

AM Filings Favor Changes

FCC Efforts Lauded, Some Criticisms Voiced

by John Gatski

WASHINGTON Reaction to the FCC's sweeping proposed AM rulemaking (docket 87-267) generally has been

favorable, but specific portions of the document have received criticism, based on written comments filed by the Nov. 19 deadline at the Commission.

In conjunction with docket comments, hundreds of stations also have submitted non-binding letters of intent to file for slots on the expanded band that will open up as a result of the rulemaking.

The proposed rulemaking includes provisions to fill the expanded AM band (1605-1705 kHz) with the worst interfering stations and to increase the first adjacent channel protection ratio from 0 dB to 16 dB. Also addressed is the possible elimination of simulcasting AM on FM (non-duplication), a mandated 10 percent interference reduction when making major station changes and new interference profile calculations including the 1.0 mV/m nighttime limit.

The Commission also sought comments pertaining to possible AM receiver standards, the role of AM stereo, spectrum allocation for Travelers' Information Stations (TIS), use of advanced antenna systems and relaxation of common ownership rules.

The proposed rulemaking is considered important to AM's future, which has suffered from band crowding, increased interference and audience migration to FM and CDs.

Generally supportive

The NAB said it supported most of the FCC's AM improvement proposals including more demanding technical interference standards and AM "homesteading" on the expanded band.

The association, however, opposed

resurrection of the non-simulcast rule and possible mandated AM stereo.

Among the proposed technical elements the NAB supported are: moving interfering stations to the expanded band, AM station reclassification to parallel the international system (FM), increasing the Class III power ceiling from 5 kW to 50 kW, revising the protection ratio from 0 dB to 16 dB and eliminating the rule that allows interference with the normal protection contour of stations that serve only one community.

In its opposition to any consideration of possible mandatory AM stereo, a proposal the NAB favored last summer, the association now concurs with the Commission's position of allowing the marketplace to decide.

NAB, however, encouraged the Commission to "favorably treat AM stereo stations in comparative hearings for new facilities and the move to the expanded band," as well as for other FCC considerations.

Addressing its opposition to the FCC's reconsideration of imposing the non-duplication rules, the NAB said the move "would result in less efficient spectrum use and less long-term programming diversity."

(continued on page 13)



The DCR Scorecard:

Digital Planet (staff shown at left) is just one of the Big Three in digital cable radio. Meet the rest of the players in Part II of our series on DCR, p. 11.

MST Delays Strother

by John Gatski

WASHINGTON Opposition by a group that wants UHF spectrum allocated for High Definition Television (HDTV) is likely to delay FCC approval of Strother Communication's request to test digital broadcasting on UHF.

The last minute comments, filed by the Association for Maximum Service Television (MST), will delay approval that was expected in early December for SCI's test plan. Strother had planned to test the Eureka 147 DAB system on channels 14 and 40 in Washington, D.C. and

15 and 32 in Boston. Strother since has changed its plans to test only on channel 40 in Washington and channel 32 in Boston.

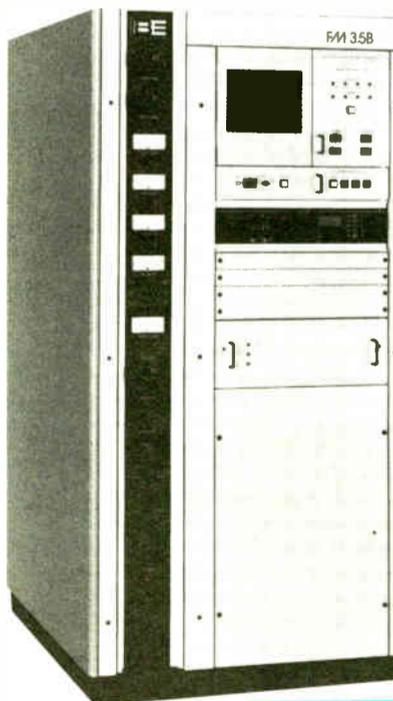
FCC Assistant Mass Media Bureau Chief William Hassinger said MST's concern needs to be looked over by the Commission, but "does not mean it is fatal."

"MSTV has raised some matters that have to be addressed. I think it will be delayed until these get resolved," Hassinger said.

Strother Communications plans to

(continued on page 13)

Digital Quality Transmission



Broadcast Electronics' FM 3.5B 3500 Watt FM Transmitter

- New world standard FX 50 Exciter.
- Guaranteed 85 dB S/N.
- Built-in synchronous AM noise test facility.
- Patented folded half-wave coaxial cavity eliminates plate blocking capacitor and sliding contacts.
- Self Contained solid state broadband IPA in slide out drawer.
- Emergency 250 watt RF patching.
- Automatic power control that maintains constant output power with proportional VSWR foldback protection.
- Optional microprocessor video display system (MVDS) with diagnostics.
- Optional PC Remote Control from MVDS.

With typical performance specifications of 0.02% IMD and 0.01% THD and guaranteed 85 dB FM S/N your listeners will hear the difference from a new FM 3.5B.

BE BROADCAST ELECTRONICS INC.

4100 N. 24th ST., P.O. BOX 3606, QUINCY, IL 62305, (217) 224-9600, TELEX: 250142, FAX: (217) 224-9607

Circle 128 On Reader Service Card

NEWS BRIEFS

New Form 301 Filing Requirements Upheld

WASHINGTON The FCC has stood by its original decision not to apply the new information requested on 301 filing forms retroactively. This means that any restrictions or denied construction requests from new 301 forms will not apply to anyone who gained approval using the old forms.

The FCC changed its application form for commercial broadcast construction permits in June

1989, to include more financial, ownership and integration information than was previously required.

When the forms were changed, however, Sound Broadcasting Co. and Field Broadcast Co. immediately requested the new requirements be applied retroactively. They argued the revisions were implemented to deter "sham or abusive" applicants from gaining approval, and these conditions existed as much in the past as in

the present or future.

In deciding to uphold its original decision limiting the form to new applicants only, the FCC cited "the great administrative burden."

FCC Enforces Tower Maintenance

WASHINGTON The FCC began an enforcement campaign in November to evaluate and improve nationwide compliance with tower painting and lighting rules. The rules, as outlined in Part 17 of the FCC regulations, are designed to ensure air traffic safety.

According to the FCC, licensees are responsible under Part 17 for ensuring that all lights on

the tower function correctly, and for painting the tower often enough to maintain good visibility.

Radio Revenue Up

WASHINGTON Radio Advertising Bureau results showed radio advertising revenue to have increased 0.4 percent during September, and year-to-date revenue through September is up 4.8 percent from the same period in 1989.

The national revenue is particularly strong on the east and west coasts, with low revenues most obvious in southeastern states.

RAB President and CEO Warren Potash was "encouraged" by the results, especially since the newspaper business and other

mediums are reporting losses in advertising.

NRSC: Third AM Standard Released

WASHINGTON According to the NAB, the National Radio Systems Committee has released its third version of the voluntary standard for AM broadcasting.

The standard, which was outlined in a report entitled "Audio Bandwidth & Distortion Recommendations for AM Broadcast Receivers," is intended as a design guide for receiver manufacturers building AM radios.

Three receiver specifications are discussed and a detailed measurement procedure is included.

To receive a copy of the report, contact Stan Salek at NAB Science & Technology: 202-429-5346.

Station Granted Waiver Of Overlap Rules

DALLAS The FCC has given the nod to Dallas AM KLIF for a six-month waiver of contour overlap provisions to allow it to acquire KKWM-AM, also in Dallas.

KLIF plans to replace KLIF with KKWM to enhance the extent of its nighttime coverage in the Dallas-Fort Worth market, the Commission said.

The FCC also granted KLIF a one-week simulcast/joint operation period in order to support the transition of the station's audience to KKWM. After that week, the two stations will have separate programming, staff and sales during the six-month waiver period.

WE SURPRISED OURSELVES!



AUDIOARTS® A-50 RADIO CONSOLE!

We wanted to know if it really was possible to build a high quality low-cost radio console. We found the answer to be quite exciting! We've come out with the A-50 console and even given it its own trade name: AUDIOARTS. This console comes complete with machine control functions; individually programmable channel logic; program, audition and telephone outputs; control room and studio monitors; as well as headphone and cue power amplifiers. It's also designed so you can expand or add accessory modules as your needs grow.

The A-50 is cost effective through clever engineering and the latest advances in electronic assembly procedures. It was developed by the same design team that creates our other high end equipment. Its performance is light years beyond the competition.

Imagine the benefit that our major market experience can bring to your station. Take advantage of Wheatstone's expertise and reputation. Call us today for immediate action!

 Wheatstone Corporation

6720 V.I.P. Parkway, Syracuse, NY, 13211 (TEL 315-455-7740 / FAX 315-454-8104)

INDEX

How Long Does It Take the FCC to Act?

by Harry Cole 15

Lamenting Lafayette

by Al Peterson 16

Orban 290RX: What the Doctor Ordered

by Ty Ford 18

Psyching Up for Overnight

by Thomas L. Vernon 19

Getting the Most from AM DAs

by Thomas Osenkowsky 20

Workbench 23

FCC Modifies Translator Rules

by Howard L. Enstrom 24

DAB's Option for Spectrum at WARC

by Steve Crowley 26

The Trials of New Ownership

by John Cummuta 27

A Guide to Trouble-Shooting Amplifiers

by Ed Montgomery 29

Playing the PC Shell Game

by Barry Mishkind 30

Buyer's Guide 33

WARC Group Report Plagued by Conflict

by Alan Carter

WASHINGTON What is described as "intense conflict" within working groups preparing recommendations for the FCC on digital radio-related positions to take to the 1992 World Administrative Radio Conference (WARC) may force the commissioners to act without benefit of a consensus.

Significant within a report from the working group on broadcast satellite service (BSS) sound, however, is language defining a stand-alone terrestrial approach for digital audio broadcasting (DAB).

The report stated that the optimum location for a stand-alone digital terrestrial service is as low in the VHF spectrum as possible, with a lower limit of approximately 80 MHz.

But of the three bands the FCC cited for DAB in a Notice of Inquiry, none was "optimum" for terrestrial delivery, the report maintained.

Satellite or terrestrial

The greatest debate is within Ad Hoc Group B on BSS sound and complementary terrestrial sound broadcasting, and between Ad Hoc Group B and Ad Hoc Group C on mobile satellite services in the 1-3 GHz bands.

Ad Hoc Group B has not reached a consensus on the need for satellite delivery of digital radio or to which band the service

would be allocated, according to the report. The document was released Nov. 27 at a meeting of the FCC WARC '92 Industry Advisory Committee.

Ad Hoc Group B and Group C differ regarding allocation. While proponents of satellite delivery said the 1435-1530 MHz bands would be appropriate, fixed and mobile interests oppose this move because the bands are allocated to aeronautical telemetry services in the U.S.

Francis Urbany, director of international and agency relations for Bell South and chairman of the FCC advisory committee, said the positions are so entrenched in Group B that consensus may not be reached. The final decision then would be left to the FCC. "The Commission: That's where the buck stops," Urbany said.

Some agreement

Some agreement exists among the proponents of DAB, who recommend that 60 MHz of bandwidth is needed. Forty megahertz would be allocated for domestic use and 20 MHz for international.

Of the three areas of spectrum the FCC proposed for satellite delivery, the service proponents agreed that 1435-1530 MHz is "most promising." They, however, noted that the Commission's recommendation of 32 MHz of bandwidth is insufficient.

If 1435-1530 MHz is allocated, the proponents recommended that the spectrum can be shared with aeronautical

VOA Mishap Fatal

by Debra Green

GREENVILLE, N.C. A veteran VOA engineer died of cardiac arrest Nov. 15, apparently induced by a 6,000 volt shock he received while performing maintenance at a transmitter site here.

Based on unofficial reports, Dallas Cox, an engineer and 20-year employee of the VOA, was called to check one of the 10 transmitters at the Greenville relay site after a "faulty indication" had been traced to it.

The transmitter was sending a Spanish program on 6040 kHz when a malfunction was discovered. The program was switched to another transmitter while the faulty one was left for repair.

At 5:50 a.m., VOA's network central office in Washington, D.C., received a call stating a man had been electrocuted, was in full cardiac arrest and that "it didn't look good," according to a VOA source.

Based on the preliminary investigation, Cox entered the transmitter after turning off the voltage, but did not turn off the filament supply. While inside the transmitter, he apparently made contact with some equipment that was still charged, resulting in the severe shock.

This is the first accident at any of the VOA sites in Greenville.

Overall, the VOA engineering staff has had an "exemplary" safety record and operates under comprehensive safety procedures when working with transmitters, according to VOA spokesman Joe O'Connell.

telemetry, or that service can be moved to 2300-2450 MHz.

The recommendation is opposed by the Aerospace and Flight Test Radio Coordinating Council, which said sharing is not acceptable and moving is too expensive.

The FCC's proposal that DAB could be allocated to 728-788 MHz was not deemed feasible because that is the area cited for high definition television.

The third option suggested by the

Commission—2390-2450 MHz—was considered technically unsuitable by both satellite and terrestrial DAB proponents.

The conflict within the process was further highlighted by the NAB, which opposes "any" allocation for satellite delivery, and by the Association for Maximum Service Television (MSTV), which opposes "any" allocation for terrestrial DAB in the UHF spectrum.

The reports will be submitted to the FCC as part of the Notice of Inquiry.

CCA

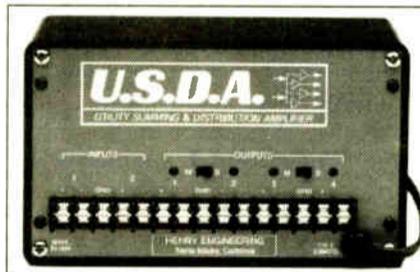


"Simplicity is the highest form of science."
-Albert Einstein

CCA Transmitters

P.O. Box 426
Fairburn, GA 30213
(404)964-3530 FAX (404)964-2222

Circle 148 On Reader Service Card



Mix and Match

Henry's MicroMixer and U.S.D.A. let you send your audio every which way. The new MicroMixer has four balanced inputs that can be individually assigned to its two balanced outputs. The U.S.D.A. has two inputs (one stereo pair) and four outputs (two stereo pairs) that can be used as a conventional DA. It also allows you to combine either output to mono without effecting the other output.

List price for either is only \$195, and Bradley offers you special pricing and fast delivery. Keep one of each on hand for your next installation crisis.

