sound that much sweeter these days, originating from NPR's new facility in downtown D.C. Working in conjunction with the city government, NPR bought its own place at 635 Massachusetts Ave. and equipped it with state-of-the-art equipment.

NPR invited industry friends to an Open House last month, a fun event complete with a guided tour of the entire installation. The Open House, presided over by new NPR President Delano Lewis, was attended by such notables as former NPR President Doug Bennett, former FCC Commissioner Patricia Diaz Dennis and ABC News' Cokie Roberts.

The more important Open House, however, had been held by NPR a few days before for its new neighbors. Those of you who know D.C., know that NPR's new neighborhood is a work in progress, with urban renewal and renovation just around the corner, anchored now and spurred by the NPR move. NPR has designed a community room into its new facility, and as Lewis put it, "plans to be a good neighbor."

Congratulations to NPR and good job on remembering radio's role in its local community. We will feature a profile of the new facility in an upcoming issue of *RW*.



Ronald B. MacIntyre has been appointed vice president for worldwide sales and marketing of United Press International, following the resignation, for health reasons, of L. Thomas Adams, who had held the position since 1993. MacIntyre was serving as director of marketing, and had served as strategic planning, marketing and sales consultant to major clients in the U.S. and overseas. Adams will continue to handle key accounts and other special projects for UPI as a consultant.

Weezie Kramer has been named vice president and general manager of WMAQ(AM) Chicago. Group W Radio's news and sports station. Kramer succeeds Rick Starr who resigned last month. Kramer had been station manager at the station.

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RFR experience

Dear RW,

This is a note in response to Lawrence Tighe's comments on whether electronic transmissions from broadcast towers affect or impair the human frame (RW, June 1).

My first experience with commercial broadcasting was as a technician in 1936. I am currently employed as chief engineer for KIPA(AM)-KHWI(FM) with three AM transmitter and two FM transmitter sites around the big island of Hawaii.

From the mid-1960s to 1990, I operated a contract service company for an average of 25 radio stations at a time. My workshop contained between four and six stations' transmitters all operating from a single tower placed approximately 50 feet from my workbench and six feet from one of these station's control rooms. The RMS antenna current on the tower varied between 80 and 110 amperes.

I worked with a crew also on towers with transmitters operating at full power, including FM and TV, searching for gas leaks and coax hot spots. Of the hundreds of technical people that I have met or worked with in all of these years, none have suffered any mysterious illnesses except one exceptional man, Dan Hunter, who died of cancer, which was undeniably due to his daily ingestion of many packs of cigarettes, not his lifelong pursuit as a chief engineer.

I clearly remember an early FM transmitter installation on a mountain site on Oahu where, because of a very sharp fall-off land contour, I mounted an eight-bay Penetrator on a short tower where the bottom bay was level with the edge of the cliff. I used to take comfort at this chilly site by sitting beside the bottom bay and running my arm or leg out along the bay until I felt a very warm and comfortable feeling.

I do not know whether it was HF diathermy or foolhardiness, but such fun

and games have had no aftermath.

The point being, of course, that an organization has grown up to develop a very financially rewarding career for all concerned, with the worst yet to come. Surely there must be a way to halt this costly fiasco. Produce the *corpus delicti* or get off the pot.

Alan L. Roycroft, chief engineer,
KIPA(AM)-KHWI(FM) Hilo, Hawaii

No small burden

Dear RW,

Your publication is widely read. You probably have a 'feel' for the radio business, and this is a rare in broadcast publications. However, one statement in the July 13 column by Harry Cole concerns me.

Mr. Cole states: "Broadcasters have been subject to the FCC/ANSI standards since then, but it has not been a great burden."

In an earlier issue on the subject of license renewal, Randy Sukow warns stations about the "temptation to check a box on the renewal form and fudge the answer."

During our last renewal time, we paid dearly to have the proper measurements made, had the full report on file, posted all the proper admonitions to anyone working at the transmitter site and built new fences, all at considerable time and cost.

We not only checked the box, but we backed it up. This may not sound like a great burden to Mr. Cole, but it certainly was to our small-market station.

Frank Luepke, general manager,
KIWA-AM-FM Sheldon, Iowa

Freeman effect

Dear RW,

Bruce and Jenny Barlett's headphone review (RW, July 13) brings to mind some information about the "Freeman effect" that I believe your readers will find useful.

Simply stated, there is a correct phasing for headphones when a jock is listening to his/her voice. I am not talking about phasing between headphone channels but about the need for phase coherency between the voice as heard in the phones and the voice as it reaches the ears via bone conduction.

There is an absolute and dramatic difference between right and wrong, and there is an easy test to determine which way is correct. If you want to be a hero with your air staff, rig up a test jig and try it.

You will have to reverse both channels of the headphones at the same time or reverse the phase of the mic audio itself. Three-wire cords make it a bit tricky to reverse the headphones so you will probably find it easier to reverse the phase of the mic cable.

You will want your test jig to provide instant A/B switching. That is pretty easy to do at the mic with some XLs and a toggle switch. The results will be dramatic.

There is a 50/50 chance it is correct now. Remember, if the results of the test cry out for mic-phase reversal, be sure all

Write Rules that Last

Radio stations in the Southeastern U.S. now preparing for license renewal proceedings next year deserve some sympathy. If the commission does not act to clarify some of its most confusing and complex regulations, stations throughout the rest of the country facing renewal over the following three years will also be in a hard place.

License renewal is, in large part, based on a history of compliance with FCC rules and regulations.

But who knows what those rules and regulations will be from month to month and year to year?

A recent court decision holds that the FCC's 1991 "Schedule of Fines and Forfeitures" is no longer valid because it was a substantive change of the rules improperly adopted through an informal "Policy Statement" rather than the formal public notice and comment process.

The good news is that stations are no longer subject to fines imposed under the 1991 schedule. The bad news is that many of those fines will probably be reimposed after the commission finally adopts a new schedule, and the entire costly process drags on.

The National Association of Broadcasters claims, with much merit, that the FCC's current Equal Employment Opportunity (EEO) enforcement regulations are invalid because they too were adopted through a quick and simple "Policy Statement" rather than giving broadcasters a chance to comment on them.

The FCC has yet to commit to submitting its EEO enforcement policy for public comment. If it does, broadcasters can be expected to tell the commissioners what they think about a policy that mandates a base fine of \$12,500 for stations that do not adequately document recruitment of women and minorities, even if its actual hiring practices are well within the EEO quotas of earlier FCC policy.

Meanwhile, stations facing renewals must decipher the rules as they now stand, do what they can to comply and be ready to react to whatever policy comes next.

The details differ, but similar confusion swirls around FCC policies for RF radiation exposure, indecency and, as another election season approaches, campaign advertising.

One day, hopefully, the government will write rules to last, keeping in mind the practical problems and expense instability has on the governed.

—RW

mics in the same room end up reversed. Of course, if you are listening off-air past phase scrambling in the audio processors, this may not mean much. Try it in the production room and watch the reaction.

We all know jocks who simply do not like change. There is a minor chance you will be correcting phase, and they may not like it because it is different. But wait until they hear how much better correct phasing can sound to a stuffed-up head.

I am not sure who Freeman is, but I do know the theory is correct. It is related to the same theory that proves there is an absolute polarity in loudspeakers that is correct for certain music recordings.

There is also the "absolute polarity effect" some folks notice when listening to certain recordings with headphones. Again, the phones may be phased correctly between themselves but may be out of phase with the source.

Reversal of both sides will produce a difference that will be judged better or worse, depending on the listener.

Mark Durenberger
Eden Prairie, Minn.

Brush with memories

Dear RW,

I so much appreciated the feature article by Read G. Burgan about the Brush Soundmirror (RW, July 13). It immediately brought back so many memories of fun and frustrating moments in the use of this machine during two of my years in the radio department at New York University.

As soon as I realized the article was about the Brush, the first thought I had was of the heat. If you tried to extend our

Soundmirror's use beyond three or four hours, it would slow down to a crawl.

Nevertheless, it seemed like heaven using it after being limited to recording our programs on 16-inch, standard groove acetates and having to start all over when someone blew a cue or a line. If the program was over 15 minutes in duration, we would cut Side A outside in and Side B inside out to overcome slight differences in quality, even though the diameter equalizers were used.

Gil Arion, Gilbert R. Arion
Associates, New York

Change the tune

Dear RW,

I thought by now someone else would have pointed it out, but I guess not. I am referring to the illustration you use for the "Tuned In" section of your fine publication.

Your readers may be tuned in, but the artist who drew the dial face surely was not. It looks like he never heard of AM radio. He has cut off half the band. AM is 535 kHz. What the heck is he listening to at 400 kHz.

So humor me, guys, and when we have the new expanded AM dial, please change it again.

Stephen H. Lampen, field sales,
Belden Wire & Cable, San Francisco

Editor's note. Mr. Lampen has a good eye. The "Tuned In" logo was slightly revised some time ago. The editors failed to notice insertion of the wrong numbers on the AM dial at that time. The logo appears with a corrected dial on page 51 of this issue.

Radio World

Vol 18, No 16

August 10, 1994

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Radio World (ISSN: 0274-8541) is published bi-weekly by Industrial Marketing Advisory Services, Inc., 5827 Columbia Pike, Suite 310, Falls Church, VA 22041. Phone: 703-998-7600, Fax: 703-998-2966. Second-class postage rates are paid at Falls Church VA 22046 and additional mailing offices. POSTMASTER: Send 3579 forms and address changes to Radio World, P.O. Box 1214, Falls Church VA 22041. Copyright 1994 by Industrial Marketing Advisory Services, Inc. All rights reserved.

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World Radio History

EEO Record Influences Renewals

► continued from page 1

rule, said Rod Porter, Deputy Chief of the FCC's Mass Media Bureau. The commission will allow stations to change their recruiting procedures and build a history of compliance.

For example, a station could occasionally go out and hire a rival cross-town station's popular white male morning personality to drive ratings up, and the FCC will not question it. They can fill some jobs through word-of-mouth contacts without formally recruiting for the vacancy, if it is an emergency situation.

But if stations totally disregard the EEO recruitment "efforts test," they risk an

eventual FCC fine and open themselves up to the possibility of a license renewal battle.

"If you look at the people that get in trou-



ble, they are basically the people who have openings, but they don't recruit," Porter said.

"Sometimes (stations) do recruit but get very poor results," he said. "We have said

that we don't care which resources you go to if you get results. But if you don't get applicants, then we prefer that you go to sources that are most likely to refer minority and women applicants."

Porter said stations should keep careful records of job applicants and the sources they tapped (colleges or interest groups serving minorities and women). "The question to ask yourself is, 'Am I in a position to

early 1970s. "You always lose. Why waste your time? I've done hundreds of petitions to deny."

Petitions to deny are less complex, but they can still be expensive and time consuming. "In my experience, 95 times out of 100, the petition is rejected by the staff. Those things rarely take hold," Cole said. But the staff usually waits months to act on it, he added.

The petition is filed, the licensee replies "and it sits on somebody's desk for a while" before anything happens because the FCC is currently short-handed, Cole said.

There are also bureaucratic delays. Whenever a change must be made in a docu-

The FCC is preparing an EEO status report for Congress, due in October, which will touch on topics including possible changes affecting small-market broadcast.

defend myself," he said.

A review of the station's hires every year or two to be certain that an adequate number of minority/female candidates are being attracted from current sources is another wise practice, Porter said.

Challenge

Historically, EEO fines are not meted out frivolously, Porter said. "When you see an item come out of the FCC on EEO, it is an item that has received a great deal of attention," he said.

Stated another way, EEO proceedings usually do not go away quickly.

If there is a challenge, the licensee may not know about it until three months after the filing deadline or perhaps longer. "If someone files a competing application, there is no requirement that they serve you. You would be stuck finding out about it by just reading the (FCC) releases," said Harry Cole of Bechtel & Cole, Washington, and writer of RW's *Cole's Law*.

After a competing application is filed, the licensee has the right to defend against the competing application. That process alone can take months or years. The case is eventually heard by an FCC administrative law judge. The entire process has been known to drag on for over a decade.

Only the most flagrant EEO violations are likely to draw a competing application. "There have only been a handful of licenses that have ever been taken away after a comparative hearing," Cole said.

"I have never, on the behalf of any client, filed a competing application. That surprises a lot of people, but I've never done it," said attorney David Honig, who has represented minority clients at the FCC since the

ment, even a minor change. "it's not like sitting at a computer screen, typing delete and typing what you want," Cole explained. "It has to go all the way back down, someone has to manually type the stuff back in and then it goes all the way back up again."

The expense and aggravation of such proceedings during past renewal rounds forced several licensees to pay challengers cash settlements to drop their petitions. However, the FCC, in response to NAB lobbying, has approved anti-abuse-of-process rules in recent years that have cut down on the number of petitions to deny.

"Now there are limits on how many dollars can go to the petitioners. They can recoup only their legitimate and prudent expenses, such as copying documents and legal fees," said Barry Umansky, NAB deputy general counsel.

But broadcasters may have reasons to be wary of other possible expenses and legal hassles due to EEO-related petitions to deny. Those reasons and other ways broadcasters can protect themselves are topics for a future installment.

Radio Revenues Hit One Billion in May

by Whitney Pinion

NEW YORK The Radio Advertising Bureau (RAB) recently announced that May was the first month that radio's advertising revenues exceeded \$1 billion, indicating a very healthy radio economy.

RAB's monthly radio revenue index showed that combined national spot and local radio revenue grew at a rate of 12 percent in May over May 1993 levels.

Industry players seem pleased but not surprised by the news. "May has historically been one of the largest months for the industry," said Bill Stakelin, president and CEO of Apollo Radio. But, he added, these numbers do reflect the rapid growth that radio has been experiencing recently.

"This growth is very real and has been sustained for the better part of a year," Stakelin said. He said he expects more record-shattering months in radio's future.

Jim Thompson, president of Liberty Broadcasting, said the figures indicate that business in general is better for all media and that radio is far exceeding growth increases of any other advertising vehicle.

So why are ad dollars flowing back into radio's pockets, especially now that advertisers are confronted with more options than ever for marketing their wares?

Gary Fries, president of the RAB, admits that it would be naive to attribute this growth to any one factor. Radio could be perceived as simply a benefactor of the upswing in ad expenditures that are the result of an improving national economy. But Fries, Stakelin and Thompson all agreed that radio's role in its own success hasn't been so passive.

According to Fries, radio is becoming more action-oriented. He referred specifically to the Radio Industry Executive Program, in which the heads of some of the best networks in the country talk one-on-one with advertisers to determine the companies' goals and how radio can help them reach these goals.

"The focus in advertising has shifted from responding to the needs of the radio stations to fulfilling the strategic needs of the advertiser," Fries said.

Thompson agreed that radio is mobilizing itself and moving more aggressively. "People are understanding that there's power in radio if used properly," he said. This way of thinking, he said, is a result of "the leadership of the industry having a clear-cut plan for getting a clean slice of the pie."

Fries also credits the emphasis on creativity in radio spots for an increase in ad revenue. The Radio-Mercury Awards in June, for instance, honored inventive, effective commercials and signaled a turning toward higher quality spots to reach listeners and get results for advertisers.

Another reason advertisers turn to radio, Stakelin said, is that the advertising community perceives radio as a very stable advertising medium without a lot of rifts. "(Radio) is not fragmented by new media," he said. "Advertisers and investors now see radio as a stable part of the daily media diet."

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World Radio History

Radio Translators Fill in Coverage Gaps

by Thomas Pear

WASHINGTON During the past year the FCC saw a significant increase in the number of applications for FM translators, mainly because stations realize they are a cost effective way to enhance coverage.

FCC Auxiliary Service Branch Chief Alan Schneider said translator applications for new or existing stations rose 33 percent between July 1, 1993, and June 30, 1994. "The majority of applications being received are for non-commercial stations," he said.

Non-commercial stations are allowed by the FCC to use translators to extend their broadcast contours and reach additional listeners—if they have support from the local community to which they are extending their coverage. Translators allow stations to rebroadcast a weak signal on a different frequency at a lower cost.

"It's cost effective," said Skip Spence, chief operator of Christian contemporary station WAYM in Nashville, Tenn. "It's

Huntsville, Ala., about 110 miles south of Nashville, and rebroadcast on 88.1.

The price tag for rebroadcasting the WAYM signal is relatively low as far as radio dollars are concerned, according to Spence. "The whole package cost about \$18,000," he said.

A non-commercial station can also take advantage of a satellite feed translator system, where a satellite is used to bounce a transmission from one location to an earth station in another location. The earth station then shoots the signal to a translator in the new area for FM broadcast.

But FCC rules stipulate that a non-commercial entity initiating a satellite transmission must own the primary station and translator and must use a reserve channel.

Unlike their non-commercial counterparts, commercial stations are more restricted in their use of translators. Commercial stations are prohibited by the FCC from owning translators to expand to new listening audiences outside their contours, so they can only use translators to overcome broadcast obstacles within their licensed contours, like hills and mountains that block frequency signals.

The rationale, said Chuck Pollack, a radio professor from Regent University in Virginia Beach, Va., is that translators allow commercial stations to infiltrate mar-

kets in outside areas and create an unfair competition burden for other commercial stations in those markets.

Small town stations would be forced to compete with stations from large markets that have significantly more resources, he said.

Non-commercial stations are an exception to the rule because they provide programming that the public normally does

not have access to, like educational and religious broadcasting.

However, commercial stations prefer to use a translator over a power booster because a translator is less costly and produces better results than a FM power booster.

They save stations money because putting up a translator involves less engineering studies than putting up a power booster. Energy-Onix marketing vice president Ernie Belanger said. Energy-Onix specializes in marketing transmitting equipment.

Besides being cost effective, a translator provides a more efficient means for commercial stations to work around

mountainous and hilly terrains.

FM boosters have a disadvantage because their signals can collide with the station's primary signal, creating a reception void in the station's broadcast contour.

The clash between the two signals is known as a "picket fence" and causes radios in the area where the signals collide to pick up the two signals intermittently with interruptions of static in between. A translator prevents this scenario from happening because it uses a different frequency than the primary broadcast frequency.

"A translator is like having a new spoke on your bicycle rim," Belanger said. 

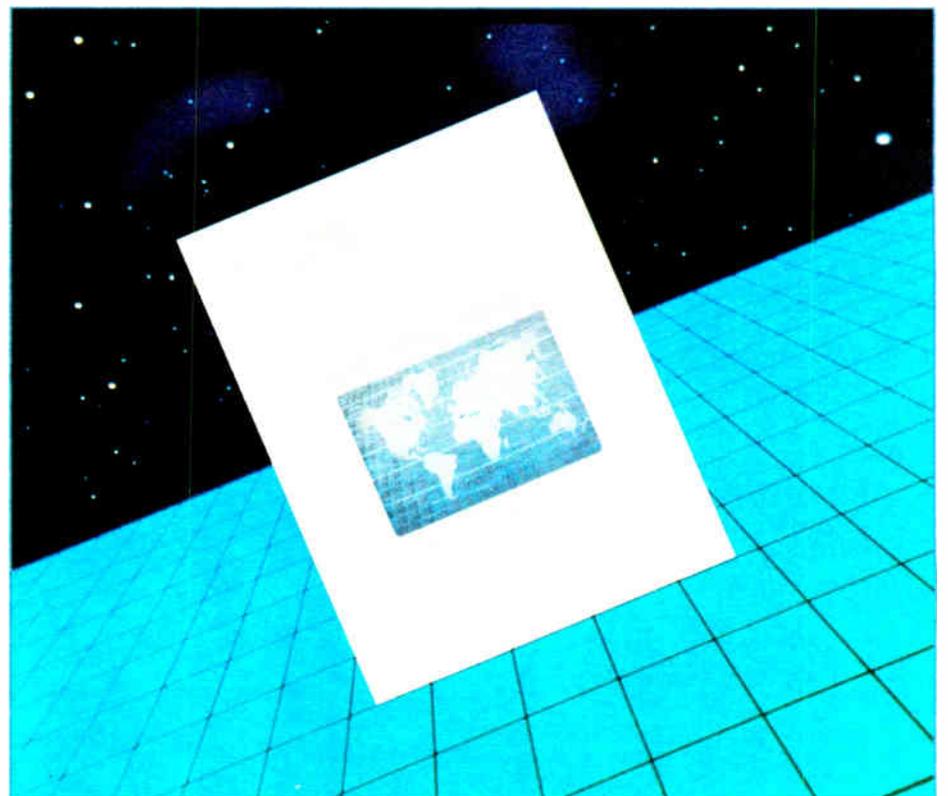


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the most effective way to take programming into another area."

Spence's non-commercial station uses two translators in its day-to-day operations to extend its listenership. Its original 88.7 signal is picked up 75 miles south in Fayetteville, Tenn., and rebroadcast via translator on 95.7.

The translated Fayetteville 95.7 signal is picked up by another translator station in



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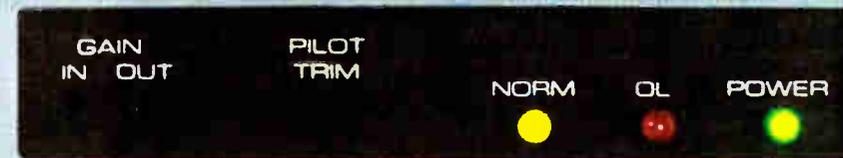
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New Fine Schedule Remanded Back to FCC

by Randy Sukow

WASHINGTON The U.S. Court of Appeals in the District of Columbia struck down the FCC's schedule of fines and forfeitures last month, voiding nearly all fines imposed by the commission since the schedule was adopted three years ago or, perhaps, putting them on hold.

The National Association of Broadcasters believes the decision should also lead to withdrawal of the most recent FCC Equal Employment Opportunity (EEO) enforcement policy, adopted in a separate policy statement last February.

However, FCC General Counsel William Kennard said broadcasters should not assume that the FCC has any

intention of vacating EEO fines imposed so far under the current policy.

The court ruled that the FCC's "Policy Statement on Fines and Forfeitures" released Aug. 1, 1991, is a substantive rule and, therefore, should have been subject to the same public notice and comment procedures that all major commission rules must pass.

The 1991 schedule replaced a policy that was considered to be obsolete by many. Large telephone companies and other media company conglomerates found in violation of FCC rules were believed to be unaffected by fines set before years of inflation blunted their sting.

The policy statement gave the commission option to fine "up to \$25,000 per

violation for each day of a continuing violation, provided that the total amount assessed for a continuing violation may not exceed \$250,000 for any single act or failure to act."

The United States Telephone Association (USTA) filed suit against the FCC in late 1992 challenging the fine schedule. USTA, supported by a number of co-plaintiffs including NAB, claimed that approval of the fine schedule without public notice and comments violated procedures set forth in federal law, including the Communications Act of 1934 and the FCC's own rules.

By finding in USTA's favor, the court voided fines for a wide range of FCC

broadcast-related rules, from technical rules, such as tower painting and lighting, to content regulation, including indecency regulations.

Most or perhaps all of the fines could be reinstated if the FCC approves the fine schedule after public notice and proceedings. "This is a procedural defect we're talking about" and not a defect in the substance of the fine schedule itself, Kennard said.

More than a million dollars in penalties assessed to Infinity Broadcasting for alleged indecency violations by famed morning man Howard Stern were the most notable FCC fines imposed under the 1991 schedule. Kennard said the commission has not decided how to proceed with Infinity or any other indecency cases in the wake of last month's decision.

Infinity is also challenging the fines in court on First Amendment grounds.

As for EEO, Henry Baumann, NAB's executive vice president and general counsel, said: "The USTA decision sounds the death knell for continued application of the EEO Policy Statement. Similarities between the two 'policy statements' warrants suspension of enforcement under the EEO Policy Statement."

EEO procedures and fines are currently of special importance to radio broadcasters. If the rules stay in place, broadcasters must continue building a record of compliance with the new guidelines before a three-year round of license renewal proceedings begins next year (see story, page 1).

The court decision "will probably require the commission to rethink the fines set under the (EEO) policy statement," but it will probably not have to completely reverse the policy, Kennard said. Broadcasters dealt EEO fines since February should not assume they do not have to pay, he said. ☺

Newcomer's Take on Automated Radio

by Allen J. Singer

BATESVILLE, Ind. About six months ago I achieved one of my goals: I landed my first job at a commercial radio station, an automated, 24-hour-a-day FM where the DJs do live-assist board operation during the day and the studio runs without a board operator at night.

WRBI(FM) Batesville, Ind. (about 50 miles from Cincinnati), plays a mixture of Top 40 and middle-of-the-road country, with a little bit of rock and roll and some country oldies. The staff includes a total of six DJs and no program director—that job is done by our music service, Broadcast Programming.

It is a community-oriented station, carrying high school basketball games and mostly local advertising. But it is automated, and with automation, at least at this station, problems can happen.

Automatic errors

Listeners are not supposed to know WRBI is automated, but it is not hard to tell. All they have to do is listen late at night as the same prerecorded messages (liners) play again and again or wait for some other computer screw-up.

The computer in the air studio pulls liners and commercials from the hard drive in the production studio's computer and plays them live. Each message has corresponding "event" numbers.

We have six reel-to-reel machines of music that the computer fires in sequence to create a sense of continuity in the music rotation. The board operator can stop the computer at will and go on live after a song to do a stopset or to play a CD.

It works fine most of the time. The computer can run the show by itself while you go off and do other things.

There is no board operator on the average weekday afternoon and overnight. The computer plays liners recorded previously by the weekend crew. Even though I am on live only one day a week, I write and record 20 liners that play at certain times during the week to make it sound like I am in the studio playing music. I can be heard, on tape, weekdays from 10 p.m. to 4 a.m.

It does not sound real. There are no time checks, current temperature readings or comments on the day's news. The computer will play two liners (typically promos for other shows or events) in a row

during my shift.

Computer errors frequently affect newscasts as well. WRBI airs Mutual News, with the computer automatically recording the satellite feed at the top of every hour on a remote-control cart machine

The computer can run the show by itself while you go off and do other things.

and playing it back a few minutes later after a song ends.

It is a great system during live newscasts. We read local news and then play the Mutual cart. But the computer occasionally misfires and records and plays five-and-a-half minutes of satellite beeps instead of news. Sometimes the beeps play in place of the news all night because there is

nobody at the station who can fix the problem.

Weekend life

My live shift begins 11 a.m. Saturdays. I read the noon news, do stopsets throughout each hour, read the 4 p.m. news and sign off at 4:30.

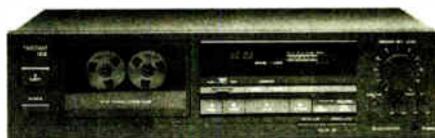
I am a busy guy during that period. Multiple duties are part of small-time radio life. I generally have at least one commercial to record, and sometimes as many as three. I also have to write and record my 20 liners for the weekdays and write and update news and sports. The other five "weekenders" have the same workload.

All the production work is supposed to be finished during the shift, but the general manager understands if I have to stay later occasionally. Production

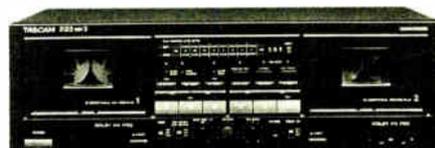
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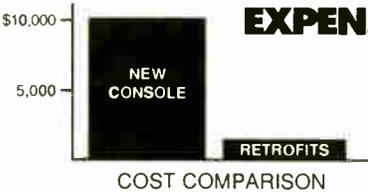
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STATION SKETCHES

Multitone Lives up to Reputation

by Tom Vernon

Part III of III

PHILADELPHIA After testing two leading multitone test systems, I find that the technology pretty much lives up to its promise of reducing audio testing and maintenance time.

In the previous installments of this multitone series (*RW*, May 18 and June 15), I described how the technology works and looked at two manufacturers' different multitone approaches. Now here is a description of my field tests on multitone equipment conducted at WXPN(FM) Philadelphia.

First steps

The test units were the Tektronix ASG 100 signal generator and Tek's VM 700 video analyzer with audio measurements option installed. (I wanted to test the AM 700 audio analyzer, but these units are not yet in full production. The AM and VM 700 analyzers have almost-identical multitone capabilities.)

The first step when using these instruments for ATR and cart maintenance is to create multitone alignment tapes. Commercially produced test tapes for this evaluation are not yet available.

I initially tweaked the machines using traditional techniques, then created a master cart and 7.5 and 15 IPS tapes. The cart and 7.5 IPS tape had 30 seconds of 1 kHz tone at a zero reference level, with the remainder of the tape having multitone at 10 dB below reference level. All tones on the 15 IPS tape were at zero reference level.

The test tapes do not have to be shuttled back and forth during machine alignment. Just set the reference level with the 1 kHz tone, then use multitone to adjust head azimuth by viewing the audio monitor phase display.

Equalization and overall response are tweaked by observing the audio spectrum in near-real time on a display screen and adjusting for flattest response. Final adjustments may be made by looking at the amplitude and phase difference between channels and tweaking for as close to zero as possible.

Record alignment is also simplified. The only difficulty comes with bias adjustments. The "near-real time" display was not adequate when using either the distortion-null or 2 dB overbias methods. The old analog meter still has the best feel when adjusting for peaks and nulls.

Good results

I experimented with flux loop testing of the playback electronics in both ATRs and analog cart machines. The two built-in cursors in the VM 700 display made it easy to scroll around the NAB curve and confirm +10 dB at 10 kHz and -1.4 dB at 100 Hz relative to 1 kHz. The combination of multitone and flux loop made fast work of matching new heads to electronics and diagnosing tape-to-head contact problems.

The view audio test function of the VM 700 shows a tabular text display of the measurements and results obtained during a test run. This permitted a complete proof of WXPN's 12-channel Logitek console through each channel in about an hour.

An interesting phenomenon during frequency response measurements was a slight difference between the results obtained with

multitone and audio sweep methods in the 12 kHz range. I have no explanation for this, but it may bear out theorists' claims that multitone is a more accurate test of system performance when the entire audio spectrum is being produced.

I was unable to do any testing of turntables or CD players with the VM 700 because there are no commercially-produced multitone discs, nor even a multitone test standard. The two competing systems use different tones.

The most powerful application of the new technology is probably the ability to test the entire air chain with a short burst. As with

all off-air monitoring, it is vital to get a demodulated signal free of multipath. With a few unobtrusive multitone bursts, STLs, processors and transmitter tuning can be put through several iterations in an afternoon.

After using the Tektronix equipment for all station audio evaluations over the last two months, it is frightful to think about going back to testing the old way. I achieved about 60 percent time savings for tape and cart machine alignment and was able to adjust machines to much tighter tolerances than would have been possible with analog test equipment.

Multitone technology lives up to its billing and then some. The biggest barrier to its immediate widespread use is the high price tag: \$1,800 for the ASG 100, and \$20,000 for the VM 700 with audio option. The AM 700's has not yet been announced. Prices are expected to drop as demand increases and more manufacturers jump into the multitone market.

Special thanks to Scott Fowler, WXPN chief engineer, and the station's staff, as well as Tom Tucker and Donna Loveland of Tektronix for their assistance in providing facilities and equipment for these evaluations.

□ □ □

Tom Vernon divides his time between consulting and completion of a Ph.D. He is occasionally sighted at WXPN(FM) Philadelphia. Call him at 717-367-5595.

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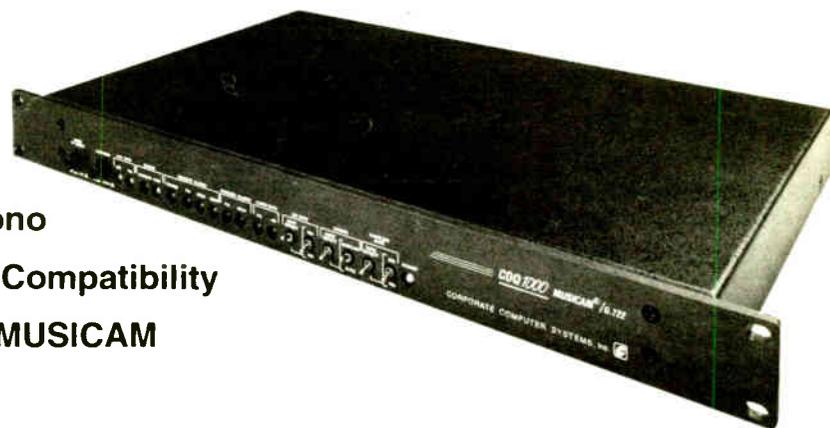
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Equipment and Applications for Radio Production and Recording

PRODUCT UPDATE

Orban DAW: Getting Better with Age

by Ty Ford

BALTIMORE I last wrote about the DSE-7000 in October and November of 1990. It was under the AKG banner then and was one of about a dozen devices on the market calling themselves digital audio workstations (DAW). There are now over fifty DAWs in the market. The DSE-7000, now under the Orban name, is still among them.

You should also know that, after experiencing a number of other DAWs, I chose to buy a DSE-7000 for my studio in December 1990. Regular readers of this column can bear witness to the fact that I have continued to write fairly about many other workstations since then.

I mention this because not mentioning it would leave room for too many misconceptions. I have used the DSE-7000 for radio spots, TV audio, corporate industrial narration, sound design for stage shows and CD pre-prep (assembling and editing material from various sources to a DAT master).

Improvements

Over the four years that the DSE-7000 has been shipping, there have been many significant changes: five free software upgrades; DAT backup; a new analog module with improved A/D conversion; an AES/EBU and SPDIF digital I/O module with dual sample rate converters, word clock I/O and video reference sync; an increase of up to 70 minutes of recording time per production (32 kHz sample rate); and up to 2GB (eight hours) of hard drive storage.

The software upgrades mostly have been the result of user suggestions. If I were to list them with full explanations,

this article would be about 20 pages too long. Topping my list of simple improvements are: making the faders track like P&G M3000 faders; +/-20 percent vari-speed playback; auto punch in/out for record; 24 locate points; the ability to play any sound in the library before importing it into a production; the ability to see how much space on a track an edited element will occupy; and improved methods of moving from place to place within a production.

Hardware improvements such as dual real-time sample rate converters, the first of which automatically adjusts to the sample rate of the source device and accepts digital inputs even from vari-speed digital inputs, are really quite ingenious. You can, for example, have an incoming sample rate of 48.48 kHz going into a 44.1 kHz production and/or through it to an output of 32 kHz, 44.1 kHz or 48 kHz. You can also run a mix at +/-20 percent with the vari-speed while maintaining a constant output sample rate of 32 kHz, 44.1 kHz or 48 kHz. Multitrack DAT backup capable of storing one production or the entire hard drive and a maximum of 256MB of RAM for a maximum of 70 minutes of recording at 32 kHz complete the list of major improvements.

The goal

Remarkably, the primary goal of the designers, the creation of an intrinsically transparent system, has remained intact. The improvements have made the DSE-7000 faster, cleaner and more useful, without making it more difficult to operate. More than 90 percent of the work is done on one screen. Edits and mixes are done in real time. You have 10 real faders to mix with, and you can

hear all eight-tracks all the time, whether you're scrubbing, recording or editing. When operating the DSE-7000, you feel like an audio producer, not a computer operator.