Bradley
BROADCAST
8101 CESSNA AVENUE • GAITHERSBURG, MARYLAND 20879-4177
TOLL FREE: 800-732-7665 • MD & DC: 301-948-0650 • FAX: 301-330-7198

Where Service and Engineering Make the Difference

Circle 44 On Reader Service Card

Look Out, It's the 1990 Dubies

by Judith Gross

FALLS CHURCH, Va. Well, here we are at the end of the first year of a new decade ... or the end of the old decade, depending on how you view these things. Last time I said that I started an **argument**. So call it what you will, 1990 is nearly over.

What would the end of the year be without holiday goodies, egg nog, mistletoe and of course: our own **Dubious Achievement Awards**.

Just in case you slept through the last two or three, the **Dubies** (as I fondly call them) are for those well-intentioned but out-in-left-field folks in the industry who lead us two steps forward only to go on and take a **giant step back**. The title was stolen fair and square from "Esquire" magazine to give it legitimacy.



The first Dubies had 10 lucky honorees but 1990 was a **busy year**. I found 15 less-than-stunning events to hand Dubies to this time around, so without further ado (drum roll, please) ... **the Dubies**.

The first thanks-for-nothing has to go to the **utility companies** who decided the cause of conservation (read: dollars and sense) could best be served by encouraging the public to use **RF light bulbs** in their homes, thus destroying forever their hopes of tuning in to their favorite AM stations.

Now we know they might retort by saying, "hey, it's only AM" thus writing off some 5,000 stations in this country, but what was especially galling was that the utility company reps contacted had **no idea** what RF bulbs were, most of them. So congrats, you take home the honors.

Next comes the FCC's giving in to a **procrastination mentality** by extending the deadline for **type-accepted STL equip-**

ment after stations already had several years to make the change. The manufacturers already had addressed the issue, equipment-wise, at considerable expense to some.

But last-minute-itis got the better of the situation, so a Dubie to the **STL extension**.

Not so lucky were those stations who figured the Commish was in a patient or lackadaisical mood. The deadline for implementing NRSC-2 was **June 30**, but an FCC "sweep" in the first week of July netted many stations in all size markets who got caught with their processing gear down. Shame, shame, shame and a Dubie to boot.

I want to give a Dubie Award to the **NAB show in Atlanta**. I've been wanting to do this since I walked my feet off trying to find my way around. But I'll compromise and give it one instead because of the coincidental timing with the **Grateful Dead** concert across the street from the convention center.

And a **mini-Dubie** to all the news reports covering them (including the ones in the trades) that made it sound like the most important thing that happened at the industry's biggest trade show was dressed in **tie-dye**.

Can't pass up the chance to honor the U.S. government, and our own Prez, with an award for **TV Marti**. The wacky plan to propagandize Cuba has caused **massive jamming** to both radio and TV stations, not to mention the tax dollars it cost as well. It's about as good an idea as the **hot air** that keeps the balloon holding its transmitter aloft.

A Dubie to the FCC for changing the place to send filing fees from D.C. to, of all places **Pittsburgh, Pa.**, and one to the Commish for the longest homework assignment on record: the **three months** it took to put together AM improvement **docket 87-267**. We know you're understaffed, but ...

And on the subject of AM, here's a Dubie for the NAB's **anti-skywave antenna project**. After haggles with the localities with the original plan to test two antennas, haggles with the designer of the second one (never built), delays in con-

struction and a lot of time stretches since the idea was first proposed, it was shown **not to work**. OK, we know, the only way to find that out was to test it. A Dubie for



you anyway.

And while we're on your case, how about an additional award for the **certification mark** for improved AM radios. It's earned one for the failure to find a **suitable name** that isn't already being used by someone else and also for its failure to attract support from **receiver manufacturers**.

Come to think of it, let's give that one to the **receiver manufacturers** instead; they haven't been supportive of AM despite all good efforts.

Now a real big Dubie to the **FAA**. Sure, they wanted to sit down and talk with the FCC and broadcast interests. Sure, they wanted to **compromise** so stations wouldn't be told they couldn't make changes or build new antennas.

Then the rulemaking came out and **not a single one** of the broadcasters' concerns were taken into account. Some compromise. And all because aircraft owners don't want to fork over the extra expense for better avionics receivers. **Comments on**

that FAA rulemaking are due at the end of **this month**, so write fast. And let's hand them their Dubie.

Another Dubie to the **SBE**, and I'll let the society choose which action earned it: either moving the SBE convention to **Houston** next year or pushing for an **engineer on the FCC**.

As for all the hoopla over **DAB**, it has brought its share of deserving honorees as well. Let's start with the **U.S. Department of Commerce** and **NASA** for holding secret meetings to push for a **global satellite DAB network**. Maybe if we close the doors, broadcasters won't find out.

Then there's the FCC's **WARC advisory group** which lets some major decisions get made in a steering committee, thus violating the whole principle of the **openness** of advisory committee meetings.

And how about an award to the **Grass Roots Division of Satellite CD Radio** for lobbying diverse community organizations in: "Your Hometown, USA" to file comments on the FCC's NOI into DAB supporting (what else) but satellite delivery.

Let's be generous and give another Dubie to the **Farm Bureau** that went ahead and included Sat CD's instructions on filing "your personal" comments to the Commission along with the Bureau's own letter, which **failed** to mention satellites at all.

And finally, since we could aptly call 1990 "**The Year of DAB**" for the revolutionary ideas that emerged and have dominated the radio industry, let's give a Dubie to those who, in the words of FCC Commissioner **Ervin Duggan**, "want to stop the tides of King Canute" by trying to keep DAB hidden under a rock somewhere.

There, the awards are out, the stockings are hung by the fire escape with care, and the holiday feast is on the table. Glug down some Wassail for me and I'll catch you in '91.

Heard a juicy tidbit? Spill your guts to Ear-waves by faxing JG at 703-998-2966, writing to PO Box 1214, Falls Church VA 22041, or calling 703-998-7600. Who knows, you could win a coveted RW mug.

Transmitter Control can be a Bear

You need to make sure you can stay on the air and stay legal. At the same time, you need to keep operating costs under control.

Choosing the right remote control system is the first step.

The ARC-16SA* from Burk Technology lets you control your transmitter from any phone. You can establish off-premises control points for unattended operation, or supervise non-technical operators by phone.

The annual savings can be thousands of dollars.

The ARC-16SA is part of a modular system. For full-time control, add a studio unit. Multi-site options make it easy to control several transmitter sites or even control studio equipment such as program automation.

Call now for your copy of our new catalog, then ask us to show you how we can improve your operation and your bottom line.

Call TOLL FREE
1-800 255-8090

BURK
TECHNOLOGY

7 Lomar Drive, Pepperell, MA, 01463 (508) 433-8877

Circle 76 On Reader Service Card

World Radio History

READERS FORUM

If you have comments for *Radio World*, call us at 800-336-3045 or send a letter to Readers' Forum (Radio World, Box 1214, Falls Church VA 22041 or MCI Mailbox #302-7776). All letters received become the property of Radio World, to be used at our discretion and as space permits.

A call to AM action

Dear RW,

Compliments to you! What a refreshing sight to see the letter written by Stephen M. Poole.

I agree that the "stereo wars" don't need to be re-hassled. But, so many of us who were in management positions when AM stereo was first introduced refused to listen to our engineering staff (after all, who listens for expert advice from the guy who changes light bulbs, sweeps the floor and always wants to buy expensive new equipment?). Instead, we "made a deal" or decided to "wait it out."

How frustrating! How like us! We fight for "simple solutions." Years ago we should have fought for multisystem receivers . . . *we didn't!* We should have slammed away at the idea of a few cents more investment to improve the technical aspects of receivers (even offered to set up a fund for research) . . . *we didn't!* We should have fought for "linear radios" that would have placed all stations on equal footing . . . *we didn't!*

Had we done these things, we would have been dealing with a different marketplace. Had we believed that we could save AM radio, we could have! Instead

of one successful station or band, we could have been a success with both AM and FM stations. It's almost too much for the average broadcaster to comprehend. It has become so easy to sell "combo" rates . . . or to simulcast the "winner" with the "loser"! To always have the excuse that "we can fix it!"

We have two AM stereo systems still competing for the broadcasters' market. I personally favor the Kahn system and think that it will win in the long run. You may feel as strongly about C-QUAM. Even now, we don't need a government "standard" set. If we had fought for the right things, the world marketplace (the listener) would have decided a "standard" for us and all those that are "still waiting" would have thought AM stereo was "old hat"! The world doesn't look that way. Instead, we have frustration and a "no movement" situation with stereo.

Now we're talking about DAB and questioning our part in the effort. Let's face it: DAB is on its way, like it or not. When it gets here, we'll sloppily adapt to the situation and probably listen to strange advice from the wrong people again. In the meantime, it's *not* too late for AM stereo. The AM band will be with us for quite some time. We should be proud of that and try, even at this late date, to rally our forces in the right direction.

AM radio is too grand a lady to just throw out the door.

Norman H. Brooks, VP/GM
Stonewall Broadcasting Co.
Elkton, Va.

FCC needs engineer's mindset

Dear RW,

When I first became aware of Dane Erickson's intention to ask the SBE for support of his motion to encourage the placement of an engineer on the FCC, I knew there was something fundamentally right about it.

It is not that I think the FCC makes decisions in a "technical vacuum," or that the FCC lacks "qualified individuals," or that the FCC is anything but "well-briefed on technical issues" (as RW, Nov. 21, 1990 quotes NAB Science and Technology chief Michael Rau's speculations as to the reasons for the SBE motion).

On balance, I believe the FCC's record shows far more sensitivity to technology than even the NAB. What I am concerned about is something I wish I had a better name for than "point of view" or "mindset."

We engineers are very aware of mindset. The "creative" and "sales" mindset types often joke about engineers' ever-so-practical and logical approach to their lives and jobs—as well as the physical manifestations, like comfortable shoes, calculators, notebooks, coveralls, cars with jumper cables or an occasional pocket protector.

I am acutely aware of mindset differences as expressed in broadcasting groups. The CEO for the company I am with now is an engineer by training and conviction. It is a wonderful and interesting place to work, where new technolog-

There are some important truths in homilies. "If you borrow something, return it"; "If you break something, offer to replace it." Of all these words to live by, however, perhaps the most important are, "If you make a promise, keep it."

More than three years ago, the FCC made a pledge to AM broadcasters across the nation—a promise to re-evaluate the technical specifications of AM, and thereby help the band out of its doldrums.

The time has come to make good on that promise.

Since the initiation of the sweeping docket MM 87-267, the Commission has gotten a steady stream of feedback from AM's supporters in the form of market attitudes, technical research, studies of the psychoacoustics of interference . . . the list is long. For its part, the current Commission—under the direction of Chairman Al Sikes—clearly re-affirmed its intention to take action on AM's problems with an equally broad "en banc" AM hearing in November 1989.

Promises Are Promises

With the extended deadline for comments on docket 87-267 here at last, there has been sufficient response from all concerned for the FCC to start making recommendations about the band. What's more, it's important for the Commission to initiate action quickly—to make a clear movement toward improvement. Given current economic conditions, AM's plight must not disappear into a morass of bureaucratic processing.

Nor should it be overshadowed by the allure of new technology. With the recent excitement in engineering circles regarding digital audio broadcasting, it's easy to get carried away. Perhaps everyone has been a little guilty of overlooking old friends when a new neighbor moves in.

The body of improvements addressed in 87-267 may be so large that it is impossible to handle all at once. If so, a flow of recommendations would be the most appropriate action, with points decided a few at a time until the docket can be closed.

Still, it's important not to sit for months on the information amassed during the past three years. After all, AM's condition has not gotten better in the intervening time.

And promises are promises . . .

—RW

ical opportunities are often grasped and decisions are long term. I have also worked for groups without any concept of the engineering mindset, where the CEO surrounded himself with people who would insulate him from the technology. Besides not being a good place to work, an engineer had to pity him the awful, repeated and costly mistakes.

I will share one other impression that I have carried with me for the last decade. At my very first NAB, I went to a poorly attended session where the congressmen responsible for media issues and FCC commissioners sat on a panel and took questions from the floor. I can still relive the embarrassment I felt for them as I learned that they could not understand most of the questions asked, or the issues raised. I still marvel at the stumbling, irrelevant and incoherent answers, and the politeness of the engineers in the audience who did not make an issue of the repeated displays of such obvious technical ignorance by our regulators.

The point is this: I believe there is an engineering mindset. While I personally feel it is the most correct of all mindsets (detail-oriented, long term, curious, creative), I know that a world of engineers would be far from a panacea; yet, it is an important background and point of view.

Further, I believe that there is a big difference between being "fully informed on a topic," and having the mindset (depth of background, or technical analytical skills, if you like) to be able to put the information into perspective. Any engineer who has had to present a complex and detailed problem to a non-technical person who wants to "be fully informed, and taken to the bottom line in two minutes" is aware that the resulting decision is more a function of presentation and luck than clearly considered options. Technical perspective

cannot be "injected" by even the most able support staff—it must be assimilated over time.

Dane's proposal specifies not a commissioner with a particular technical specialty, but merely one that can demonstrate some technical competence (in any discipline or state). That is part of the elegant beauty of the proposal.

Like many Americans, I have acquired a certain skepticism which surrounds the U.S. Congress, the president and the commissions that they create in their own image. Asking for some sensitivity to the technology can only be fair and positive, and become more important with time.

I am dejected when I read comments that suggest that technical representation at the Commission level will have no effect and thus the SBE initiative is fruitless. I rather see this as an opportunity. To the extent that we engineers are an important profession in this industry, this represents proper recognition of that fact and the value of our point of view.

Historically, the make-up of the Commission often included engineers—a practical result, considering that a portion of those motivated to perform well in the FCC would also likely have a technical background. Ultimately, however, the FCC appointments are made for other, less pragmatic reasons. Clearly the trend of this half of the century has been to economic and political interests rather than technical. As that trend continues, it is in the best interest of all (not just engineers protecting turf) to remember the technical roots and the basic purpose of the Commission.

So far, I find the motives of those opposed to the SBE motion to be needlessly pessimistic at best and transparent at worst.

Frederick M. Baumgartner
WTTV
Indianapolis, Ind.

Radio World
Vol 14, No 24 December 26, 1990

Editor, Alex Zavistovich
Editorial Consultant, Judith Gross
International Editor, Alan Carter
Associate Editor, Charles Taylor
News Editor, John Gatski
Reporters, Benn Kobb, Frank Beacham/L.A.
Editorial Assistant, Debra Green
Technical Editor, John Bisset
Technical Advisor, Tom McGinley

Production Director, Kim Lowe
Chris Freter, Lisa Roach,
Julianne Stone, Lisa Stafford
Ad Production Coordinator,
Regan Deatherine

Publisher, Stevan B. Dana
Associate Publishers, Arthur Constantine
Carmel King

Ad Coordination Manager, Simone Mullins
Circulation Manager, Tiana Hickman
Accounts Receivable, Valerie Mason

Advertising Sales Representatives:
Eastern U.S., Art Constantine
800-336-3045, Fax: 703-998-2966
Western U.S., Jack Ducart
800-336-3045, Fax: 703-998-2966

Radio World (ISSN: 0274-8541) is published semimonthly 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 is paid at Falls Church VA 22041 and additional mailing offices. POSTMASTER: Send 3579 forms and address changes to Radio World, P.O. Box 1214, Falls Church VA 22041. Copyright 1990 by Industrial Marketing Advisory Services, Inc. All rights reserved.

Free subscriptions are available upon request to professional broadcasting and audiovisual equipment users. For address changes, send current and new address to RW a month in advance at the above address. Unsolicited manuscripts are welcomed for review; send to the attention of the appropriate editor.

Next Issue
Radio World
January 9, 1991

**GET IT
RIGHT**
FROM HARRIS ALLIED

Fast, fully integrated field sales assistance.

We're enlarging our team of field sales experts.

Experienced, familiar people providing in-person technical advice and consultation on both RF and studio products.

A new telemarketing center for quicker response.

Fast phone access to every Harris Allied product.

Everything from basic supplies to capital equipment.

**WE'RE
EXPANDING
YOUR RESOURCES**

A complete broadcast technology resource.

Industry-leading RF products.

Over 5000 audio and studio products from more than 250 manufacturers.

Satellite systems, used equipment exchange, leasing and other financial alternatives.

Comprehensive support.

Keeping you on the air with everything from a part to a transmitter.

Systems assistance from the simple to a turnkey — nationwide and worldwide.

Broadcast Tech — the industry's only facility dedicated to training tomorrow's technical personnel.

Starting this January, Harris Allied leads the way with more people, more products, more support than any other source in broadcasting. Come — take the lead with us.

 **HARRIS
ALLIED**
BROADCAST EQUIPMENT

STUDIO EQUIPMENT • HARRIS RF PRODUCTS • SATELLITE GEAR • TRADE-INS • TURNKEY SYSTEMS

© 1990 HARRIS/ALLIED

"Call me, I'm interested." Circle 20.

"Send me literature." Circle 88.

Economy Affects Station Buys

Editor's note: In part two of RW's financial outlook series, West Coast correspondent Frank Beacham looks at station financing during current economic conditions.

by Frank Beacham

Part II of II

LOS ANGELES Tight bank credit, uncertainty over the economy and the prospect of war have caused the sale of radio stations to slow to a snail's pace as key players in broadcasting react to the economic excesses of the 1980s.

An informal survey of industry veterans involved in radio station trading produced universal agreement that the market is very flat, credit is tight and potential station buyers are in a "wait and see" mood.

There also was universal agreement that terrestrial radio broadcasting remains a good business and the imminent arrival of digital technology absolutely is not a factor in today's financial equation.

"The market through most of 1990 has been very poor. I would say somewhere between poor to dismal, depending on your point of view," said Ray Stanfield, chairman of Chapman Associates, a Van Nuys, Calif. station brokerage firm. "The lenders have deserted. Values have declined. Sellers have not been willing to recognize the extent of the decline and buyers are not willing to pay last year's prices for this year's values."

But, Stanfield said, the radio industry is basically healthy. "The problem that we have in the resale market is that so many stations that were bought in the latter part of the '80s were purchased for prices that were simply too

high," he said.

"Even healthy radio stations could not support the level of debt incurred in their purchase. The problem in the industry is not the profitability of stations, it's the level of debt that has been incurred in the purchase of those stations."

A glimmer of hope

From a banker's perspective, Sally Proctor, vice president of Security Pacific National Bank in Los Angeles and a 16-year veteran of broadcast lending, sees a bright future for radio even in a recession.

She tied the current situation of flat station sales to the real estate market and the shortage of available bank funds for financing broadcast properties.

"By definition, radio station acquisition financing qualifies as what's called an 'HLT'—a highly leveraged transaction," Proctor explained. "Because of the S&L problem, the Controller of the Currency has issued guidelines regarding HLT lending by banks. The banks are supposed to limit their HLT lending to a percentage of their portfolio."

Therefore it follows that banks, depending on their financial condition and their portfolio, are less aggressive at the moment about lending for acquisition of broadcast properties, she said.

"I also equate the current situation to the real estate market," Proctor continued. "I think there are buyers... I know there are buyers waiting on the sidelines. I have customers who are potential buyers. But I think many buyers are on the sidelines waiting to find out how low is low, as far as price is concerned. Once the curve of prices starts back up, I see a lot of interested parties jumping in to buy stations."

Dick Blackburn of Blackburn & Co., the Washington, D.C.-based brokerage firm, said Proctor's statement on waiting buyers is not entirely correct.

Waiting on financing

"Those bank customers are not waiting for prices to go lower, they are waiting for her to give them some money," Blackburn said. The bank guidelines, he emphasized, require that financial institutions hold larger cash reserves against leveraged transactions.

Those reserves count against the bank's bottom line and depress earnings, Blackburn explained. "When they depress their earnings, they depress their stock and right now everybody is trying to do just the opposite because they are severely depressed," he said.

After an adjustment period, Blackburn predicted, banks will come back into the station financing business. "The general experience for banks with radio stations has been very good," he said. "I do not think that most of the problems broadcasters are now having borrowing money is a result of broadcasting, but is the result of real estate and other ventures not working."

Steve Crane, president of Emmis Broadcasting, predicts prospective station buyers will find money soon from new sources, other than banks. "I think new sources of capital will be developed which will replace those that have dried up," Crane said. "You will find people who will jump into the breach and provide funding for potential buyers."

Emmis has stations for sale in Boston and Minneapolis, but recently sold stations in Houston and San Francisco, Crane said. "It takes patience and a little time, but people will be able to get the kind of prices they want," he said.

Stanfield predicted tight bank credit will lead to an increase in seller financ-

ing of radio properties. Blackburn, however, said most sellers are not in the position to self-finance their stations.

Tight credit

"A lot of people (station owners) owe so much money now that they can't take a note," Blackburn said. "They have to give the note to the bank. It's really the bank taking the note. It's not going to be a seller-financed deal but a new credit deal with the same lender."

Both Stanfield and Blackburn noted that some worried banks have developed "work-out groups" to help financially-burdened stations climb out from under their debt loads.

"These work-out groups are set up to get the money in for the bank and make the best business decision for the bank and they are pros at that," Blackburn said. "They are not pros at marketing

(continued on page 14)

... the market is very flat, credit is tight and potential station buyers are in a "wait and see" mood.

**Air Cooled
Dummy Loads
now in power
ratings of
5kW, 10kW,
15kW, 25kW,
35kW, 50kW,
and 75kW
with low VSWR
that is stable
under power
with a
frequency range
of 60hz to
240Mhz.**

**QUIET
COMPACT
PORTABLE**



**ALTRONIC
RESEARCH
INC.**

For (OMEGALINE) RF
Coaxial Load Resistors

WATER AND AIR COOLED
MODELS FROM 5 to 200KW

CALL TOLL FREE
1-800-482-LOAD

P.O. Box 249
Yellville, AR 72687
(501)449-4093

Your Problem Solvers
from **ATI**

- Mike
- Line
- Phono
- Mixing
- Matching
- Metering
- Monitoring
- Processing
- Distribution
- Rack Mounting

AUDIO TECHNOLOGIES, INC.
328 W. Maple Ave., Horsham, PA 19044 • (215) 443-0330 • FAX (215) 443-0394

Satellite CD Modifies Proposal

by Charles Taylor

WASHINGTON Satellite CD Radio, which has petitioned the FCC to create a hybrid digital service utilizing both terrestrial and satellite transmission, has amended its proposal to include "spread spectrum" technology.

The changes incorporate modifications drafted by Stanford Telecommunications Inc., which devised the engineering specifications for Satellite CD's proposal, filed with the Commission in May.

In addition to the technical changes Satellite CD has proposed, it filed with the FCC an amendment to the owner-

ship of its stock—now giving Stanford a piece of the pie.

The proposed technical amendment will employ frequency selective diversity to help combat multipath delay and fading. The previous filing was based upon a single channel per carrier (SCPC) assignment of each stereo channel to a fixed frequency.

Intersymbol interference degradations caused by multipath were controlled by an adaptive equalizer in the receiver, and fading was addressed through time diversity, according to the previous filing.

The new system maintains the SCPC

design, while incorporating the ability to address frequency-selective fading through frequency diversity.

Outdoes Eureka 147 system?

Peter Dolan, president of CD Satellite, said the improvement will have a major effect on the overall influence of the company's proposed system, and, he claimed, will outdo Europe's Eureka 147 system, currently the only working digital transmission carrier worldwide.

"It's our understanding that this modification makes our proposal the best already out there. It leapfrogs the Eureka system," Dolan said. "Ours is a

much more flexible system, which provides a better quality of radio reception, particularly in a mobile environment."

Another relevant factor, he said, is that the amendment will now give the U.S. the opportunity to export technology, instead of importing a system developed in another nation.

Stanford Telecom's technical improvements, according to Satellite CD's FCC filing, will provide a system that will "exhibit robust performance" in a wide variety of mobile channel environments, including rural, wooded, mountainous, suburban and dense urban environments.

"We believe that in order to maximize the consumer audience, it is important to design a system that will support CD-quality radio reception via satellite in this continuum of environments to the maximum extent possible," Satellite CD wrote.

Hopping frequencies

Based on technical data from the filing, the new transmission system is accomplished through a slow frequency hop implementation in which the assignment of a number of stereo channels to an equal number of carrier frequen-

The amendment will use frequency selective diversity...

cies is changed periodically. Thus, frequency diversity of each stereo channel is achieved by broadcasting a channel for two milliseconds at one frequency, followed by two milliseconds at another distant frequency, and so on.

In this manner, each of 12 independent stereo channels achieves the diversity associated with a 3.5 MHz bandwidth by hopping among 12 carriers that fully occupy the 3.5 MHz bandwidth.

Satellite CD said all critical elements of the mobile receiver for the system—including adaptive equalization of a fading dispersive channel, frequency hopping and fast carrier phase estimation—have been implemented in operation systems by Stanford Telecom over the last few years.

As a result of Stanford Telecom's technical involvement in Satellite CD's venture, Satellite CD has granted the company part ownership.

In its original May filing, 50 percent of the company was owned by Marcor, a D.C.-based communications consulting firm; and 50 percent was owned by New Era Corp., a Maryland technology development firm.

Now, the company lists 66 percent ownership by Era-Mar (made up of partners of Marcor and New Era), 12 percent by "various U.S. citizens" and 22 percent by Stanford Telecom.

Dolan hesitated to discuss the ramifications of the new stock split, but said "We are negotiating the exact position (Stanford Telecom) will be taking with the company. We will be going forward with their services, which have been nothing short of exceptional."

For more information, contact Peter Dolan at Satellite CD Radio at 202-408-0080.

TAKING IT TO THE STREETS

Programming Crossroads—Radio programming is now at a crossroads with stations using sound alike formats to attract target demographics. How your station gets its next advertising dollar may depend on how you handle remote broadcasts. Remotes will give you an edge on the competition, involve your listeners and give you station recognition.

The Premium Vehicle—You need a premium vehicle to broadcast the cleanest sound. Your next remote doesn't have to be an audio compromise. Deliver studio quality sound with the new **Moseley Remote Programming Link 4000**.

Quiet Ride—The **RPL 4010 Transmitter** delivers up to 20 watts in a package that's lightweight, portable and field programmable.

You can drive to your remote with confidence that the **RPL 4020 Receiver** will operate in high RF environments virtually immune from adjacent channel interference.

Cruise Controls-

You and your air talent will enjoy the easy set-up of the **RPL 4000** featuring a built-in 3-channel audio mixer for mic and line inputs, 2:1 internal noise reduction, two frequency operation, wide/narrow bandwidth and extensive metering and diagnostics. The **RPL 4000** is also fully compatible with existing RPU's.

Service and Support-

As with all Moseley products, the **RPL 4000** carries a 2 year warranty and 24 hour technical support.

The **RPL 4000** puts you in the driver's seat. So what are you waiting for. Get your economical **Moseley RPL 4000** and take it to the street!



Destined to be a classic, the **RPL 4000** is available NOW from your favorite Moseley dealer!

Moseley

The Trusted Name in Communications

Moseley
Associates
Incorporated

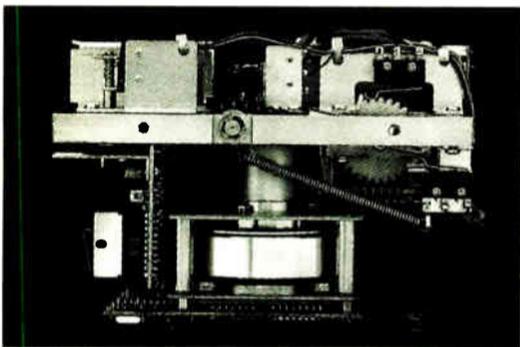
111 Castilian Drive
Santa Barbara, CA USA
93117-3093

a
GRC Int'l
Company

Phone 805 968 9621
Telex 658448
FAX: 805 685 9638

The cart machine with bells and whistles your audience will never hear.

Finally, a cart that delivers the creature comforts that other Otari audio machines have offered for years! And not only does Otari's CTM-10 make your job easier, it also delivers outstanding audio performance, so your output sounds more like a CD player than a cart.



Heavy duty, direct drive capstan provides accuracy and reliability.

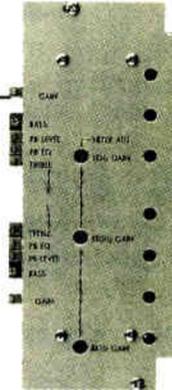
You get extensive metering, including dedicated metering for the cue-track. (Now you can verify the cue-tone *before* you go

on-air!) And for adjustments to program length, there's a *true* vari-speed control.

You'll also find a record azimuth adjustment system *with phase display* for when you want to make the best recording possible.

But the CTM-10 is not all just bells and whistles. It's the only cart you can buy with HX-Pro.* That means that you can get a really hot signal off the tape, and still keep those high frequencies where they need to be for that crisp, clear sound.

And some things we keep real cool, like we don't use solenoids for our pinchroller because they can generate excess heat. You'll also appreciate the CTM-10's fast start time—it lets you cue up tighter without worrying about wow.