More than any workstation I've seen, the DSE-7000 democratizes the power of digital audio production. The eight tracks



Orban DSE-7000

of the DSE-7000 are easier to use than a four-track analog equipped studio. This means that even "computerphobic" members of your staff can use the system.

In addition to being fundamentally easy to use, the system's "context-sensitive help" sub-program keeps you gently on track. Whether by haste, distraction, too much or too little coffee, you don't hit the right button, the system deduces what

you were trying to do and offers a discreet suggestion at the bottom of the screen.

By its detractors, the DSE-7000 has been disparaged for its lack of SMPTE, its destructive editing, its limited session lengths and its lack of EQ and mix automation. However, the DSE-7000 was designed to make radio spots. Although the system currently lacks SMPTE capability, some users have found that over short periods of time (30 to 60 seconds), cold rolling the DSE-7000 to picture works for sweetening. I've also been successful in using MIDI FSK tone recorded on one of the DSE-7000's eight tracks to drive my MIDI sequencer. Video transports that will slave to SMPTE should behave similarly.

The destructive editing issue has never been a problem for me. First, the DSE-7000 always allows you to "undo" the last step. Second, if I do unusually challenging editing, like pulling a client's butt out of the ditch by making new words out of syllables stolen from other words, I copy the parts I need and then go to work. Copying takes no time and doesn't use additional memory.

Detractors are also fond of saying things like, "With all that RAM, if you get a power glitch you could lose the whole production." What they don't say is that the internal hard drive automatically "saves" as you work. Of the two times I have lost power, only once did I lose any audio. That was because the hard drive hadn't quite finished the save. Lesson learned: If you have a UPS (uninterruptable power source) in your facility, use it to power the DSE-7000.

In the four years that the DSE-7000 has been in the market, its recording time for each production has jumped from 17.6 minutes to 70.4 minutes at 32 kHz (somewhat less for 44.1 kHz). My first configuration, just under 13 minutes, allowed me to do three or four versions

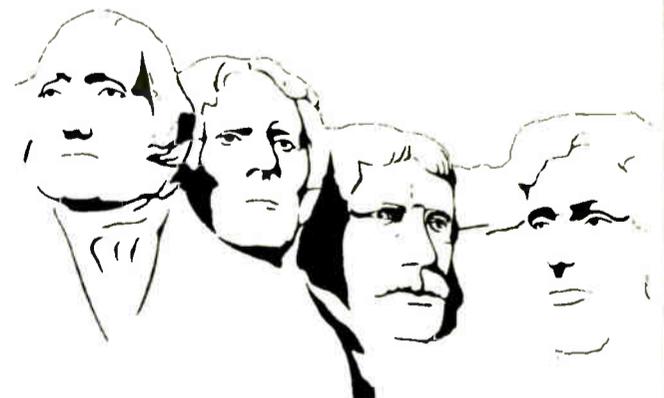
continued on page 16 ►

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Urban Digital Workstation

► continued from page 15

of a sixty second radio spot for a local music venue. You know the drill: four different versions to reflect the changes for a Thursday through Sunday time buy.

Again, because copying does not use additional time, elements common to the original spot, like the venue's signature music bed, a lot of the voice tracks and a good deal of the music upcuts, were copied. You won't make your next album on the DSE-7000,

although theoretically you could make an eight-track recording with each track being a full 8:45 long. You probably also won't create a half-hour documentary with wall-to-wall voice track, full-length stereo music track and full-length mono ambient sound track, but you could do one that runs 17:30.

I have also designed audio for two stage productions within the last year, each of which ran about two hours. The longest act ran twenty-eight minutes. I looped several minutes of stereo frogs in

the jungle, stereo crickets in the woods and stereo birds in the forest, to create an extremely realistic background environment. I used the other two tracks to "spot" in cameo appearances by various birds and animals.

EQ or not EQ

Unlike multitrack music production, where most tracks are recorded somewhat flat and the EQ set during the mix, spot production seldom requires that amount of tweaking. Because you can always hear all of the

tracks at any time, and because you can change their playback level at any time, if something needs to be EQ'ed, you know it (and do it) as you're putting it into the system.

Incidentally, each of the eight channels of the DSE-7000 has two sends, each one can be

at both the analog and digital outputs simultaneously, you actually have two pairs of sends per channel.

Automation

If I were doing more long-form program production, ten to thirty minutes long across all eight

Over the four years that the DSE-7000 has been shipping, there have been many significant changes.

either pre- or post-send. With the new analog/digital I/O module, since all sends are available

tracks, I'd want mix automation. Of course, if you can squeeze your production onto just six of the system's eight tracks, you can do an internal digital bounce mix to any one or two tracks of the remaining tracks. That way, if you make a bad mix move you can back up, punch in and continue mixing.

Because the DSE-7000 always lets you "undo" one step, you could have audio on all eight tracks and digital bounce mix them to any one or two tracks. However, if you had to stop due to a bad mix move, you'd have to commit to everything you did before the error, or "undo" and start again. Here again, it depends on the way you work.

Consistent with the price/value curve of most digital technology, the price of the DSE-7000, which started at \$37,500 for an entry level system (4.4 minutes, 160MB) in 1990, has come down to \$25,500 for a 17-minute version with a 1GB hard drive and fully upgraded analog and digital I/O modules. Rumor has it that by the time this article hits the streets, the system will also be available in an analog-only, dual sample rate 17-minute, 1GB version with roll-around stand for \$19,950. The 8 1/2 minute, analog-only, 210 MB version may also be available for \$16,500, with no stand. DAT backup for these low-cost versions is available as a \$2,700 option.

For the existing user base, the upgrade price for the new analog/digital I/O is \$1,600; 64MB memory cards can be added for \$6,000 each. The most expensive configuration, 256MB memory, new analog/digital I/O, DAT, roll-around stand and 17" monitor is about \$43,000.

Conclusion

In my opinion, what warts there are, are small indeed. Don't get me wrong, I love my Macintosh Quadra 840 A/V. (I'm writing this article on it.) But for cutting spots and doing all of the other things I've described in this article, the DSE-7000 remains difficult to match and even harder to beat.

□ □ □

Ty Ford has recently been involved in a frenzy of voice work for radio stations. If not in session, he may be reached at (410) 889-6201.

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PRODUCT EVALUATION

Inexpensive Mic from Sennheiser

by Chris O'Brien

MANASSAS, Va. Have you ever shopped for a great microphone to use in the field or even in the studio but then discovered that your budget and the cost of a new microphone are often miles apart? Well, say hello to Sennheiser's latest contribution to the budget microphone list, the MKE 4032 U and the MKE 4032 U3.

The MKE 4032 U is designed for singers, studio and auxiliary broadcast applications, while the MKE 4032 U3 was designed for rock musicians and is suitable for minimal singing distance (lip contact). The test I conducted involved the MKE 4032 U—and the results are impressive.

With the introduction of the MKE 4032 U and MKE 4032 U3 at \$650, Sennheiser has brought broadcasters a reliable, sharp-sounding microphone that can hold its own with some of the more expensive microphones.

Features

The MKE 4032 U has features that make it a great bargain for the price including: insensitivity to popping sounds like "p's" and "b's," high volume capability before the onset of feedback, undistorted sound levels up to 140 dB, AC/DC phantom power supply, switchable roll-off filter, adjustable microphone sensitivity, on/off



Sennheiser MKE 4032 U

switch, rugged all-metal housing and battery check display (for DC phantom power supply).

The MKE 4032 U offers two power supply choices. Battery power supply utilizing a 1.5 V Mignon LR06 placed within the shaft of the microphone housing or a phantom power supply 12V to 48V. The battery test can be carried out each time the microphone is used via an LED located on the on/off switch. Claimed battery life is 200 hours.

The MKE 4032 U can process a maximum sound pressure level of 140 dB without distortion.

The microphone pattern is super cardioid. Frequency response is rated at 70 Hz to 20 kHz with a 64 dB signal-to-noise ratio pursuant to DIN 45 405 and CCIR468-2.

The test

I tested the MKE 4032 U in three broadcast arenas: on air, in production and in the field for remote broadcasts.

In the on-air environment I found the MKE 4032 U to have a warm, crisp sound. In fact, while using the MKE 4032 U I was also using an Electro-Voice RE20. We used both of these during our morning show, and the Sennheiser MKE 4032 U sounded as good or even a little "warmer" than the Electro-Voice RE20. As claimed, the MKE was extremely insensitive to popping noises and that added to the overall sound of the announcer.

I really enjoyed the MKE 4032 U in the

production room. If you would like to add a slightly warmer, crisper sound to your production, the MKE 4032 works fine. The spots I produced using the Sennheiser stood out on the air for the obvious reason that the sound of the MKE is so different from our usual RE20. The built-in roll-off filter also added the extra compensation that I was looking for.

In the field, we utilized the MKE 4032 U as a PA microphone and as remote microphone connected to a Gentner Microtel. The microphone again performed well and again the roll-off filter was an asset. Using the Microtel over standard telephone lines.

I really couldn't tell any difference in sound quality between the MKE 4032 U and the Shure microphone we usually use in the field.

Summary

During the evaluation, I used the MKE 4032 U microphone in several environments and realized its overall sound quality and durability potential for broadcast, field recording and in the production room. I give the MKE 4032 U a resounding five out of a possible five. The price is right, and the name Sennheiser is definitely one with

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Chris O'Brien is program director and morning show personality for WRCY, "Thunder 107.7" in Washington, D.C. He also is a contributing writer to Studio Sessions.



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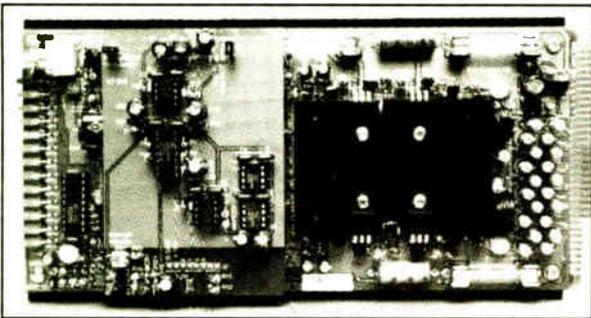
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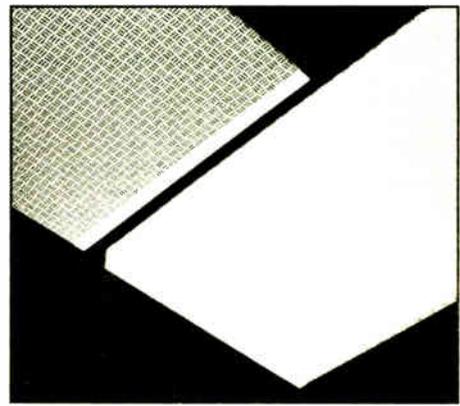


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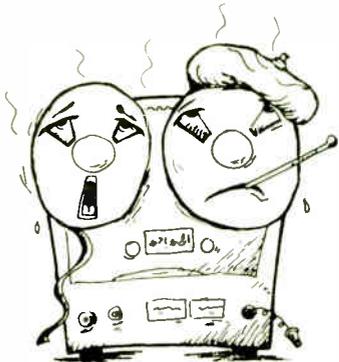
Made of lightweight galvanized steel, the MetalSonex shell is said to provide maximum absorption via a unique 50 percent perforation pattern.

For more information, contact illbruck at 612-521-1010; or circle **Reader Service 93**.

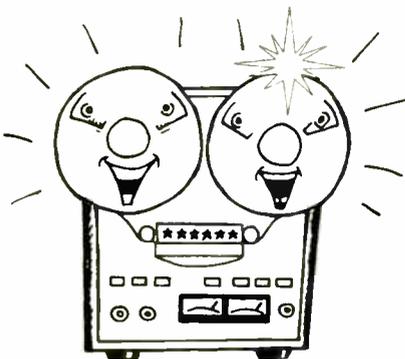


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Audio-Technica SmartMixer

The Audio Technica SmartMixer, which is becoming popular among broadcasters, is a microprocessor-controlled, automatic switching, four-channel microphone mixer.



The unit features switchable priority: either allowing one mic at a time or disconnecting the mics from the control bus, which allows each mic to activate when the input level is strong enough.

For more information, contact Peter Sabin at Audio-Technica, 216-686-2600; or circle **Reader Service 209**.

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TDK Sound Professional DAT

TDK offers a full line of professional DATs from 16 minutes to 120 minutes.

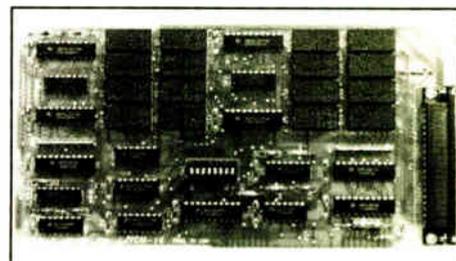
Each tape features Electron Beam Curing to enhance reliability and durability.



For more information, contact TDK at 516-625-0100; or circle **Reader Service 4**.



Sealevel Systems Latch-16 Relay Adaptor



The Latch-16 is a I/O interface board for personal computers that can be used as 16 control status output relays, allowing a non-volatile interface to control equipment including studio automation, control room and multi-media systems.

Unlike traditional relay cards, Sealevel says the Latch-16 remains in its existing state even when the PCs are powered down.

For more information, contact Sealevel Systems at 803-843-4343; or circle **Reader Service 142**.

“The thing is just impossible to screw up! The DM-80’s non-destructive editing is the only way to go, and revisions are extremely easy and very quick!”

–David Esch, Director of
Commercial Production
WPNT, Chicago

“We looked at DAWs for a year—no other product could even come close to the DM-80’s price/performance ratio.”

–Bill Robinson,
Production Director
WQCD N.Y., NY

“I love this machine! It’s reliable, and user friendly. I can edit in 1/3 the time, and I wasn’t familiar with disk recorders—the DM-80 is easy to learn and use.”

–Michael Cook,
Program Director
KSJJ/KPRB, Redmond, OR

Broadcast professionals speak out about the DM-80 Digital Audio Workstation!

“I’ve been editing on tape half my life, and was hesitant to give up “rocking the reels”—but I found this machine is incredibly easy to edit with. And its expandable storage put it way ahead of the competitors we compared.”

–George Zahn,
Operations Director
WVXU, Cincinnati

“We universally love our DM-80’s! They have revolutionized the way we work here and we have made it a point to spread this word to other public radio stations.”

–Richard Paul
Special Projects Engineer
WAMU-FM, Washington, DC

“The DM-80 does more than DAWs costing twice as much. It’s very rugged—you can set it up and forget about it. And it’s easy to use.”

–Tony Diggs,
Chief Engineer
WKHK Richmond, VA

“It’s like a digital studio in your lap! The DM-80 is a very affordable, portable, high quality digital editing system.”

–Howard Silberberg,
Sound Engineer
United Nations Radio
N.Y., NY

“The DM-80 is a great production tool—it really changed our sound! I like its fast and easy editing capabilities.”

–Mike Britton,
Production Director
KODY/KXNP, North Platte, NE

“We originally chose the DM-80 because of its user friendliness. Then we discovered the real magic of this device: a promo announcement that normally would take 4 hours can be done in 30 minutes.”

–Tom Collins,
International College of
Broadcasting & Recording, Dayton

“The DM-80 is easy to learn, and once learned...it’s fast, very fast! We also like its clean digital sound.”

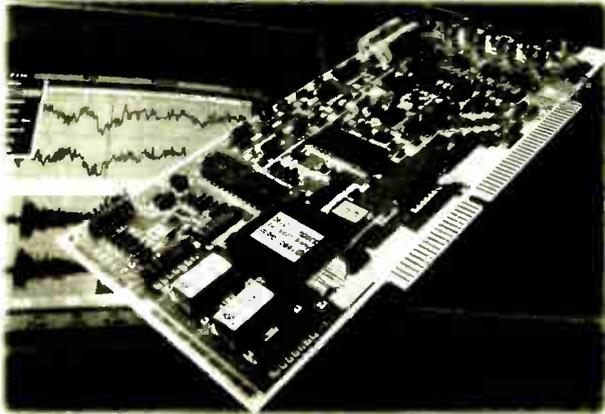
–Barry Witherspoon
Program Director
WSTO-FM, Evansville, IN

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Call (213) 685-5141, Ext. 337, or FAX (213) 722-0911 for more information about the DM-80 Digital Audio Workstation for the magic of hard disk recording and random access editing at your fingertips.



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Excuse #1. Digital editors are too complicated and difficult to use

The **CardD System** is easy to learn! The editing operations are intuitive, and you can be doing productive work in a very short time. A tutorial and sample sound files are included.

Excuse #2. Digital recording/editing is slow and laborious.

The **CardD System** is FAST! Cut-and-paste editing is extremely fast. Want to cut out a breath? Mark it, hit the Delete hot-key, and it's gone!

Excuse #3 I'm afraid of losing my sound file if I blow an edit.

Editing on the **CardD System** is nondestructive. Don't like the edit you just did? Just hit the UNDO key! Or use the unique Edit History list to go back as many as 10 steps and redo your edits.

Excuse #4. All of this digital technology is so unproven.

The **CardD System** has been shipping since 1990. Hundreds of systems have been sold to radio stations and are in daily use.

Excuse #5 I can't afford a digital recording/editing system

A **CardD** professional recording/editing system is only \$994.00 list price and it runs on an inexpensive IBM compatible computer. An entire system is probably less than you could purchase a new reel-to-reel machine for. More expensive editing systems aren't necessarily better for your radio production work.

Excuse #6 I want to see it work before I buy it

We're so confident you will like the **CardD** that BSW will let you try it at no risk. If it doesn't meet your expectations for any reason within 30 days of purchase you can return it with no obligation.

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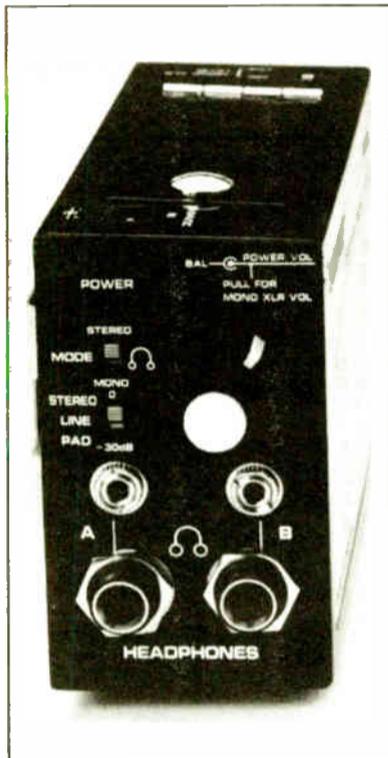
7012 27th Street West Tacoma, Washington 98466

SHORT TAKE

Shure FP-22 Stereo Headphone Amp

Find yourself running out of headphone feeds? Would you like to be able to mix a 0 to +4 stereo source and a mono mic or line level source from different origins in your headset? Would you like to do this monitoring before the console, looping through the source signals without altering them? Do you have some users who want one source in the left ear and another in the right, vice versa, or somewhere in between? Do you need battery and AC operation? The modestly-named Shure FP22 Stereo Headphone Amplifier does all of this, comes with an industrial-strength metal belt clip and weighs in at one pound, with standard 9V battery.

There are two headphone outputs, each of which has both a 1/4-inch TRS stereo jack and 3.5mm stereo mini-jack. The 1/4-inch jacks are switched so that you can use either the 1/4-inch or 3.5mm output on



each headphone output, but not both. The FP22 also has a mono/stereo switch for the headphones.

Shure has packed a lot of simple flexibility into the FP22. The only fault I found with it was that, while the headphone outputs are designed to provide a good level for most phones, they couldn't drive my relatively inefficient AKG K240s to a sufficient level without distortion. Other phones with higher sensitivity sounded fine. Check your headphone spec sheet for the sensitivity rating; the AKG K240 has an 88 dB figure. The higher the figure, the louder the phones will be.

The spec and info sheet that comes with the FP22 is full of handy application tips, from trouble-shooting to in-ear monitoring to how to rig a pair of FP22s as a two-station intercom. List price is \$375.00.

For more information, contact Shure at 1-800-447-4873; or circle Reader Service 72.

-Ty Ford

Post-Mixing Concerts for Broadcast

by Bruce Bartlett
with Jenny Bartlett

ELKHART, Ind. After you record a concert for broadcast, the tape of that concert needs some polishing before it's ready to go on the air. You want to edit the tape, add ambience, and dub in announcements to make a tight, professional program.

At WVPE-FM in Elkhart, Music Producer Jim Biddle and I came up with an efficient procedure to do this. It may work well for you, too.

Let's start with the concert recording. We use two mixers at the concert: one for

the house sound and one for recording. The mics feed the house mixer. Each input channel in the house mixer has a direct output. We connect the direct outputs to the recording mixer inputs. Using this mixer, the recording engineer does an independent mix over headphones and records the mix to DAT.

Announcer/audience mix

If the mix balances are especially critical, we record on an 8-track digital recorder (Tascam DA-88) and mix the tracks later in the studio.

Before the concert begins, we record several minutes of audience noise to be used

as ambience under an announcer. After the concert, we record a studio announcer reading the program intro, outro and breaks. We will mix the audience background noise with the announcements so it will sound like the announcer was at the concert.

First, we want to hear the announcer reading the intro over the audience background noise: "Welcome to the WVPE concert series..." We put the announcer tape in one DAT, the audience tape into a second DAT, and mix them. We also mix the spoken break and outro with audience noise. These mixes are recorded on a DAT

continued on page 28 ►

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SIGNAL-TO-NOISE

Coles 'Lip Mic' Filters out Noise

by Frank Beacham

NEW YORK Okay, broadcasters, time for a little quiz. Let's say you need to go on the air from a location where the background noise is so piercingly loud that you have to shout to the top of your lungs to be heard by the person next to you. In this situation, what microphone would you use to guarantee that your listeners hear natural, well-balanced voice quality with a dramatic reduction of that ambient noise?

There's really only one correct response to this question and, if you're like me (at

least up until a few weeks ago), you probably don't know it. Give up? The answer is the Coles 4104 Commentator's Ribbon Microphone (a/k/a "the lip mic"), one of the best kept secrets in U.S. broadcasting.

English-made

The Model 4104 was designed by D.E.L. Shorter and H.D. Harwood of the British Broadcasting Corp. (BBC) in the mid-1950s and has been in constant production ever since. Today, Britain's Coles Electroacoustics manufactures the 4104, as well as another Shorter/Harwood-designed classic, the Model 4038 studio

ribbon microphone.

In Europe, the 4104 is a well-known and widely-used tool for broadcasting voice commentary from noisy locations. It offers better than 30dB average discrimination between voice and background noise while maintaining a rich, natural quality to human speech.

Often called the "lip mic" because the user places the mic's metal positioning bar across the upper lip, the 4104 is a pressure gradient ribbon design with a high degree of acoustic damping. It offers a flat frequency response at the controlled talking distance and is completely free

from breath noises.

The mic element is housed in a rugged brass perforated case with stainless steel woven mesh nose and mouth screens. Weighing 10 ounces, the mic is handheld by a PVC-covered handle with an XLR connector embedded in the end.

The Big Apple test

I gave the 4104 a tough workout on some of the noisiest streets of New York City. Providing vocal commentary as large tractor-trailer rigs and honking taxi cabs passed only a few feet away and loud jet engines roared overhead, I could barely hear myself speak into the mic. Any omni or cardioid mic design, I was confident, would have been severely challenged in these conditions.

Back in a quiet room, I played the DAT recordings made with the 4104 on the street. The results were stunning. Background noise was reduced so dramatically that without my own commentary to guide me I would have been unable to identify the various vehicles passing by.

I also noticed an interesting side effect. Because the outside noise was so great, I found myself occasionally raising my voice in order to hear myself speak. Not only was this unnecessary with the 4104, but it sounded a bit strange with the lack of

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The TS612 is a six-line (expandable to 12) Telephone System. It features Gentner's Direct Connect Technology™, which allows you to hook it into a regular phone line. Plus, its built-in handset and keypad eliminate the need for another screening phone. With the TS612, you can talk to callers (even the Pizza Guy) off-air, while other callers are on-air.

Technologically, the TS612 features built-in mix minus, to complement Gentner's digital audio enhancement. It has two DCT Superhybrids, automatic level control, dual air control surfaces, optional screener control surface, and dual audio bus operation. You also have DCT connection to your hard disk or studio PC, for screening and controlling calls. But what would you expect — the TS612 was designed specifically for talk shows.

See your Gentner rep today, or call 1-800-945-7730 and make your life easier with the TS612. After all, that psycho's still on line two.



 **Gentner**

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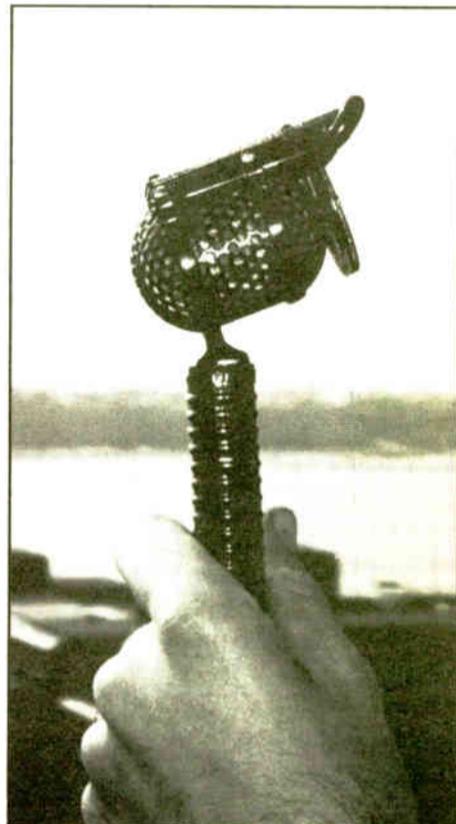


Photo by Frank Beacham

The Coles 4104 is widely used in Europe.

background noise. A normal voice sounds best and I can see where one should be conscious of not unnaturally raising the voice when using this microphone.

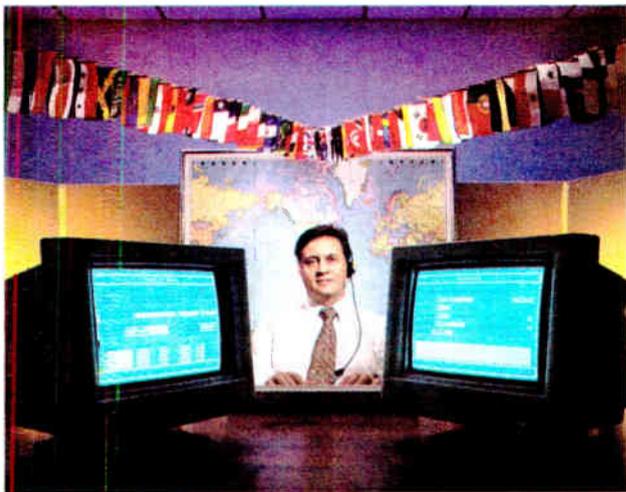
Although, surprisingly, I could find no U.S. radio stations using the 4104, I did find an enthusiastic user at WCBS-TV in New York. Marc Weiner, who manages equipment for the station's news operation, said the 4104 has been "a valuable tool" for years at the station. He said the microphone allows news reporters to do voice-overs for video news segments on location or in noisy newsrooms without an announce booth.

Made for outdoors

One misnomer that's been carried over from the old days of RCA 44 and 77 studio microphones in broadcasting is that all ribbon mics are a very delicate breed and should be used only indoors. Not so

continued on page 27 ▶

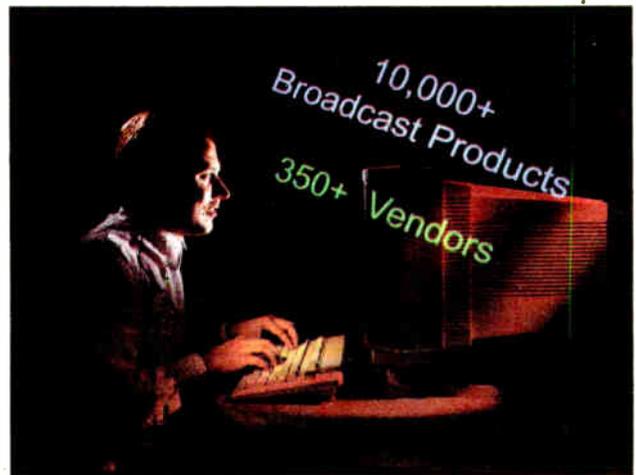
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Now, Scott Studios makes digital audio simple and easy. You get **24 instant-play digital decks** on a computer touchscreen in your air studio.

Six scheduled songs (or spots) automatically come into the log at the left half of your screen from your music and traffic computers. Your jocks can rearrange song sweeps and stop sets at a touch of our arrow keys (to the right of the song titles and spots).

The top line of the screen shows what's on the air. Songs play from hard disk (or CD juke boxes). Commercials, jingles and other digital audio airs from our Production Bank's hard disk. You see legible labels for everything, showing long title and artist names, intro times, lengths, endings, years, announcer initials, outcues, posts, tempos and trivia.

Large digital timers automatically count down intro times, and flash 60-, 45-, and 30-seconds 'til end warnings. You also get clear count-downs the last 15 seconds as everything ends.

In addition, 18 "always ready" players (on the right half of the screen) air unscheduled jingles, sounders, effects, comedy, interactive bits, and rotations of promos or PSAs at any time. Each jock gets several of his own, a total of **26 sets** of 18 user-defined "instant access audio" buttons.

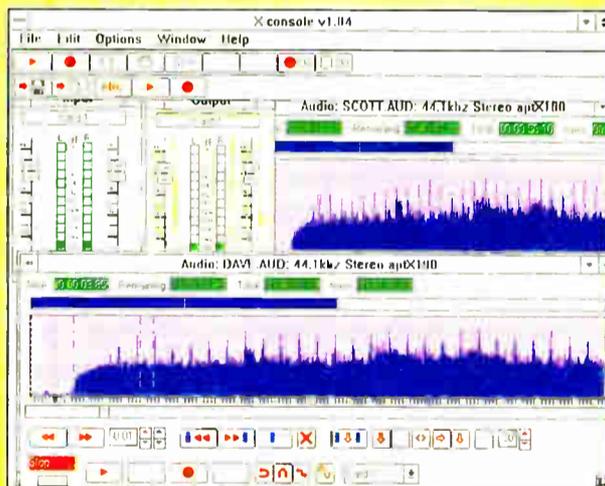
The Scott System gives your jocks the tools they need for *great* shows! Nothing else comes close!

10:14:18A Copyright 1994 by Scott Studios Corp.

Air 3:34	Brown Sugar Rolling Stones Up Tempo :29/3:44/F 1971 C20105 10:14 # 1 - from "Sticky Fingers" CD	:19	Fade On-Air Tab	Jingles & Spots 7	Music Library 8	
Start F2	Feelin' Stronger Every Day Chicago Medium Tempo :25/4:03/F 1973 C12608 10:17	Auto 6	Jingles A	Applause B	Sweeper C	Jingles & Spots D
Start F3	Back Announce DS Dave Scott - Linked to C12608 :00/0:08/C BAL VO2214 10:21	F7 Move Up	Weather E	News Open F	News Close G	Rimshots H
Start F4	McDonald's 2 for \$2 Special JT Q: Thru Saturdays Only. :00/1:00/C COM DA1103 10:21	F8 Move Up	Morning Jin. I	Oldies Jingle J	Legal ID K	Animal Noises L
Start F5	Bob's Bargain Barn BW Q: At Westland & City Park Dr. :01/1:00/C COM DA4310 10:22	F9 Move Up	Top 8 at 8 Jin. M	Crowd Boos N	Happy B'day O	More Events 9
Start F6	Uptempo Jingle Q: Kiss FM. :00/0:06/C JIN DA1037 10:22	F10 Move Up	Winner Theme Q	Crowd Cheer R	Weather Service S	Options 0

The Scott Studio System puts everything in your radio station at your fingertip. Simply touch the button and whatever you want plays instantly. Your program log, complete with all songs, commercials, comedy bits, jingles, promos and PSAs, comes into your studio from your traffic and music computers.

ABC	DEF	GHI	JKL	MNO	PQR	STUV	WXYZ
1-2-3 Len Barry :12/2:21 1963	A Hard Day's Beatles :02/2:26 1964	A Thousand Sta Kathy Young :08/3:07 1960	Action Fred's Can'on :00/2:14 1965	Ain't No Smth Bill Withers :09/1:58 1971	499 Beach Boys :08/4:31 1968	A Little Bit of Gene Pitney :12/2:45 1967	A Town W'out Procol Harum :24/4:00 1967
96 Tears & Mysterians :10/2:53 1966	A Little Bit of S The Jarecks :09/2:09 1966	A Whiter Shade Procol Harum :24/4:00 1967	Ain't Gold Rush Neil Young :10/3:31 1970	Ain't Nothing I Marvin & Tam :06/2:10 1968	A Beautiful The Baycals :10/2:30 1968	A World W'out Peter Gordon :03/2:37 1964	Ain't She Sweet Beatles :02/2:10 1961
A Day in Life Beatles :08/4:31 1968	A Lover's O. C. M. Plattner :00/2:32 1959	Abraham, Mart Dion :21/3:18 1968	Ain't No Moun Marvin & Tam :06/2:21 '66	Ain't That Pec Marvin Gaye :12/2:55 1965	A Groovy Kind Mindbenders :07/1:58 1966	A Teenager in Dion/Belmonts :06/2:25 1965	Ain't That A S Eats Domino :09/2:24 1955
Titles 1	Artists 2	Time 3	Year 4	Cat 5	Spots 6	Hot 7	Play 8



12:21:38A Copyright 1994 by Scott Studios Corp.

Air 2:44	Without You Mariah Carey :21/3:53/F HIT HM0105 12:21:47 # 1 for 2 Weeks in March, 1994	:11	Delete Del	Jingles & Spots 7	Music Library 8	
Start F2	Sweets of Philadelphia Bruce Springsteen :25/4:03/F HIT HM2608 12:24:40	Auto 6	Jingles A	Applause B	Sweeper C	Jingles & Spots D
<p>Young Country Congratulates the latest Winner in our "Win It Before You Can Buy It" Contest: Dave Scott of Dallas has won the CD of his choice from Sound Warehouse. Stand by... YOUR chance to Win is coming up in just minutes, here on Young Country.</p>		Weather E	News Open F	News Close G	Rimshots H	
<p>Dallas Weather: Sun this afternoon, followed by Darkness tonight, low 66. Sunshine tomorrow with a high of 83. Nbwfl's 77 at Young Country.</p>		Morning Jin. I	Oldies Jingle J	Legal ID K	Animal Noises L	
		Top 8 at 8 M	Crowd Boos N	Happy B'day O	More Events 9	
		Contest Theme Q	Crowd Cheer R	Weather Service S	Options 0	

The World's Fastest Requests!