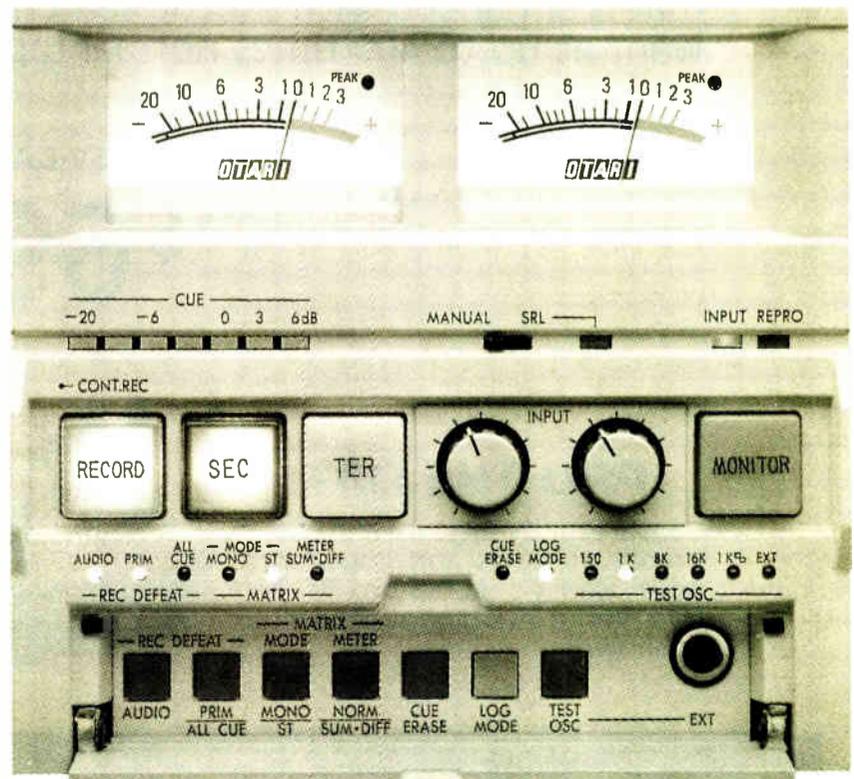
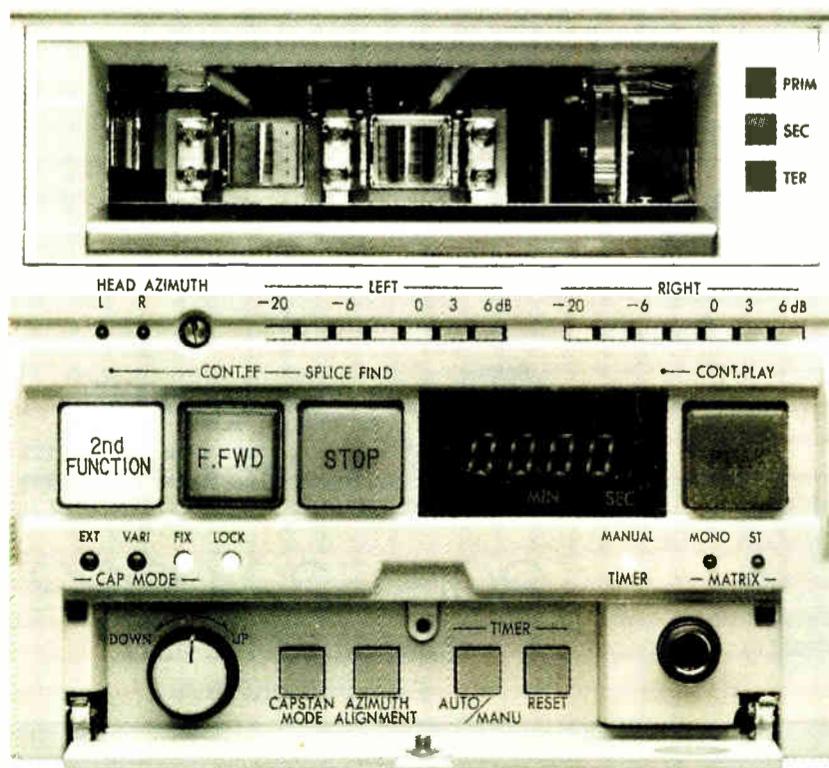


Equalization adjustments are easy to reach and clearly marked, making maintenance and service fast and easy.

And, of course, we give you choice. There are stereo *and* mono record/play decks, *and* a mono/stereo play-only deck.

Call us at (415) 341-5900 for more information about the CTM-10. The cart machine we built for perfectionists.

OTARI



*HX-Pro is a trademark of Dolby Laboratories Licensing Corporation

© 1989 Otari

**GET IT
RIGHT**
FROM HARRIS ALLIED

NOW ... EVERYBODY CAN AFFORDAT!



TECHNICS SV-DA10

If you've waited for the price of DAT to come down, your wait is over! The new SV-DA10 R-DAT by Technics brings digital down to earth. Its R-DAT format is enhanced with shuttle search which permits location of the cut you want at up to 400 times normal tape speed. RCA connectors in and out.

DIGITAL
SV-DA10 R-DAT
\$695⁰⁰

PRO THE DAT!

Convert the SV-DA10 ins and outs to broadcast levels and impedances with Henry's Matchbox™. Only \$179⁰⁰ more including all connectors as shown.



**HARRIS
ALLIED**
BROADCAST EQUIPMENT

800-622-0022

CANADA 800-268-6817

FAX 317-962-8961

STUDIO EQUIPMENT • HARRIS RF PRODUCTS • SATELLITE GEAR • TRADE-INS • TURNKEY SYSTEMS

© 1990 HARRIS/ALLIED

"Call me, I'm interested." Circle 10.

"Send me literature." Circle 132.

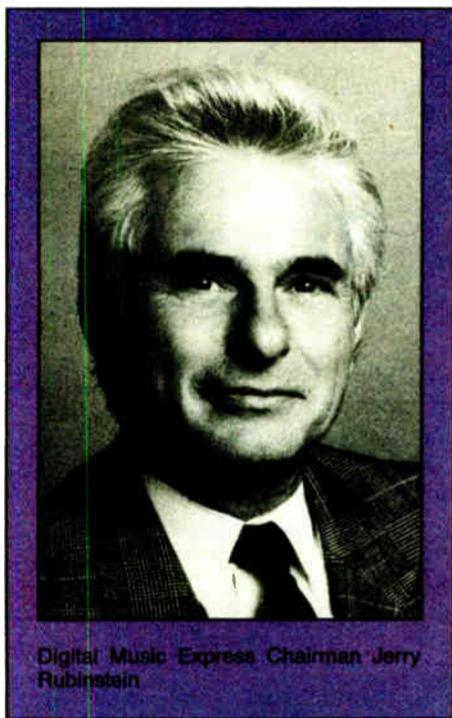
Digital Cable Radio: The Players

Editor's note: RW's West Coast correspondent Frank Beacham takes a look at management in part two of a three-part series on digital cable radio services.

by Frank Beacham

Part II of III

LOS ANGELES Of the three pioneer companies at the forefront of the digital ca-



Digital Music Express Chairman Jerry Rubinstein

ble radio movement, not one is represented by traditional terrestrial broadcasters.

Top management among these entrepreneurial companies came from the music, cable television and electronics industries. Only at the programming level do those with traditional radio broadcasting experience make the transition.

If digital radio is successful, it is likely that "outsiders," not broadcasters, will be responsible for what has been called the biggest change in audio programming distribution in 70 years.

Take Digital Planet of Carson, Calif. Its chief executive officer, Doug Talley, is founder of Digital Radio Laboratories and developer of a proprietary bandwidth-efficient digital transmission system. His service will use the technology to deliver CD-quality audio over cable systems.

Digital Planet President William H. Delany previously oversaw marketing and operations as senior vice president of cable's Home Shopping Network.

Experienced management

Digital Music Express, the service of New York-based International Cablecasting Technologies, is chaired by Jerry Rubinstein, former chairman of United Artists Records and ABC Records. The firm's president is Tom Oliver, a founding member of HBO's management team and the man personally responsible for launching the Cinemax cable service.

At Jerrold Communications' Digital Cable Network, David Del Beccaro, who has a solid background in the cable industry, is responsible for overall development, marketing and sales at the network. Jerrold President Hal M. Krisbergh has led efforts to develop new applications for broadband cable technology. In fact, Jerrold Communications has a history of

building systems and hardware for the cable industry from its inception.

Those instrumental in digital broadcasting's initial development believe the technology's newness and their experience give them an advantage over traditional broadcasters.

"These backgrounds relate to the skills that are necessary to get this business together," Digital Planet's Delany said. "All three of us are start-up companies dealing with programming, technology and manufacturing."

"If you look at the big communications companies that specialize in radio and television broadcasting, you'll find they seldom, if ever, invest in start-up companies," Delany said. "And this business is a hot potato. We are in a very controversial area. We border on the legal problems associated with DAT and digital generally. That's a scary thing for them."

Programmers in demand

The communications conglomerates, however, are keeping a watchful eye on the fledgling digital cable radio business, Delany said.

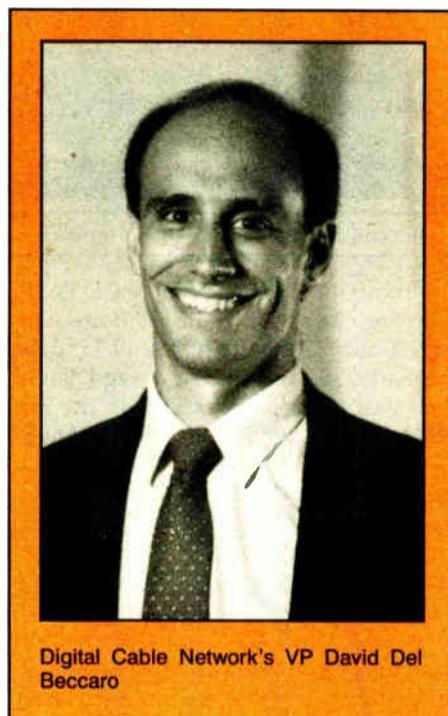
Although traditional broadcasters are not on the front lines of digital cable radio development, they have indirectly contributed to the new service. Former programmers have been hired and are now putting formats together for the digital cable radio companies.

Paul Goldstein, VP of programming at Digital Planet, was co-creator of the nation's most successful radio format in 20 years—The Wave.

Joe Capobianco, director of programming for Digital Cable Radio, has programmed three Top 10 market stations and acted as a consultant for many broadcasting conglomerates. And Kent Burkhardt, director of programming at Digital Music Express, has strong roots in broadcasting as founder of Burkhardt/Douglas and Associates, one of the

world's leaders in new format development.

Armed with experienced program-



Digital Cable Network's VP David Del Beccaro

mers, the three companies' management teams are betting their services will succeed in the potentially lucrative market for home delivery of CD-quality audio programming. Early consumer tests have produced optimistic results, but some industry observers think there's room for only one service to have long-term success.

Positive test marketing

Digital Cable Radio tested its service for two years in three cities and got highly favorable feedback from listeners. According to the company, nearly 90 percent of respondents said the service exceeded their expectations and 60 percent said the digital music service was their favorite audio component. Test sub-

scribers also exhibited the highest premium service retention rate in the history of cable, the company reported.

Research by the A.C. Nielsen Co. found that about 14 percent of the 52 million cable households (7.2 million potential listeners) in the U.S. are "very likely" to subscribe to digital cable radio at a price of \$7.50 a month. Other research has revealed similar results.

"There's no question they have a shot," Wendall H. Bailey, a vice president of the National Cable Television Association, told "Business Week" magazine. "The question is how big it will get."

NAB Vice President of Operations John Abel is convinced the current number of digital cable players will dwindle.

"Cable audio services have been tried before in analog and have not been successful," Abel said. "My guess is that not all three will be successful."

Well-known allies

Digital Radio Laboratories, parent company of Digital Planet, has entered into a two-year, \$85 million pact with Hitachi, Ltd. and Mitsui Comtek, the trading arm of Mitsui Group, for the manufacture and distribution of Digital Planet's proprietary digital tuners. Hitachi will manufacture the tuners and Mitsui Comtek will finance the \$85 million manufacturing budget and supervise export of the tuners to the United States.

Digital Music Express has teamed with Scientific-Atlanta, an inventor of satellite digital audio systems, to manufacture its tuner, which is compatible with the 16-bit, 44.1 kHz Sony/Philips CD standard.

Digital Cable Radio's tuners are backed by Jerrold, whose parent company is General Instruments.

■ ■ ■

Part III of this series, in the next issue of RW, will probe broadcast industry reaction to digital cable radio.

Just What the Doctor Ordered...

You've got a bright, contemporary sound that's the envy of your competitors — but your playlist includes a lot of material from a different era — a time when things sounded great but, well, "dull." On top of that, those old disks and carts are noisier than your new equipment, and they aren't getting any quieter!

Not a "generic" prescription

The Orban 290R continuously analyzes your audio and adds just the correct amount of sparkle and space for *each* tune or spot. Used in transfers, it gives your library the contemporary sound you need while its **Open Sound™** single-ended noise reduction cleans up hiss and surface noise.



orban

LISTEN TO THE DIFFERENCE.

a division of AKG Acoustics, Inc.

1525 Alvarado Street

San Leandro, California 94577 USA

Tel 415/351-3500 Fax 415/351-0500

Strong Medicine

The Orban 290R — three unique processing functions in two independent channels of audio problem solving power. Don't let tired audio undermine your 90's sound. Call your favorite equipment supplier today and try out a 290R. You'll be feeling fine in the morning!



Denon Introduces CD Recorder

by James Careless

EDMONTON, Alberta Denon has unveiled the almost-ready-for-production version of a "CD cart recorder" here at the annual convention of the Canadian Association of Broadcasters (CAB).

The unit is just what the name implies. "What this recorder does is take a write-once disc, and record onto the disc whatever you want to record," according to Almon Clegg, a consultant to Denon's parent company, Nippon Columbia.

"The disc is manufactured using some 'rare earth materials,'" Clegg said, "which are vacuum-deposited on the surface." During the recording process, a laser with a little bit higher power than you would normally have on a player is used to excite the surface.

"All it does is raise the temperature to the point that it raises a little bubble. Then, during the playback, the bubble has a different reflective characteristic (than the surrounding area), and gives you essentially the same effect as a compact disc," Clegg said.

Japan will get first crack at the \$30,000 CD cart recorders, followed by Canada, which should see them by April 1991. The U.S. is next, but Clegg does not know when.

This will also allow the record-once CD to be tested before it makes its U.S. debut, according to Clegg.



Denon's DN-7700R CD cart recorder allows in-house CD recording.

Although a fully recordable CD is the ultimate desire of radio stations, the record-once CD is the first of its kind on the market. Several CES shows ago, Tandy promised a recordable CD with the imposing name of "THOR"—Tandy High-Density Optical Recorder. The company has yet to deliver on those promises, however.