When your music is on Scott Studios' hard disk, you'll have *a thousand* songs at your fingertips (or as many as you want). Simply touch the song you want and it plays *instantly*. And, of course, all your comedy bits, spots, jingles, promos and PSAs also play *immediately*.

Scott Studios' "Wall Of Carts"

You get *ten* user-defined databases, showing songs by titles, artists, lengths, years and categories. You also get instant access sorts for Spots, Promos, Jingles, Comedy and Live Copy. Touch what you want and it *plays immediately*.

Or, you can *pick* something to play later. It moves to the log screen so you can schedule it whenever you want. Either in the "Wall Of Carts" or the main log screen, your jocks choose whether to start audio themselves or let the Scott System sequence automatically.

Sound Better With Digital Editing

Scott Systems pay for themselves in increased efficiency, both on-the-air and in production. The digital magic begins with a graphic waveform editor that quickly cleans up out-takes and works wonders with big productions.

Play with Overlap While Recording

Scott Systems use Apt-X, the best-sounding digital audio (used in DTS theatres)! You get 3 cards to play 2 sources on-the-air with overlap while simultaneously recording or playing in production. And Scott Studios is one of the few offering *triple overlap play while recording*.

Save Time With Multiple Stations

If you have more than one station, production is immediately playable in every air studio over Scott Studios' *free* peer-to-peer LAN. Nobody wastes time redubbing spots, retyping additional labels, or even walking carts to air studios.

Live Copy On Screen

The Scott System automatically brings up live tags, weather, promos, contest copy, news headlines and sports scores to follow your log and your format.

Scott Studios Are Catching On Fast

But don't be fooled by imitations, because the competition isn't even close to catching up to our new features! Scott Studios is working with 100 winners from Detroit to Denver, Miami to Missoula, and Bangor to Bakersfield. Call for a demo and details.

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DIGITAL DOMAIN

Keeping Equipment Perspective on Digital

by Mel Lambert

LOS ANGELES I am sometimes asked how I develop themes for this column. Quite often it is serendipity. A recent example might throw some light on the oftentimes random nature of the creative process. A couple of weeks ago I had been sympathizing with a good friend of mine, a chief engineer for a group of stations out here on the West Coast.

His dilemma was possibly all-to-common in today's cost-conscious broadcasting: How to keep stations on the air without rapidly becoming a basket case.

His boss is a fair man but seemed unaware of how unreliable the on-air hardware had become and was extending the envelope of possibility by wanting to achieve a great deal more than the gear could provide. Time for a heart to heart. I had suggested. Maybe the tactic would be to point out that, like automobiles (a not unreasonable analogy to use for a non-technical type), broadcast equipment needs both routine preventative maintenance and a regular retirement schedule.

Just as that once cherry Mustang needs to receive a thorough lube job from time to time—and, after substantial mileage, will probably just run out of steam—consoles, cart machines and other electro-mechanical devices also cannot simply be patched together and pressed back into service indefinitely.

Wear and tear

And to be fair to my friend, two other, possibly all-to-familiar factors should be considered. For one thing, some of the on-air talent were particularly hard on the equipment—time without number, buttons had to be replaced because of "operator frustration." But, even more importantly, some of the broadcast systems simply were not up to the job required of them. By saving a few dollars at the time the consoles and peripheral systems were commissioned—as well as failing to train the staff on how they were supposed to be used—the legacy was frustration for the chief engineer entrusted with trying to keep the gear from continuously returning to the shop.

The bottom line, of course, is reasonably simple to diagnose: Use technology and technologies that were designed to withstand the rigors of a typical broadcast station, without adding any gray hairs to my friend's already salt-and-pepper appearance. (And, as an aside, let's maybe try and deal with manufacturers that understand our needs a little more closely and can supply parts on a fast turnaround basis, as well as providing decent user manuals and technical support. Some of this digital hardware and computer-controlled gear is becoming pretty complicated.)

As serendipity would have it, during the same period of time that I was attempting to prevent this individual

from falling on something sharp—or looking for alternative employment in the food-preparation industry—I received a rash of calls about a couple of new digital systems that have been causing something of a stir throughout our industry. On more than one occasion, my advice was sought on the applicability of these new technologies, based purely on their technical performance.

Up to the task

In every instance, I predicted that the mixing device, disk-based recorder or MiniDisc player should behave as predicted. While I was sure that the sonic

performance would be up to the standard that 16-bit technology is capable of delivering, and that the respective manufacturers were well versed in the fabrication of devices utilizing the latest chips and topologies, I was bemused to realize that few of those seeking my option were concerned about the system's appropriateness in the broadcast environment.

After all, technical performance is just one factor in the often complex selection process. Just as we would probably pass on a consumer-grade amplifier for use in the production studio—simply because it would be difficult to interface at +4 dBV levels, as well as being too frail for the job required of it—so we need to consider a device's packaging and general construction. When compact disc players were first unveiled over a dozen years ago, the purchase of early consumer models allowed stations to develop a

ready familiarity with their operational parameters.

And when consumer-grade DAT recorders appeared around six years ago, they were soon pressed into service for field recording, as well as long-form record/play back for on-air duties. More recently, MiniDisc and DCC systems were first made available in consumer packages, allowing their performance to be evaluated within a variety of environments. While the jury is still out on professional DCC systems, it cannot have escaped anybody's attention that the new generation of MD recorder/players sound substantially better than early versions. (But do please take close note of the number of generations and the sonic effects of tandem coding.)

cost device that seems to offer all the sonic and operational advantages of digital technology, maybe we can avoid the pitfalls we have experienced from analog. We need high-quality construction if a console, for example, is going to last more than the briefest of evaluation sessions. Metal, not plastic, cases; long-throw, conductive plastic faders, not small-format, carbon-track alternatives; large, people-sized knobs and indicators, not miniature controls with poor scale markings; a simple, intuitive user interface, not a complex series of menus and scrolling windows. The list continues.

Avoid pitfalls

To paraphrase a well-known expression, any doubts we might have about the length of time a piece of gear will hold up in a pressured air or production studio are almost certainly well founded. There are reasons why broadcast hardware looks the way it does and is

constructed from high-quality, robust materials. It needs to be.

constructed from high-quality, robust materials. It needs to be.

Mel Lambert is principal of Media&Marketing, a Los Angeles-based consulting service for the professional audio industry. He can be reached at 818-753-9510.

Microphone From Coles Cuts Noise

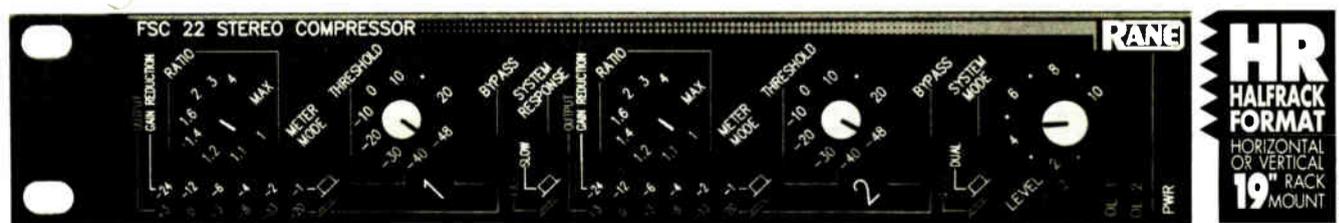
► continued from page 24

the 4104. This mic can withstand the rigors of daily use in the field. Coles says the 4104 can be used with no degradation in voice quality in air stream velocities of up to 20 miles per hour without a wind screen. Presumably, the mic could withstand even greater wind velocities when wrapped in acoustic foam.

The Coles 4104 is a child of the 1950s, but it could be a valuable tool for innovative broadcasters of the 1990s. The 4104 (list price: \$595) is imported into the U.S. by Wes Dooley's Audio Applications at 1029 North Allen Ave., Pasadena, CA 91104. Tel: (818) 798-9128. Wes also imports the legendary Coles 4038 studio ribbon (list price: \$995). If you like the sound of classic RCA 44s and 77s, check out the sweet ribbon sound of the 4038. It survives today for good reason.

Frank Beacham is a writer, director, producer and consultant. His address is 163 Amsterdam Ave. #361, New York, NY 10023. E-Mail: beacham@radiomail.net.

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to the widely acclaimed DC 24... but don't let the size fool you. The FSC 22 is very big on performance and features. Like switchable attack/release response, dual-mode metering to display either gain reduction or output level, and an Input Trim switch to match -10dBV or +4dBu systems for minimum noise and maximum headroom. It's even got those clever new Neutrik connectors that accept three-pin or 1/4" connectors!

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FSC 22

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Post-Mixing Concerts

► continued from page 23
tape labeled "announcer/audience mix."

Assemble-edits

Time to put together the show. At this point, there are two program elements on two DATs: announcer/audience mix and music. We'll mix these two DATs onto a third DAT called the production master tape (Figure 1).

The basic plan is to assemble-edit or mix the parts of the program onto the production master. The program sequence is as follows: spoken intro, music, spoken break, more music and spoken outro.

We copy the spoken intro to the production master tape, leaving several seconds

of audience noise after the spoken intro. Then we assemble-edit the concert recording onto the audience noise.

We park the production master tape just after the intro. Next we put the concert tape in a DAT machine and play it. If it needs reverb or EQ, we add some. After setting levels, we play the concert tape a few seconds before the music starts and hit "record" on the production master tape. This makes a copy of the concert tape onto the production master.

Why not record the announcer, audience and concert onto hard disk and mix them on a computer? It's time consuming. You must record the program elements onto hard disk, edit and mix them, and then

play them back. This takes twice as long as simply dubbing from DAT to DAT through a mixer.

Editing

Often the concert recording needs to be edited for a tighter presentation. We want to remove long pauses, technical glitches and excess talk between songs.

Before the editing session, we listen to the concert tape and note the start and stop

mix them digitally? With the software we're using, a digital mix takes too long, and you can't hear the mix until it's calculated. We prefer to do mixes in the analog domain through a mixer instead.

About halfway through the program, we fade down the applause and mix in the break. "You're listening to a concert of the T. Hadley choir recorded February 5 in the Memorial Theater..." After the break is copied, we assemble-edit the rest

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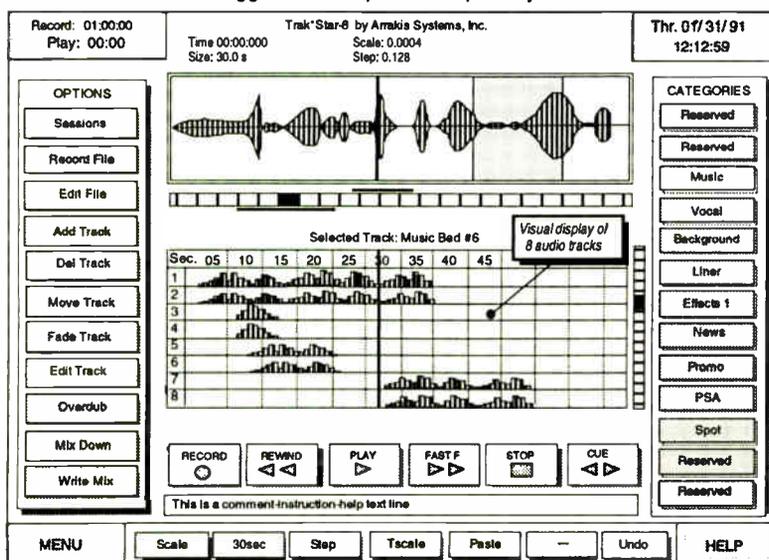
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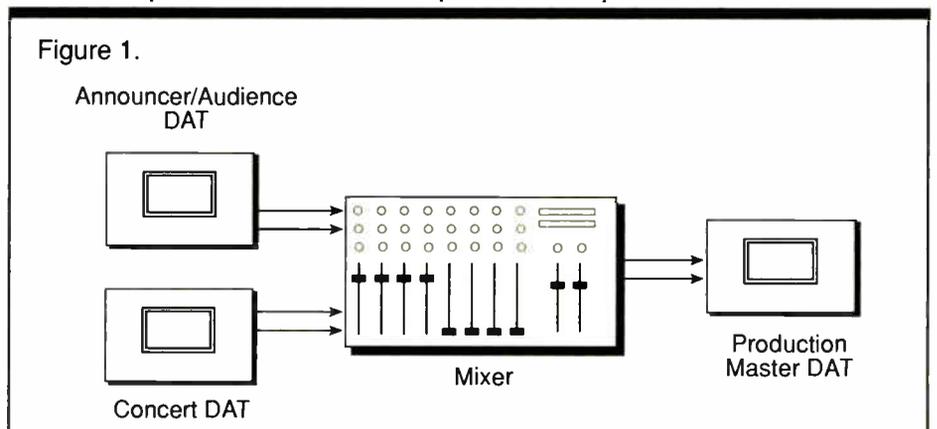
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Circle (65) On Reader Service Card



times of the parts we want to keep. Now is the time to use a PC-based digital editor to edit the program. While recording the concert tape to hard disk, we mark edit points by pressing a key on the computer keyboard. Then we fine-tune the start and stop points on screen with a mouse.

In this manner, we assemble a playlist of desired segments. Finally we play the playlist—the edited concert—from hard disk into the mixer and record it onto the production master.

Why don't we record the announcer and audience noise onto hard disk as well and

of the concert onto the end of the break.

Eventually we reach the final applause. While fading it out, we mix in the outro, and the program is finished. There's the finished production master, ready to play on the air.

□ □ □

Bruce Bartlett is a microphone engineer and technical writer for Crown International, and the author of "Practical Recording Techniques," published by Howard Sams. Jenny Bartlett is a technical writer. Bruce can be reached at 219-294-8388.

A Broadcast Industry BEST KEPT SECRET

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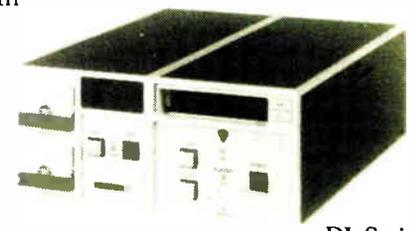
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WORKBENCH

Orban 8000A Requires Careful Capping

by John Bisset

SPRINGFIELD, Va. I recently saw a poster in an office that said, "If we don't take care of the customer, someone else will!" I imagine that credo is firmly in place at Orban.

A recent Workbench column suggested troubleshooting a whistling Optimod 8000A stereo generator by replacing the electrolytic caps (RW, May 18). Orban

Product Manager, Chris Holt called to warn me that wholesale replacement of all the electrolytics in the Orban 8000A could create more problems than it solves. At the minimum, the re-capped unit may require a complete alignment.

Orban offers its 8000A customers a free replacement electrolytics kit. The caps in the kit will stop the whistling problem (caused when ripple appears on the 15-volt power supply), but are not the

capacitors that, if replaced, require a complete alignment. Orban has also changed the values of some of the replacement capacitors, so consider this a field upgrade.

If you own an 8000A, and need one of these kits, contact Orban customer service at 510-351-3500. If you own an Optimod 8100A1, Chris says the stereo generator has a completely different design, and is immune to the effects of aging electrolytics.

★ ★ ★

Cornelius Gould, an assistant engineer at WERE(AM)-WNCX(FM) Cleveland, has done some tests on the Harris MSP-95 audio processor/stereo generator and believes the built-in wideband limiter is the weakest link in the processor.

The wideband gain control loop is disabled when the C-51 on the limiter board is pulled out. An Aphex Compellor 320 can be used to replace the limiter circuit.

Cornelius is amazed at how this simple modification breathes new life into MSP-95's old design. The setup information is straight-forward. The Compellor must be operated with the limiter switches "on." The "Process Balance" control should be moved to "Leveling" to get an open sound or Moved to "Compress" to add density.

The MSP-95 input gain switches must be set up for the output level of the Aphex. Adjust the "Process Level" control

For a free copy of this useful booklet, circle Reader Service tkk. By the way, if you have the RE-660 or 661 in the field, RE America offers a free software enhancement upgrade. Contact RE America at 216-871-7617.

★ ★ ★

Robin Cross at WNIU(FM)-WNIJ(FM) DeKalb, Ill., suggests a modification to improve the efficiency of the Moseley MRC-1 remote control.

The MRC-1 consists of two microprocessors talking to each other with the data moving between them in packets. The transmitter unit is connected to the transmitter fail-safe interlocks on both transmitters.

Robin was having a problem with both transmitters going off the air, and then popping back on. He improved the SCA and STL that relayed the data, but the problem persisted.

He knew by listening to the data leaving for the transmitter and returning that the problem was with the MRC-1. It was not sending packets to the transmitter. The remote unit would respond every time the studio unit polled it.

The source of the problem turned out to be an R-26, a 1k resistor on the CPU board at the studio, which had burned in half. Robin replaced it with two 2k resistors in parallel. There have been no more problems.

Robin wondered whether he cured a symptom of a bigger problem. Just to be safe, he added a fan and ventilation panels to cool the MRC-1 power supply, which runs "hot as a pistol," he says. Cooling has paid off. Robin was also losing displays

Replacement of all the electrolytics in the Orban 8000A could create more problems than it solves. The re-capped unit may require a complete alignment.

for the desired level of clipping (which will also control loudness), and HF limiter activity.

Be careful with these adjustments. The MSP-95 was designed before the era of distortion-controlled clipping, so it is very easy to trash your audio for a tiny increase in loudness. With some careful adjustments, this modification should please you.

If your station is using a phone line or discrete STL, install the Compellor at the studio and the Harris box at the transmitter. Cornelius Gould can be reached at Cleveland, 216-861-0100.

★ ★ ★

If you have delayed merging onto the information superhighway for fear of being hit broadside, RE America can help.

Kathleen Karas of Crouse-Kimzey of Annapolis passed me a copy of RE America's Digital Network Access Guide. Not only does the guide simplify the explanations of ISDN, T-1 and Switched 56, it also provides some valuable advice on ordering digital services and includes complete updates on the local exchange carriers, their rates, the services they offer and contact names and telephone numbers.

on the MRC-1 and improved air circulation seems to have reduced display failures as well.

★ ★ ★

A friend of mine in Colorado Springs is having great difficulty getting U.S. West's ISDN service to work. The problem appears to be in the configuration of U.S. West's switch and no one knows who to contact to resolve the problem.

If you have also had problems with U.S. West's service and know the magic number to call to rectify ISDN problems, drop me a line and I will pass the information on in a future column.

Speaking of the telephone, I have gotten a number of calls from readers wanting more information on the Purple Processor (RW, June 15). If you cannot wait for a response to the reader service number you circled, you can reach the company at 301-414-5415.

□ □ □

John Bisset is a principal with Multiphase, a contract engineering company based in the Washington, D.C. area. He can be reached at 703-323-7180; fax 703-764-0751. Published submissions qualify for SBE certification credit.

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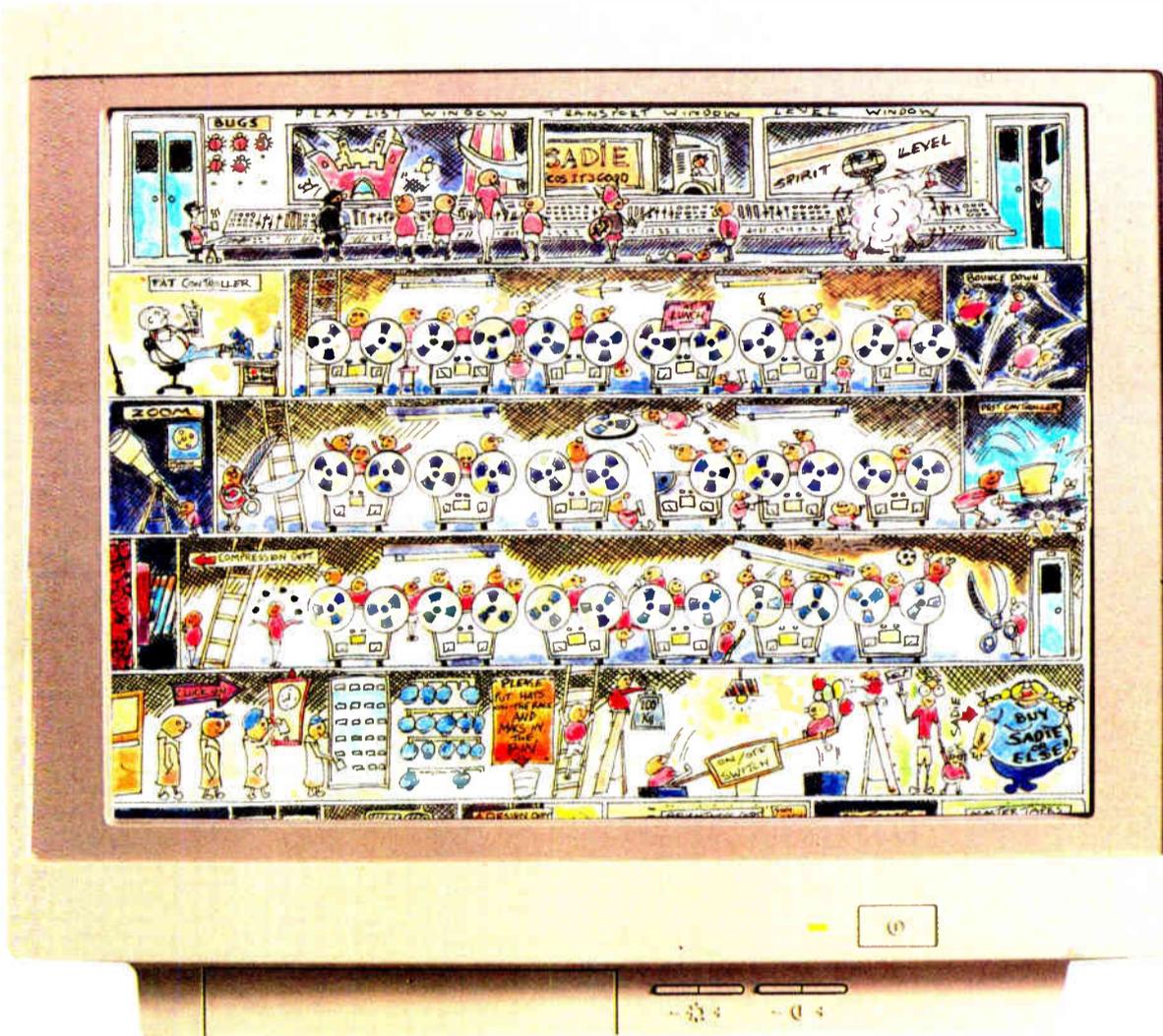
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Live Assist Screen
Pictured

The screenshot shows the LPB SALSA software interface. At the top left, there is a timer displaying '02:29:32' and 'ON' with a green dot. To its right is the 'LPB' logo and another timer showing '22:09'. Below the timer is a level indicator for 'L' and 'R' channels, each with a bar graph and a circle. The 'SALSA' logo is centered. To the right of the logo are 'ON AIR' (green dot), 'PAUSE' (circle), and 'ERROR' (circle) indicators. A central playlist table is shown below:

00:	ALABAMA	BORN COUNTRY	03:07
03:	HIGHWAY 101	WHO'S LONELY NOW	03:09
06:	ALAN JACKSON	CHASIN THAT NEON R	02:58
09:	THE JUDDS	LOVE CAN BUILD A	04:04
13:	THE BROWN ADOBE	SALSA SPECIALS	00:30
14:	WVBU LEGAL ID	SPRING MARATHON ID	01:00
14:	LEWISBURG PHOTO	SPRING FEVER SALE	00:30
15:	CARLENE CARTER	COME ON BACK	02:46

Below the playlist is a 'SPORTS NEWS (updated at 3pm)' section with two news items. To the right of the playlist is a control panel with buttons for 'ON AIR', 'PAUSE', 'STEP', 'MENU', 'CLOCK', 'TIME EVENT', 'SEARCH', 'TEXT', 'TITLE', 'NEWS', 'ARTIST', 'SPORTS', 'ALBUM', 'WETHR', 'TEMPO', 'STOCKS', 'THEME', 'LOCAL REPORT', and 'TIME'. A callout box points to the 'ARTIST', 'SPORTS', 'WETHR', 'STOCKS', 'LOCAL REPORT', and 'FARM REPORT' buttons, stating 'User Programmable Database Search and Store Parameters'.

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World Radio History

Stations Are Harmed by Light-Fingered Staffers

Dear Luci,

I hate to do this, but it's Heavy Topic Time again, this time about something that greatly inconvenienced nearly everyone here and demands attention: theft at the station.

I'm not talking about the assistant engineer exaggerating on the expense and mileage reports. I mean people walking away with things that were not theirs and royally screwing things up in the process.

One recent Monday I discovered that someone over the weekend made off with two entire Technics shells, cartridges and styli right off the studio turntables, along with our AM program director's favorite cans, for a total of almost \$300 worth of stuff. Someone with more than a simple consumer turntable decided to help him/herself to backup parts at our expense.

I still use valuable material that is only available on vinyl. This theft severely crippled our programming while we waited for the replacement parts. I will not mention any of the colorful phrases

'Weekender' Life Is Busy

► continued from page 11

work often takes more time during a Reds game. (WRBI is a Cincinnati Reds network affiliate.) I have to do production and write sports during the game, and when we do remotes, either at a local game or any kind of local event, finding time to do production is even harder.

It can always be done. Time management is the key.

WRBI's equipment is not new. Our air and production studio boards are at least 15 years old, and our production studio mic is older. There is only one CD player in each studio.

New equipment would be helpful, but our productions are adequate. Programs are produced on an Otari two-track reel machine and recorded into the hard drive recording system. We have backup carts for everything, which are especially useful for board operators during remotes.

Overall, I enjoy working at WRBI. The small staff is almost like a family. Along with four years of experience at my campus radio station, I believe my time at WRBI has improved my skills so that some day soon I will be ready for medium- to large-market radio.

I owe much to having a chance to work part-time at an automated radio station.

□ □ □

Allen J. Singer is a senior at Northern Kentucky University, Highland Heights. He can be reached at 812-744-3601.

our program director uncorked.

This may seem petty compared to, say, a station discovering its entire ground plane unearthed for the salvage value of the copper. But to quote nationally syndicated radio legend Don Imus, "I'm really torqued off about this."

The "disappearance" of a few items—station T-shirts, CDs, blank cassettes, record company promotional goodies—are taken in stride. However, when the station gets up and walks away in bits and pieces, we have to be concerned.

One daring disappearing act happened in 1984 after my station installed the market's first CD player. The competition bought one in a panic within days after our announcement and promptly had it vanish with one of the station's former employees.

Have you heard your own stories about stations losing PCs? cassette decks? special effect boxes? entire boxes of carts? Who would want stuff like this?

Answer: Someone who could sell them to a friend at an out-of-town station, or maybe a bootleg operation.

Most programmers and general managers I've talked to would show anyone caught in the act to the door. Sometimes they are ready to prosecute. But what if the thief passes up the newsroom's portable Marantz and lifts a giveaway Zamphir CD instead?

Becky Palmer, program director at WPCX(FM) Auburn, N.Y., suggests a rational, situation-dependent approach. "First, confront the person to be sure something going out the door really belongs to the station," she says. "Next, consider the value of the person to the operation of the station versus the value of what was being taken."

In other words, you would not let your ten-year morning man go because he helped himself to a roll of toilet paper.

"If it's more serious, I'll put a written reprimand into the employee's file along with a warning. If it's very serious, then, of course, the only alternative left is termination," Palmer says.

Prosecution is "very possible," she says, "if only to set an example that theft won't be tolerated. But you have to balance that decision against the negative press your station could receive if the employee's arrest becomes public record." That's just the kind of thing your competition would love to put on their newscasts.

Sometimes the program director receives a call from the next station, asking why the employee was let go. What makes someone think he can put a station on his resume when he knows he was blown out the door for doing something illegal?

Station managers are wise to track smaller, expensive digital devices, like DAT tapes and MiniDisks, as the barrier between pro and consumer equipment blurs. They should also watch for the guy who runs off his own diskette of WordPerfect for his home machine or takes a bootleg version of RCS Selector to his next radio job. Luci, you don't even want to know what damages software companies will hit that clown with.

Grousing won't make my turntable cartridges come back, but having my own

FROM THE TRENCHES

by Alan Peterson



column space sure feels good. If it were me behind the big desk, I'd not only show the dummy the door, but I'd demand the gear back AND reimbursement to the station for the cost of replacement.

Otherwise, a phone call to the Fifth Precinct might be in order.

My studio now has a full MIDI rig, all-

digital effects and EQ and a new digital recorder/editor augmenting existing equipment. I dread to think of what may disappear next, never to return.

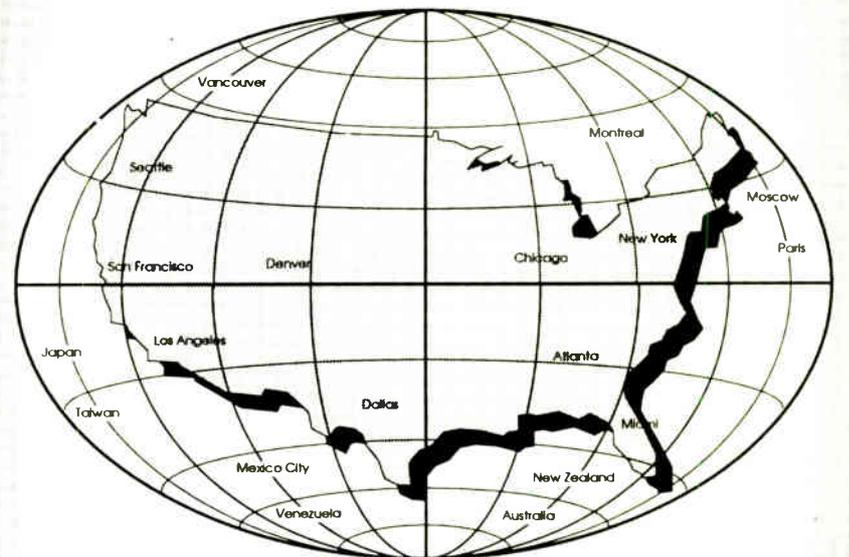
—Al

□ □ □

Alan Peterson is production director for WTCY(AM)-WNNK-FM Harrisburg, Pa., and, yes, he's still ticked.

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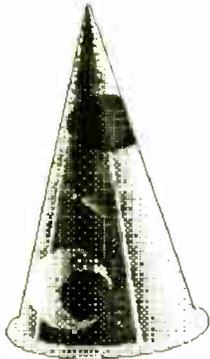
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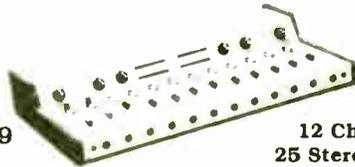
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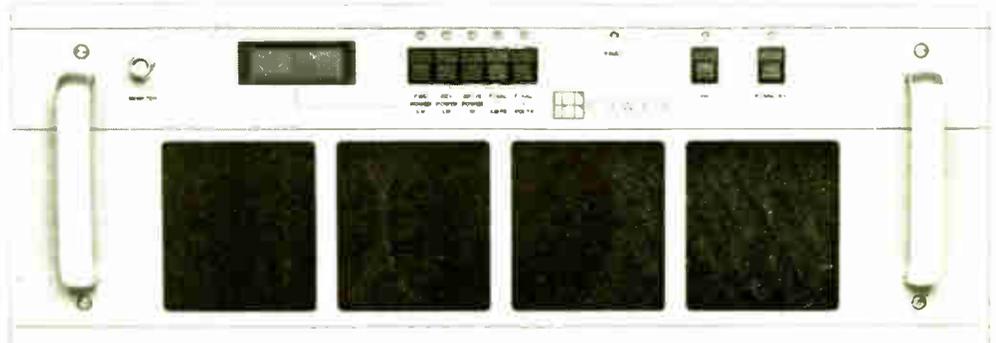
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KEYBOARD CONNECTION

Resources at Hand for PC Beginners

by Barry Mishkind

TUCSON, Ariz. Some of you have called or written to express appreciation for the recent articles on writing your own little utility programs and using PowerBasic to design "pop-up" programs that are ready at a keystroke (RW, June 15 and July 13).

But some are still a bit apprehensive about their abilities to write programs. There are several resources available that will help even the most inexperienced programmer feel confident.

BASIC approach

BASIC has been in wide use for several years, and there are major benefits to learning it. Virtually anything written in BASIC will run on any personal computer in DOS or Windows.

This is especially true if you have the new PowerBasic Developer Kit™ for Windows, which takes your existing PowerBasic code written in DOS text and converts it right into a Windows program.

Many programs and subroutines have already been written. Often, all you need to do is find the kind of program you need, customize it a little and put it to work, learning BASIC in the process.

You can find these programs almost anywhere: from friends, manufacturers, suppliers, bulletin board services, on-line services, CD-ROMs and books. The Society of Broadcast Engineers (SBE) compiled and shared a program list a few years back.

RF Specialties has long distributed a diskette of free utilities, which is available through your regional representative.

Steve Schott at Continental Electronics produced a similar diskette of BASIC programs that allows you to do some customizing and lets you see how the programs are written. For example, Steve provides printer command instructions on the diskette that makes output look nicer and teaches you how to make the commands work.

On-line service subscribers may find copies of BASIC utility programs in the relevant file areas. FidoNet users can find dozens of them on broadcasting-related billboard services, like those operated by SBE chapters and by private companies, such as the National Supervisory Network.

There are not too many CD-ROMs for broadcasters yet, but several ham-oriented CD-ROMs have programs that will work in broadcast applications or that may be adapted by broadcasters.

Some of the best resources are the code libraries used to automate many of the foundations of any program. Whether you want to draw a box around a menu, create drop-down menus, quickly design a subroutine or do one of hundreds of other functions, these libraries will likely have the code ready to run.

Products available

PowerBasic 3.0c, a great BASIC compiler from PowerBasic Inc. (800-780-7707), comes with a diskette of nearly 1.5 megabytes of demos and source codes for various purposes. The diskette holds a sampling of PowerBasics' PBXtra™, which consists of hundreds of code modules. Information on TSR programming is included as well as simple tasks, like sending a graphics screen to your printer. It also shows you more complex tasks,

like A/D interfacing and sound functions. The diskette lists for under \$50.

The Full Power Toolbox™ 2.0 from Information Management Systems (801-226-6390), a little more expensive set, contains about a hundred functions ready to use and comes with a manual of examples to show you how to use it. The FPT helps you design context-sensitive help files so that your staff can use your utilities or provide drop-down menus and pick lists.

The Environment™ from the Creative Software Alliance (800-272-0575) includes routines and modules to help you build up your "front-end" applications,

Creative Software's PBTools: Professional™ holds over 500 routines to reduce the size of your programs while increasing speed. Both programs work well in DOS and Windows applications.