Broadcasters prefer optical for a number of reasons, Clegg said. Number one, there's no wear. "But most importantly," Clegg said, "the CD has quick access from track to track and cue-up capability, making getting ready to go on-air much faster and convenient."

The CD cart recorder was a big attraction at Denon's CAB booth, even though the company did not promote its appearance very heavily.

Users of the new disc system can record a single track at a time. However, because

of content data information, and until the entire disc is recorded, the partially used disc can only be played in a specially

redesigned Denon CD cart player, the DN 970. Once it's filled, it can be played on any player.

Denon's recordable CD unit is not the only such product on the market today, a fact Clegg readily admitted. But he said it does have advantages over other CD recorders.

"It is the only stand-alone recorder," Clegg said. "There's no computer NTC attachment. It is completely self-contained." (The rack-mounted unit takes up three spaces on a standard rack.)

Another plus for Denon's CD cart recorder is the generally high reputation the company's CD cart playback format enjoys. Many broadcasters rank it as the best piece of technology introduced in the last five years.

James Careless is a Canadian free-lance writer and broadcaster.

Filings Urge Reforms

by Charles Taylor

WASHINGTON The handful of parties filing reply comments on the FCC's Notice of Proposed Rulemaking to reform the comparative hearing licensing process demonstrated unanimous opinion that such action is necessary.

The groups, however, were rigorously divided on one issue, the Anax Policy, which allows license applicants to exclude passive owners—such as limited partners and non-voting shareholders—for diversity of ownership and ownership/management integration.

The Commission recommended abolishment of the policy, claiming it will "treat all ownership interests equally for purposes of determining the comparative standing of applicants."

The FCC's notice, released in May, intends to bring relief to often extended delays in processing competing broadcast licenses.

In comments filed in August, the vast majority of those filing agreed that both oral and discovery testimony are essential elements in this process and should not be eliminated, and that a six-month Commission review rule should be initiated.

Parties also held consensus that some manner of enforcing post-hearing pledges should be developed and that the Commission's review board should be maintained.

The Federal Communications Bar Association, like most commenters, agreed that the Commission should act quickly on the points.

Regarding the Anax policy, the Congressional Black Caucus (CBC), in its reply comments, asked that the FCC modify the policy, rather than abolish it. The organization referred to an idea proposed in comments by civil rights organizations requiring two-tier permittees who win construction permits to certify that the voting owners maintain both voting and operating control.

Further, these permittees must demonstrate their financing of construction of the station, including providing agreements between the voting owners and non-voting owners, the groups suggested. Also, the Field Operations Bureau staff should randomly investigate these licensees to ensure the voting owners maintain control.

The National Association of Black-Owned Broadcasters (NABOB) encouraged the FCC to delay changes of the policy, claiming that alternatives need to be investigated.

The organization suggested relaxing current financial certification requirements, which it said may give minority applicants a greater opportunity to obtain construction permits for new stations.

Mid-West Family Group encouraged abolition of the policy, claiming it damages the integrity of the hearing process by allowing a comparative determination to be made on the basis of unrealistic proposals, and slows the comparative process by encouraging additional litigation.

Elimination would not preclude minority and female participation in broadcasting and would not lessen the chances of victory by an applicant utilizing passive equity investors, but would speed the process by eliminating a substantial amount of litigation, Mid-West said.

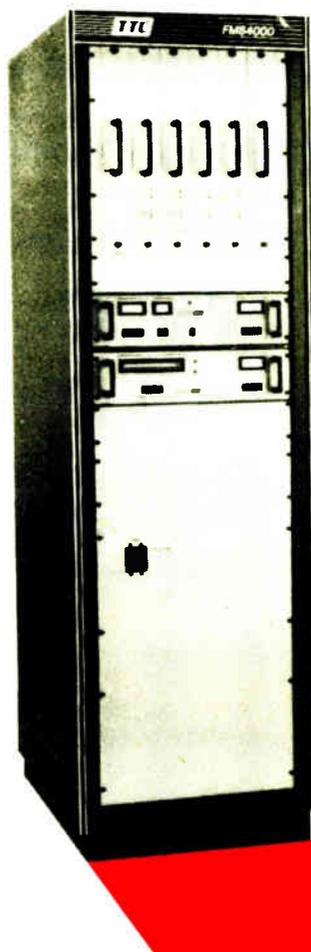
The Howard University Small Business Development Center asked that the policy be preserved, claiming it creates capital by attracting and utilizing the investments of others.

Michael Hirrel, in his reply comments, agreed the policy should stay. "Anax provides an essential opportunity for minorities to enter broadcasting," he said.

Amid the disagreement, FCBA called upon the Commission to move forward with a ruling on the procedural reforms, leaving resolution of policy matters for a further notice of proposed rulemaking.

For information on docket 90-264, contact the FCC at 202-632-5050.

TTC



MEET A COMPANY
THAT IS BIG
IN LEADING EDGE
TECHNOLOGY

TTC

With the All Solid State
FMS Line of FM Transmitters

TTC's Leading Edge
Technology Gives You:

- Easy Fast Installation
- Constant Power Output
- Low Maintenance
- Virtually No Down Time
- Low Power Costs
- One of the Best Speeded
Exciters in Radio

The TTC FMS Line—Products that give you years of trouble-free, crystal-clear signal, and is available in 1kW to 8kW models

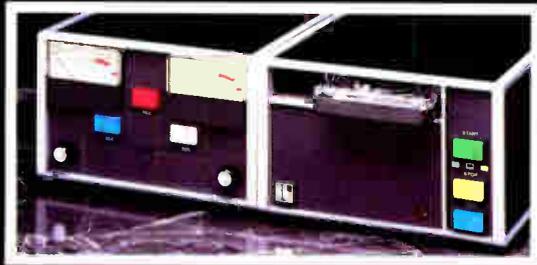
Call 1-813-684-7724 for product information
and dealer nearest you.

Circle 138 On Reader Service Card

it



*ESL-V Eraser/
Splice Locator*



99B Series Recorder/Reproducer



*DELTA I Reproducer, DELTA III Triple-Deck Reproducer,
DELTA IV Record Amplifier*



Series 1 Reproducer



Series 1 Recorder/Reproducer

**HARRIS
ALLIED**

ITC DELTA SERIES

The DELTA series consistently meets the tough requirements of professionals who demand outstanding audio performance in a reliable, mid-priced mono or stereo cartridge machine.

Standard features include:

- DELTA I single deck or space saving DELTA III triple deck reproducers
- 3 cue tones
- High-speed cue on DELTA I reproducer
- Microprocessor controlled logic
- Crystal referenced phase lock loop DC brushless servo motor
- DELTA IV recording amplifier converts a DELTA I reproducer or the bottom deck of a DELTA III reproducer into a recorder



DELTA I Reproducer

A stand-alone single deck reproducer, for size A and AA cartridges. High-speed cue and all NAB cue tones standard. A DELTA IV recording amplifier may be added to provide complete recording capabilities.

Plug-in P.C. boards with socketed I.C.'s and gold flash edge connectors

Automatic auxiliary start pulse for clock reset, standard on all DELTA reproducers

Audio mutes on detection of end-of-message cue tone

High slew rate and low noise 5500 series op amps (5532, 5534 AN) for clean audio

Modular mother board and daughter board construction with plug-in P.C. boards

1/2" thick anodized tool plate aluminum deck resists wear and is warp resistant

Specially designed heads for very flat frequency response and long life

Microprocessor design virtually eliminates troublesome relays and discrete components of other designs

Transformerless output configuration, with XLR connectors standard for performance

Efficient toroidal power transformer

Quiet, air-damped bottoming solenoid with constant pressure design virtually eliminates skew induced phase error

Patented micro-adjust headblock assembly with adjustable long life stainless steel tape guides

Crystal referenced brushless DC servo motor for low flutter and precise speed control

Repeat-play lockout prevents cart from being played twice in a row; this feature can be disabled

Flashing "cart played" indicator

High-speed cue, 22.5 IPS for convenience

Scuff and scratch resistant polycarbonate front panel

Long life switches with easily replaceable lamps

Compact size 1/3 rack width conserves space in today's tighter installations

Other features include:

- Digital cue tone detection eliminating cue tone component adjustments
- Multi-turn trimpots
- Full remote control available through rear panel connection
- XLR audio input connections
- International I.E.C. type AC connector with removable cord and integral RFI filtering
- Easily removable top covers for service access. Extender P.C. boards are available
- Quiet internal variable speed fan supplements convection cooling in the DELTA III reproducer
- Dual overhead cart hold down mechanism for precise cartridge positioning

ITC DELTA SERIES

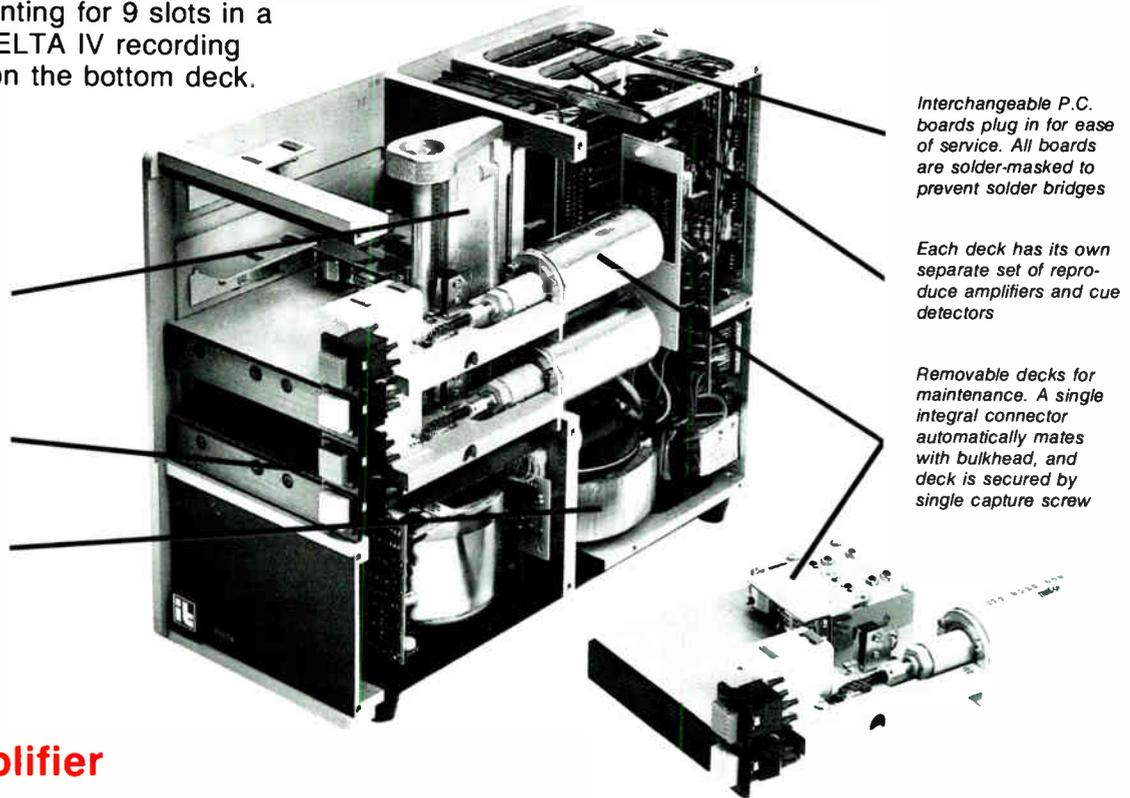
ITC DELTA III Reproducer

Three independent reproduce only decks in a space of two single decks! Narrow size allows three across rack mounting for 9 slots in a 19-inch rack! Add a DELTA IV recording amplifier, and record on the bottom deck.

Single piece casting supports motor along entire motor shaft length

Bottom deck converts to recorder by adding DELTA IV recording amplifier

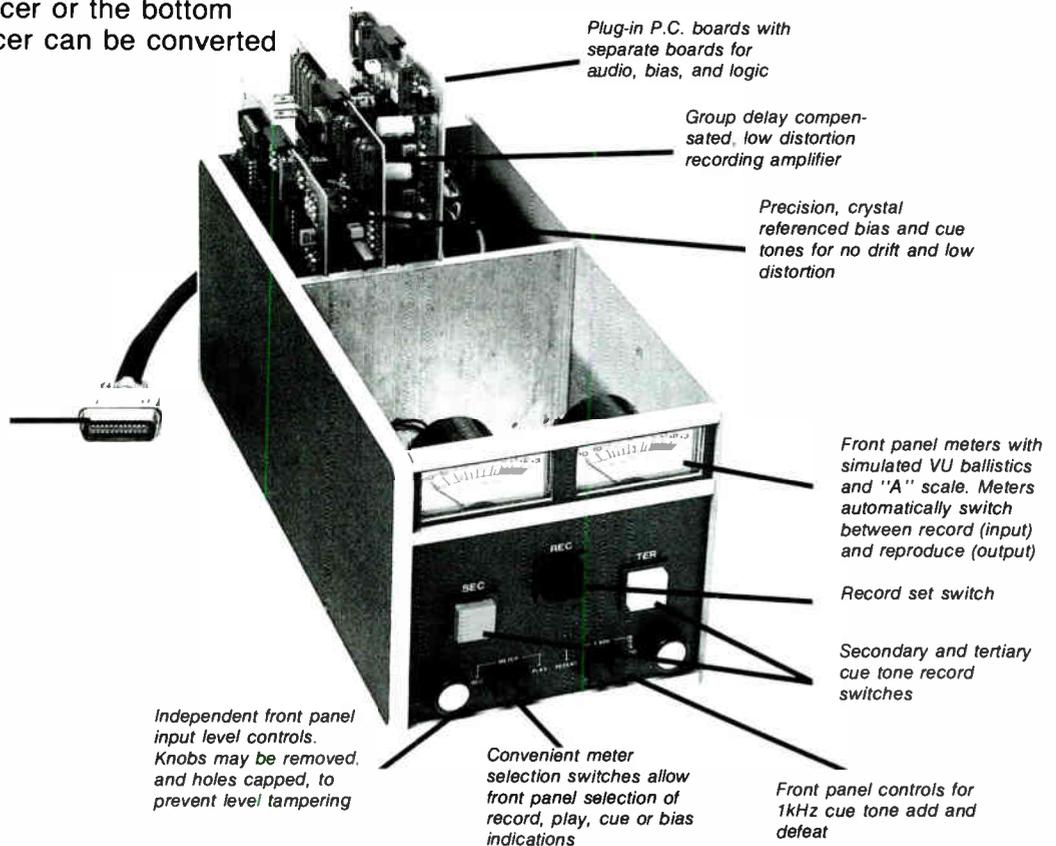
Toroidal power transformer for less heat and hum



ITC DELTA IV Recording Amplifier

With the addition of a DELTA IV recording amplifier, a DELTA I reproducer or the bottom deck of a DELTA III reproducer can be converted to a recorder.