DSE Software's PB/Vision-PB/Workshop™ is especially useful for developing graphic user interfaces (GUIs) for your programs. GUIs greatly simplify the task of designing in-house forms. (Phone DSE at 707-459-4358.)

Sometimes it is more comforting to have a book in your hand as you learn programming. "QBasic By Example" (Que Books) by Grey Perry, an author who spe-

cializes in teaching beginning programming without pain, breaks the process down to logical steps, from input to processing to output, allowing you to build confidence as you write working programs.

"Absolute Beginners Guide to QBasic" (Sams), another Perry book, uses a series of questions and answers to show how to accomplish tasks.

For the more experienced programmers, PC Magazine's "Basic Techniques and Utilities" (Ziff-Davis) by Ethan Winer highlights the tips and tricks to speeding up and improving programs. Winer leads the reader into many advanced techniques that put "sparkle" in your work.

□ □ □

Barry Mishkind 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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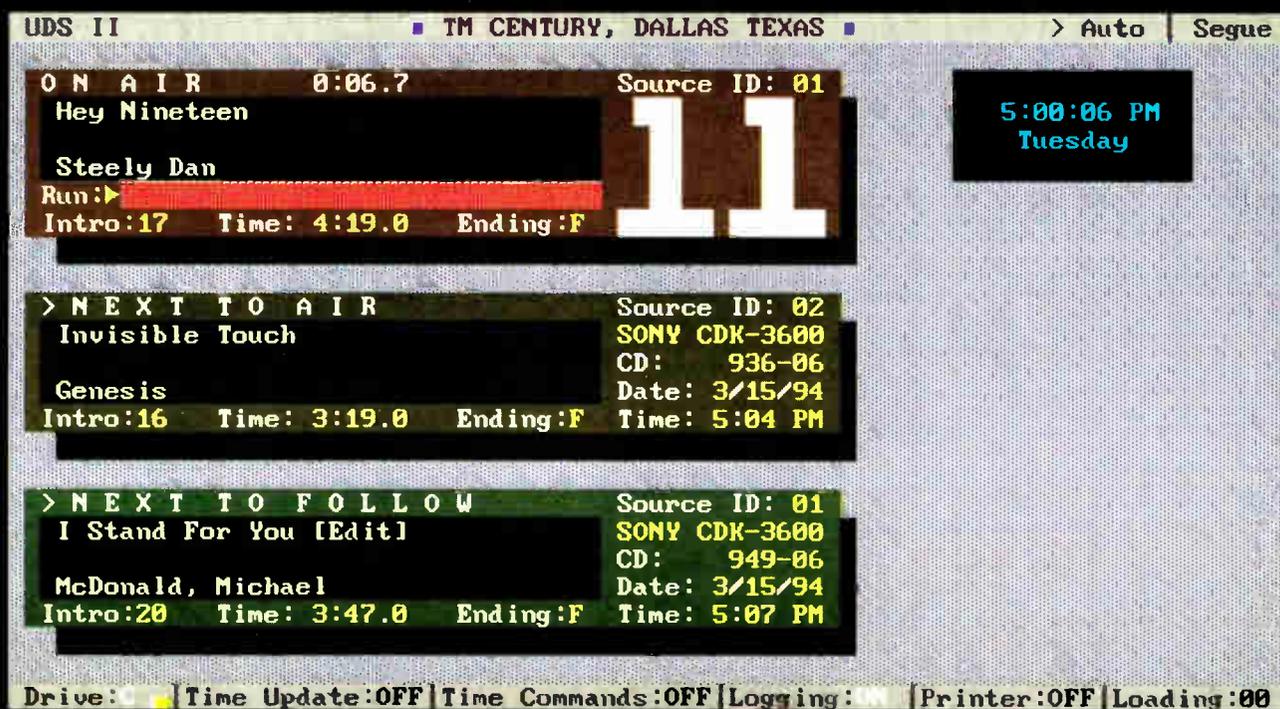
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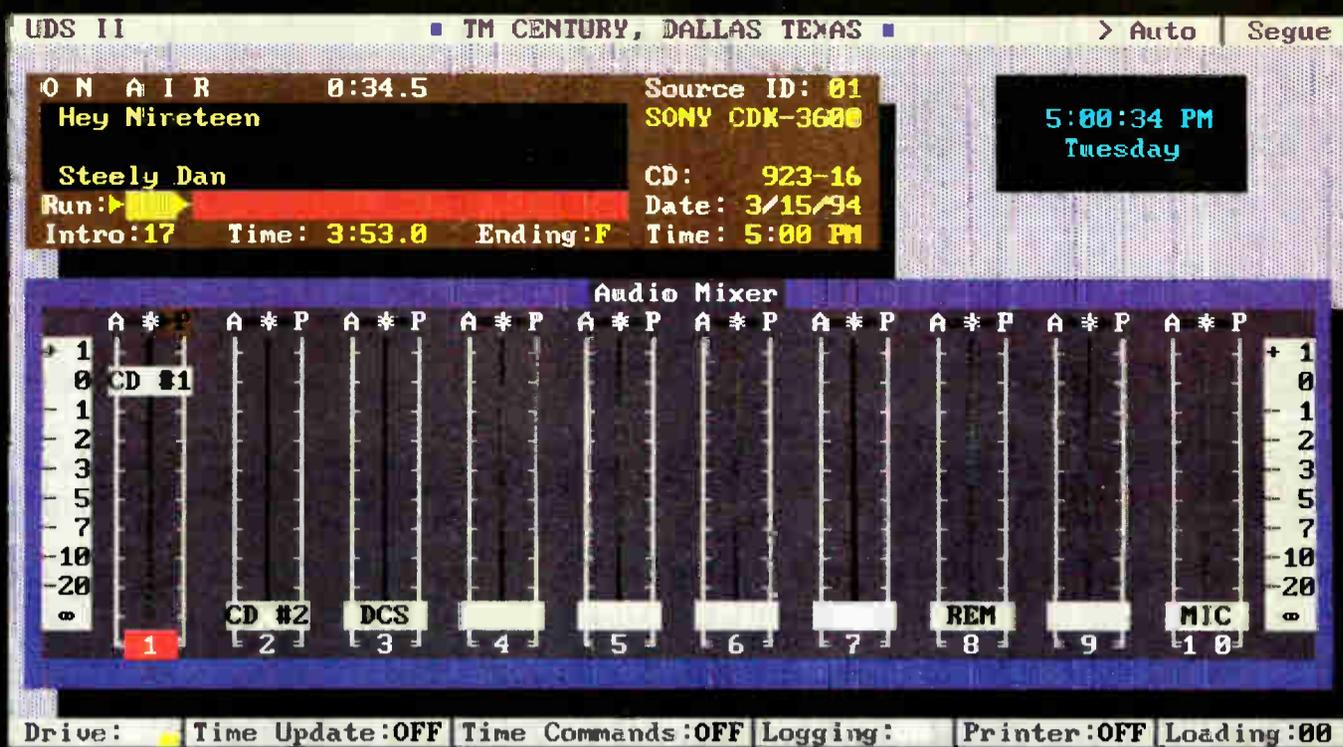
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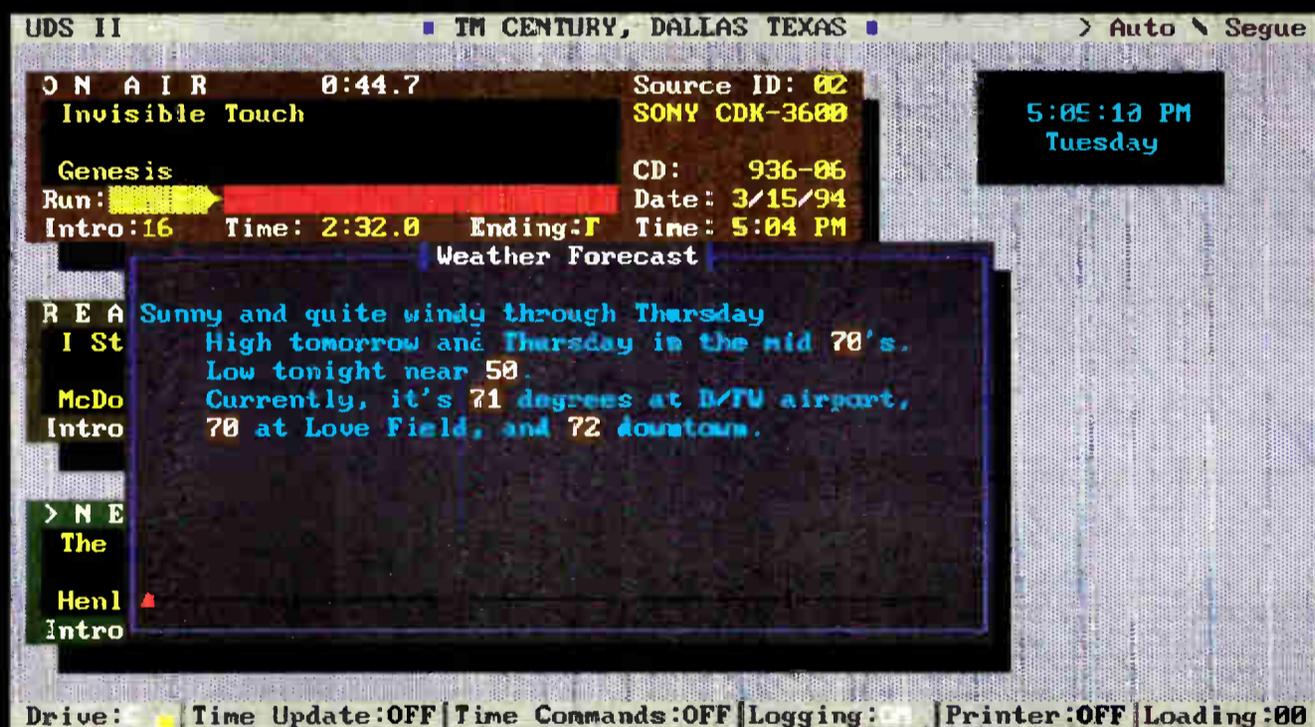


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'Shadow' out of Place on the Big Screen

by Read G. Burgan

LAKE LINDEN, Mich. When blustery winter storms swirled drifts of snow outside the windows of my childhood home in Michigan's Northern Upper Peninsula, I would sit comfortably on our cozy living room floor, listening to "The Shadow" effortlessly thwart macabre villains every Sunday evening from 5 to 5:30.

When it was over, I believed that any of the villainous murderers could be hiding in the shadows of my bedroom. Would the Shadow appear to assist me in my hour of need? I could only hope.

Universal Pictures' summer release of

"The Shadow" starring Alec Baldwin attempts to bring the venerable radio hero to new audiences. On a positive note, the "feel" is nearly perfect. The sets have a comic book look that creates the mood of 1930s and 1940s many of us held in our minds as we listened to the radio.

Attention to detail is evident. Those who appreciate period radio equipment will be pleased to see an old RCA ribbon microphone and a Collins Radio shortwave.

But "The Shadow" is a difficult series to bring to the big screen. It requires a medium in which the mind creates most of the story.

"The Shadow" movie reminds me of the

backdrops in the movie "Dick Tracy" where the Disney people painted the city buildings on glass and back-lit them. The mood is dark and moderately surrealistic, just as "The Shadow" should be. Computerized special effects are used well.

The old Shadow was successful in both the Street and Smith's detective magazines and later the radio series. Both media shared similar traits. The reader/listener's mind created the actual picture of the Shadow and surrounding scenes.

Several motion pictures featured the Shadow, including "The Shadow Strikes" (1937) and "The Shadow Returns" (1946). They were unsuccessful because a man

who makes himself invisible by clouding men's minds was poor material for a visual medium.

The producers of the current film should have learned from their predecessors. The new movie is a far cry from the radio episodes many of us grew up with.

For one thing, it is more violent. The radio censors of the 1930s and 40s would not have stood idly while the Shadow blithely threw people off of buildings and impaled them on gargoyle statues. In several scenes, the movie has more blazing guns than the "Lone Ranger."

Radio's Shadow usually disarmed men and left them for the authorities, rather

continued on page 40 ►

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What's Your Shadow IQ?

by Read Burgan

How well do you know "The Shadow"? Test your memory with this quiz based on information in two marvelous books: "The Great Radio Heroes," by Jim Harmon, Ace Books Inc., 1967, and "Tune In Yesterday, The Ultimate Encyclopedia Of Old-Time Radio, 1925-1976," by John Dunning, Prentice-Hall Inc., 1976.

1. What year did "The Shadow" first appear on radio?
2. Which network carried "The Shadow"?
3. What was the title of the program's theme music?
4. Over the years, how many actors played "The Shadow"?
5. Who was the most famous actor to play the role?
6. How old was that actor when he began playing it?
7. What years did he play it?
8. Who was the last actor to play "The Shadow"?
9. What years did he play the role?
10. Name the other actors who held the role.
11. What famous lines introduced and closed the program?
12. What was the name of the cab driver who appeared regularly?
13. What was the name of the police commissioner?
14. In what magazine did "The Shadow" first appear?
15. Who wrote most of the first Shadow stories for this magazine?
16. Who wrote the first scripts for the radio series?
17. When was the last episode of "The Shadow" broadcast?
18. Who played Margo Lane opposite Orson Welles?
19. Who played Margo Lane opposite Bret Morrison?
20. Who was responsible for returning "The Shadow" to the air in the 1960s?

answers on page 40 ►

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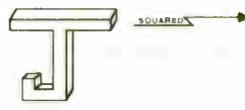
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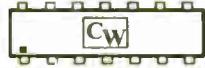


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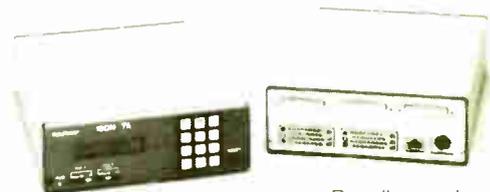
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AUDIO BROADCAST GROUP

READER SERVICE NO. 8

Misplaced 'Shadow'

► continued from page 38

than leaving a trail of bodies in his wake.

The Shadow's character was consistent throughout the show's run from 1930 to 1954. He was suave, debonair, sophisticated, yet with a sense of humor and a disarming ability to face any crisis.

Bret Morrison took the role in 1945 and, for many of us, he was the quintessential Shadow. His voice purred like aural velvet. He was readily believable as a

wealthy man about town. When he took the form of the Shadow, you could only cringe for the poor villain who was foolish enough to tangle with him.

Baldwin's Lamont Cranston and Shadow are not consistent with the radio character that stayed true to form for nearly 25 years. He is flippant, but not sophisticated. Perhaps the most telling shortcoming is when he attempts the Shadow's infamous laugh. On the radio it was both

controlled and menacing. Baldwin's is more closely described as hysterical.

You can almost imagine Baldwin in his dressing room going over his lines: "THE weed of crime bears bitter fruit. The WEED of crime bears... Will someone please bring out that recording of Bret Morrison again?!" He never gets it quite right.

Who were the makers of "The Shadow" movie trying to reach? If they were hoping to cash in on the memories of the millions who grew up with "The Shadow" on radio, they missed the mark by producing a show

that is too violent and not close enough to the original series.

If they want to attract a whole new young generation, the picture has too little action to grab them.

That may be the movie's greatest failure—it does not know whether it wants to show a new super hero springing to life, or an old friend coming out of retirement.

□□□

Read G. Burgan is a writer, producer and photographer and a former public radio station manager. He can be reached at 906-296-0652.

Shadow IQ Answers

1. The Shadow's initial appearance was on the *Detective Story* program in August of 1930. Give yourself five points if you said 1930. 2. A trick question. Over several years, "The Shadow" aired on CBS, NBC and finally the Mutual Radio network. One point for each network you listed. If you listed all three, give yourself an additional two points. 3. *Omphale's Spinning Wheel* (five points). If you said *The William Tell Overture*, deduct five points. (That'll teach you not to guess.) 4. This may be open to debate, but if you said nine, give yourself 10 points. 5. Orson Welles (five points).

6. Twenty-two (five points). 7. 1937 to 1939 (10 points). 8. Bret Morrison (five points). 9. 1945 to 1954 (15 points). 10. Jack LaCurto, Frank Readick, George Earle, Robert Hardy Andrews, Bill Johnstone, John Archer and Steve Courleigh (five points for each name you listed; another 10 points if you got them all in the right order).

11. "The weed of crime bears bitter fruit. Crime does not pay. The Shadow knows." (five points). 12. Shrevie (five points). 13. Commissioner Weston (five points). 14. *Street and Smith* magazines (10 points). 15. Walter Gibson (10 points). If you said Maxwell Grant, Gibson's pen name, give yourself five points.

16. Harry E. Charlott (15 points). If you said Walter Gibson, deduct 15 points. (See, guessing doesn't pay.) 17. Dec. 26, 1954 (10 points). If you said 1954, give yourself five points. 18. Agnes Moorehead (five points). 19. Lesley Woods, Grace Matthews or Gertrude Werner (15 points if you named at least one of the three). 20. Charles Michaelson (10 points).

If you scored a perfect 200, you are a Shadow expert and certainly know *what evil lurks in the hearts of men*. If you scored 150 or better, you are better than average and will never be tempted by the weed of crime's bitter fruit. If you scored less than 100, you missed too many episodes and obviously had a wasted youth.

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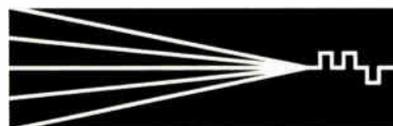
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DESIGNS THAT MAKE THE DIFFERENCE

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World Radio History

USER REPORT

Wheatstone Flexibility Suits Alaskan Station

by **Pierre A. Lonewolf**
Chief Engineer
Lonewolf Communications
KOTZ(AM)

KOTZEBUE, Alaska In the last two years, we have installed new consoles at KOTZ(AM) in both our news and bilingual studios, both of which were manu-

factured by Wheatstone Corp. of Syracuse, N.Y. This article focuses on the smaller of the two boards, the A-20 on-air broadcast console used in our newsroom.

When we finally decided to upgrade the newsroom from its old state to something that the entire staff could use, yet remain versatile enough for the more

experienced users, the boss came up with the usual requirements—that it do everything, last forever and cost nothing. Wheatstone managed to meet the first condition quite well; the second, only time will tell; and the last will never be.

Size and flexibility

The A-20 has two things that really

sold us on it—its size and flexibility. The price didn't hurt either.

The location of the newsroom was "size-restricted," but the console's 19-inch by 24.75-inch footprint solved that problem neatly. The other item that stood out was the flexibility of the console itself.

The console comes with ten input modules. In our case, it was configured with two mic and eight line level inputs. The mic modules (MM-20) have the usual A/B select switch and trim control with assign bus buttons for program or audition right under them. Then follows the fader, which is a 100-millimeter conductive plastic-type, positioned above the on/off switches. So far pretty standard stuff, neat and easy for anyone to figure out.

What you do not see at first is a real treat for the folks plagued with talk shows. On each mic printed circuit board is a set of DIP switches that lets the engineer select, among other things, if he or she wants to feed the audio to the mix-minus bus for call-ins. This feature is a great help and sure makes life, at least for me, a lot simpler.

The other choices that are there: talk back to studio, studio mute and control

The A-20 has two things that really sold us on it—its size and flexibility. The price didn't hurt either.

room mute. Everything is nice simple and neat.

The line input modules (SL-20) are outwardly the same as the mic inputs except for the module identification number, the addition of a cue button and another trim control for stereo. As with the mic module, the internal DIP switch is there, with the mix-minus and control room mute staying the same.

The difference for the line module is the timer restart and the local/external ready indicator. The uses of these need no explanation here.

Output side

On the output side of the console, we have the OM-20 module. The outputs consist of a mix-minus output, audition left and right, program left and right, and a mono out. All have trim controls and patch-in/patch-out (inserts) except for the mono and mix-minus outputs. The patch points have proved to be real handy for both the news staff and all of our on-air users.

Other option modules offered for the A-20 include the ST-20 studio turret, SC-20 studio control module, LS-6 line select module, FF-2 remote module, SS-6 remote module, MP-32 telephone module, ICM-32 intercom module, CLK-5 clock control card and the TM-6A timer control card. Because this console is

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more or less targeted for a small news-room/studio, these option modules cover just about anything you could need. Your imagination is the limit.

Just to quickly cover the specs of the A-20: The frequency response on the line inputs is ± 0.2 dB (20 Hz to 20 kHz), with mic response at ± 0.5 dB (30 Hz to 20 kHz).

The THD+Noise is at <0.003 percent line and <0.005 percent mic, and it has a noise floor of -88 dBm line and -74 dBm mic. The console can give you a +28 dBm on all of the outputs, which are electronically balanced.

Well, enough of specs part, just about any console you look at these days will pass audio better than most humans can hear anyway. One has to think of the application more than specs it seems these days.

Impressions

As for the whole thing, these impressions come to mind.

The staff really likes the console: It is easy for everyone to learn how to use. They also like the color and layout. Laugh if you like, but it is important to some people.

I like the flexibility of the whole thing. I can configure it to suit just about anything that I will run into here.

The documentation is good, and although I wish its arrangement were a little better, everything is there for you.

I guess the best part is the wiring method that Wheatstone uses. At first, I did not like the DB25 connections, but after about eight or nine of them, they won me over. It really does make things go faster.

I do, however, have a few "wish list" items: The overall construction could be just a bit heavier considering the number of people that pass through our doors. Also, the VU meter light bulbs could be a standard something. I am at the end of the world compared to some of you



The A-20 console proves simple enough for beginners yet versatile enough for pros.

folks: I cannot just go out and buy parts at the local hardware or discount store. There simply aren't any.

Overall I give the whole console a good score. People can use it easily. I have not covered everything on the console: If detailed information is what you need, give the folks at Wheatstone a call. They have been a great help to us.

□ □ □

For information from Wheatstone, contact Ray Esparolini in New York state at 315-452-5000; fax: 315-452-0160; or circle Reader Service 138.

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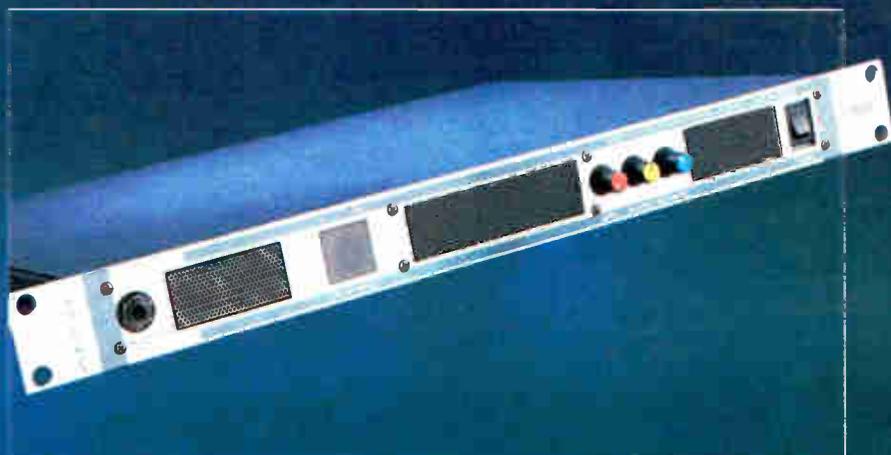
The AEQ Portable Mixer MP-10

- ▶ Ideal for remote event transmission.
- ▶ Easy to install and operate.
- ▶ Provides portability and autonomy.
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Special features:

- ▶ Five transformer balanced inputs selectable Mic / Line.
- ▶ Front panel input controls.
- ▶ Capable of linking mixers together to increase number of inputs.
- ▶ Transformer balanced outputs.
- ▶ Internal Ni-Cd rechargeable batteries provides 4 hour autonomy.
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- ▶ Three headphone output jacks.

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 - ▶ Four mono inputs Mic / Line selectable.
 - ▶ One Telephone Hybrid interface.
 - ▶ Studio control Intercom monitor.
 - ▶ One main stereo output plus mono sum output.
 - ▶ Power supply for On Air signaling.
 - ▶ The AEQ BC-500 comes with 4 blank modules to enhance this configuration.



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USER REPORT

Logitek Mariner Is Feature-Filled

by Dennis Orcutt
Chief Engineer
KMGL(FM)

OKLAHOMA CITY My search for a new audio console for my control room led me through many aisles at NAB '93. I was originally set on getting a big name console, but the prices were simply too high. Then I found the Logitek booth.

My control room is set up with three microphones, a news studio, six cart machines, three CD players, two reel-to-reels, a dedicated input for the Marti unit and two eight-line selectable remote

a new interface box for sequencing the cart machines.

• The meter bridge is completely removable to facilitate installation and you can stay on-air with the bridge removed.

The Mariner was looking quite impressive. All I had to do was wire the outputs of the Delta cart machines to the console, and it would do the rest.

My next question to Logitek was what if I do not want to sequence events, can I stop and run on a remote start only?

"Easy," said Tag Borland, president of Logitek. "We make the A input sequence and the B input standard remote start."

audio, pauses for four more seconds, starts the next mixer and CD player, and then waits two more seconds to turn off the current mixer and CD player.

Smooth transition

It creates a very smooth transition: Even the DJs couldn't believe how good the music segue was. This option is great for emergencies or bathroom runs.

The on-board controller in each input module can be programmed to do any of these functions, and even to interface with satellite feeds or automation systems. It is definitely a walkaway console. Logitek even offers the option of preset levels for the fader.

You can have all the pots physically turned down, and the remote start from the device, cart, CD, satellite, etc. will turn the module on and place the audio output to a preset 0 dB level. If you wish to make some changes to that, all you need to do is push the slider up to the 0 dB point and the slider takes control of the output.

I was thoroughly impressed. The tape input modules have their own six function remote starts that interface with any reel-to-reel deck. I also selected an eight-input line select switch for each reel-to-reel to choose which deck will record. This makes it easy for the DJ to record the phone, air, program, audition or any other device you wire to the line select.

Borland also took the alarm outputs

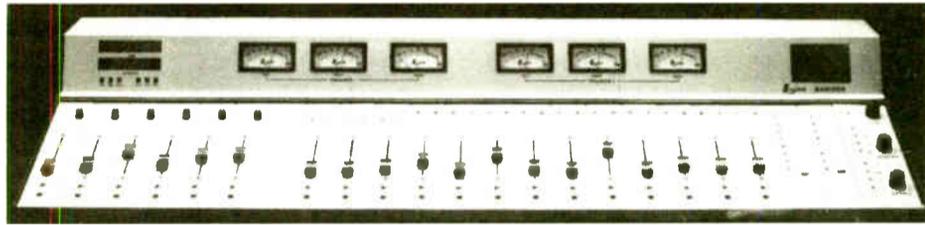
from my EBS receiver and the AP machine and programmed them to flash the input module's input select button. This way I need not drill any ugly holes in the console to mount warning lights.

I almost walked away from the booth without even asking how much all of these features would cost because I knew it would be very expensive, but I went ahead and asked anyway. Borland thought for a moment, asked me what modules I would need and what line select options and then quoted me a price of \$11,000.

Again, I was amazed.

□ □ □

For information from Logitek, contact Tag Borland in Texas at 713-782-4592; fax: 713-782-7597; or circle Reader Service 91.



The 22-input Mariner board includes options that KMGL never thought would fit into the budget.

inputs for other production rooms, EBS and all the numerous options that you could need for a nonconflicting operation.

Sequencer box

I was not sure if I would keep the cart machines for another year or another decade. And because they had been sequencing from the secondary tone output for more than 15 years, I really couldn't change that.

I had built my own relay-controlled sequencer box—very crude by today's standards—and wanted to eliminate that extra piece of hardware with something nicer looking. Otherwise, I knew that this would be just one more thing to build and install during the short two-week window between Christmas and early January when we were not in the book.

I also had to rebuild one of my old production rooms to accommodate a temporary control room.

All of this leads me back to my original problem of what size console to buy for all of the inputs I use. If I went with all my options, I would need 22 inputs, but if I got a new digital storage unit for my spots, I would only need 17.

An expensive brand's consoles would cost in excess of \$21,000 for the full blown unit and about \$16,000 for one with fewer inputs.

I also looked at some budget consoles. I liked them at first, but after seeing what options they supported, I saw that features were cut to the bone.

To do what I really wanted to do, I would have to buy one of the premium boards.

Features

Finally, I found a console that met all of my needs but without being too expensive—the Logitek Mariner 22-input console.

After seeing all of the features it provided, I was almost afraid to ask its price. Some of its features include:

• All-digital control of the audio and switching in the module means there is no audio on the buttons or the fader, and thus no noise. The monitor and headphone pots are also digital controllers.

• The on-board digital controller in each input module controls all sequencing. In my case, this eliminated the need to build

I asked if he could do the same thing with my Denon CD players. Again, the answer was yes. I have standard remote start in the A input and sequencing in the B input.

I sent Borland the specifications and information for the CD players. He took the Denon end-of-message output, which is activated 10 seconds prior to the end of

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USER REPORT

Home Broadcast Studio Possible with Comrex

by Randy Dietrich
Chief Engineer
WORD-FM

PITTSBURGH Because of a little black box, a Christian counselor/talk show host can reach his radio audience five nights a week and know that when his hour-long program is over he will end up in bed, not in an icy ditch.

"UP LATE with Dr. Doug" is a popular program on WORD-FM, our Christian talk station in Pittsburgh. For years, Doug Wiegand Ph.D., a nationally recog-

nized counselor, minister and author, had broadcast on various local stations. Most recently, he had a one-hour daytime program on our sister station WPIT(AM).

As the WPIT time slot was a less-than-ideal time to reach his prime audience, Dr. Wiegand accepted WORD-FM's offer of a nightly slot, from midnight to 1 a.m.

Many reasons

From Wiegand's point of view, it was preferable for many reasons: "Now, with an open conversation format instead of a prepared program, we provide valuable counsel-

ing to many who, for financial reasons, would never end up in an office setting," he said.

Because he is widely known for appearances on Christian television, his book and private practice, Wiegand's "UP LATE" show did very well from its premiere on WORD-FM in May 1993. But not without a few problems.

Wiegand had a 40-minute drive each way to the station, leaving home at 11 p.m. and returning about 2 a.m. With his full-time counseling practice, impaired vision and Pittsburgh's worst winter in 30 years, the situation quickly began to take its toll.

"Randy would have to substitute a tape we provided on the nights I slid into a ditch someplace and had to scramble to a phone to call the station," Wiegand said.

So I sat down with Doug and a broadcast equipment catalog to look for a way he could produce the late-night broadcasts from home. When we came across

extender we had recommended that he purchased both. Comrex told us to return the demo unit and had a new Talk Console to us the next day. Broadcasts with the new system commenced this year in mid-May.

Wiegand operates like Larry King, speaking to one caller while the next line waits until he brings them on air with a push of "Air 1" or "Air 2."

Simple

"In eight years and three different studios, I have never seen anything this simple," he said. "I just keep an eye on the line to make sure it's properly leveled, no green going into the red. And feeding the program on the frequency extender certainly is a more attractive solution than having the phone company install a special line at \$1,500 or more."

The other option we had considered was some sort of mixing board, but Wiegand

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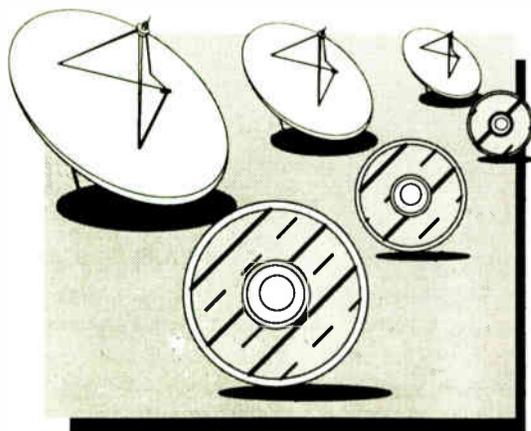
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Circle (71) On Reader Service Card



Dr. Doug uses the Comrex Talk Console to broadcast his call-in show from home.

the Comrex Talk Console, it jumped off the page. I had used Comrex frequency extenders for years.

Demo unit

We called Harris Allied and arranged with Lynn Distler at Comrex to get a demo unit. It was on my desk the next morning.

We put it through its paces and found it did everything it was supposed to and more, just like our other Comrex equipment. We did a few dry runs on our Q-bus and it sounded great.

"The extent of my technical knowledge is pushing buttons," said Wiegand. "My VCR is still flashing '12:00.' But when Randy installed the Comrex, he spent just 10 minutes showing me how to call the station, turn on the Talk Console, dial in, wait till I hear my theme music and then turn on the mic."

The Talk Console is ideal for remote talk show broadcasts because it provides everything the host needs to put callers on air, call the station and control line levels. Integral mix-minus circuitry insures that on-air callers will not hear their own echo.

Wiegand was so pleased with the operating simplicity of the Talk Console and the broadcast quality provided by the single line frequency

would have had to connect the equipment to it. He was very happy with the Comrex: "That other equipment would have been as big as my desktop, while my Talk Console isn't much bigger than my Bible."

Wiegand handles all advertising and sponsorship for "UP LATE" and contracts with WORD-FM for his time. He provides us with a schedule of commercials and station breaks. From the trouble-free operation and smooth-sounding shows, it is obvious that he is having no problems whatever at his studio end.

"It is the best step we've ever taken in our radio ministry," he said. "Absolute convenience for a one-person operation so I can concentrate on counseling instead of technical details. And the price is minimal."

In addition to clear, crisp-sounding broadcasts, Beth Wiegand, who works with both her husband's counseling practice and "UP LATE," said that program quality has improved noticeably because Wiegand is completely relaxed. "Fifteen minutes after we're off air, I'm in bed," said Wiegand.

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For information from Comrex, contact Lynn Distler in Massachusetts at 800-237-1776; fax: 508-635-0401; or circle Reader Service 135.

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Circle (42) On Reader Service Card

USER REPORT

New AM Easily Installs LPB 7000

by Michael Martindale
Director of Engineering
KATD(AM)-KVON(AM)-KVYN(FM)

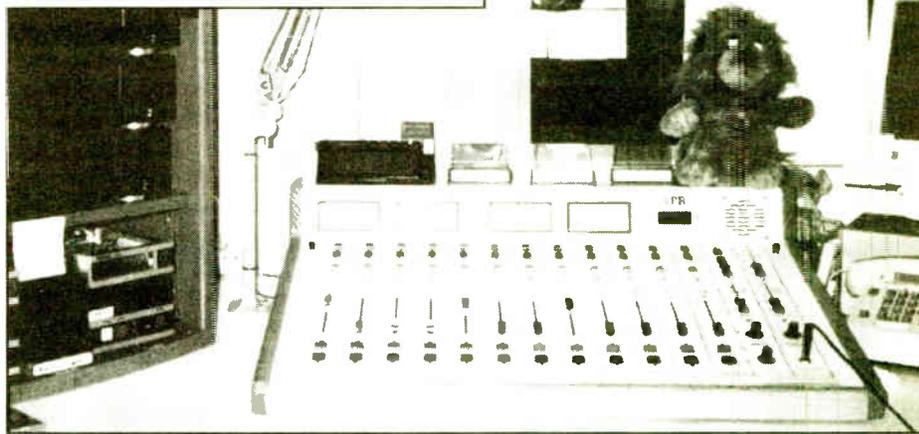
NAPA, Calif. A little over a year ago, at NAB '93, I was introduced to the new owner of a local AM station and was asked to design and build his new studios. As a listener of the station, I was somewhat familiar with it but had never seen the facility. The engineer at the time clued me in on what I was about to inherit. I knew the facility needed upgrading from its present state, but as the station was to move anyway, improving the

facility was not too great of a task.