Record amplifier interconnect cables mate with rear panel connectors on DELTA I or DELTA III reproducers to provide power, logic, and head lead interconnection



ITC SERIES 1

AUDIO TAPE CARTRIDGE



ITC designed the Series 1 cartridge machine with all the features you need at an inexpensive price.

The Series 1 cartridge machines are available in mono or stereo recorder or reproducer versions. Three NAB cue tones and high speed cue are standard. Recorders offer front panel 1 kHz add and defeat functions.

Standard features include hi speed cueing from the DC servo motor, three cue tones (1 kHz, 150 Hz; and 8 kHz), and superior ITC designed audio performance. Front panel LED indicators, metering and function select switches are also standard.

Cartridge stability is enhanced by a cast aluminum, nickel-plated deck assembly which is milled to precision tolerances and a new cart hold-down system which uses silent guide rails.

A new carriage system significantly reduces current requirements thereby greatly reducing heat generation.

AFFORDABLE INNOVATION FOR THE 1990's

ITC Series cartridge machines combine quality, features, performance and affordability. These machines are designed to help you meet the changing financial requirements of today's broadcast environment.

A crystal-referenced, brushless, DC servo capstan motor provides excellent wow and flutter performance, speed stability ($\pm .2\%$) and cool operation. ITC's commitment to a quality drive system eliminates problems commonly associated with other methods using out-dated, less reliable motors.

Several newly designed features enable the Series 1 to provide cool, reliable operation. Using an advanced solenoid/cam design, the pressure roller is consistently positioned against the capstan shaft and leveraged by the cam, thereby lowering the solenoid holding requirement. The benefits are cool operation, longer component life, less wow and flutter, and improved tape stability. Bottom line: the overall effect of these unique design features allows the Series 1 cartridge machine to have a one-piece, unventilated outer case which provides protection against the harsh studio environment of dust, ashes and coffee — all detriments to machine life.

The ITC Series 1 provides the right combination for today's broadcaster: high quality, reliability performance in a package that is easy for operators to use, and at a price level to keep you financially competitive.

TRIDGE MACHINE

RELIABILITY

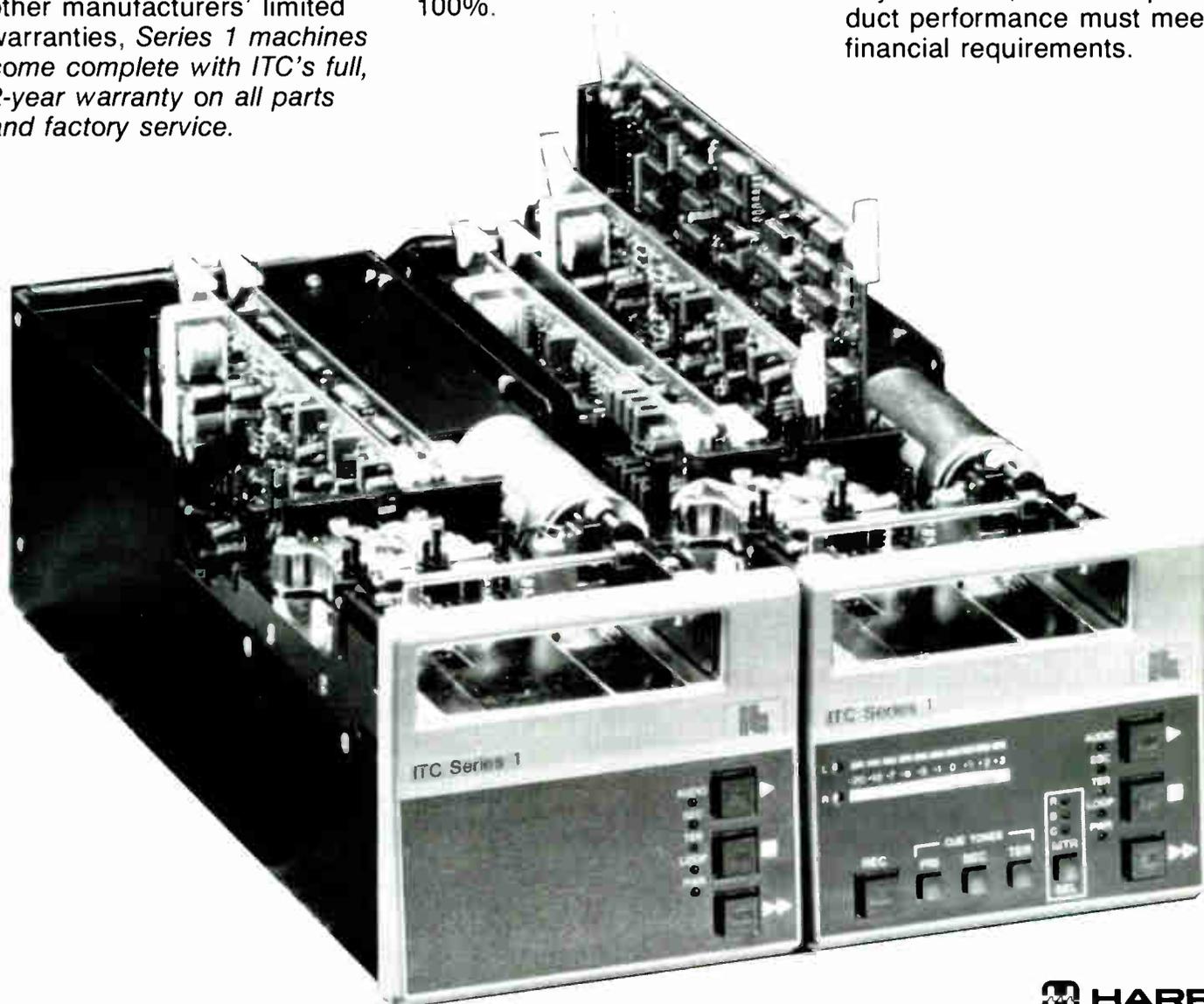
Series 1 Cartridge Machines incorporate reliable ITC features, such as a Teflon® - coated solenoid plunger, DC servo motor, stable deck assembly and long-life switch contacts. PC boards plug into the mother board and are fastened to the rear panel for additional support. All logic is discrete CMOS. Multiple levels of quality control, from the component level to finished assembly, assure ITC quality and reliability. Unlike other manufacturers' limited warranties, *Series 1 machines come complete with ITC's full, 2-year warranty on all parts and factory service.*

EASY TO MAINTAIN

The Series 1 chassis is designed to slide out of its case for easy top access to the heads and pressure roller. PC boards have card pulls and are clearly labeled for easy identification of parts. Only one extender card is needed for service, and each board is keyed to ensure replacement in the correct slot. A complete technical manual is included; and, of course, ITC's legendary support team is behind you 100%.

COMMITMENT TO SERVICE

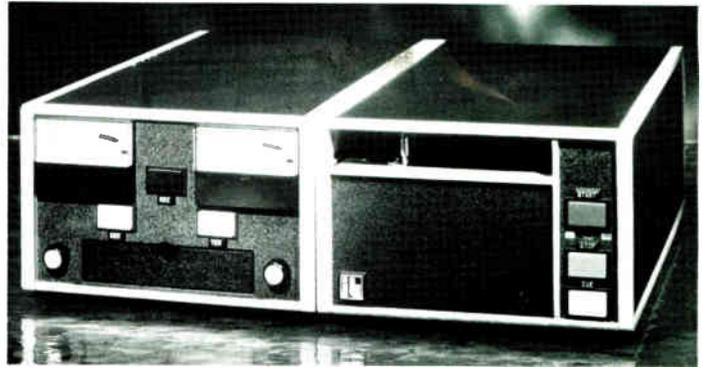
International Tapetronics Corporation has been serving the needs of the broadcasting industry for many years. ITC put together the industry's finest team of knowledgeable sales professionals. ITC supports Harris Allied International with an experienced customer service and technical service staff. Furthermore, ITC understands the competitive nature of today's market, and how product performance must meet financial requirements.



ITC 99B SERIES

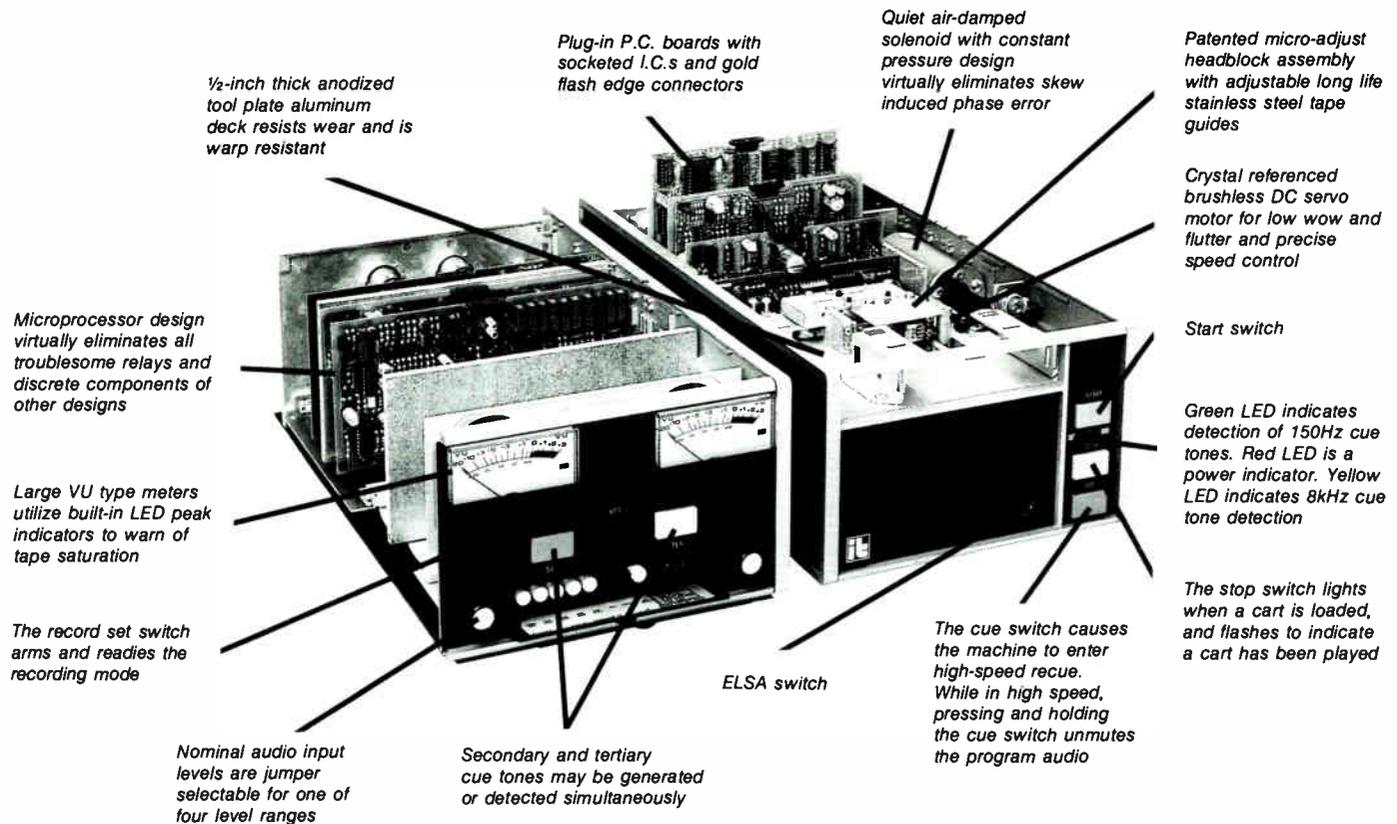
Loaded with features, the 99B Series delights the most discriminating user and listener. Central to the 99B Series is the patented ELSA feature found in the recorder. The ELSA cartridge preparation feature automatically erases the cartridge, locates the splice and azimuth and aligns the record head for maximum phase response performance. The 99B Series standard features include:

- Patented ELSA cartridge preparation
- 3 cue tones
- High-speed cue
- Microprocessor controlled logic
- Crystal referenced phase lock loop DC brushless servo motor
- Mono or stereo recorders and reproducers
- Specially designed heads for very flat frequency response and long life
- Audio mutes on detection of end-of-message cue tone
- Multi-turn trimpots
- Full remote control through rear panel connection
- XLR audio connections



99B SERIES Recording Amplifier/Reproducer

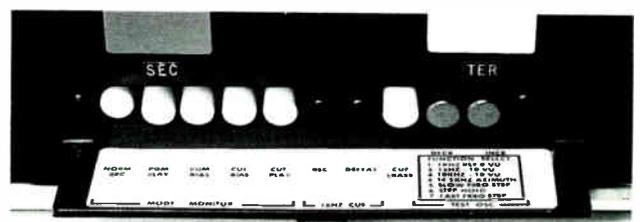
Available in recorder/reproducer and reproducer versions for size A and AA cartridges. Hi-speed cue and all NAB cue tones standard.



Easily Accessible Color-Coded Switches

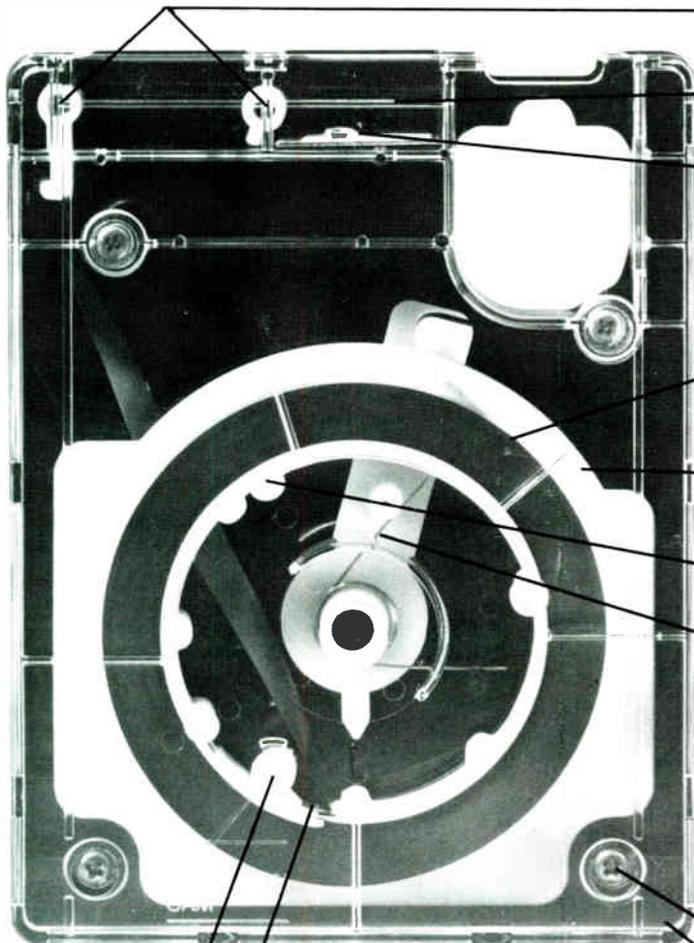
Convenient color-coded push buttons provide control of special machine functions. The 1kHz cue record and defeat switches (red switches) permit addition and deletion of stop tones. A cue erase facility (white switch) allows erasure of any information recorded on the cue track without affecting program material. A test tone generator (green switches) offers seven functions and an LED displays mode identification.

Recording Amplifier Special Functions Panel



ITC CART II & ESL V

ITC Cart II Features



Tape exits naturally from the hub center instead of twisting and curling up and over the pack to reduce edge stress and debris for extended tape life.

Adjustable cam to control tape loop for maximum life.

Naturally lubricated concave guides gently position tape to allow the cartridge machine to do the critical guidance.

NAB head penetration and centering marks to facilitate head block and cartridge guide adjustment.

Built-in magnetic head shield to protect heads from stray radiated hum and low frequency noise.

Window for visual splice identification.

High output, low noise, studio-grade tape is capable of impressive frequency response and higher recording levels for improved signal to noise performance.

Naturally lubricated hub material with 40% glass bead fill has broad temperature stability and resists warpage for consistent performance.

Non-rotating hub to reduce wow and flutter, eliminate annoying rotating hub rattle and minimize stop cue over-shoot.

Patented dynamic tension control system to insure proper tape-to-head contact, provide constant tape tension and control tape looping inside cartridge.

No pressure pads to cause troublesome tape steering and wear or induce modulation noise.

Cart cover of polycarbonate materials to insure long, lasting, break resistant wear.

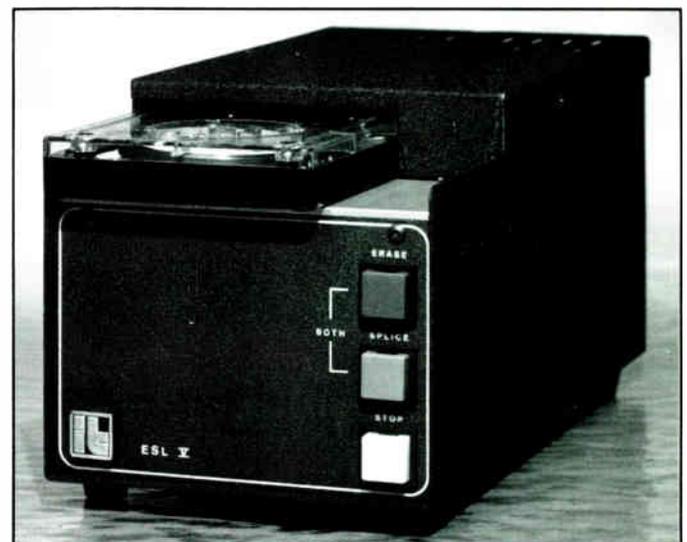
Four screw antiwarp construction for an extremely rigid body that resists flexing.

Interlocking tabs in cover and base to eliminate sliding when cartridges are stacked.

ITC ESL V Eraser/Splice Locator

The ESL V eraser/splice locator combines erasing and splice locating into one easy, automatic step ensuring consistent high quality audio reproduction from cartridge to cartridge. This eliminates the tedious task and inconsistency of manually bulk erasing cartridges and visually locating splices.

Microprocessor control assures a clean, deep erasure every time eliminating unwanted program material and noise. High-speed splice locate (30 IPS) frees the operator from visually locating the tape splice. The operator can then perform other tasks, such as cueing tapes, pre-reading copy, locating sound effects or music while the ESL V eraser/splice locator properly prepares the cartridge for recording.





International Tapetronics Corporation, (ITC), the world's leader in the design and manufacture of audio tape cartridge machines and accessories, was founded in 1969 in Bloomington, Illinois. Throughout the 1970's, ITC led the industry in bringing to the broadcast market innovative equipment. ITC's Premium Line Series of cartridge machines became the industry standard. ITC was the first manufacturer to market a micro-processor-based recorder/reproducer, which also incorporated a truly revolutionary system for erasing and preparing cartridges.

In 1982, the 3M Company purchased ITC. During the '80s, ITC introduced the Delta and Omega Series of cartridge machines, and designed an audio routing switcher — The Audio Switcher. This switcher utilizes cutting edge component and software technology to bring a new dimension in audio signal routing.

In 1990, Carle & Associates purchased ITC from 3M, embarking on an aggressive program of new product development and technological diversification. In early 1990, ITC introduced the economy priced Series 1 audio tape cartridge machine with many operational features and capabilities normally associated with much more expensive units.

For over 20 years, ITC has been bringing advances in audio technology to the broadcast market in user-friendly packages, at reasonable costs, and with ITC's trademarks of quality, reliability and service.

ITC products are marketed by Harris Allied Broadcast Equipment.

Allied, the leading distributor of broadcast equipment was formed in 1974 as a used radio equipment business. The business has evolved into a distributorship of new broadcast equipment for over 250 vendors.

Harris Allied's employee organization is 500 strong and consists of U.S. offices, a Canadian office and representatives serving 80 countries.

Now we're in the process of expanding our field sales team from 12 people to 15. Our **Telemarketing** Center officially opens the first of the year.

Starting January 2, 1991, you'll be able to dial the single toll-free number listed below to access:

Information on any Harris Allied radio product or service

Place an order

Contact or arrange for a visit from any member of our radio **field** sales team.

Every **field salesperson** and every member of our **telemarketing staff** will represent every product we provide. These products include all Harris AM and FM transmission products as well as more than 5000 radio studio products we distribute from over 250 leading manufacturers including ITC.

The success of this decade rests with the leaders of this industry. Take the lead with **Harris Allied Broadcast Equipment** and with ITC.

You can rely on the team that has proven its ability on projects of all sizes, for broadcasters worldwide.



P.O. BOX 1487 3712 NATIONAL RD. WEST
RICHMOND, INDIANA 47375 USA

800-622-0022

CANADA 800-268-6817

FAX 317-962-8961

MST Files Against Strother

(continued from page 1)
respond shortly, according to company president Ron Strother. "We don't expect that filing to kill our test authority," Strother said. "We were disappointed that they filed but we weren't surprised. This will delay us to the point that we'll have to at least respond to what was raised in their filing."

MST's objections center on policy and some technical proposals of Strother's test plan.

Squeezing in more channels

Strother's plan entails testing DAB on UHF to reveal whether the Eureka system can be used on that band to accommodate stations in 2 MHz chunks of spectrum. Eureka 147 will also be tested in other frequencies as well.

The digital broadcasting system has been tested in 4 MHz segments in Canada. Although initial Canadian tests required about 7 MHz for 16 stations, testers were able to squeeze that number of stations into 4 MHz.

By putting up to six stations in 2 MHz, the DAB systems could accommodate all U.S. terrestrial radio stations (AM included) and maintain their coverage areas or improve them, according to Strother.

Strother is convinced that four to six stations can be squeezed into 2 MHz segments without adversely affecting the "CD quality audio," but the UHF and other frequencies' testing is required to determine which bands will be suitable.

According to MST General Counsel Julian Shephard, however, there is no need to test DAB on UHF because the spectrum is not likely to be approved for that use.

"It's a bad idea (to use the UHF spectrum) for people who want DAB and HDTV," Shephard said.

Shephard said MST and other parties, including the FCC, are heavily involved in the Advanced Television Test Center's (ATTC) HDTV testing program, which will select an HDTV transmission standard that likely will use UHF spectrum.

HDTV on UHF

"Both the industry and the Commission have committed enormous resources to the implementation of a terrestrial ATV system in the UHF band," MST's written objections noted.

Test approval also would be "poor policy" by the FCC since it has already frozen UHF television allocations, pending selection of an HDTV transmission system, Shephard noted.

Regarding Strother's intended tests to determine digital transmission propagation characteristics on UHF, Shephard said it is unnecessary because research already has been done.

Research for DAB would much better served on frequencies in the 1 GHz range, he added.

In its filing, MST also opposed international use of UHF spectrum in Region 2 (North America, Mexico, South America) because it still would hinder HDTV in the U.S.

MST's objections included some technical concerns stemming from Strother's proposed transmission tests.

If approved, the transmissions would be conducted from a site in Boston and a site outside of Washington, D.C. in Fairfax County, Va., according to Strother.

Sites in question

MST said, however, that the sites Strother listed in its proposal will not be available for the testing.

According to the MST filing, "The Boston site is simply the reference coordinates for Boston shown in the U.S. National Atlas, a location on the plaza of the Boston Government Center adjacent to the City Hall and

the JFK Federal Building.

"Clearly, this is not an available site for any transmitter, much less for the 500-foot temporary tower envisioned," the MST filing said.

The proposed Washington, D.C. transmission site—a tower owned by local TV station WNVN—is not likely to receive permission because it could potentially interfere with other area broadcast facilities, including emergency communications, MST noted.

The tower already is under considerable opposition because of potential interference problems, the filing continued. It is also the site of a proposed 2.75 million watt channel 14 home shopping station intended to serve the Washington metropolitan area.

Strother said MST is mistaken in its assessment of the proposed test sites. "We filed for a blanket request to cover a given area," he said. "We're not saying we're going to put DAB there (those specific sites), just test it. One of the frequencies we chose has al-

ready been selected by the FCC for experimentation."

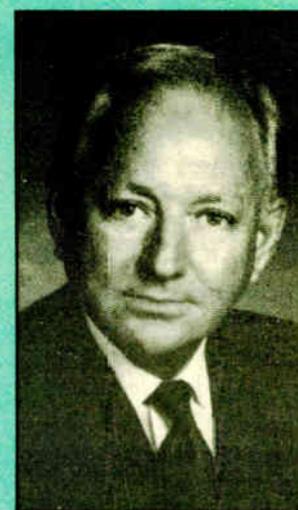
MST off base

Consulting engineering firm du Treil, Lundin and Rackley has worked with Strother in filing its test proposal. Engineer Joe Stielper said MST's comments appear off base.

He said testing channel 14 from the Washington area site was just one frequency being considered and probably will not be followed through because of the shopping channel application.

Steve Crowley, an engineer who also worked on the Strother proposal for du Treil, Lundin and Rackley, said there is no predicted interference based on FCC guidelines, but the filing acknowledged interference potential.

But, he noted, experimental authority is the most restrictive type of authorization granted. If interference is shown, the authorization provides for remedies, such as requiring power reduction, Crowley ex-



"We don't think the FCC is going to have any problem with our proposal."

SCI President
Ron Strother

plained.

Strother said he is confident the objections will be addressed and the Commission will approve the test. "We don't think the FCC is going to have any trouble with our proposal," he said. "They are located very near one of our test areas. I'm sure if there were a problem they could easily shut it down."

Comments Support AM Docket

(continued from page 1)

The NAB also opposed the FCC proposal to require stations to reduce interference by 10 percent when seeking a major modification.

Opposing preference

Clear Channel Broadcasting Service also agreed with many of the Commission proposals, but opposed giving expanded band preference to stations causing greatest interference on the present band.

"While a laudable goal, the Commission's proposal would, unfortunately, probably not have the desired effect," according to CCBS's comments. "Typically the station that imposes the greatest nighttime limit on co-channel stations is either one of the older regional stations or a clear channel station."

CCBS suggested daytime-only stations are more deserving of an expanded band preference.

Woodward Communications, owner of Class IV WHBY in Appleton, Wisc., and other smaller daytime stations, apparently agreed with CCBS.

"A flat prohibition against those (Class IV) stations, which in many cases are in the greatest need of relief, is not only unreasonably discriminatory against these stations, but also does not appear to serve any legitimate policy goal of the Commission," Woodward Communications President John Johnson, Jr. said in his comments.

Increase expanded band power

Broadcast consulting firm du Treil, Lundin and Rackley, in filing last minute supplemental comments, asked the Commission not to limit expanded band power levels to 10 kW daytime power and 1 kW nighttime as proposed.

Instead, the firm recommended that the Commission increase both daytime and nighttime power ceilings to 50 kW.

CBS filed comments in favor of the Commission's proposed rulemaking with a few exceptions, most notably the provision that would reduce the nighttime contour protection for Class II-A stations.

CBS also opposed restoration of the non-duplication rule. Although supportive of 87-267's goals, National Public Radio (NPR) chided the Commission for what it called a "missed opportunity" for public radio expansion in the expanded AM band and increased minority participation.

The National Association for the Advancement of Colored

People (NAACP) also filed comments calling for Commission encouragement of minority-owned stations on the expanded band.

AM stereo considerations

For the most part, Group W commended the Commission's efforts, but recommended an exception to the proposed nighttime rule for existing stations not meeting the new protection criteria that would be forced to move for reasons beyond their control.

General Motors recommended that AM stereo not be made mandatory, but preference should be given to stereo stations applying for the expanded band. In discussion of wideband receivers, GM warned, "Widening receivers before congestion is reduced will result in listeners either tuning away or selecting narrow bandwidth most of the time."

GM's suggested regulatory remedies to improve AM included limiting modulation to 100 percent rather than 125 percent, tighter adjacent and second adjacent protection ratios, and limiting antenna configurations for the expanded band to omnidirectional only or mildly directional.

In its comments, Motorola, the developer of C-QUAM, the nation's de facto AM stereo standard, said the Commission should adopt an AM stereo standard and mandate it for the expanded band only, explore directional arrays as a method to increase coverage and reduce interference.

Many comments expressed concern about the proposed mandatory 10 percent nighttime interference reduction for major change approval.

Broadcast consulting firm John Furr and Associates called it the "the most damaging proposal in the notice."

In a study made of Dallas-based WOAI, Furr said the 10 percent interference reduction would force the Class I-A station to broadcast at reduced nighttime power.

Sellmeyer Engineering said the Commission is using "faulty logic in its attempt to help AM."

"The presumed problem of adjacent channel interference is a very small part of the problem the AM service faces," the firm said. "Man-made interference, natural atmospheric interference and attenuation of the AM signal by buildings are all much more serious problems."