Innovation included purchasing a new audio console. The old console, not very good to begin with, was aging. Purchasing a new board meant satisfying my own slightly extravagant taste and the owner's requirement for an inexpensive console.

Wish list

Jay Michaels, the program director/operations director, wanted remote starts, ease of use and slide faders. I wanted high-quality audio and switchers, modular architecture, ease of maintenance, full metering and monitoring, and no VCAs.



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After looking at many consoles at NAB, we passed the LPB booth where its new line of 7000 series consoles was on display. I spoke with John Devecka and spent some time looking over the console very carefully. After working with it for a while, I realized that it offered something for everyone at our station. My first impressions of the board, combined with my knowledge of LPB's reputation, led me to purchase a 12-channel 7012 for KATD(AM).

The console arrived on time, as promised, and in excellent condition. Despite the box being marked "fragile," it was not damaged in shipping. It took only eight hours to wire the console; I opted to take it to an external punch panel and connected all equipment from there.

All terminations are made within at screw terminal blocks. The wire exits through slots in the bottom of the main frame. Everything inside of the console and in the manual is clearly marked and easy to understand. The inside of the console is laid out for easy access to components.

The console uses plug-in amplifier modules in the frame, and all ICs are socketed. High-quality Penny & Giles faders are used, as well as high-quality switches with LED status indicators.

VU meters

The console has four VU meters with peak LED indicators, two of which can be assigned to any one of the three stereo busses. One can be assigned as a mono mix meter.

Monitoring facilities are excellent, with full separate monitoring for studio audio, as well as headphone audio. A timer is included in the meter bridge and is programmable through any of the 12 modules or can be operated manually via a timer control on the mainframe. The power supply is rack-mounted separate from the console.

I did an oldies show on the station for a while, and I can say from experience that the console is laid out extremely well. All switches and faders are easy to operate and everything is clearly labeled. All switch actions are extremely silent with very good isolation, leaving no audible ticks or pops on air.

The console meets and easily exceeds its published specs. Our console is totally maxed out on inputs, and we have never had any isolation problems.

The 7012 has given us excellent performance and helps make KATD a great-sounding station. My only regret is not purchasing the 18-channel 7018.

□ □ □

For information from LPB, contact John Devecka in Pennsylvania at 610-644-1123; fax: 610-644-8651; or circle Reader Service 41.

BE Mix Trak-90 Perfect for After MidNite

► continued from page 1

Giles sliders and balanced stereo send and receive patch points, making the interfacing of external audio processing equipment a breeze.

Cutting edge

The design of the MT-90 is cutting edge, but, thankfully, it is not over-engineered so as to neglect traditional engineering concerns like two-position switches. It incorporates high-quality "silent hall effect" switches that turn on and off the modules, while also providing the necessary machine control for all other outboard gear.

The elegance of the console's design is also highlighted in the final line amp section of the board. BE went the extra mile by incorporating the LT-1010 cur-

He needed a very complex recording scheme that combined the caller, music and microphone, hands-free, all routing

With more than 20 inputs and auxiliary modules, the MT-90 delivers all the smooth and efficient technical firepower needed to meet or beat your competition.

seamlessly through the cue bus side chain. BE worked closely with me to design this specific board to fit neatly into an existing slot available on the console. The finished design is an expanded cue channel.

As is common with air-talent, Garner doesn't care how it happens, just that it

endless dedication and efforts, the end result was nothing short of phenomenal and our broadcast became the center of

1990s, then BE is certainly the company of our times. With more than 20 inputs and auxiliary modules, the MT-90 delivers all the smooth and efficient technical firepower needed to meet or beat your competition.

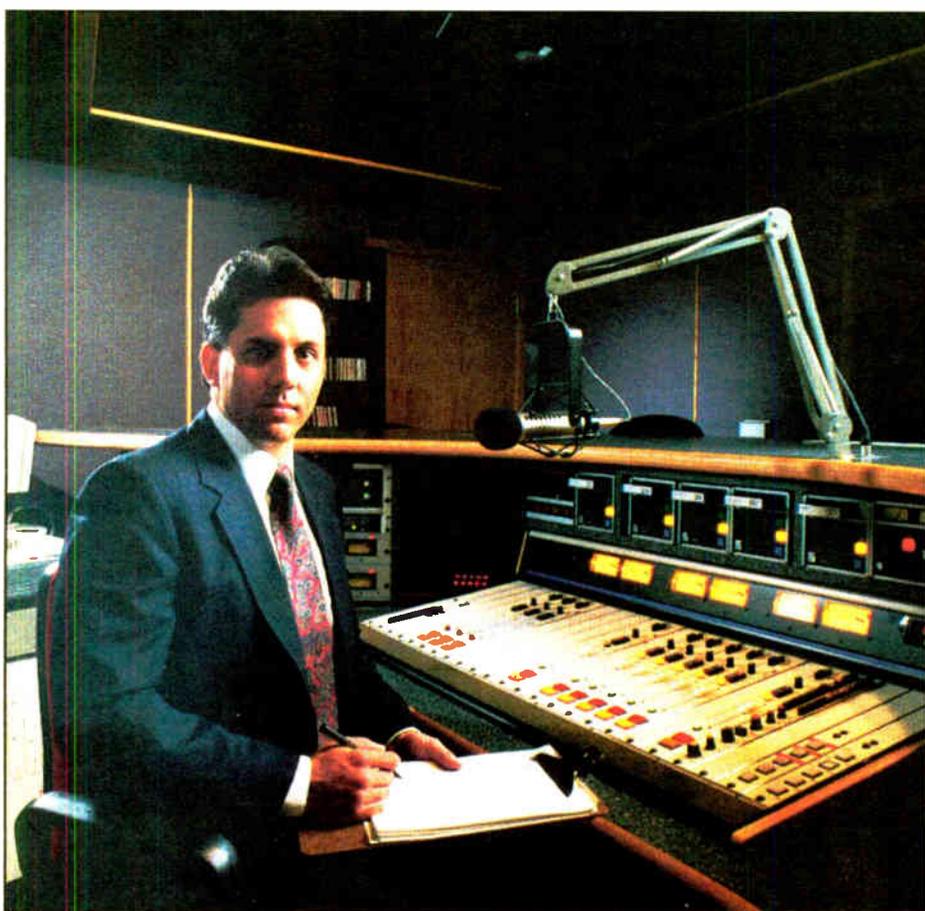
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For information from Broadcast Electronics, contact Dave Buck in Illinois at 217-224-9600; fax: 217-224-9607; or circle Reader Service 185.

Matthew Connor can be reached in Los Angeles at 213-851-7770.

attention for the whole convention.

If "lean and mean" is the motto of the



Matthew Connor displays the BE Mix Trak-90, which keeps After MidNite flowing smoothly.

rent pump into its design. Many manufacturers cannot begin to match these technical standards. The end result is a board with significantly increased output drive capability.

The machine control segment of the installation presented a whole new set of challenges. With the stock board, you have the option of configuring the console for "simple remote" or "remote sequence."

After MidNite needed the cart machines to sequentially trigger one another automatically. With the multiple pieces of equipment we used, it became confusing. Again, BE was there to help me interface the other manufacturer's equipment to the Mix Trak-90's remote features.

Without a question, the BE Mix Trak-90 is a versatile and flexible performer. It easily expands as the needs of a station grow.

The demands placed on the project by the show's host, Blair Garner, were quite specific.

does. His praise for the feature is endless.

Road trip

When After MidNite decided to hit the road and go live from the Country Radio Seminar in Nashville, Tenn., I was asked to replicate the entire studio for the three-show broadcast from the Opryland Hotel. The only hitch was that we only had four weeks to set everything up.

With custom-built studio furniture by Mager Kizziah (formerly of Master Craft) and duplicate Mix Trak-90 provided by BE, the demands were met with flying colors. BE even went the extra mile by providing the necessary peripherals—recreating the exact layout designed for our Hollywood studio.

Having gone through the whole procedure only a few months prior, the remote was a plug-and-play operation. Granted, it was a cross-country plug-and-play. And it all had to be done in three days. Thanks to BE's seemingly

Quantum FM

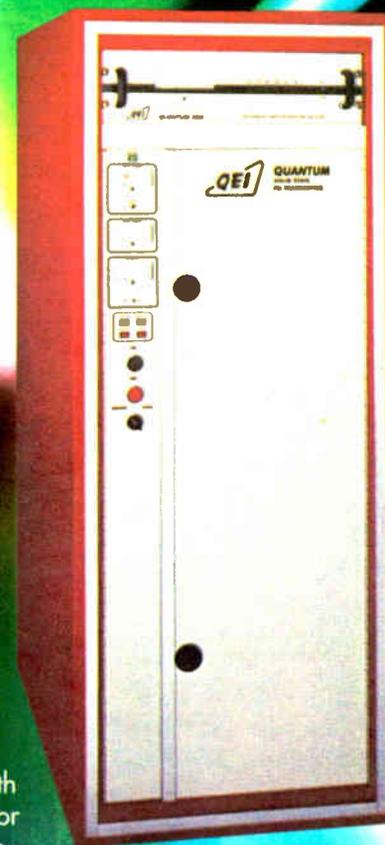
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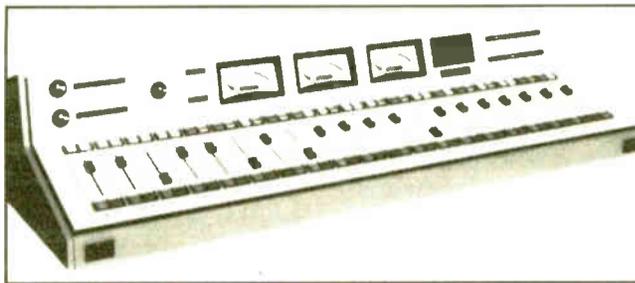
Autogram Consoles Meet Check List

by **Gil Garcia, PBE**
Chief Engineer
KPEZ(FM)-KHFI-FM

AUSTIN, Texas During my 30 years as a radio engineer, I have worked on, built and installed several consoles for both control and production rooms.

Over the past 15 years, I have installed more **Autogram** consoles in radio stations than any other board. Not that these are the only good boards on the market, but my company has selected many Autogram consoles.

When buying a board, I check first with



The Autogram RTV 20 console

the technical director and other engineers in my company to see what kind of trouble they have experienced with different boards, how the announcers like them and

how easy they are to install and maintain. I then check the price and the availability of parts and technical assistance.

When I help repair or install a board at one of our other stations, I am able to work with what others have bought.

I have found that some of these boards are good, but others have design problems that plague the engineer for the life of the console. I have even heard some engineers say they prefer a

certain console because they know its quirks after all of the work they have done on it.

Others tell me that periodically replacing switches, pots, shafts and power supply parts is to be expected, given the complexity of the piece of equipment.

I also consider the room I will use a console in when I buy it.

In the control room you want something that anyone can use to get the product from a cart, CD, satellite or computer to the air. It should have simple controls because announcers need not spend time readjusting EQ settings, panners, mix-minus buttons or anything else that might cause on-air errors.

Simple to use

The production room is a different story. The board should have more bells and whistles, but it should still be simple to use. I remember visiting a station and the engineer showed me a great 30-channel board: It looked like the Starship Enterprise. When I asked to see what it could do, only one production director knew how to run it.

When I went back later that year, the production director was no longer with the station. The board was now considered all but useless because no one knew what all the buttons did.

A simple spot now took longer to cut because the board was too complex. It seems the ex-production director had it wired for his use only, and the configuration was unknown to the rest of the staff.

I try to make sure that anyone can walk in and produce a spot fast and easy but without sacrificing the ability to produce sophisticated spots with lots of tracks and effects.

Among the consoles I have worked with, the IC 10 Autogram console is one of my favorites. Autogram console controls are simple. Almost all channel selections are the same so the announcer is not confused. The shielding on the board is doubled in the IC 10, so coffee or Coke spills cannot hurt the board.

The IC 10 is easy to install and simple to understand and work on. There are no bells and whistles: Just a straightforward console that gets the job done and sounds as great as the big, fancy units. The IC 10 packs the power supply, cue and monitor all in a single console that rests on a countertop.

Controls

Another popular Autogram unit is the RTV 20. It also has simple controls, all of which are identical, decreasing the chance of mistakes. An interface for satellite or computer and Penny & Giles sliders are included too. The only problem I seem to have with these boards is changing the light bulbs once a year.

The first RTV 20 I installed worked flawlessly. But the other unit had a small problem attributable to our needing the board in less than a week. Autogram custom built the board for us—something they were happy to do. But when it arrived, we detected a small hum in the audition channel. Autogram sent a design engineer down to check out the board and to help break it in at our control room.

The RTV 20 is a modern console with a great price. The best thing about it is its ease of installation. All you need is wire cutters and a small screwdriver, and the console can be on-line in minutes.

□ □ □

For information from Autogram, contact Ernie Ankele in Texas at 800-327-6901; fax: 214-423-6334; or circle Reader Service 82.

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Company News

Varian Associates launched a remanufacture program for its Eimac-brand broadcast power grid tubes.

BBE Sound Inc., manufacturer of high definition audio technologies, and **Barcus-Berry**, manufacturer of musical instrument amplifiers, have merged.

New River Studios of Ft. Lauderdale, Fla., installed the **Korg SoundLink** to enhance its 32-track digital and 48-track recording facility.

Gaylord Entertainment Co. purchased a **Harrison AP-100** on-air console to be installed in the Wildhorse Saloon in Nashville, Tenn.

The console will be used for interviews and live broadcasts on WSM-FM.

Audio-Technica named **Manny's Music** of New York City its microphone dealer of the year for 1993. Also, **Ace Music** of Miami was named A-T's wireless dealer of the year.

Circuit Research Labs Inc. (CRL) and **Tektronix Inc.** entered an agreement under which CRL licensed certain digital audio testing technology to Tektronix.

Also, Tektronix recently received ISO 90001 certification, which attests to the company's design, production, installation and service record.

Prime Images Inc. in Pennsauken, N.J., purchased **Ampex** system equipment to be incorporated into a new digital component suite at its new 15,000-square-foot facility.

JLCooper Electronics expanded its Los Angeles-based headquarters to accommodate increases in sales, manufacturing and R&D requirements.

Also, JLCooper added three new sales representatives: **Cadon Technical Sales Co.**, based in Raytown, Mo.; **Dobbs-Stanford Inc.**, based in Dallas; and **Cambridge Pro Sales**, based in South Euclid, Ohio.

Hewlett-Packard (HP) and **Wavetek Corp.** reached an agreement under which Wavetek licensed HP's patented A-to-D conversion technology. Wavetek plans to use this technology in certain precision, bench-top test and measurement instruments manufactured by its calibration division, based in Norwich, England.

The Wireless Business Telephone Systems Seminar, the only end-user seminar dedicated to the applications, benefits and limitations of wireless PBXs, in-building cellular communications systems and on-premises PCS, is set for September 19-20 in St. Louis.

For information, contact **Carole Kaufman** at **Alexander Resources**, the sponsor of the seminar, at 800-948-8225; or fax: 602-948-1081.

Monitor-manufacturer **Galaxy Audio** appointed **Givan Associates** its factory representative for New England. Givan Associates is based in West Boylston, Mass.

Wegener Corp. announced the revenues and operating results for the third quarter of fiscal 1994, which ended May 27, 1994. During this period, the company reported earnings of \$85,000. By comparison, in the third quarter of 1993, Wegener lost \$23,000.

Wegener also announced the delivery of its DR180 Digital Audio Receivers to Miami-based **Magic Radio International Inc.** Magic Radio will use the receivers to deliver Satélite de Programación Latinoamericano (SPL), a Spanish-language news, music, sports and lifestyle service originating in Madrid, Spain.

Solid State Logic announced the installation of an SL 4064 G Plus console with **Ultimation** and

Total Recall at **Cecco Music** in New York.

International Tapetronics Corp. (ITC) acquired the entire broadcasting technology line from **Systems Marketing Corp. (SMC)**, an audio automation company in Normal, Ill. SMC, also known as **Sono-Mag**, manufactures analog automation equipment, including the **Audio Cartridge Carousel**.

Telex Communications Inc. announced its annual sales rep awards during the 1994 NSCA show in Las Vegas. Rep of the Year awards were jointly awarded to **Bencsik Associates**, Ocala, Fla., and **Ziskind Associates**, Arlington Heights, Ill.

Telex also appointed two new manufacturer's representatives. The Dallas-based **P.B. Bowers** will represent Telex in Texas, Oklahoma, Arkansas, Louisiana, Mississippi and western Tennessee. The Salt Lake City-based **THISCO** will cover New Mexico, Utah, Wyoming, Colorado, eastern Montana, southern Idaho and western Nebraska.

People, Promotions and Appointments

Bart Petrini joined **Richardson Electronics Inc.** as vice president of its electron device group, which includes Richardson's electron tube business.

Richardson Electronics, Ltd.

Richardson also tapped **Jim Patterson** as national sales manager and **Joe D'Agostino** and **Bob Magill** as area managers for its solid state and components strategic business unit.

Radio Spirits tapped **Craig Harding** as a senior producer of its old-time radio programs and cassettes.

Audio-Technica (A-T) appointed **Michael Edwards** sales engineer. He acts as a liaison between customers and A-T's engineering department.

Mark Kaltman joined **The Synclavier Company** as national sales manager. He oversees all aspects of North American sales of the company's digital audio workstations.

Shure Brothers Inc. promoted **John Phelan** to vice president of international

marketing and sales and **Alan Hershner** to vice president of domestic sales.

Music Choice promoted both **Valerie Nay** and **Jennifer Reed** to the position of affiliate relations director.

FirstCom Broadcast Services promoted **Carol Rowden** to the position of general manager. FirstCom produces and markets music services.

Varian Associates Inc. named **Keith Botts** customer support manager for its microwave equipment products business unit, headquartered in Santa Clara, Calif.

Thomas Parkinson was appointed president and chief executive officer of **Shape Inc.**, an independent manufacturer of audio cassettes, video cassettes and CD jewel boxes.

Roland

Roland Corp. announced three new appointments to its professional audio division: **Tom Stephenson** was promoted to national sales manager, **Laura Tyson** joins the company as northeastern regional manager and **Grendal Hanks** is western regional manager.

Allen Stone joined the soon-to-launch **Prime Sports Radio (PSR)** as program director. PSR is a division of **Liberty Sports Inc.**, a 24-hour network devoted

to national sports information.

Broadcast Programming tapped **J.J. Cook** as national CHR/Hot AC programmer-consultant. For the past two years, Cook was vice president of programming for the Heritage Broadcast Group.

BP also hired **David McKay** as a regional manager in Seattle.

JLCooper Electronics promoted **Chuck Thompson** to the position of vice president and general manager.

Doug Wood joined the sales and marketing department of **Otari Corp.** as its new product manager. He oversees product development for both digital workstations and consoles.

Otari also appointed **Robert La Violette** its sales manager for industrial products in the Western Hemisphere.

Switchcraft Inc. appointed **B. Alan Berg** director of engineering and **Bob Ross** director of telecom sales.

CBS Americas, CBS's Spanish-language radio network, added two new staff members.

Luis Carrera was named manager of technical operations, and **Aliki Langhorst** was named operations/traffic supervisor.

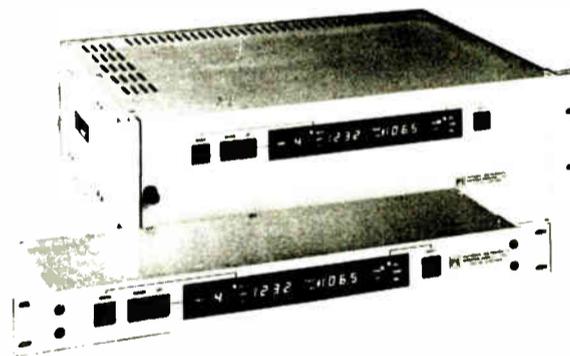


NEOTEK

Tim Shuttleworth was appointed senior design engineer for **Neotek Corp.**

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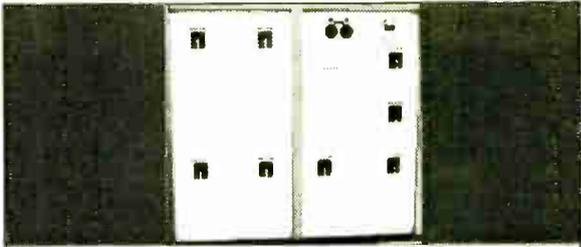
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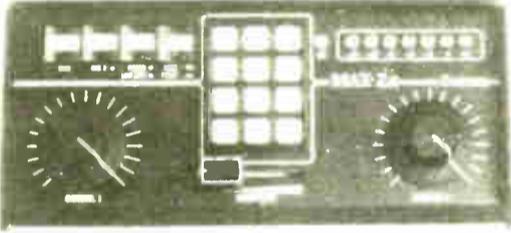
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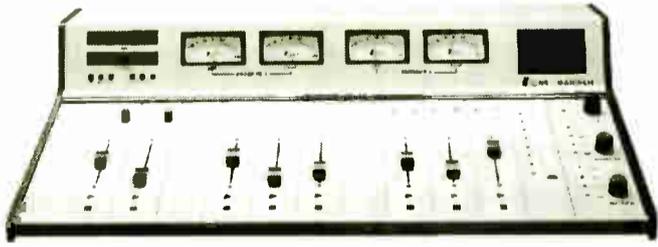
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INDUSTRY ROUNDUP

Consoles Succumb to the Digital Age

by T. Carter Ross

WASHINGTON The basic board with its pots, slides, mixers and VU meters has been a stalwart, remaining essentially unchanged for decades. But with the advent and integration of more digital and computer-based equipment, change is gradually affecting even these hold-outs.

At NAB '94, Harris Allied introduced an all-digital-to-air studio that integrated a **Graham-Patten Systems D/ESAM** digital edit suite audio mixer. The board, with some modifications to its control architecture, represented a major concept shift toward the probable future of console technology.

Showing a concept

Said Jay Adrick, Harris Allied product line director for broadcast systems, "What we were showing was a concept. The board was not to be used as an on-air board, but we are working on developing an on-air digital console."

"We are looking at format conversion, sample rate converters, etc., all integrated into the console. A system that would be totally integrated in one box instead of something modularized," he said.

Until such a board hits the market, something Harris Allied hopes to see by NAB '95, broadcasters will have to work with contemporary console technology. And while the digital and computer revolutions will affect some of the uses and functions of consoles, the basics are unlikely to change. For decades, consoles have had a standard layout that has remained relatively unchanged.

Bill Harland, director of domestic sales for **Broadcast Electronics**, said, "I don't really see the console as we know it today going away any time soon."

"The actual lay out for on-air has been designed in a fashion that makes sense to operate," said **Ray Esparolini**, director of sales for **Wheatstone**. "That doesn't need to be changed."

"The integration of digital audio has to wrap around a familiar interface: the console. Audio mixing consoles remain the human interface choice that talent and management demand," said **Jon Young**, **Arrakis** vice president of worldwide sales.

Also, the basic "feel" of consoles is unlikely to change. Most manufacturers stressed the importance of the "tactile feedback" that slides, buttons and pots offer. Young pointed to the initial reluctance of broadcasters to move from rotary pots to slide faders as an example of how viscerally broadcasters feel about their consoles.

"A control board that the talent knows provides speed and ease of use without retraining—this is what broadcasters demand," said Young. "People are comfortable with their consoles."

Board basics

While the basics of boards may not change, manufacturers do see digital consoles—or at least more digital-friendly consoles—as part of the near future.

"I see analog consoles, at least new ones, disappearing over the

next few years," said **Tag Borland**, president of **Logitek**. "In the next two years, it will be cheaper to make all-digital consoles than all-analog."

Tim Schwieger, vice president, marketing, for **BSW**, also sees more digital technology being integrated. "Consoles will incorporate a lot of digital inputs and outputs. Most inputs that are now analog will need to be digital," he said.

One thing is agreed upon: Digital source gear, such as

hard disk cart-replacement systems, is able to consolidate multiple tape and cart sources into a single machine, thus requiring less inputs to the console. Consequently, boards are likely to shrink in size.

"I see the on-air console becoming smaller and doing more from a smaller size because of the technology being put into them," Schwieger said.

Harland agrees. "I think consoles will become smaller, not larger, leaving more space for

keyboards and monitors," he said.

The technology to create the digital boards of the future is currently in existence, according to several manufacturers, the only real problem being cost.

Adrick said, "The pieces are all available today, but it's all modularized. By the time you stack all of the components into one box, it's costly."

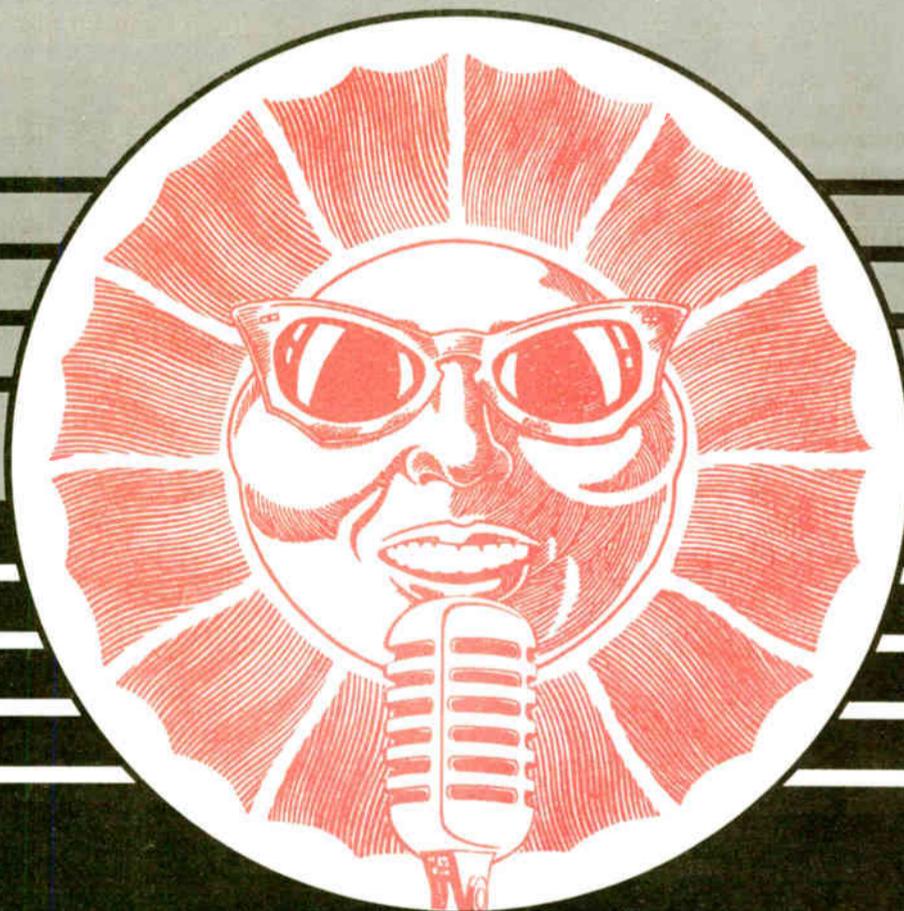
"The price-to-performance ratio is not there," said Harland.

Others point out that a console is not a piece of equipment readily replaced by broadcasters.

"Broadcasters are buying consoles on how they will work over

continued on page 54 ►

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TECHNOLOGY UPDATES

AUDIOARTS

MR-40 Console Is Capable of Both On-Air and Production Use

SYRACUSE, N.Y. The MR-40 console from Audioarts Engineering offers features that allow it to be used as either a production or on-air board. It comes standard with four mono mic/line input modules and eight stereo line modules. The modules are all removed easily for configuration changes or maintenance.

Standard on/off buttons are located at the bottom of each mic input module, and start/stop buttons with machine control logic are on the bottom of the line modules. All are LED illuminated.

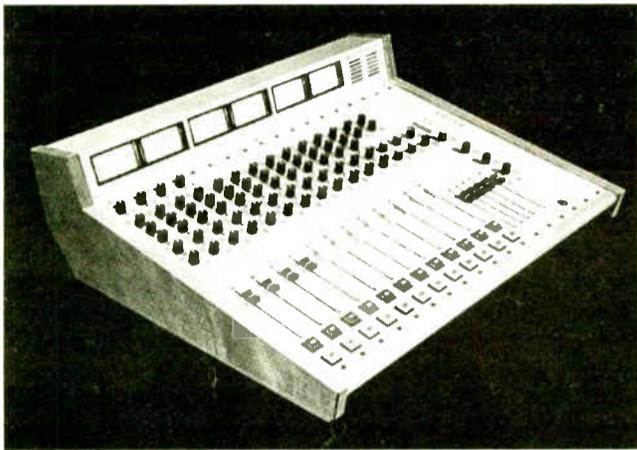
Above the buttons are 104-millimeter conductive plastic faders that provide smooth transitions and maximum control.

The modules can be assigned direct to program avoiding the group masters or assigned to the four group masters for multitrack tape/digital audio workstation production. Above the assignments is a pre-post fader selectable stereo send control, which is great for feeding effects devices or creating a mix-minus.

Three bands of 16 dB \pm EQ, which is selectable in or out, are located above the send.

Controlling the modules are the four sub-masters also with front panel recessed gain and VU trims. Volume control for the studio, control room and headphone are all through individual stereo conductive plastic pots.

The MR-40 includes four separate group meters as well as left and right program meters. All six are illuminated



Sifam VU meters.

The board is also designed for studios using digital technology. It uses non-VCA technology and all technical specifications exceed the requirements for 16-bit digital audio.

For information, contact Rick Strage in New York state at 315-452-0160; fax: 315-452-5000; or circle Reader Service 151.

DATEQ

BCS50 Offers Quality Audio at Cost-Effective Price

ALMERE-HAVEN, Netherlands The BCS50 on-air mixing console from Dateq offers users high quality audio at a cost-effective price. It is a VCA-controlled, modular console with a frame that houses up to 16 channels and with generous script space in the center.

All modules are connected to a motherboard through gold-plated connectors. The BCS50 also features "dynamic buss design" to help ensure the lowest

possible noise floor.

Available modules for the BCS50 include both stereo and mono channels, a telephone channel with built-in hybrid, and the Master Module, which provides extensive monitoring capabilities.

Also available is the Meterbridge. Two mounted VU meters follow the multi-source selection, ensuring that the signal monitored is the signal on the bridge. It also can be built with an integrated clock/timer.

For information, contact Barry Fox at QMI in Massachusetts at 508-435-4243; fax: 508-435-3660; or circle Reader Service 39.

NEOTEK

Élite and Esprit Consoles Are Designed for Customization

CHICAGO For more than 20 years, Neotek Corp. has manufactured custom-built professional audio mixing consoles. Its current product line includes two consoles for broadcast work: the Élite and the Esprit.

Although originally designed for multitrack recording, a modified broadcast version of the Élite console has proven very popular. Over the past five years, many Scandinavian radio stations, including Swedish and Danish state broadcasters, have chosen Neotek Élite consoles.

The Esprit console system, on the other hand, is specifically designed for broadcast work. It offers eight auxiliary busses and a

mix-minus from every input module. The eight remaining mix busses may be configured as mono or stereo in any combination. Other features include live mic sensing, fader switch logic and a comprehensive talkback and return talkback system.

Although the Esprit has not been on the market as long as the Élite it has been well received in Australia by the Australian Broadcasting Corp., which has already purchased four Esprit consoles.

The Esprit is designed for customization. It offers numerous configuration options, free frame specifications and a variety of meter and patch bay choices.

For information, contact Hugh Daly in Illinois at 312-929-6699; fax: 312-975-1700; or circle Reader Service 107.

AUDITRONICS

Destiny 2000 Incorporates Hard Disk System and Music Management

MEMPHIS, Tenn. The Destiny 2000 from Auditronics combines the powerful technology of hard disk systems and music management into a piece of equipment familiar to everyone at the radio station—the on-air audio console.

The Destiny 2000 system consists of two major parts—the on-air console and the PC hardware and software. The console itself is a standard audio console with analog I/O, faders, I/O selection and monitoring facilities.

Virtually every function of the Destiny 2000 is available for computer control via a single RS-232 port. This includes input selection, channel on/off switching, output bus select, cuing and even level control at the fader.

Conversely, every manual operation at the console generates a signal to the PC indicating which button was pressed, letting the system software take the appropriate action. The computer is completely integrated into every console function.

At the other end of the RS-232 cable, the Destiny 2000 software manages all of the little details that make live radio so hectic. Music and commercial schedules, created in separate offices on separate computers in a local area network (LAN), are merged together to form a composite program management log.

When it is time to air a spot or song, the operator simply presses the appropriate "Channel On" button; just as she would do on an ordinary console. An "Auto" button lets the system run by itself, when needed.

For information, contact Murray Shields in Tennessee at 901-362-1350; fax: 901-365-8629; or circle Reader Service 219.

The Future Of Consoles

► continued from page 53

the next 10 to 15 years. They're considering "What if everything goes digital?," said Esparolini. For that reason, Esparolini noted, manufacturers are designing their analog consoles with specifications that suit digital equipment.

Similarly, Young said, "Prices must remain consistent with current technology. Cost is critical to when broadcasters will accept new technology."

Dedicated function

Another step forward for console technology will be boards for dedicated functions. Advances in technology not only allow console functions to be passed on to other equipment, they also allow consoles to incorporate more telco, automation and other functions.

Lynn Distler, vice president of sales and marketing at Comrex, points to the use of specialized boards for remotes as an example.

"With more shows originating from outside of the studio, you will need more and more devices that allow non-technical people to the job," she said.

Instead of several cases full of wires, cables, microphones, headphones, etc., all of which require technical assistance to assemble, Distler sees a role for units that do not require an engineer to assemble.

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One simple lift of the front panel provides total access to all parts, connectors, and controls.

All assemblies, including faders, switches, and circuit boards are fully connectorized for fast, solderless replacement.

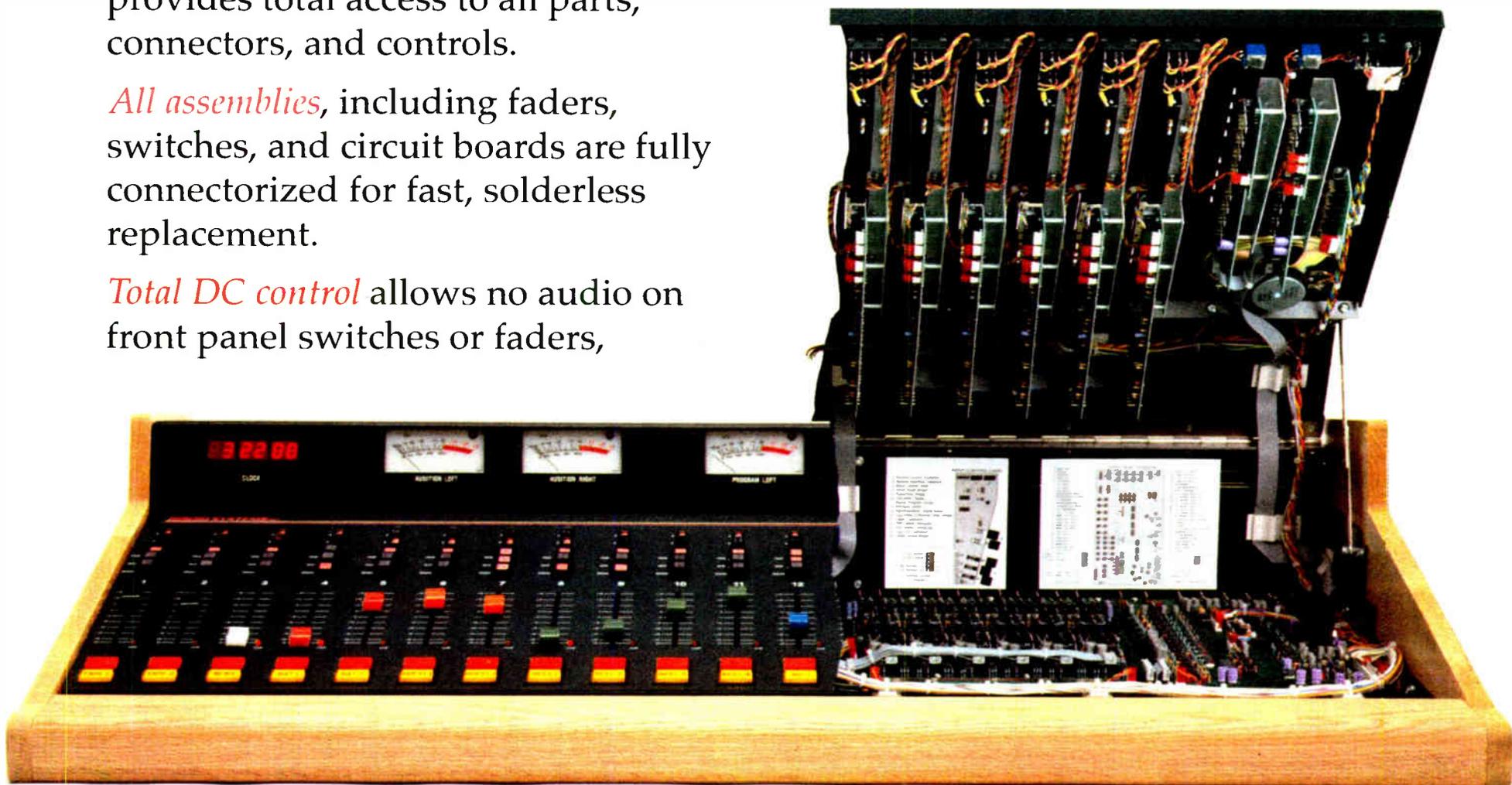
Total DC control allows no audio on front panel switches or faders,

assuring long term audio integrity and reduced maintenance costs.

Quick-connect barrier strips are used for all audio and remote control wiring.

Complete input agility allows any channel to mix mic, through consumer, through line level signals on either input with completely programmable logic.

Documentation of connector pin-outs, and internal control locations are screened inside the console for quick reference.



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AUDIX

ABS Series Combines Ergonomics and Control Capabilities

SAFFRON WALDEN, England

The new ABS Series of mixing consoles from Audix Broadcast Ltd. offers a comprehensive range of control capabilities in a highly reliable, ergonomically designed control surface.



Based on a 40-millimeter modular system, the ABS uses Audix' sealed miniature audio routing technology (SMART) and custom logic interface control (CLIC) concepts to enhance system performance.

The ABS system is available in three standard configurations: 12 or 16 channels, with a central script area for on-air use, and eight channels, with a side script area for production applications.

Conductive track control and gold-plated switch and connector contacts ensure

high reliability. Structural reliability is obtained by the use of specialized aluminum extrusions.

Three standard furniture configurations are available to complement the audio mixers, and an optional interview table can be supported from the main desk within sight of the presenter.

For information, contact Ian Jennings in the U.K. at 44-799-542-220; fax: 44-799-541-248; or circle Reader Service 76.

ARRAKIS

Gemini Helps Bridge Analog-Digital Gap

FORT COLLINS, Colo. Arrakis Systems, a leading supplier of conventional control, production and news mixing consoles and hard disk workstations/automation, now offers a platform that marries the standard mixing console with digital audio.

Realizing the need to bridge analog and digital, Arrakis established a compatible protocol in the form of Gemini. Gemini, which can stand alone or be integrated into the Arrakis 12000 Series console, performs the principal application of and is

dedicated primarily to complex, live, on-air, high-velocity studio situations.

Gemini's "Command Center" greatly simplifies user training and operation. A single Gemini Command Center can control up to six workstations from a single control surface. And with triple play and triple record capabilities, Gemini totally replaces magnetic tape equipment of all types.

Although Gemini includes more capabilities than the conventional mixing console, its price is in line with that of many analog consoles on the market today.

For information, contact Jon Young in Colorado at 303-224-2248; fax: 303-493-1076; or circle Reader Service 210.

STUDER

C-Series Consoles Accommodate up to 60 Inputs

TORONTO C-Series audio mixing consoles from Studer are designed to exacting specifications that meet or exceed the requirements of discriminating audio professionals. Studer audio quality, innovative systems engineering and custom manufacturing combine to create a line of audio mixing products designed to meet the most stringent audio mixing and processing requirements.

Features of the C-Series include 30-millimeter modules and solid state FET switching and electronically balanced channel inserts. They accommodate up to 60 inputs in any combination of stereo and mono input modules. Stereo inputs are available with or without EQ.

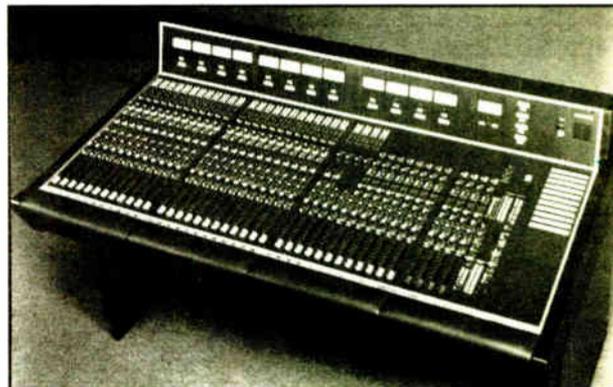
The boards can be configured with up to 16 mono or eight stereo groups and four master outputs. An N-1 (mix-

minus) bus accommodates one output per input channel.

A wide selection of penthouse modules allows the choice of meters (PPM or VU), compressor/limiter noise gates, signaling, talkback and intercom equipment, external remote controls, multifunction digital clocks, etc.

The C-Series can be configured with up to nine mono and one stereo aux sends and with compressor/limiters in subgroups and masters.

Extensive customization of the boards is possible. They are available in



portable, desk mount, drop through desk mount or freestanding configurations.

For information, contact Studer Canada Ltd. in Ontario at 416-510-1347; fax: 416-510-1294; or circle Reader Service 171.

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READER SERVICE NO. 184

HARRISON**AP-100 Console Includes Logic Control System**

NASHVILLE, Tenn. The AP-100 on-air console from Harrison by GLW features a dual path program system that allows independent external processing of mono voice sounds and stereo music sources.

Each input of each channel can be separately selected to feed either the music program bus or the voice program bus. Separate patch points are provided for each. Following the patch points, the voice and music signals are combined for metering, monitoring and the final stereo output.

The AP-100 is a processor-driven console, with an extensive logic control system allowing any input to be setup for virtually any external device—microphones, CD players, cart machines, telephone interfaces, etc. The A and B inputs of each channel can be set for different devices, and there are independent logic interfaces with four I/O for each of these inputs.

Other standard features in the AP-100 include: count-up/down presettable timer, PFL amplifier with speaker, next event function (any input can be armed to be the next), SMPTE serial port for interfacing with video editing and switching systems, and the use of digitally controlled attenuators

For information, contact Dave Purple in Tennessee at 615-331-8800; fax: 615-331-8833; or circle Reader Service 101.

TOA ELECTRONICS**Digital Mixing System Features Ergonomic Console And 32-Bit Microprocessors**

SOUTH SAN FRANCISCO, Calif. The ix-11000 from the Digital Mixing Systems (DMS) division of TOA Electronics is designed specifically for broadcast, post production and recording applications.

The ix-11000 consists of a compact console and freestanding processing rack. The largest xi-11000 system is equipped with 64 inputs, 48 multitrack returns and 48 multitrack send busses. For patching both analog and digital signals, 256 I/Os are available, and four bands of parametric equalization, high- and low-pass filters, delays and dynamics are offered on each I/O.

The ergonomic console is designed to be easy to learn and to operate. The ix-11000 allows users to access any function instantly with color touch-sensitive LCD screens and motorized faders. For added flexibility, console setups can be preset off-line and recalled later with the use of any IBM-compatible PC.

Control windows within the system provide high-resolution metering (80 dB range) of up to 32 channels on a single screen, fader levels with gain in dB, preset configurations, channel status and EQ curves.

Twin Motorola 32-bit microprocessors lie at the heart of the system and are backed by redundant power supplies. In the event of AC main failure, the entire system setup is restored within 30 seconds.

For information, contact TOA in California at 415-588-2538; fax: 415-588-3349; or circle Reader Service 117.

TACTILE TECHNOLOGY**M4000 Provides Fully Automated Mixing System**

CERRITOS, Calif. The M4000 fully automated mixing system from Tactile Technology Inc. (T²) uses a separate control surface resembling a conventional mixing console that communicates to the rack-mount audio processing electronics via RS-422 serial communications.

With the M4000, all mixing control functions are automated: faders, EQ, aux send, aux receive, pan routing, etc. It includes a built-in distributed intelligence computer screen, making an external computer and monitor screen unnecessary. Motor faders for all sections (including the monitors)

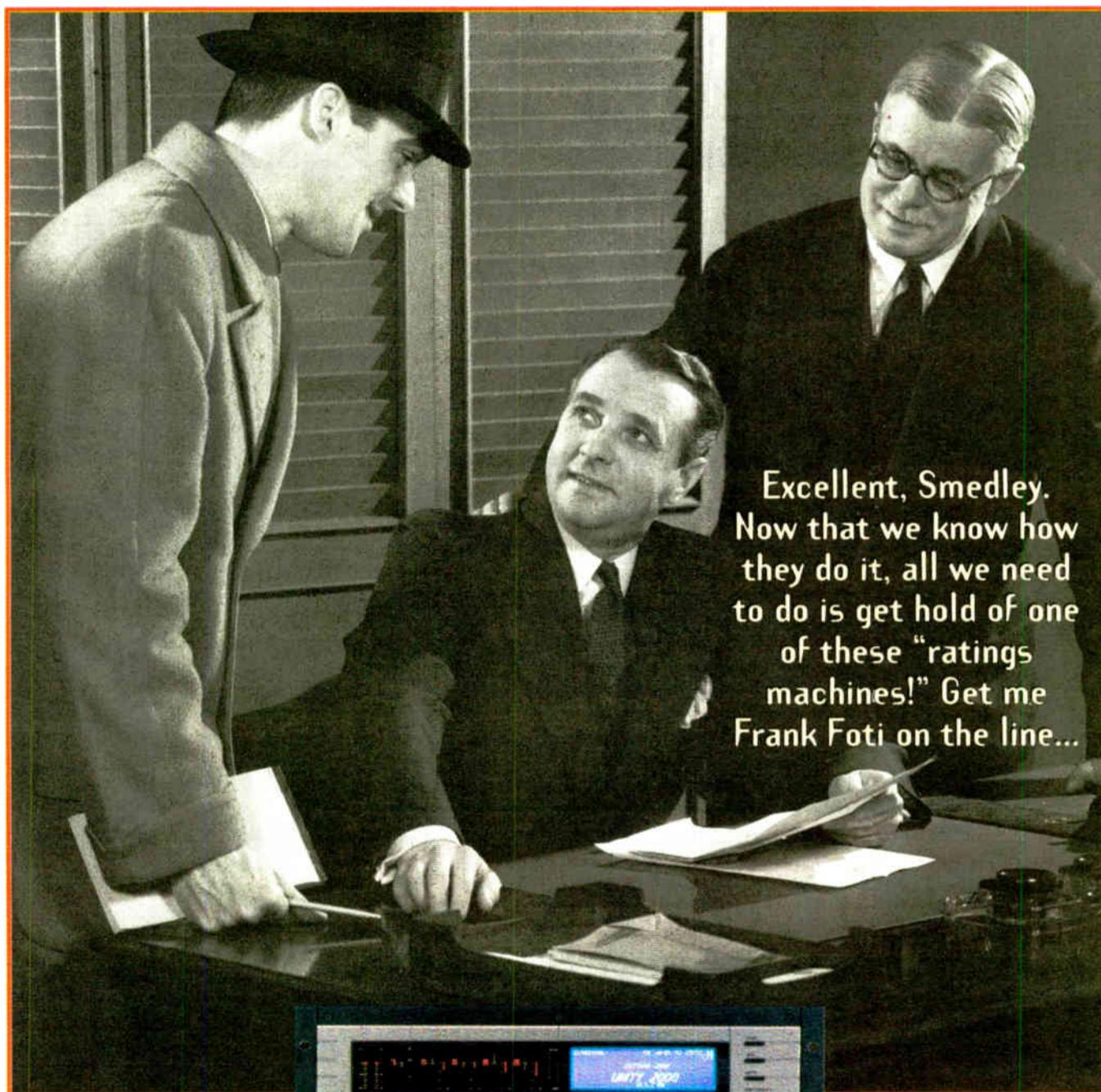


are available as an option, as is a SMPTE time code reader.

Also featured on the M4000 is a digital audio workstation throughput, which enables you to plug stereo digital input into the M4000, mix in the master analog mix and output the signal digitally thanks to a built-in A/D converter.

Full MIDI implementation and a real world event controller with eight relay, four TTL and four opto-isolated connections round out the unit.

For information, contact Mark Cohen at T² in California at 310-802-1500; fax: 310-802-7330; or circle Reader Service 32.



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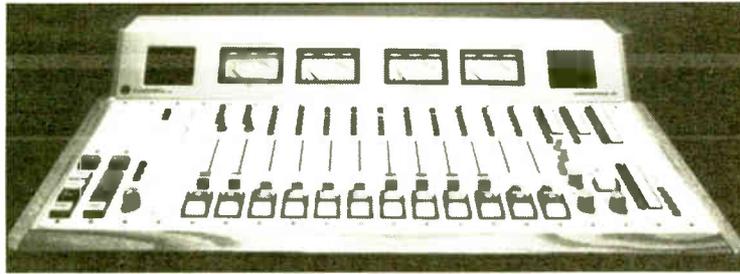
PR&E

Radiomixer Integrates Telephone Interface Technology

CARLSBAD, Calif. More than ever before, telephones have become a primary program source for many formats. The proper handling of contest, talk radio, news and request/dedication lines requires two mix-minus caller feeds that automatically switch between off-line and on-air, two mix-minus recording feeds providing both composite and split channels, and a caller-only monitor feed.

The Radiomixer console from

Pacific Recorders & Engineering includes a built-in telco mix system that is both flexible and easy to use. The system quickly and efficiently accommo-



dates the telephone feed and recording requirements of an off-line contest mix as well as a traditional on-air talk show. It makes taking a call on air no more difficult than playing a CD.

The system can switch automatically from one mix-minus format to the other—an especially handy feature for taking a contest winner directly to air and then back off-

line, all the while recording the caller, mics and other bits on split tracks for post production.

The Radiomixer's standard line input modules are equipped with control and assignment

logic that allow either of their two inputs to be designated as a telephone input. It then can command the telco mix system to provide the appropriate mix-minus feed to the caller.

The telco mix system uses four different categories of source signals from the console's input modules: microphones, lines, caller one and caller two (if used) to create five unique mix-minus feeds: telephone hybrid one, telephone hybrid two, composite tape mix, split-track tape mix and caller-only monitor mix.

For information, contact Mike Uhl or Ed de la Fuente in California at 619-438-3911; fax: 619-438-9277; or circle Reader Service 36.

DUGAN

Automatic Microphone Mixing System

SAN FRANCISCO Before now, automatic mic mixers were generally known for gating mics on and off in churches and courtrooms. Now **Dan Dugan Sound Design** has created a new category of products called automatic mixing controllers.

The Dugan Model D is an eight-channel unit that patches into the insert points of professional audio mixing console. It makes smooth instant crossfades between live mics. This gives the mixer all the familiar features of the board, plus a non-gating automatic mic mixing algorithm.

The Model D instantly senses who is talking and crossfades the speaker's mic up and the others down. This frees the mixer to focus on balance, sound quality and troubleshooting, instead of being chained to the faders waiting for cues.

The Dugan system maintains a natural ambience and does not cut off speakers who go off-mic. By linking units together, up to 100 mics can be mixed without gating, noise build-up or feedback.

For information, contact Dan Dugan in California at 415-821-9776; fax: 415-826-7699; or circle Reader Service 214.

AEQ

BC-500 Console Designed with Smaller Stations in Mind

TEMPE, Ariz. The BC-500 broadcast console from **AEQ America** is specifically designed to meet the needs of smaller stations, offering the advantages and features of professional equipment at a more affordable price.

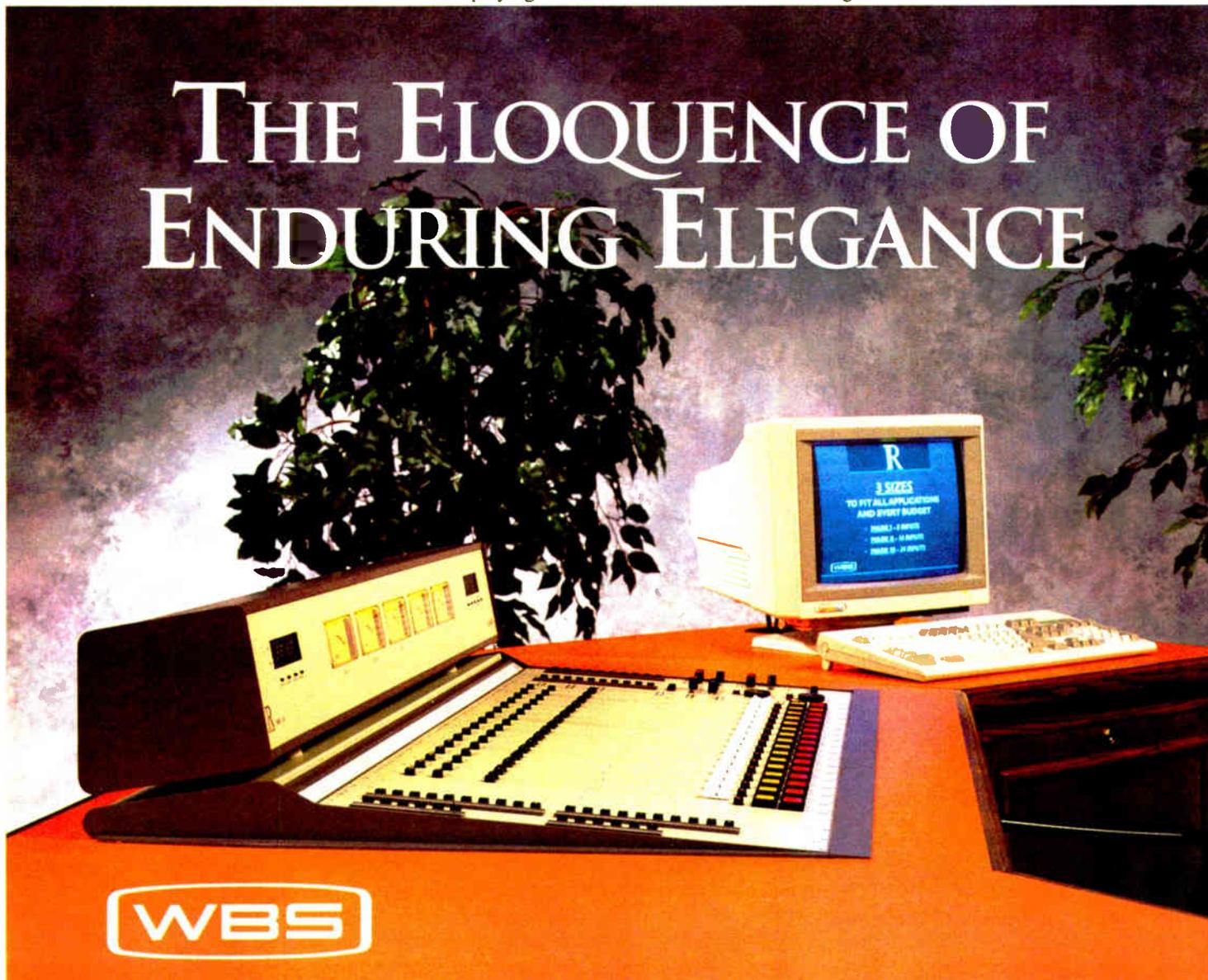
Among the many characteristics that make the BC-500 ideal for local broadcasters are its user-friendly operation, easy maintenance and modular design.

Modular design allows users to configure the mixer according to their specific needs. The BC-500 can easily be enhanced by adding new input modules or re-accommodating the modules within the chassis as needed. Among the available modules are: mic/line mono input; double line stereo input; and I/O for external telephone hybrid.

The BC-500 is equipped with VCA signal control on faders; electronically balanced busses; metal XLR connectors with metallic latch locks; user-programmable pre- or post-fader send; stereo PFL; and independent control of studio and control headphones.

For information, contact Gerardo Vargas in Arizona at 602-431-0334; fax: 602-431-0497; or circle Reader Service 17.

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WARD-BECK

Renaissance Series Consoles Designed to Suit the Needs Of Broadcast Professionals

SCARBOROUGH, Ontario The design objectives for Renaissance, the latest radio console series from Ward-Beck Systems Ltd., were distilled from extensive research of broadcast needs.

Given the constantly changing operational environment, with computers and peripherals appearing everywhere, the Renaissance needed to retain the look and feel of a traditional audio console by offering input selectors, channel on/off, linear slide fader and program assignment controls in a familiar arrangement.

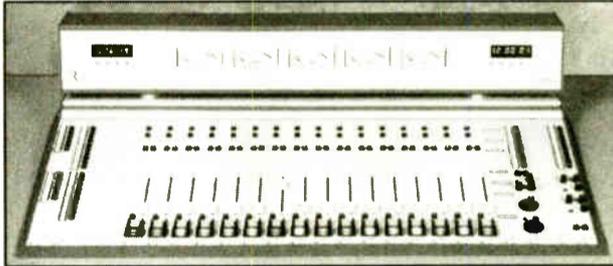
Renaissance also had to be human and/or machine operable to serve in either live-assist and walk-away modes at the flick of a switch.

Cost, of course, is always important, and Renaissance had to fit contemporary budgets. With cost in mind, it was important that installation and maintenance be easy.

All of these criteria had to be met without compromising the Ward-Beck tradition of sonically pure, durable and serviceable audio products.

Renaissance is now a reality. Installation of the first consoles delivered is underway.

The fully modular design offers electronic



switching throughout. Penny & Giles actuated VCAs, and a comprehensive control/tally logic system that facilitates interfacing to computer control and a wide variety of ancillary equipment.

The extensive audio bus structure allows up to four stereo programs, stereo and mono auxiliary feeds with pre/post selection and level control, as well as the ability to create four mix-minus telephone sends.

The age-old problems of monitor level control wear and monitor speaker damage are addressed with a unique digital shaft encoder controlling the monitor level VCAs. Digital clock, timer and five

VU meters are standard.

Renaissance is offered in three standard mainframe sizes: the eight-channel MK I, the 16-channel MK II and the 24-channel MK III.

For information, contact Eugene Johnson in Ontario at 416-438-6550; fax: 416-438-3865; or circle Reader Service 3.

RADIO SYSTEMS

RS Series of Consoles Includes Upgraded and Expanded Capabilities

BRIDGEPORT, N.J. The RS Series of six-, 12-, 18- and 24-channel consoles from Radio Systems are now a mature product, having been manufactured for five years and with more than 750 in use throughout the world. But this does not mean that the company has stopped expanding and improving the capabilities of these economical consoles.

The advent of LMAs and the popularity of talk formats demand multiple mix-minus outputs. To respond, Radio Systems now can equip any RS console with up to eight separate sends in any combination of user-assignable or hard-wired options.

Network affiliation timing requirements caused us to incorporate the Super Clock system into the consoles. Now any console clock or timer display can sync to any external pulse or serial time reference or drive remote digital or analog displays.

And, for the ultimate in flexibility, Radio Systems is able to expand a console quickly and economically.

One customer needed a larger console for a station upgrade. By coordinating express shipments, we were able to bring the 12-channel unit in in the morning, replace the front panel and meter bridge and add six new fader assemblies for return shipment as a new 18-channel console by that afternoon. The price for this series ran only the original difference in cost between the models.

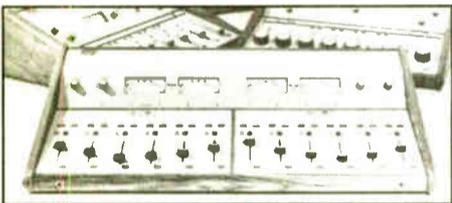
For information, contact Dan Braverman in New Jersey at 609-467-8000; fax: 609-467-3044; or circle Reader Service 147.

ATI

Simple Front-Opening Console Package Design Part Of Vanguard Series

HORSHAM, Pa. The Vanguard Series of six-, eight- and 12-mixer on-air consoles from Audio Technology Inc. are engineered to provide full-featured performance, modular serviceability and effective RF protection at modest cost.

A digitally scanned modular panel switch matrix controls all I/O selection. VCA level controls eliminate all audio from panel faders and pots and allow effective use of inexpensive faders. The removal of all audio signals from the panel greatly improves immunity to high RF fields. It also allows a simple front opening console package design, unmatched for accessibility and economy.



All audio signals are confined to a fully plug-in modular self-shielding mother-daughter circuit assembly. All studio wiring is made directly to the motherboard using high reliability punch down connectors while all circuit modules plug flat onto the motherboard using gold-on-gold connectors for easy and quick serviceability.

Up to 24 balanced inputs are individually programmable to precisely match studio requirements. Dual bus stereo and monosum outputs are provided with VU or LED bar graph metering. Complete cue, headphone and monitoring facilities are included with optional mix-minus outputs.

For information, contact Ed Mullin in Pennsylvania at 215-443-0330; fax: 215-443-0394; or circle Reader Service 88.

FIDELIPAC

Dynamax MX Series Are Truly Modular

MOORESTOWN, N.J. Broadcasters demand versatility, superior audio quality and rugged, serviceable designs from their audio mixing consoles. In addition, the market for consoles that provide these attributes at a reasonable price has grown dramatically. Fidelipac designed the Dynamax MX Series to satisfy these requirements.

The MX Series offers a range of models with either linear or rotary faders from six to 18 channels. Standard features include VCA control of all audio and monitoring, independent remote start for each console input, opto-isolated remote module on/off, a count-up timer, input expansion switching, four independently assignable output busses and fader start.

MXE model options include a mic EQ module and brand new studio

talkback/monitor and telephone interface modules.

Excellent audio quality is achieved through the use of quality components and careful layout. High performance Bi-FET op amps provide superior audio while substantially reducing heat. RF immunity is excellent thanks to carefully designed grounding and shielding. High quality conductive plastic attenuators combined with VCA control help prevent scratches and pops.



The MX Series is a truly modular, motherboard-based console. Input modules are hot-plugable, eliminating downtime during service.

For information, contact Bob McNeil in New Jersey at 609-235-3900; fax: 609-235-7779; or circle Reader Service 174.

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"A penny saved is a penny earned"

"If it ain't broke, don't fix it"

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Sacramento, CA 95828
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(916) 383-1182 fax

RESOURCE GUIDE

Furniture, Acoustic Tile & Studio Components

The following mini-directory lists manufacturers of furniture, acoustic tile and studio components (i.e., patch bays, clocks, connectors, audio routers, etc.) who responded to **RW's** request for information. For information, circle the appropriate number on the **Reader Service** card, or contact the manufacturer directly.

Acoustical Solutions Inc.

2720 Enterprise Parkway, Suite 101
Richmond, VA 23294

contact: Michael Binns, president
800-782-5742 fax: 804-346-8808

Acoustical Solutions' product line includes Alpha Wedge and Pyramid acoustic foams; AlphaSorb wall panels and hanging baffles; Soundtex wall covering; Audio Seal sound barrier; Acoustic Systems modular recording/broadcast booths; and Sonex products. For information, circle Reader Service 6.

Acoustic Systems

P.O. Box 3610

Austin, TX 78764

contact: Ginny Cookson, sales administration

800-749-1460 fax: 512-444-2282

Acoustic Systems' product line of pre-fabricated voiceover booths combine acoustic integrity with straightforward ordering of hardware to provide an enclosure system for broadcast, recording and production applications. For information, circle Reader Service 127.

Anthro Corp.

10450 S.W. Manhasset Drive
Tualatin, OR 97062

contact: Sales Department
800-325-3841 fax: 800-325-0045

AnthroCarts are mobile, adjustable equipment carts that hold up to 150 pounds. They can be configured to fit any application. AnthroCarts come in a variety of sizes with more than 50 optional accessories. For information, circle Reader Service 38.

Arrakis Systems

2619 Midpoint Drive
Fort Collins, CO 80525

contact: Bob Groome or Jon Young
303-224-2248 fax: 303-493-1076

Arrakis Systems provides conventional and digital equipment-support furniture. Completely pre-wired for quick and easy assembly by the end user. Custom and standard designs are available and many types ship via UPS. For information, circle Reader Service 78.

Atlas/Soundolier

1859 Intertech Drive
Fenton, MO 63026

contact: Bud Waters, director of sales
314-349-3110 fax: 314-349-1251

Atlas/Soundolier offers a selection of 19-inch wide vertical cabinets in floor, desk and wall-mount styles; console assemblies and matching desks; as well as a variety of convenience, electronic and cooling accessories. For information, circle Reader Service 140.

Audio Accessories Inc.

Mill Street

P.O. Box 174

Marlow, NH 03456

contact: Timothy Symonds, operations manager

603-446-3335 fax: 603-446-7543

Audio Accessories' product line includes audio jack panels and jacks; pre-wired audio patch panels; patch cords; patch cord holders; Polysand; video panels; RS-422 patching; Edac connectors and accessories; and nickel-plated patch cords. For information, circle Reader Service 95.

Audioarts Engineering

7305 Performance Drive
Syracuse, NY 13212

contact: Rick Strage, sales manager
315-452-5000 fax: 315-452-0160

The Audioarts SDA-8400 is a quad 1x4 cost-effective distribution amplifier with digital quality audio performance. It can be a 1x8 stereo or 1x16 mono or almost any combination in between. For information, circle Reader Service 188.

Audio Broadcast Group Inc.

2342 S. Division

Grand Rapids, MI 49507

contact: Dave Howland, vice president
800-999-9281 fax: 616-452-1652

Audio Broadcast Group Inc. introduces the dramatically redesigned for 1994 Data Stream Series of our exclusive "Digital Ready" studio furniture. Created specifically for the efficient housing and operation of today's digital hard drive storage/studio automation systems and workstations. Our designers have combined the ultimate in systems and workstations. Our designers have combined the ultimate in functional work space and eye-pleasing appearance. For information, circle Reader Service 144.

Broadcast Television Systems Inc.

94 W. Cochran St.

Simi Valley, CA 93065

contact: Sales Department

805-584-4700 fax: 805-584-4750

While primarily a television equipment manufacturer, BTS does manufacture a variety of routing, control systems and A-D/D-A converters used by radio networks (including NPR and CBS) and audio recording facilities. For information, circle Reader Service 53.

Connectronics Corp.

300 Long Beach Blvd.

Stratford, CT 06497

contact: Richard Chilvers

800-322-2537 fax: 203-375-5811

Connectronics is a manufacturer and direct importer of a wide range of British-designed professional audio interconnect products, including specialized audio wires, cables and TT/bantam, 1/4-inch and mixed patch bays. For information, circle Reader Service 158.

dbx Professional Products

8760 S. Sandy Parkway
Sandy, UT 84070

contact: Lynn Martin, sales manager
801-566-8800 fax: 801-566-7005

dbx offers a number of utility devices to solve common studio setup and

operation problems. These include the PB-48 balanced 1/4-inch TRS patch bay; the 115 PowerLight, an eight outlet power conditioner and rack light; and the 1024 buffer amplifier. For information, circle Reader Service 206.

DGS Pro Audio

P.O. Box 170426

Arlington, TX 76003-0426

contact: A.T. White

800-292-2834 fax: 817-473-7712

Manufacturer of Deltron connectors and Gotham audio cables. Deltron offers XLR, RCA and 1/4-inch jack plugs. Gotham offers double shielded microphone cable from unbalanced single conduction to 34 pair. For information, circle Reader Service 49.

ESE

142 Sierra St.

El Segundo, CA 90245

contact: Bill R., sales engineering

310-322-2136 fax: 310-322-8127

ESE manufactures reliable, cost-effective timing devices. ESE's more than 140 standard products include: master/slave clock systems; standalone clocks and timers; programmable clocks with contact closure outputs; and time code products. For information, circle Reader Service 114.

The Express Group

3518 Third Ave.

San Diego, CA 92103

contact: Byron Andrus

619-298-2834 fax: 619-298-4143

The Express Group offers six lines of affordable, high-quality, modular studio furniture. In addition, we specialize in fine, custom-designed furniture for any special application. For information, circle Reader Service 195.

Henry Engineering

503 Key Vista Drive

Sierra Madre, CA 91024

contact: Hank Landsberg, owner
818-355-3656 fax: 818-355-0077

The Fast Trac II voice-over audio workstation from Henry Engineering is a micro console that is ideal as a mini-production center for voice-overs, spot dubbing or as the audio switching and control center for a digital audio editor. For information, circle Reader Service 63.

J.N.S. Electronics, Inc.

P.O. Box 32550

San Jose, CA 95152

contact: John Leonard, president

J.N.S. offers the 9000 Series audio router, the 8310 Series audio switcher and the 8000 Series rackframe, which includes some 30 modules to meet many audio needs. For information, circle Reader Service 169.

Martinson-Nicholls Inc.

7243-A Industrial Park Blvd.

Mentor, OH 44060

contact: Dan Ruminski, president

216-951-1312 fax: 216-951-1315

Martinson-Nicholls offer Noise Abator vinyl matting and NDM, a liquid that adds mass and density to materials when dry. These products are designed to stop noise/sound transmission or aid in absorption. For information, circle Reader Service 120.

Murphy Studio Furniture

4153 N. Bonita St.

Spring Valley, CA 91977

contact: Dennis Murphy or Sandy Beremcs

619-698-4658 fax: 619-698-1268

Murphy Studio Furniture designs and produces studio furniture for radio stations and production facilities. We offer six lines of ergonomically designed furniture and customization of standard lines. We also do complete custom "theme" layouts. For information, circle Reader Service 34.

Belden® audio cables can make a difference.

Be honest. If you had the big guy on-mic, would he sound a little ... thin? The problem could be your audio cables, particularly if you're not connected with the broadcast industry's No. 1 choice, Belden.

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reliability, and availability by broadcast professionals who know what they're getting when they buy Belden. We offer the industry's most complete line of cables, with immediate availability through our extensive distributor network. Digital audio cables. Snake cables. Flexible mic cables. Audio multi-conductor and paired cables. You name it.

If you had Pavarotti here,



Neutrik USA

195 Lehigh Ave.
Lakewood, NJ 08701
contact: Bill Dorman
908-901-9488 fax: 908-901-9608

Neutrik manufactures audio connectors in cable and panel mount, hard wiring of DC mount, 1/4-inch plugs and jacks, audio adapters, goosenecks, audio transformers, pre-assembled patch cords and various types of industrial circular connectors. For information, circle **Reader Service 103**.

Nigel B Furniture

10655 W. Vanowen St.
Burbank, CA 91505-1136
contact: Sales Office
818-769-9824 fax: 818-769-9965

Nigel B Furniture offers a range of modular rack furniture with good looks and space efficient designs that are superior to the heavy-looking consoles of yesteryear. Modular design allows you to customize the work pieces into different configurations. For information, circle **Reader Service 70**.

Northeastern Communications Concepts Inc.

16 E. 42nd St.
New York, NY 10017
contact: Alfred D'Alessio, president
212-972-1320 fax: 212-972-1595

NCC supplies customized furniture and a complete line of acoustical components, from wall panels to studio equipment. NCC also provides a variety of services to the broadcast and recording industries, including studio design, modular construction, systems engineering and installation. For information, circle **Reader Service 111**.

Pacific Recorders & Engineering Corp.

2070 Las Palmas Drive
Carlsbad, CA 92009
contact: Mike Dosch, general manager
619-438-3911 fax: 619-438-9277

PR&E offers a full line of custom broadcast furniture, designed for operational ergonomics and easy maintenance access. PrimeLine modular

furniture offers many of the same features at a budget price. PR&E also offers high performance and full-featured peripherals, including distribution amps, line switchers, Molex patch bays and wiring systems, and a broadcast delay controller. For information, circle **Reader Service 26**.

Panduit Corp.

17301 Ridgeland Ave.
Tinley Park, IL 60477-0981
contact: Product Manager, Network Wiring Products
800-777-3300, ext. 8314 fax: 708-532-1811

Panduit wire management system for 19-inch racks accommodates coax, fiber optic, UTP and STP cables and patch panels. It features flexible fingers front and back for fast cable moves, adds and changes. For information, circle **Reader Service 164**.

Pulizzi Engineering Inc.

3260 S. Susan St.
Santa Ana, CA 92704-6865
contact: Jason Alkire, sales/technical support
714-540-4229 fax: 714-641-9062

Pulizzi Engineering Z-Line AC power distribution and control systems feature circuit breaker protection, EMI/RFI filtering and spike/surge protection, remote control and multiple time delay. For information, circle **Reader Service 202**.

Radio Systems Inc.

601 Heron Drive
P.O. Box 458
Bridgeport, NJ 08014-0458
contact: Dan Braverman, president
609-467-8000 fax: 609-467-3044

Radio Systems offers a complete line of digital and analog master clocks and timer systems. For information, circle **Reader Service 46**.

Sandar Electronics A/S

Thoroya
P.O. Box 1733
N-3230 Sandefjord, Norway
contact: Odd Evensen, overseas sales director

47-334-59600 fax: 47-334-59333

Sandar Electronics offers a 64x64 audio router for program and conference use in only three rack units; a 16x16 stereo router in a single rack unit; and dual line, distribution and remote controlled amplifiers, up to 40 amplifiers in three rack units. For information, circle **Reader Service 131**.

Sonex Acoustical Products

3800 Washington Ave. N.
Minneapolis, MN 55412
contact: Eric Johnson, national sales manager
800-662-0032 fax: 612-521-5639

The Sonex Acoustical Division of ill-bruk Inc. manufactures Sonex acoustic materials in a variety of colors, patterns and thickness for the sound treatment of audio, video and broadcast studios. Also offered is Fabrix acoustical material with fiber-free semi-rigid melamine in an assortment of decorator fabric colors. For information, circle **Reader Service 98**.

Studio Technology

2 Pennsylvania Ave.
Malvern, PA 19355
contact: Vince Fiola, director
610-640-1229 fax: 610-640-5880

Studio Technology builds custom broadcast furniture. Our premium and standard furniture lines can be tailored to fit any budget. Design assistance is available or we can custom build to your specifications. For information, circle **Reader Service 15**.

Switchcraft

5555 N. Elston Ave.
Chicago, IL 60630
contact: Linnea Ker
312-631-1234 fax: 312-792-2129

Switchcraft offers a full array of audio connectors, jacks, plugs, audio and video patch panels, patch cords, molded cable assemblies, audio accessories, switches, jackfields, jack panels, power cords, and EAC power receptacles. For information, circle **Reader Service 161**.

Wheatstone Corp.

7305 Performance Drive
Syracuse, NY 13212
contact: Ray Esparolini, Sales
315-452-5000 fax: 315-452-0160

Wheatstone's rugged modular studio furniture features: RackFrame for perfect rack openings; 1.5-inch thick sides and continuous height counters laminated on both sides; all trim in solid oak; and cabinets that provide generous wire passageways. For information, circle **Reader Service 172**.

Z-Systems Inc.

4641-F N.W. Sixth St.
Gainesville, FL 32609
contact: Glenn Zelniker, president
904-371-0990 fax: 904-371-0093

Z-Systems offers a digital audio router, eight lines in, eight out, with XLR, coax or optical I/O. Z-Systems also offers a plastic fiber bridge eight-channel bidirectional XLR-to-optical converter. For information, circle **Reader Service 10**.

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Circle (54) On Reader Service Card

Circle (85) On Reader Service Card

MARKETPLACE

Recently Introduced Products for the Radio Broadcast Professional

Digital Satellite Receiver

Filling the gap for stations looking for DATS/SEDAT reception on SatCom C-5 is the Ariel digital satellite receiver from Satellite Systems. It uses a consumer-grade LNB or C-to-L band downconverter to interface with existing A/A 73000 and Fairchild Dart installations.

The Ariel is card-compatible with the Dart 384, allowing stations to use their current audio and data demodulators. Additionally, Satellite Systems manufactures a converter



card so that stations can retire S/A 73000 mainframes and convert most S/A cards to the Ariel.

Satellite Systems also provides an L-band demodulator card to replace the

Fairchild Dart downconverter and control demod card, helping stations extend the life of their existing Dart equipment. A new Ariel 7.5/15 kHz dual-bandwidth, dual-channel audio card is available as is a 3.5 kHz voice cue decoder.

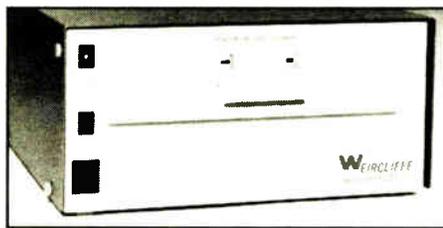
For information, contact Michael Lowery in Colorado at 719-634-6319; fax: 719-635-8151; or circle **Reader Service 123**.

Shielded Tape Erasers

The BTE 200 Series is Weircliffe's line of cost-effective shielded degaussers. These units are compact and low-weight, table-top or optional rackmount.

The BTE 200 is the base model rated at 800 Oersteds and capable of erasing VHS, Betacam, audio cassettes and NAB cartridges, data cartridges, computer disks and reels measuring up to 8.25 inches in diameter.

The BTE 200 HD version is a continuous degausser. Throughput is in excess of 400 VHS tapes per hour.



The BTE 200 HDS version, rated at 1,000 Oersteds, can erase the same as the basic model plus S-VHS and DAT. This version is not continuous. Throughput for the base and HDS models are 250 VHS tapes per hour.

Shielding restricts exposure of low frequency electromagnetic fields at its surface—an important health and safety consideration for many employers today. Also, shielding protects sensitive instruments in close proximity to the tape eraser.

For information, contact Kent McGuire at Preco in Arizona at 800-227-8887; fax: 602-483-9357; or circle **Reader Service 20**.

Cassette for Multitrack Recording

DIC Digital introduces an 8-millimeter cassette designed for use in digital multitrack decks, in particular the Tascam DA-88. Designed for audio professions, the tapes are available in four lengths: 15, 30, 60 and 120 minutes.

These lengths are actual audio recording times, not video tape lengths that offer users less time than what they expect.

For information, contact Kevin Kennedy in New Jersey at 800-328-1342; fax: 201-692-7757; or circle **Reader Service 84**.

Multiple Mode DSP Filter

The *super* DSP Filter from MFJ Enterprises combines four types of filters and adaptive noise reduction to help eliminate heterodynes, noise and interference.

An automatic notch filter searches for and eliminates multiple heterodynes in all filter modes, but because of the high sampling rate and very narrow notch voice signals are not degraded.

Adaptive noise reduction provides up to 20 dB of noise reduction and works on all random noise including white noise, impulse noise, static, ignition noise, power line noise, hiss, atmospheric noise, wideband noise and computer noise.

Tunable highpass/lowpass FIR linear phase "brick wall" filters allow you to create custom filters for voice, data and other modes. Three tunable bandpass filters and 16 preset filters are also available.

For information, contact Martin Jue in Mississippi at 601-323-5869; fax: 601-323-6551; or circle **Reader Service 212**.

I COULD HAVE BOUGHT A DIGILINK!

Are you thinking about replacing your old cart machines with 'Digital Carts' such as floppies, flopticals, Bernoullis, or Optical?? Well, think about it a little more! Add up the list price for a digital cartridge recorder, just a single player, AND the floppy disks--- and you will find that you could have bought a Digilink workstation for \$7,995 that gave you 'Live' -AND- 'Automation' capabilities!!!

A Digilink workstation stores audio on an internal hard disk and comes out of the box with a capacity of 547 one minute, stereo carts for only \$7,995. Even better, the Digilink hard disk has an average 15 year life. Imagine how many floppies you will break, wear out, lose, and replace over 15 years. That doesn't count all of the floppy disk mechanisms that will jam, break, and simply fail...

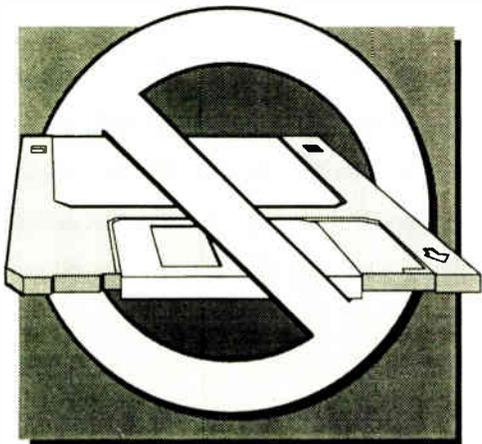
Also with a Digilink, you get much more! You can stack up hundreds of 'carts' in the play list and just walk away. You get satellite automation in the Digilink workstation and can optionally add CD players. A digital audio cut and splice editor even comes standard with Digilink. Because Digilink will play and record at the same time, you can play a spot to air while it starts a scheduled network autorecord. You can even network delay with Digilink.

With all of these features, it is easy to see why there are more than 500 Digilink workstations around the world from Paris to Moscow to Taiwan to Jamaica and in your own backyard. Don't suddenly come to the realization that you could have bought a Digilink!

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Circle (96) On Reader Service Card

Compact, Integrated Transmitter

Crown Broadcast offers an integrated solution to transmission and audio processing with the FM200, a user-adjustable, solid-state, 20 to 200 W integrated transmission system that also provides built-in audio processing and stereo generation.

The FM200 is user-selectable in the 87 to 108 MHz range and power supply comes from 100/120 VAC, 220/240 VAC or even 36 to 48 VDC (battery) power. A built-in power regulator ensures consistent operation in situations with irregular power. The system automatically restarts after power interruptions.

The unit is available in three configurations: transmitter only, transmitter with stereo generator, and transmitter and stereo generator with audio processing. The unit weighs only 35 pounds and is small enough to fit into a suitcase.

It includes a built-in I/O interface for remote monitoring and control. Built-in metering and diagnostics of RF power, SWR, ALC, PA VDC, PA temperature and supply DC voltage are all displayed on the front panel. Trouble-shooting is facilitated by easily removed circuit boards and an internal voltmeter, allowing hassle-free voltage check and verification via the front-panel LED.

The amplifier of the FM200 is conservatively rated at 200 W. With the audio processor and stereo generator, harmonic distortion is less than 0.2 percent; without the processor and generator, it is less than 0.1 percent (both measured at 50 Hz to 15 kHz, THD+Noise). Stereo separation with the audio processor and stereo generator is better than -45 dB (50 Hz to 15 kHz).

For information, contact Mark Potterbaum in Indiana at 219-294-8050; fax: 219-294-8329; or circle **Reader Service 58**.





The Dynamax MX Series

"E" Models From 8 to 18 Channels
New Beige Finish or Metallic Gray

- True modular design
- Ultra-reliable motherboard construction
- VCA mixer and monitor control
- Active balanced line inputs, transformer isolated mic inputs
- Active balanced main and monitor outputs
- Full monitoring/cueing facilities with VCA level control and active source selection
- Built-in cue amp with speaker and amplified stereo 8-ohm headphone output
- Independent remote start for each "A" and "B" input
- Opto-isolated remote module on/off
- Selectable fader start
- Optional 5-band mic EQ module with pan
- Two inputs per module, mic/line or line/line – line inputs may be mono or stereo, consumer or professional format
- Four assignable outputs – two stereo plus two mono
- Available in 8, 10, 12, 14, 16, or 18 channel models
- Independent level controls for each "A" and "B" input
- Separate audio and logic power supplies
- Sturdy, all-steel construction
- Durable Lexan overlay control surfaces
- Count-up event timer standard
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Circle (179) On Reader Service Card

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CORPORATION

Computer Concepts Corporation
8375 Melrose Drive, Lenexa, KS 66214
Phone: (913) 541-0900 Fax: (913) 541-0169

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Radio World

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AMPLIFIERS

Want To Sell

Altec Lansing 1606A, mixer/amp, 40 W, 4 inputs, no input modules incl, as is, \$25; Altec plug in modules 1588, 1578, 1579, \$25/ea. E Davison, POB 7167, Springfield IL 62791. 217-787-0800.

Marantz 510, exc cond, \$350. F Virtue, Virtue Audio & Video, 8809-11 Rising Sun Ave, Philadelphia PA 19115. 215-763-2825.

McGahan M1003, 100 w tube amp, w/2 low imp mike inputs, \$50; Precision Electronics S68, 60 W, w/2 lo imp mic inputs, \$35; Bogen CHS60A 60 W, SS w/2 low imp mic inputs, 2 aux, clean, \$50; CHS100A 100 W w/4 low imp mike inputs, adjustable compression, gd cond, \$75. E Davison, POB 7167, Springfield IL 62791. 217-787-0800.

Funai (8), 2 input, 4 output audio DA, -10 dB RCA inputs & output, bass & treble control, \$15/ea. G Dunn, N CA News, 5383 Willow Lake Ct, Byron CA, 94514. 510-515-0299.

Carver PM-900 (8), 450 W/chnl, \$500. B Garity, KTW3, 605-362-9901.

McIntosh 24C, tube type audio amps, mint chrome chassis, mono & stereo avail will trade for RCA mic. S Homer, KLAX, 5700 Sunset, Hollywood CA 90028. 805-654-0577.

Dynaco stereo 120 solid state, rack mt \$229, Dynaco stereo 70 tube amp all new tubes! Dynaco PAT 4 preamps \$59. W Gunn 319-320-0728.

ANTENNAS/TOWERS/CABLES

Want To Sell

Andrew JH7-50A, 1-5/8" coax, several at 310', \$7.25/ft; Andrew LDF2-50, 3/8" coax. Any length, \$0.85/ft. Andrew LDF7-50A, 1-5/8" coax, (4) lengths of 245' & 3 lengths of 265', \$5.00/ft, J Mussell, 1421 Bay Ave, Santa Maria CA 93454. 805-922-7775.

Andrew HJ5-75, 7/8", air coaxial cable, 3 sep rolls consisting of 407', 422' & 650', never opened, BO. J Book, WOC, 3535 E Kimberly, Davenport IA 52807. 319-344-7000.

Dielectric motorized coax transfer switch, 3 1/8", \$750. J Addie, WLTL, 708-579-3749.

Bogner UHF 14 UHF TV antenna, max input 1 kW, \$500. J Arzuaga, WQOZ, POB 980, Quebradillas PR 00678-0980. 809-895-2725.

Scala PR 450, 450 MHz (4), change to any freq from 450-950, \$350/ea or \$1200/all. J Arzuaga, WQOZ, POB 980, Quebradillas PR 00678-0980. 809-895-2725.

FM - ANTENNAS

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Swager Dura 42" face tower, 55' top section being replaced due to directional pattern, \$1500. P Stover, WJYJ, POB 905, Spotsylvania VA 22553. 703-582-5371.

Jampro/Cetec 2 bay 10 kW FM, tuned to 102.3. E Stokes, Stokes Comm, POB 249, Randolph Center VT 05061. 802-728-4411.

Symetrix SX111 digital autonulling, telephone hybrids (2), \$650/ea or \$1200 both. A Selk, 404-876-8894.

World Tower 18" steel rod tower, 154' 20' sections, still in air, BO; 45 G 20' sections of Wind Charger tower, 100' total, \$1000. J Kesler, WOBZ, POB 644, Livingston NJ 40445-0220. 606-843-9999.

Dielectric DCR-C5 5 bay FM, \$7500; Andrews 500' 1 5/8" coax, hangers, clamps, \$750. P Stover, WJYJ, POB 905, Spotsylvania VA 22553. 703-582-5371 ext 4.

Shively 3 bay, 92.1, w/extra long raydomes, exc cond, will deliver to factory for retuning, \$3000. B Williamson, WNHQ, 28 Jones Rd Ste 3, Milford NH 03055. 603-672-9292.

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Cablewave 1 5/8" EIA flange conn, new \$150 ea; Cablewave 3" EIA flange conn, \$300 ea; coax switches, electrical type, 7/8", \$600, 1 5/8", \$1045, 3", \$2250. T Hodgkin, 14 E Main, Walla Walla WA 99362. 509-529-6242.

ERI 3-bay FM for Class A service, \$2500; ERI 25 kW isocoupler. G Hammond, WEZS, 1308 Gottstown Rd, Manchester NH 03102. 603-669-1605.

Want To Buy

Standby FM on 97.7. B Lacy, KARX, 2075 N Hwy A1A, Indialantic, FL 32903. 407-773-1962.

2 or 3 Bay CP FM antenna on 99.1, low power, 1 or 2 kW. T Truland, KGLX, 1632 S 2nd St, Gallup NM 87301. 505-863-9391.

AUDIO PRODUCTION

Want To Sell

MXR NR, dbx type II, 2 chnl, \$30; Teac AN 300, type B NR, w/4 large VU meters, tone, level controls 4 chan, \$30; Lange high pass, low pass filter set, 600 ohm in & out, balanced, \$60. G Dunn, N CA News, 5383 Willow Lake Ct, Byron CA, 94514. 510-516-0299.

Orban 111B reverb, exc cond, \$250. R Haney, KLAQ/KROD, 4141 Pinnacle #120, El Paso TX 79902. 915-544-8864.

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dbx 144 4 chnl encode/decode type I, noise red, (2), \$200 ea, \$300/both. P Cibley, Cibley Music, 138 E 38 St, New York NY 10016. 212-986-2219.

Dolby 361 Type A NR units (6), \$350/ea; Dolby A301 stereo Type A NR w/auto switcher option, \$175; dbx 187 4-chnl Type I NR unit, rcd/ply, \$200; dbx K9-22 NR cards for Dolby 360/361 frames (2), \$150/ea; Crown DC-300 stereo pwr amp 150 W/ch, \$350; Soundcraftman SG-2205-600 stereo graphic EQ, \$125; Technics Pro SH-9010 stereo Parametric/graphic EQ, \$175; Technics Pro SH-9020 stereo peak metering unit, needs alignment, \$125; Dynaco 410 stereo pwr amp, 200 W/ch, \$300. T Steele, WMOO, POB 410, Derby VT 05829. 802-766-9236.

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360 Systems AM 16/E audio routing switcher 16x16 expansion unit, \$495; Studer Dyaxis, 2-chnl digital audio processor unit, cond unknown, \$395; Straight Wire Audio UA-2 amp/DA cards (5), also 3 kits, all 8 for \$350. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-258-6161.

Pacific Recorders XB-200 switcher, 20 in, stereo out, passive push button, \$250. S Horner, KLAX, 5700 Sunset, Hollywood CA 90028. 805-654-0577.

Interalia MLU2 24 line digital announcer w/over 12 minutes of voice storage, \$2500. R Serrett, Ryder Comm, 3111 University Dr, Coral Springs FL 33065. 305-753-6666.

CRL SCA-300B, new, \$1300. J Lai, Ultratek, 1251 W Sepulveda #347, Torrance CA 90502. 310-618-1610.

Gates Dynamore 70; solid state remote amp/mixer (2), \$35. G Hammond, WEZS, 1308 Gottstown Rd, Manchester NH 03102. 603-669-1605.

Demeter 4 ch rack ml tube direct box NEW \$795. W Gunn 619-320-0728.

ADC 96 & 144 Pr TT patchbays, excel cond, 1 rack space, 3 rows of 48, top 2 rows normalled, \$149, 96 is 2 row normalled, \$129 (you remove old wiring) or we totally refurbish w/new front panel, ready to install, \$199-229. TT cords up to 10 per bay at \$9 ea, reg \$13.95, also 1/4" bays. Audio Village, 619-320-0728, or Fax 619-320-2454.

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Want To Sell

Format Sentry w/2 interfaces, 1 yo, \$4800. M Rollings, Rollings Comm, POB 882, St Louis MO 63006. 314-458-5595.

SMC MSP-1 2000 event controller, SMC-450 stereo Carousels (4), UI-1 satellite interface, log printer, rolling racks (2), \$995. D Kelly, KWPN, Box 84, West Point NE 68788. 402-372-5423.

Systemation Superswitch; Otari ARS-1000 stereo PB reel; Conex 25 Hz generator, as package or separate. R Haney, KLAQ/KROD, 4141 Pinnacle #120, El Paso TX 79902. 915-544-8864.

Smartcaster digital automation system, complete, 5 hours record time, \$3000. G Kauffman, KCLN, 1853 442nd Ave, Clinton IA 52732. 319-243-1390.

IGM Go-Carts (4) in good working condition, (2) IGM Go-Carts for spare parts, \$1500. P Tinkle, Thunderbolt Bdct, POB 318, Martin TN 38237. 901-587-9526.

Automation system will run 3 sources, BO or will trade for 5 or 6 channel mic mixer. J Kesler, WOBZ, POB 644, Livingston NJ 40445-0220. 606-843-9999.

Shafer 900, automation with 901 controller, 902 switch mem, RAS/MOS mem, 900 system power supply, Gates Criterion (2) cart decks, Shafer AudioFile (2), 48 tray cart playback, 2 ITC R/R decks, sell all or will part out. G Hammond, WEZS, 1308 Gottstown Rd, Manchester NH 03102. 603-669-1605.

SMC MSP-1 2000 event, incl remote head, 24 tray bi directional Go-Carts (3), dual play cart dwr, Revox PR-99 play only with EOM (2), SMC tone sensor, manuals and racks, good condition, \$2500. P Stover, WJYJ, POB 905, Spotsylvania VA 22553. 703-582-5371 ext 4.

Harris 9000 auto controller system, terminal, screen, 24 tray bi-directional Go-Carts (3), dual play cart dwr, Revox PR-99 play only w/EOM (2), SMC tone sensor, manuals and racks, good condition, \$2500. P Stover, WJYJ, POB 905, Spotsylvania VA 22553. 703-582-5371.

Harris 9002 handle tapes or satellite, ITC 750's, 48 tray Instacart, cart decks (3), floppy drive, 2 UDT's, 90 reels of AC oldies, \$3000. J David, KMPL/KSTG, POB 907 Sikeston MO 63801. 314-471-1520.

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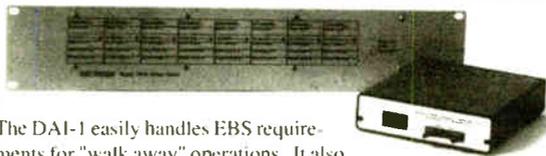


- Otari MX-5050BII Reel -
- CRL FM-2 Basic FM Processing Package -
- Gentner VRC-2000 Dial Remote w/ accessories -
- LPB Citation C-85 8-Pot Stereo Constole -
- Belar AMM-2A AM Modulation Monitor -
- ITC Delta Stereo RP -
- BE 5300B Stereo 3D w/tones -
- Marti MW-500 STL Booster/Repeater -
- Orban 622B Stereo Parametric EQ -
- Valley 400 Mic Processor -
- Valley 'DYNAMITE' Stereo Studio Limiter -
- Quantum QM-168 8 Track Console -
- Bird 3" 25KW Wattmeter -
- Andrew 96.7 MHz FM Isocoupler -
- Tektronix 7704A 200 MHz Scope -
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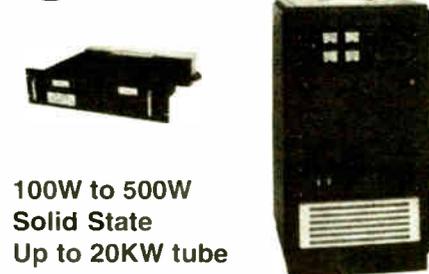
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CART MACHINES

Want To Sell

BE 5300C mono triple deck, PB, master needs rebuilding, \$300/BO. P Bossert, KSPK, 516 Main St, Walsenburg CO 81089. 719-738-3636.

ITC encore R/P, mono in wrking cond, \$250. K Carpenter, KPGM, 601 W Collins, Casper WY 82601. 307-266-4203.

Gates Criterion 80, 2 tones (5), all have rec heads installed; Gates Criterion 80 rec amps, mono, 3 tones, PB decks, \$200 ea; record amps, \$100. G Hammond, WEZS, 1308 Gottstown Rd, Manchester NH 03102. 603-669-1605.

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Ampro cart mach, mono play, gd cond., \$100; Spotmaster 1070P mono play, gd cond., \$100. G Kornbluth, A&J Rcdg Studios, 212-247-4860.

Revox PR99 play only w/EOM for auto (2), gd cond, \$400 ea. P Stover, WJYJ, POB 905, Spotsylvania VA 22553. 703-582-5371 ext 4.

ATC DC2190 rk mtable mono; PC2150 record interface both R/P, very clean, BO. M Hardy, WMSJ, POB 432, Freeport ME 04032. 207-785-2272.

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/Spotmaster Mdl 602B, 5-cart, mono PB. As-is wrkg cond. Some spare parts, \$200 each. John (703) 221-5236.

Want To Buy

Audi-Cord DL series. R Van Zandt, WWGN, 15 Walnut Hills, Springfield IL 62707. 217-487-7711.

ITC, BE, Fidelipac cart machines: single, triple, mono, stereo, play & record/play. Call M O'Drobinak @ 619-758-0888.

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Want To Sell

Tascam 38, 1/2" 8 trk, open reel, \$1100. P Cibley, Cibley Music, 138 E 38 St, New York NY 10016. 212-986-2219.

Technics 1520, taken out of service 2 yrs ago, needs cleaning, BO. D Vick, WRDVO, Roanoke VA 24015. 703-343-4444.

Otari MX5050-8, 8 trk R-R, uses 1/2" tape, inc CB-110 remote cntrl and 8 trks of DBX 180 R/P noise reduction, \$4000/BO. R Haney, KLAQ/KROD, 4141 Pinnacle #120, El Paso TX 79902. 915-544-8864.

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Ampex, mono tube PB amp, \$85. R Perrine, The Imagination Industry, 2475 State Rd, Cuyahoga Falls OH 442223. 216-929-3712.

ITC 770, PB only, 2 trk stereo, 10.5" reels, 7.5 & 15 ips, BO; Ampex 350, PB only, 2 trk stereo w/solid state electronics, BO. K Carpenter, KPGM, 601 W Collins, Casper WY 82601. 307-266-4203.

Teac AN60 NR unit, \$80; Pioneer RT707, \$350; Pioneer RT701, \$300; Akai 4000D, \$100; Viking 433, \$100; Viking RP84 record amp, \$100. J Parsons, Parson Sound, 2781 Fayson Circ, Deltona FL 32738. 904-532-0192.

TEAC RA-41 record amp, stereo w/cables, \$75. G Hammond, WEZS, 1308 Gottstown Rd, Manchester NH 03102. 603-669-1605.

Tascam 80-8, multi track R-R w/Dolby C NR, remote control, roll around rack, gd cond, \$500. P Stover, WJYJ, POB 905, Spotsylvania VA 22553. 703-582-5371.

Yamaha KX-230 stereo cassette rcds (3), \$150/ea. T Steele, WMOO, POB 410, Derby VT 05829. 802-766-9236.

Scully 280, 14" stereo, \$275; Ampex 601 mono w/rk mt, \$100; Ampex AG-350 mono, \$200; ITC 770 stereo PB, \$250; Scully 280 record amps, \$150. G Hammond, WEZS, 1308 Gottstown Rd, Manchester NH 03102. 603-669-1605.

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Fostex 280, multi track, 8 input mixer, high speed, 4 trk, Dolby C, exc cond, \$500; Foster X-18, multi track, 4 chnl mixer, 4 trk recorder, Dolby B, exc cond, \$150. P Stover, WJYJ, POB 905, Spotsylvania VA 22553. 703-582-5371.

Sony TCM 500 EV, portable, built in dual mic mixing, vox, 3 head, batt or AC pwr, \$100. G Dunn, N CA News, 5383 Willow Lake Ct, Byron CA, 94514. 510-516-0299.

Ampex 350 classic mono R-R w/pwr sup, unmounted, very clean, BO. M Hardy, WMSJ, POB 432, Freeport ME 04032. 207-785-2272. 108A

Scully 280A (5) 1/4" 2-trk 7.5/15, w/wo Russ Lang console cabinets, vgc, \$500/ea; Recordex 2500 R/R or cassette master 5 slave high speed duplicator, \$1000. G Kornbluth, A&J Rcdg, 212-247-4860.

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Otari Mark II-IV 1/2" 4-track, multi-track, mint, less than 50 hours, Best Offer. R Kaufman, Pams Productions, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

Otari 5050 MK III-8 track, heads excellent, \$2450. Wayne Gunn 619-320-0728.

Recordex 6 cassett rewriter \$100; Tascam 40-4 4 trk 10" in flight case w/free dbx \$750; MRL new short test tapes \$39 for 1/4" to \$199 for 2". W Gunn 619-320-0728.

16 track 2" \$3450, MCI JH110C-8 \$2800, 110C-8 play only \$500, ATR800 mono or Tascam 7300 or 2502 \$600 ea, MCI Locator III \$1195, Tascam 52 2 trk \$1200, Ampex AG350 electr \$50/ch. W Gunn 619-320-0728.

Scully '100' recorders, record/play amplifiers, 8, 16, 24 track heads. Sequoia Electronics, 4646 Houndshaven Way, San Jose CA 95111. 408-363-1646.

Want To Buy

Ampex tube recorders and mixers. W Gunn, 619-320-0728.

Tascam 58 1/2" 8 trk wanted to buy or trade for Otari 5050 MK III-8 or...? Wayne Gunn 619-320-0728.

Ampex ATR100 taperecorders for parts. Circuit cards, heads, motors, machine parts, or electronic parts. Call 818-907-5161.

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Kimtron KT7-PC IBM compatible dumb terminals, (2), \$95/ea. T Steele, WMOO, POB 410, Derby VT 05829. 802-766-9236.

Diablo 1650, daisy wheel pmtr, comm letter qual, RS-232 serial interface, spare ribbon cart incl, \$75. G Hammond, WEZS, 1308 Gottstown Rd, Manchester NH 03102. 603-669-1605.

Want To Buy

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Shure M67 and M675, remote mixers, mint cond, \$150 or will trade for M68, M63 and M62V. J Arthur, DVS Communications, RD 1, Belfast NY 14711. 716-365-8870.

ADM ST-160 II, 4 trk, EQ mods, 1x8 stereo selects, 4 trk mix, docs & extras, BO. J Book, WOC, 3535 E Kimberly, Davenport IA 52807. 319-344-7000.

Russco 505, \$350. J Arzuaga, WQOZ, POB 980, Quebradillas PR 00678-0980. 809-895-2725.

Gates Yard, 8 chnl mono input, dual VU meters w/new solid state electronics not installed, \$100. G Dunn, N CA News, 5383 Willow Lake Ct, Byron CA, 94514. 510-516-0299.

Gates Gatesway, 8 chnl, mono console w/spare pwr supply, monitor, amp, \$600/BO; Gates Producer, solid state, 4 chnl, \$750/BO. J LoPresti, WGSR, 111 Avalon Dr, Warner Robins GA 31093. 912-929-4904.

Shure M675 mic mixer, BO. P Doolittle, W Eng Co, POB 1318, Polson MT 59800. 406-883-4800.

Harris Stereo 80 8 chnl stereo, \$1000; LPB S-10 5 chnl mono w/pair of TT & cabs, \$450. G Hammond, WEZS, 1308 Gottstown Rd, Manchester NH 03102. 603-669-1605.

Ampro mono/dual chnl, 8 pot, slide cntrl; McMartin (2), mono/dual chnl, 8 pot, \$300 ea + shpng; McMartin B-500 console, \$500 + shpng. B Perry, Ainsley Comm, 30 Trails End, Mayflower AR 72106. 501-470-1728.

Grommes Precision M-5 tube type, 5 chnl, \$300; Russco 5055 stereo 5 chnl, \$475; Russco 505R mono 5 chnl, \$250. J Parsons, Parson Sound, 2781 Fayson Circ, Deltona FL 32738. 904-532-0192.

Gates Gatesway 8 chnl, old but in gd cond, tube power supply, BO. M Hardy, WMSJ, POB 432, Freeport ME 04032. 207-785-2272.

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Gotham Long (10) throw KCW600/1 faders, \$50/ea. G Kornbluth, A&J Rcdg, 212-247-4860.

Gates 10 chnl mono console, bad audition amp, otherwise works fine, \$900. R Wittick, KPCC/KCMT, POB 11370, Quincy CA 95971. 916-283-1370.

Ramko DC5AR 5 channel mixers, vgc, \$175 each. 916-725-2434.

Audioarts A-50, \$3950. 804-525-0900.

Want To Buy

BE S250 5 chnl w/manuals, M Skinner, KFMD, 801-628-1000.

Auditronics 200 Series modules in good condition. G Jablonski, WHMI, POB 935, Howell MI 48844. 517-546-0860.

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Technics SH9010 5 band parametric EQ, stereo, rack mt, \$200. E Davison, POB 7167, Springfield IL 62791. 217-787-0800.

Whirlwind Medusa, 50' multipair snake, 16 balanced inputs w/XLR connectors and 4 unbalanced outputs, \$125. R Haney, KLAQ/KROD, 4141 Pinnacle #120, El Paso TX 79902. 915-544-8864.

Realistic MC-1800, 2 way spkr, 8" woofer, VGC, (3), \$50. K Carpenter, KPGM, 601 W Collins, Casper WY 82601. 307-266-4203.

Korg DUP-1 vocoder/harmonizer, excellent condition, \$400; Lexicon LXP-1, reverb/delay, excellent condition, \$300; ART Phantom 2408 mixing console, 24 inputs, pro specs, \$800. W Whitney, 2232 Wengler, Overland MO 63114. 314-428-8430.

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ITC Delta players, mono (3), VGC, \$650. K O'Malley, WTKR, 804-446-1328.

Spotmaster 505 BR, rack mount, mono, play only w/secondary cue detector, gd cond, \$75 + s&h/COD; Spotmaster 505B table top compact, mono, play only, gd cond, \$75 + s&h/COD. G Gibbs, KMNS/KSEZ, 901 Stueben St, Sioux City IA 51102. 712-239-3966.

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Over 200 confirmed openings each week. Air Talent, PD, News, Sports, Production, Promotions, GM & GSM & Maintenance Engineering jobs. Stations call us each day to list openings FREE & they're available to you by Fax or BBS. You'll be surprised how inexpensive we are. Call now!

208-465-4821

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BBS 208-467-4110

ABOUT OUR EMPLOYMENT SECTION

HELP WANTED

Any company or station can run "Help Wanted" ads for \$1.50/word or buy a display box for \$60/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.

Mail to: BROADCAST EQUIPMENT EXCHANGE
PO Box 1214, Falls Church, VA 22041 Attn: Simone Mullins

DISCO-PRO SOUND EQUIP...WTS

Radio Shack 32-1200 console, 3 mic w/pan, 2 line, 2 turntable inputs, cue & mic amp, \$50. G Dunn, 5383 Willow Lake Ct, Byron CA, 94514. 510-516-0299.

Want To Buy

ARP 2600 synthesizer, other makes considered; Analog sequencers. G Wons, LBPH, 919 Walnut St, Philadelphia PA 19107. 215-925-3213.

JBL 4312A monitor loudspeaker, only need 1 in gd cond. T Steele, WMOO, POB 410, Derby VT 05829. 802-766-9236.

FINANCIAL SERVICES

\$60 K expansion capital needed to bring 2nd year radio network further along vertical growth curve, expansion plans avail to principals/primary investors. debt/equity, equity pos or joint venture considered. Sportcom, 80 Zevan Rd, Johnson City NY 13790. Fax 607-770-9165.

EQUIPMENT FINANCING

ON ALL RADIO EQUIPMENT

- Easy to qualify
- Fixed-rate, long-term leases
- Any new or used equipment
- 100% financing, no down payment
- No financials required under \$50,000
- Refinancing existing equipment



Call Mark Wilson (800) 275-0185

LIMITERS

Want To Sell

Optimod 8100A, gd cond, still wrks, \$2500. J Bacon, KTAN, POB 2770, Sierra Vista AZ 85635. 602-458-4313.

CBS Audimax III, stereo limiter, \$75. R Perrine, The Imagination Industry, 2475 State Rd, Cuyahoga Falls OH 44223. 216-929-3712.

Spectra Sonic 610, compressor/limiter, gd cond, \$275. J Addie, WLTL, 708-579-3749.

Cutting Edge Vigilante, approx 1 yr old, \$2200. J Michaels, WCOWWKLJ, POB 549, Sparta WI 54656. 608-269-3100.

BBE 422, sonic maximizer, adds presence + definition to sig, stereo, \$250; Aphex aural exciter type C, stereo, just rebuilt by Aphex, \$200. K Carpenter, KPGM, 601 W Collins, Casper WY 82601. 307-266-4203.

Orban 81000A/XT2 w/manuals, updates. M Skinner, KSGI, 210 North 1000 East, St George UT 84770. 801-628-1000.

Inovonics 230 mono, 8 band compressor/limiter, recently calibrated, \$250. A Anello, 1915 W Waters Ave #1, Tampa FL 33604. 813-933-6009.

CRL FM2G, SG800A stereo generator, SEP800 spectral energy processor; SPP800 stereo prep processor, SMP 850 modulation processor, \$5000/BO; Mod Sci MYB-2 Stereo Maxx, \$1500; CRL Dynaflex DX-2, \$400. B Perry, Ainsley Comm, 30 Trails End, Mayflower AR 72106. 501-470-1728.

Alesis 3630 compressor-limiter \$200; dbx160XT compressor-limiter, \$250; BBE 802 sonic maximizer, \$200. B Garity, KTWB, 605-362-9901.

BE AM400 AM, \$150; CBS 410 FM Volumax (2), \$50; CBS 444 Audimax, \$50; Orban 9000 AM Optimod, \$1000; Orban 8000 FM Optimod, \$1500. G Hammond, WEZS, 1308 Gottstown Rd, Manchester NH 03102. 603-669-1605.

CRL SPP-800 stereo prep processor, \$1300/BO; CRL AM stereo matrix processor, \$1600. J Kesler, WOBZ, POB 644, Livingston NY 40445-0220. 606-843-9999.

Optimod 8100 w/XT2 chassis, \$4500. 804-525-0900.

Want To Buy

Fairchild 670 or 660 tube compressor/limiter, Teletronics LA-2A tube compressor/limiter or UREI LA-3A solid state compressor/limiter, call after 3PM CST. 214-271-7625.

MICROPHONES

Want To Sell

RCA 77DX vintage mic, exc cond, inc orig 6 ft mic cord & yoke hardware, \$900. B Lacy, KARX, 2075 N Hwy A1A, Indianialtic, FL 32903. 407-773-1962.

Audio Technica ATM31, \$85; Audio Technica ATM25, \$85; Electro Voice PL10 \$75; Sennheiser MD421U, \$325; Shure SM57, \$70. B Garity, KTWB, 605-362-9901.

Audio Technica PRO4L cardioid mics (4), new, \$75/ea. T Steele, WMOO, POB 410, Derby VT 05829. 802-766-9236.

Manley Labs CR3A, new, \$795 w/shockmount, windscreens & case, no risk trial in your studio. Also have used mics & everything else. Get our catalog! Liberal trade policy too. Audio Village, 619-320-0728.

RE-20's (2), \$500. 804-525-0900.

Want To Buy

EV RE 20 mic. M Skinner, KSGI, 210 North 1000 East, St George UT 84770. 801-628-1000.

Sennheiser MD 421, want 4. R Van Zandt, WWGN, 15 Walnut Hills, Springfield IL 62707. 217-487-7711.

EV RE-20 will trade Sennheiser MD-441. G McNetlin, Box 742, Blacksburg VA 24063. 703-552-8073.

AKG D202-E in gd cond with or w/o cable. G Hammond, WEZS, 1308 Gottstown Rd, Manchester NH 03102. 603-669-1605.

Network ID plates for RCA 77DX and 44-BX mics; other parts also of interest. T Heathwood, Heritage Radio, POB 16, Boston MA 02167.

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.

77-DX's, 44-BX's, WE KU-3A's On-Air lights, recording lights & audition lights. Top price paid. Fast response. Bill Bryant Mgmt, 2601 Hillsboro Rd, G12, Nashville TN 37212. 615-269-6131, FAX: 615-292-3434.

Neumann U87s, KM84s, AKG 451s, EV RE20s, Sennheiser 421s. W Gunn 619-320-0728.

MISCELLANEOUS

Want To Sell

Western Electric 120H repeat coils with housings, \$25 ea; WE 754A rk mt VU indicator, +4 to +26 range, \$40; Ramko ACL-25 cart winder, \$75; Technics SLP720 CD player, for parts, \$50. G Hammond, WEZS, 1308 Gottstown Rd, Manchester NH 03102. 603-669-1605.

Large quantity ADC/UTC audio, \$12/ea, call for list. G Kombluth, A&J Rcdg, 212-247-4860.

Equipment racks (2) on casters, 53" tall, 27 rack spaces, walnut formica, gd cond, \$50/ea. T Price, DOCSI Corp, 1140 N LaBrea, Hollywood CA 90038. 213-462-4966.

Shure ST3000 teleconference, speakerphone systems, \$325. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-258-6161.

Topaz 12000 W true UPS w/batteries, 230V/3 phase in, 120V/220V single and 3 phase out, \$2995. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-258-6161.

19" steel equip rack (2), 76" rack space, 18" deep, \$75 + shipping. G Dunn, N CA News, 5383 Willow Lake Ct, Byron CA, 94514. 510-516-0299.

Retron Blowers for Elcom, Harris, CCA, CSI, McMartin, rebuilt & new. Goodrich Enterprises Inc. 11435 Manderson St, Omaha, NE 68164. 402-493-1886 FAX 402-493-6821

Patchbay 96 pt, 48 jack, w/30 cables, \$100. G Dunn, N CA News, 5383 Willow Lake Ct, Byron CA, 94514. 510-516-0299.

Radio Shack 42-2110 (3), 3 input switch, -10 dB RCA, \$5 ea. G Dunn, N CA News, 5383 Willow Lake Ct, Byron CA, 94514. 510-516-0299.

Pacific Recorders Molex audio connector panel w/patch bays, several avail, \$100; Erberg BA-6 bcdct aler mon w/matching remote unit, like new, \$250. S Horner, KLAX, 5700 Sunset, Hollywood CA 90028. 805-654-0577.

World famous psychic to stars and celebrities, 30 years experience, can help you to obtain love, health, wealth and luck. Will do free interviews. Call David Guardino anytime, 703-978-1754 or 615-539-0434.

Ronk Rotophase 40KVA, \$2250. 804-525-0900.

Want To Buy

Jazz record collections, 10" LP/12" LP be-bop, swing, dixie, highest prices paid. B Rose, Program Recdgs, 228 East 10th, NANY 10003. 212-674-3060.

MONITORS

Want To Sell

McMartin 2500C 97.9 MHz, gd wrking cond, hi/lo outputs, solid state, w/manual, \$150 + s & h/cod. G Gibbs, KMNS/KSEZ, 901 Stuebent St, Sioux City IA 51102. 712-239-3966.

Gates GTM-88F, GTM-88S and GTM-88R, freq mod monitor & RF amp package, all on 92.5 MHz, \$300/all. G Hammond, WEZS, 1308 Gottstown Rd, Manchester NH 03102. 603-669-1605.

Sansui TV-D99 AMX AM/FM stereo tuner, C-QUAM, \$200. G Dunn, N CA News, 5383 Willow Lake Ct, Byron CA, 94514. 510-516-0299.

Harris FS-80 & FT-80 modulation monitors, \$1200. 804-525-0900.

RECEIVERS & TRANSCEIVERS

Want To Sell

McMartin TR66B, TRSSC & TR55C, SCA rcvrs, \$25. M Hendrickson, Hedberg BC Group, POB 249, Blue Earth MN 56013. 507-526-4044.

SCA RECEIVERS—ALL TYPES

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Will work to meet your receiver needs

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2237 Industrial Boulevard Sarasota, FL 34234 Tel: 813 351 4454 FAX: 6081

Technics ST9030 stereo tuner. B Calthamer, WMBI AM-FM, 820 N LaSalle Dr, Chicago IL 60610. 312-329-4304.

AM STEREO RECEIVERS

Portable, Home/Studio, Auto

RRADCO GROUP

708-513-1386

Belar FMM2, FMS2, RF amp tuned to 95.3, 2 yo, \$2500. M Rollings, Rollings Comm, POB 882, St Louis MO 63006. 314-458-5595.

GE Superadio III, custom modified w/noise free SCA w/improved selectivity & sensitivity, \$95. Other modifications avail. Performance guaranteed. 800-944-0630.

Want To Buy

Sony TFM-9450 table radio, call w/price. E Nardi, 718-648-0322.

REMOTE & MICROWAVE EQUIPMENT

Want To Sell

Burk TC-B excellent condition, with manual, \$1200. L Hunt, KMVL, 102 W Main St, Madisonville TX 77864. 409-348-9200.

RENT IT HERE! Call Steve Kirsch for Details

COMREX

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Digital Phone Hybrids

GENTNER

EFT 3100 3-Line Extenders

SHURE

FP-410 Automatic Mixers

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Burk ARC-16 (dual units), 16 I/O chnls, equip with radio modems & CI-16 computer interface, Burk IP-8 relay panel. L Bush, KWOW, 6920 Woodway Dr, Waco TX 76712. 817-772-5306.

QEI 7775 auto transmission system w/remote monitor, \$800; Hallikainen & Friends DRC-190 digital remote contol, \$1500. P Stover, WJYJ, POB 905, Spotsylvania VA 22553. 703-582-5371 ext 4.

McMartin TG-2/EBS, tone generator, \$75; McMartin AMR-1 AM receiver, \$50. G Hammond, WEZS, 1308 Gottstown Rd, Manchester NH 03102. 603-669-1605.

Gentner 5PH3A telephone processor, 6 mos old, never used, will trade for RE20 or SM5B, \$400. B Shannon, WXTA, 4910 Richmond, Erie PA 16509. 814-476-7426.

Moseley TRC-W remote cntrl sys, wire-line, \$500; Moseley 1077-2 AM freq and mod monitor remote meter panel, \$50. G Hammond, WEZS, 1308 Gottstown Rd, Manchester NH 03102. 603-669-1605.

RENTALS
RENTALS
RENTALS

COMREX

3-line extender

Frank Grundstein 610-642-0978
Audio/Video Consultants

Comrex 3XR 3-line decoder, with remote control. Perfect condition. \$2950. S Kirsch, Silver Lake Audio, 2590 Hillside Ct., Baldwin NY 11510. 516-623-6114.

Marti RPT-15-2, \$450. 804-525-0900.

Want To Buy

Gentner VRC-2000; Marti STL-10 stereo system. R Van Zandt, WWGN, 15 Walnut Hills, Springfield IL 62707. 217-487-7711.

Burk TC-8, telephone speech unit, for use w/Burk TC-8. L Hunt, KMVL, 102 W Main St, Madisonville TX 77864. 409-348-9200.

Telephone coupler, one-line for production studio, preferably with mix-minus and processing which easily interfaces with Tascam board. T Heathwood, Heritage Radio, POB 16, Boston MA 02167.

SATELLITE EQUIPMENT

Want To Sell

Wegener 1866 FM 2, subcarrier rcvr, for audio and data, BO. J Book, WOC, 3535 E Kimberly, Davenport IA 52807. 319-344-7000.

PHONE: 703-998-7600 FAX: 703-998-2966



Call Simone Mullins, Classified Ad Manager, to reserve space in the next issue. Use your credit card to pay, we now accept VISA and MASTERCARD.

Radio World

5827 Columbia Pike, 3rd Floor
Falls Church, VA 22041

Select from these categories for best ad positioning:

- | | | |
|----------------------------|---------------------------|--------------------------|
| Acoustics | Consoles | Software |
| Amplifiers | Disco-Pro Sound Equip. | Stations |
| Antennas & Towers & Cables | Financial Services | Stereo Generators |
| Audio Production (Other) | Leasing | Tapes, Carts & Reels |
| Brokers | Limiters | Tax Deductable Equipment |
| Business Opportunities | Microphones | Test Equipment |
| Cart Machines | Miscellaneous | Transmitter/Exciters |
| Cassette & R-R Recorders | Monitors | Tubes |
| CD Players | Receivers & Transceivers | Turntables |
| Computers | Remote & Microwave Equip. | Positions Wanted |
| | Satellite Equipment | Help Wanted |

Classified Advertising Rates Effective January 1, 1994

	1x	3x	6x	12x
1-9 col inch (per inch)	\$60	58	54	49
10-19 col inch (per inch)	55	52	49	44
Distributor Directory	100	95	90	85
Professional Card	65	60	55	50
Classified Line Ad		\$1.50 per word		
Blind Box Ad		\$10 additional		

To compute ad costs: Multiply the number of ad inches (columns x inches) by the desired rate schedule for your per unit cost. Example: a 3" ad at the 1x rate is \$180, at the 3x rate \$174, at the 6x rate \$162, at the 12x rate \$147, etc.

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Zephyrus for JSA
Zephyrus 700 SPCP

We Repair & Rebuild all Popular Receivers Quick Service!

Satellite Systems
(719) 634-6319

Harris 6528, video rcvr, \$300; Janeil AP-1000, antenna positioning system, \$50. K Carpenter, KPGM, 601 W Collins, Casper WY 82601. 307-266-4203.

Wegener 1601, w/2 Panda Cards II, 1610 tone decoders 1645 & 1646, 1606-21 rcvr, exc cond, \$1250. K Crosthwait, WTNN, 13206 Buttermilk Rd, Knoxville TN 37932. 615-690-8807.

Wegener 1601 mainframe, w/1606-11 down converter, 1601-1 rec/transponder selectro, 1601 pwr supply, 2 1644 relay cards, 2 Panda II demods, 2046-03 controller mod, also extra cards, BO. B Perry, Ainsley Comm, 30 Trails End, Mayflower AR 72106. 501-470-1728.

OuterSpace Experts!

**We SELL * TRADE * BUY
SATELLITE EQUIPMENT
317-962-8596**



Scientific Atlanta 7550 satellite rcvr w/AD6305 DC, 7014, (2) 7010 demod, ready to go for Unistar ACII, excl cond, \$3500. T Steele, WMOO, POB 410, Derby VT 05829. 802-766-9236.

Paradyne 19200 satellite modem, \$100. S Horner, KLAX, 5700 Sunset, Hollywood CA 90028. 805-654-0577.

Wegener 1601 SPCP rcvr w/1605-12, 1601-201, 1689-01, 1601-01, 1601-02 cards; Microdyne 1100 70 MHz converter. J Mueller, Family Stations, 2909 Hegenberger Rd, Oakland CA 94621. 510-568-6200 ext 240.

Want To Buy

Zephyrus rcvr and cards for MBN. R Van Zandt, WWGN, 15 Walnut Hills, Springfield IL 62707. 217-487-7711.

Fairchild Dart 384 rcvr, down converter, 7.5 kHz cards. M Skinner, KSGI, 210 North 1000 East, St George UT 84770. 801-628-1000.

SOFTWARE/
DATABASES

Want To Sell

Datacount Darts radio commercial traffic software, \$1200/BO. D Miller, WINA, 501 E Main St, Charlottesville VA 22902. 804-977-3030.

PC SOFTWARE for Broadcasters. Traffic, Billing, & Accounting. Powerful, inexpensive. Works with automated, satellite or live operations. INTERFACES with popular DIGITAL AUTOMATION SYSTEMS. Try it for 90 days, no obligation.

**Absolute Broadcast Automation
Naples, Florida (813) 643-3689**

Want To Buy

FM or AM/FM combo, bdctr w/investor group seeks combo in Midwest, serious sellers only, all replies in strict confidence. PO Box 149, Wasco IL 60183.

STATIONS

Want To Sell

FM permit, 25,000 W in midwest, \$40,000. D Ganske, Hawkeye Radio, 5546-3 Century AVC, Middleton WI 53562. 609-831-8708.

AM/FM in MS college town, possible owner financing, \$435,000. D Ganske, Hawkeye Radio, 5546-3 Century AVC, Middleton WI 53562.

FM country format, 5000 W, 24 hrs 7 days, remote cntrl ops. AM Gospel, 1000 W, \$220,000. D Bailey, 912-868-2134.

Retiring after 21 yrs, AM gospel/FM country-sports stn in NC. 919-872-7331.

LPTV, 5 yrs old, license renewed 1988, on cable, makes profit, 3 acres, mobile home, equip, cash only, BO. N Davis, 904-892-4038.

FM, midwest, pwrful sig, new equip, med mkt, great potential, \$125,000 down, owner financing @ 8%, \$450,000. D Ganske, Hawkeye Radio, 5546-3 Century AVC, Middleton WI 53562. 609-831-8708.

Person to lease/purchase FM stn for small beach town in FL, mnthly payments as low as \$4000. Bob, 813-896-0045.1962.

700 W FM, w/one acre and 7 room house, \$65,000. D Parsons, KLUH, POB 1313, Poplar Bluff MO 63902. 314-686-1663.

Want To Buy

FM CP in KY, will consider small FM station, owner financing a must. L Harkins, POB 397, Cave City KY 42127. 800-942-9304.

Seeking SE Coastal AM/LMA or will help fix your AM. Vacation Radio, 68 Pt Comfort Rd, Hilton Head SC 29928.

Husband/Wife broadcast professionals with 25+ years experience, wishing to relocate to small market. Interested in FM only, or AM/FM combo, in NW Ohio, Michigan, Wisconsin, Minnesota, or N Dakota only. We will locally own and operate station. We have good track record for sales, operation, and community service. Send rate card, description of assets and property, year end statement, and terms. All replies will be kept very confidential. Serious replies only! Send replies to: Radio World, POB 1214, Falls Church VA 22041. Attn: Box #94-06-01-1RW.

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Falls Church, VA 22041
Attn: #94-08-10-3RW

STEREO
GENERATORS

Want To Sell

Inovonics 705 FM/FMX, approx 1 yr old, \$900. J Michaels, WCOW/WKLJ, POB 549, Sparta WI 54656. 608-269-3100.

C-QUAM exciter, BO. J Kesler, WOBZ, POB 644, Livingston NY 40445-0220. 606-843-9999.

TAPES/CARTS/REELS
& CD's

Want To Sell

Pams Jingles ref tapes, 1951-1976, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625.

Audiopak A-2, large quantity of music lengths 3:00 - 5:30, new, unused, \$2 each, used good condition, \$1 each. M Gollub, WMJS, POB 547, Prince Frederick MD 20678.

Custom cart rack, wood, wall mount, 300+ cpy 3 1/2" x 4 1/2", \$100; 200+ 2 1/2" x 4 1/2", \$80 you pay shipping. K Carpenter, KPGM, 601 W Collins, Casper WY 82601. 307-266-4203.

Cart Carousels, 120 place (2), \$75 each, 200 place Carousel, \$100 you pay shipping. J Michaels, WCOW/WKLJ, POB 549, Sparta WI 54656. 608-269-3100.

Scotchcart 3M II 4.5 & 5.5 min (300), like new, \$1.20 ea or \$300 for all; Fidelipac 40 & 70 sec carts, (135), \$30. D Nuechterlein, WULM, 6130 S Dehmel Rd, Frankenmuth MI 48734-9562. 517-652-6663.

Classic AOR library, all on 7" reels, \$300. D Pulwers, Dave's Price Audio, 310 N Howard St, Alexandria VA 22304. 703-751-9346.

Fidelipac Gold Mastercarts, approx 1000, music length, all or part, \$50 ea. G Hammond, WEZS, 1308 Gottstown Rd, Manchester NH 03102. 603-669-1605.

Want To Buy

Vintage 16" ET's: AFRS discs, V-disks, used 7" reel 1/4" tape, must be in excellent condition, used carts, 10 sec, 20 sec, 30 sec, 40 sec. T Heathwood, Heritage Radio, POB 16, Boston MA 02167.

Fidelipac/Audiopak Mastercart II gold or AA-4 light blue in 2:30 through 4:00 lengths, must be in very good condition, call after 3PM CST. 214-271-7625.

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& ASSOC., INC.

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Want To Sell

Educational station needs studio, production equipment, low power carrier current transmitters, etc, shipping & receipt provided. Dr. Newcomb, Grand River Radio, 216-548-2053.

Non-profit Christian Network needs all types of equip and supplies for network to be installed in Siberia. Word of Light Network. POB 80890, Fairbanks AK 99708. 907-479-0751.

Non-profit Christian Bdctg Network looking for donation of equip to bdct church programs, equip needed is RR tape, mics, cart machines. Caribbean Christian Bdctg Network, POB 8263, Haledon N. 07508. 201-881-7044.

Going Digital? Not-for-profit, volunteer op. 501(c) station seeks analog equip esp R-R or cassette decks, CD players. S Kutzko, WEFT, 113 N Market St, Champaign IL 61820. 217-359-9338.

TEST EQUIPMENT

Want To Sell

HP 1200B scope, almost new, \$200. K O'Malley, WTKR, 804-446-1328.

Potomac Instruments RMP 19D, digital remote metering panel, FCC type approved for use with AM antenna monitor, remote metering, compatible with AM-19 & 19D, PM-19 & PM-112 with manual, \$350. G Gibbs, KMNS/KSEZ, 901 Stueben St, Sioux City IA 51102. 712-239-3966.

General Radio 11 std freq oscillator. R Winquist, POB 6668, Lake Worth FL 33466. 407-964-2496.

Flyke 80 digital multimeter, true RMS, AC/battery, 10 ohms opt, \$125; Shure M6S equalization analyzer with pink noise source & analyzer mic in travel case, \$295. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-258-6161.

Potomac Instruments AT-51 audio test set, inc AG-51 audio oscillator, AA-51 analyzer, AX-51 balancing xfrms (2), cables & manuals, exc cond, \$3800. J Seaman, CTNA, 3211 4th St NE, Washington DC 20017. 202-541-3029.

EICO 378 audio generator, \$50. G Hammond, WEZS, 1308 Gottstown Rd, Manchester NH 03102. 603-669-1605.

TRANSMITTERS

Want To Sell

BE 3.5A, 3.5 kW FM with FX-30 exciter, very good condition, operated at 2 kW. D Nadon, WLKZ, 603-524-0105.

QEI FM 10,000Q, single phase, only 1500 hours, \$25,000; CSI T1A-AM, new tubes, built 1980, 1240 kHz, good condition, \$4500; Collins 831, 2 kW FM with stereo exciter, good condition, \$6500. J Ingram, WBLE, Box 73, Batesville MS 38606. 601-563-4664.

DEMOED EQUIPMENT
BEXT Inc. has a few demoed exciters, amplifiers and STL's for sale. All demoed systems are sold first come first served and have the same 2 year warranty as BEXT's new equipment. For information: 619-239-8462

Broadcast Electronics FX30 fm exciter, excellent condition, \$3500. J Gallagher, WBEA, 211 Jason St, Pittsfield MA 01201. 413-499-3333.

BE FM-5B, 5 kW incl FX-50 exciter, one new spare final, spare voltage rectifier/regulator, std BE spares kit, spare semiconductor kit, 3 phase, tuned to 1000.9, \$22000. W Lada, WAQY, 45 Fisher Ave, E Longmeadow MA 01028. 413-525-4141.

Tepco J318 10 kW AM booster with TX broadband ant, \$1800; 20 W FM exciter, solid state, synthesized freq to any chnl, \$1500. J Arzuaga, WGOZ, POB 980, Quebradillas PR 00678-0980. 809-895-2725.

CCA Electronics has the following trade-in equipment for sale:
CSI T-20F 20 kW FM, ITA FM10,000C 10 kW FM, Harris FM2.5K 2.5 kW FM with MX-15 exciter & CCA FM60G 60 W FM exciter. Also RCA BTA-50 50 kW AM. Please contact Steve, Howard, or Darrin at 404-964-3530

Wilkinson AM 10,000D, solid state audio driver & RF exciter, very good condition, presently on air, \$22000. WONQ, 1033 Semoran Blvd, Casselberry FL 32707. 407-830-0800.

CCA 10000 W, works great with all manuals and docs, \$9000; Bauer 10000 W AM, all manuals & docs, works great, \$7500. R Wittick, KPCCO/KCMT, POB 11370, Quincy CA 95971. 916-283-1370.

RCA BTA-10U, 10 kW/5 kW, manuals, blueprints, detailed maintenance docs, \$10,000. D Jackson, KSCO, 2300 Portola Dr, Santa Cruz CA 95062. 408-475-1080.

QEI Q30000 1989 30,000 W FM transmitter in excellent condition, included QEI remote control system, \$26900; CSI 3 kW 1981 single phase in excellent condition, including new Eimac final, \$9500; Harris FM 3-H very clean & excellent condition, just out of service, \$7000. J Davis, SCB Inc, POB 7762, Amarillo TX 79114. 806-355-1187.

Collins 310 Z-2, FM exciter, \$1200. J Michaels, WCOW/WKLJ, POB 549, Sparta WI 54656. 608-269-3100.

Gates BC-5P AM transmitter 1410 kHz, excellent condition, Best Offer. P Scott, WGGM, 10600 Jefferson Davis Hwy, Richmond VA 23237. 800-868-6161.

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CRL SMC 600A stereo modulation controller, \$200. B Lacy, KARX, 2075 N Hwy A1A, Indiantonic, FL 32903. 407-773-1962.

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McMartin AM/FM xmtr, any model, exciter or stereo modules. Goodrich Ent., 11435 Manderson, Omaha NE 68164. 402-493-1886.

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TURNTABLES

Want To Sell

Russco Fidelity Pro TT preamps (3). gd cond, \$50 ea. R Haney, KLAQ/KROD, 4141 Pinnacle #120, El Paso TX 79902. 915-544-8864.

Russco Cue Master (2), 12" 3 spd TT, Shure tone arms, stereo cartridges, \$150/BO. J LoPresti, WGSR, 111 Avalon Dr, Warner Robins GA 31093. 912-929-4904.

BE QRK 12C (2), QRK 12C2 (2), need work, BO. P Bossert, KSPK, 516 Main St, Walsenburg CO 81089. 719-738-3636.

Technics SP-10 M 3 super torque TT w/base & tonearm, new, \$2500; UREI 1122 precision stereo TT preamp, \$150. T Steele, WMOO, POB 410, Derby VT 05829. 802-766-9236.

Sony SQD 2050, 4 chnl disc decoder, all frmts, \$25. G Dunn, N CA News, 5383 Willow Lake Ct, Byron CA, 94514. 510-516-0299.

JVC 4-DD-5 quadrasonic disc demodulator, low hrs, \$50. D Pulwers, Dave's Price Audio, 310 N Howard St, Alexandria VA 22304. 703-751-9346.

QRK turntables (2) 3-speed, w/tone arms, no cartridges, \$50/ea. C McDonald, KKJV, POB 807, Veradale WA 99037. 509-484-4531.

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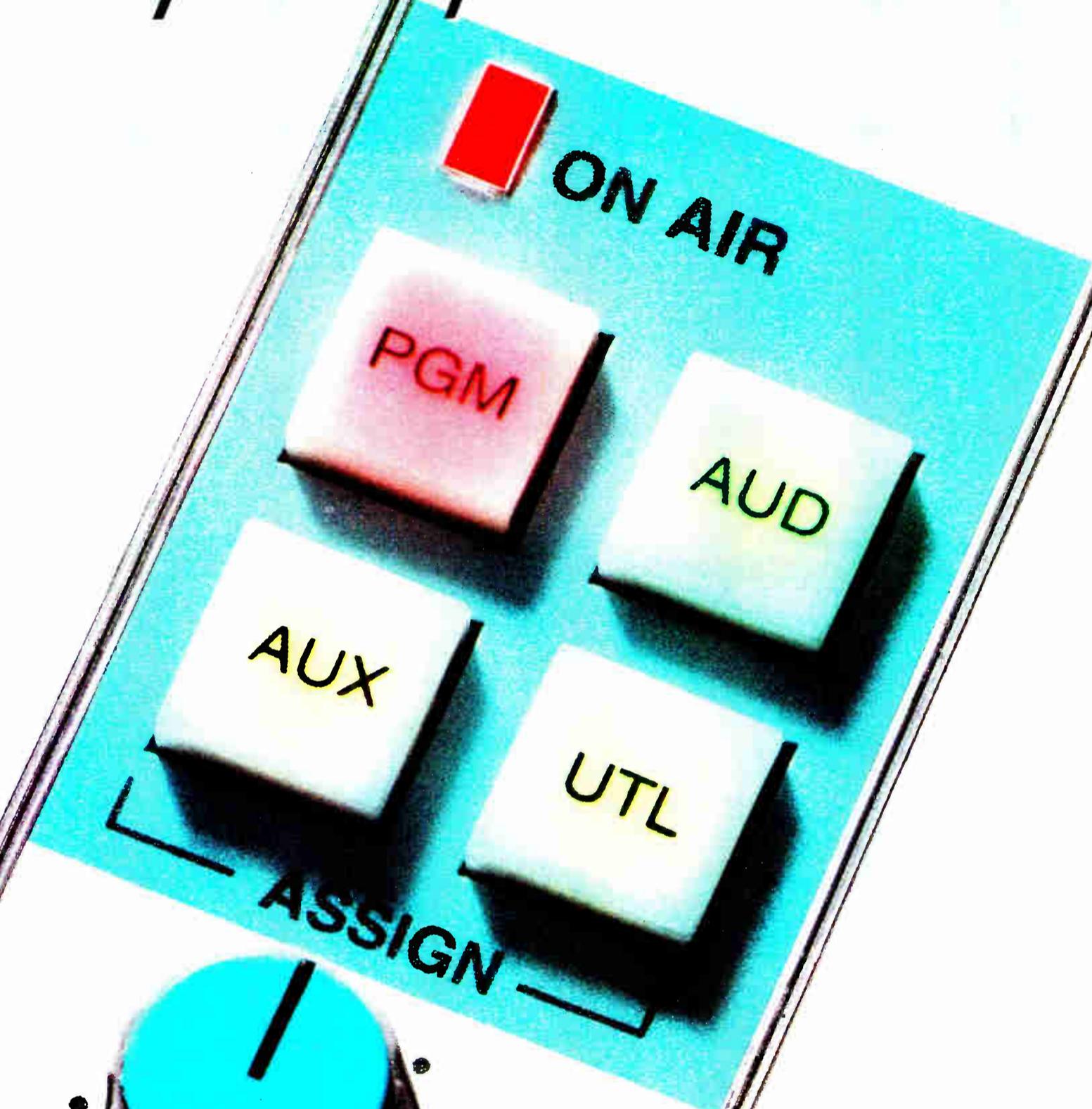
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