A.J. Williams, president of KDWN in Las Vegas, said the FCC proposals "penalize the present standard broadcast licensee, essentially locking him (or her) into their present facilities, or (they) remove an incentive to improve the facility."

FCC Fine-Tunes Move-In Rules

Fate of Gammon, Others, Uncertain in the Wake Of FCC Actions on Community of License

by Charles Taylor

WASHINGTON The FCC initiated minor changes in its community of license rules adopted in April, after reviewing three petitions for reconsideration.

The petitions, filed by the NAB, Sinclair TeleCable and Harron Communications Corp., were addressed at a Commission meeting in November.

Rules adopted in April provided a procedure where, in certain cases, FM and television licensees could apply to move their established community of license.

Gammon's moves pending

Some had predicted that the Commission's actions would affect the well-publicized applications of Tom Gammon, whose Emerald Broadcasting has proposed to move three FM stations into larger communities, much to the opposition of the NAB and some stations in those larger cities.

While the new rules will enforce a minimum one-year ownership requirement of licenses before changes would be considered, little else appears to have been affected.

FCC Mass Media Chief Roy Stewart said he would not discuss Gammon's applica-

tions while action was pending, and calls to Gammon's attorney Kevin Boyle, with the firm of Latham and Watkins, were not returned.

NAB predicts migration

NAB, in its filing, expressed concern that the new procedure would result in a massive migration of stations from rural to urban areas, where profits would be more bountiful.

The Commission disagreed with the assumption, stating that even in cases where a licensee can claim first local service preference in a larger metropolitan area, policies exist that, in many cases, prohibit such a move.

The FCC also declined to accept the NAB's suggestion that all licensees should be required to provide service to their communities of license for a period of time before requesting a change in community.

The Commission, did say, however, that it would not accept a petition for a change in community of license during the first year of station operation in cases where a

license granted in a comparative hearing would not have been granted if the contest had been for a station at the new community.

Sinclair suggested that the FCC should eliminate prohibition against a community's sole local service being relocated where conditions permit. The company argued that the prohibition was adopted without proper notice, and could lead to "results inconsistent with the Commission's allotment priorities because it forecloses proposals that would serve the same or a higher allotment priority."

The Commission pointed out that already, in limited circumstances, it may waive the prohibition on the removal of an existing service representing a community's sole transmission service.

However, "removal of an existing service is warranted only if there is a showing of sufficient public interest factors to offset the public's expectation of continued service," the FCC said.

Fifteen mile rule

Harron expressed concern that licensees in communities assigned in accordance with the Commission's former "15 mile" rule would be unable to relocate to the community where their channel was originally allotted. The "15 mile" rule permitted a TV license applicant to specify as the community of license a community within 15 miles of the community listed in the Table of Allotments without petitioning to amend the Table.

The FCC rejected Harron's proposal to reclassify as a minor change an application for modification of license involving such a move. Instead, the Commission directed the Mass Media Bureau to amend the TV Table of Allotments so that it accurately reflects the community where channels assigned under the "15 mile" rule are used.

In the meeting, the Commission also

determined that where two licensees in a community each file a petition to change location and each cites the other as a remaining station, the petitions would be treated in the same manner as any set of conflicting allotment petitions.

The FCC also decided that where AM and FM licensees in the same community request a change in community of license, and the public interest may best be served by the retention of one of the stations, the request of the AM licensee generally would be preferred over that of the FM licensee.

Finally, because AM and FM stations have traditionally been considered joint components of a single aural medium, the Commission determined it will examine the availability of FM and all AM stations in a community and will consider both commercial and non-commercial stations.

For information, contact the FCC's Michael Ruger at 202-632-7792.

... the new rules will enforce a minimum one-year ownership required of licenses before changes would be considered...

Economic Condition

(continued from page 7)

new loans. They are literally trying to work the banks and the client, primarily the bank, out of the situation they find themselves in. They put pressure where pressure is warranted and back off when they should."

Blackburn said his experience with such bank "work-out" personnel has been favorable and he felt that they had helped some stations with their problems. "They are well-trained business people and have been helpful," he said.

The approaching digital broadcast technology is not a factor in the current station market, based on broadcast station broker opinion.

"I don't think the average broadcaster knows what digital is all about," Stanfield said. "It's a new thought for people in the industry. I don't think the concept has been with us long enough for it to have had any impact on station values.

"But having said that, I am sure there are some investors who are saying digital is going to change the face of radio and that will lead to a change of the value of radio stations," he added.

Buy Direct.

Model TM-2
6 Digit Timer ~~List \$175.~~ Direct \$145.



~~List \$195.~~ Direct \$165. Model TM-2R
6 Digit Timer w/Remote

Now you can buy the industry's most popular *Timers* direct from the manufacturer at fantastic savings.

Just pick up the phone and call *toll-free*. It has never been so easy to save money on quality broadcast equipment.

Your Factory Direct Source.

RADIO SYSTEMS INC.

110 High Hill Road □ P.O. Box 458 □ Bridgeport, NJ 08014-0458
609/467-8000 □ 800/523-2133 □ FAX 609/467-3044

SUBSCRIPTION/READER SERVICE FORM

Radio World

December 26, 1990 Issue Use until March 26, 1991

FREE Subscription/Renewal Card

I would like to receive or continue receiving **Radio World** FREE each month. YES NO

Signature _____ Date _____

Please print and include all information:

Name _____ Title _____

Company/Station _____

Address _____

City _____ State _____ ZIP _____

Business Telephone () _____

Please circle only one entry for each category:

- I. Type of Firm**
- D. Combination AM/FM station
 - A. Commercial AM station
 - B. Commercial FM station
 - C. Educational FM station
 - E. Network/group owner
 - F. Recording studio
 - G. TV station/teleprod facility
 - H. Consultant/ind engineer
 - I. Mfg. distributor or dealer
 - J. Other _____

- II. Job Function**
- A. Ownership
 - B. General management
 - C. Engineering
 - D. Programming/production
 - E. News operations
 - F. Other (specify) _____

- III. Purchasing Authority**
- 1. Recommend
 - 2. Specify
 - 3. Approve

Reader Service

Please first fill out contact information at left. Then check each advertisement for corresponding number and circle below. NOTE: Circle no more than 15 numbers, otherwise card will not be processed.

- 001 023 045 067 089 111 133
- 002 024 046 068 090 112 134
- 003 025 047 069 091 113 135
- 004 026 048 070 092 114 136
- 005 027 049 071 093 115 137
- 006 028 050 072 094 116 138
- 007 029 051 073 095 117 139
- 008 030 052 074 096 118 140
- 009 031 053 075 097 119 141
- 010 032 054 076 098 120 142
- 011 033 055 077 099 121 143
- 012 034 056 078 100 122 144
- 013 035 057 079 101 123 145
- 014 036 058 080 102 124 146
- 015 037 059 081 103 125 147
- 016 038 060 082 104 126 148
- 017 039 061 083 105 127 149
- 018 040 062 084 106 128 150
- 019 041 063 085 107 129 151
- 020 042 064 086 108 130 152
- 021 043 065 087 109 131 153
- 022 044 066 088 110 132 154

How Long Does It Take the FCC to Act?

by Harry Cole

WASHINGTON The topic for today is time. The text could be from the Rolling Stones ("Time Is On My Side"), or it could be from the Outsiders ("Time Won't Let Me"). The point is that all too often broadcasters don't have a realistic understanding of exactly how much time it takes the FCC to do things.

The result—almost invariably frustration and, in too many cases, severe financial hardship bordering on disaster—could often be avoided if the broadcaster simply bothered to understand the Commission's own sense of time and the factors influencing that sense.

COLE'S LAW

The FCC is, of course, responsible for regulating the entire broadcast industry, as well as all other radio users. But Congress (and the general economy) has placed severe constraints on the FCC in recent years. As a result, staff levels are down, even though the numbers of all types of licensees has continued to increase.

This alone contributes to delays in getting things done, since there are fewer people available to do the work. The delays are then magnified by the Commission's bureaucratic nature, which requires that work produced by lower level personnel be reviewed by higher level personnel. Thus, any single project normally requires consideration by at least two—and more often four or five—levels of review before it will see the light of day.

The human factor

Also, human nature comes into play. As you may have correctly surmised, your average FCC staffer has more things to do than time in which to do them. And the Commission generally encourages its staff to operate under a "management by objective" regimen, which places a high priority on the number of actions taken by each office in the bureaucracy.

A staff person may be faced with one particularly complex and/or confusing matter and 10 relatively straightforward and routine matters. It therefore is not surprising that he would tend to defer the more time-consuming task in hopes of cranking out a lot of easier-to-deal-with actions. This is also true if a matter is not complex or confusing, but presents an especially controversial question about which there are substantial arguments (and pressures) on either side.

Finally, a variety of other reasonably simple considerations also may have an impact on the FCC's timing. For example, because all buyers or sellers of broadcast properties are subject to tax laws, the number of license assignment applications typically swell during the last quarter of each year, as buyers and sellers try to get their deals approved and closed prior to Jan. 1 for tax purposes.

For another example, if you ask the FCC to do something unusual, and some other party has already asked the Commission

to do the same kind of thing, it is almost certain that your request won't get acted on until the earlier-filed request is resolved.

Some priorities

There are no universally valid rules of thumb regarding how long—weeks, months, years, millennia, geological ages, etc.—things take at the FCC. Generally, you can expect the quickest turn-around on renewal applications, assignment/transfer applications and most simple special temporary authorization ("STA") requests.

The Commission's staff seems to recognize the overriding importance of the renewal process and assigns those applications high priority. Along the same lines, assignment/transfer applications have become so integral a part of the industry, and so central to the Commission's marketplace theory of regulation, that they, too, are usually disposed of promptly.

What does promptly mean? For renewals, absent some complication (such as a petition to deny, an EEO inquiry, a competing application, etc.), you can expect to have your license renewed within four months of the filing.

An assignment/transfer application without complications will usually be granted within approximately 60 days of filing. Action on STA requests can take as little as a few days or weeks, depending on the nature of the request.

That's the good news. The bad news is that most everything else seems to take at least six to nine months. The slightest wrinkle—whether it be a wholly meritless petition to deny, an innovative technical proposal, a request for special consideration, etc.—can increase that time by a multiple of two or more. And that's just to get through the first round at the FCC.

Long and winding road

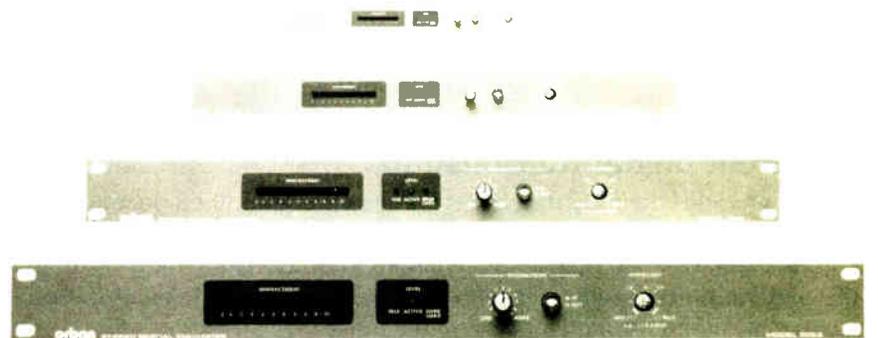
If reconsideration or review of the initial result is sought, the entire process can take at least a couple of years. This is especially troublesome if you're involved in a project—such as getting your FM station an upgraded classification—that requires multiple steps (i.e., a rulemaking proceeding followed by an application). Each of the independent steps is subject to its own set of potential delays, which means that some such projects might take as long as five to ten years before all is said and done.

This is not to say that all projects will take that long. But it is important to recognize, realistically (i.e., from best- and worst-case scenarios), what the potential FCC timeline is before you undertake a project. It is equally important to develop your own private timeline so that you can judge the practical feasibility of your project.

It is conceivable that what you wish to achieve cannot be done in the time frame you have. But it is best to recognize that before you have started down the long and often expensive road of trying to get the FCC to do something.

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

Enhance Your Station's Image



With the 222A From Orban

Okay . . . you say you're already processing as loud as you're legally allowed, but you want to stand out on the dial even more. How about enhancing your station's spatial image?

The minute you place the Orban 222A Stereo Spatial Enhancer in your on-air chain, you'll begin to hear a subtle change for the better. Your stereo image will become magnified and intensified; your listeners will also hear more loudness, brightness, dynamics and depth. The 222A will open up your sound without an increase in multipath distortion and will not exaggerate reverberation.

Why not take the 222A for a test drive. Call BSW toll free to arrange a no obligation demonstration.

BSW®

BROADCAST SUPPLY WEST

America's Full-Time Broadcast Supplier

1-800-426-8434

ORDERS • INFORMATION • SPECIFICATIONS
BSW • 7012 27th Street W • Tacoma, WA 98466 • FAX 206-565-8114

Circle 63 On Reader Service Card



Bring your station into the 90's with CAT-LINK—the digital STL/TSL.

"It's a dream system—we get specs like the microwave wasn't even there. CAT-LINK has completely eliminated the STL delay."

Jeff Andrew, WGCI-FM, Chicago

"CAT-LINK solved all our problems in 4 minutes—2 minutes to install each end. Performance has been impeccable."

Paul Christensen, WIVY-FM, Jacksonville, FL

"CAT-LINK makes money for us, and it improves the sound of the station."

Mike Callaghan, KIIS-FM, Los Angeles CA

"CAT-LINK has held up through extreme heat, a hostile RF environment and nasty summer lightning storms."

Dick Byrd, WZGC-FM, Atlanta GA

Two-way multi-channel communications

CAT-LINK digitizes the entire composite signal with no data compression, so you can run the stereo generator and processing at the studio, where they really belong. At the same time, CAT-LINK sends and receives up to four customized auxiliary channels with no crosstalk—SCAs, control channels, voice communications, RS232 data, AM audio, transmitter readings and satellite or remote program feeds. What's more, CAT-LINK gives you extra capabilities like transmitter building surveillance via closed circuit TV and an analog telemetry channel.

Transparent digital transmission

CAT-LINK encodes the fully processed composite signal, then decodes it at the transmitter. You always get full stereo separation, without the phase or amplitude variations that plague two-channel STLs. Dynamic range is up to 84 dB, and your processed composite signal can use virtually all of it. You hear clear, clean, undistorted audio—all the time.

No audible delays

CAT-LINK's real-time digital encode/decode process doesn't introduce audible delays as data compression can. Jocks can monitor on-air without problems.

Flexible signal path options

- 23 GHz

Stations across the country are avoiding 950 MHz problems by using 23 GHz with CAT-LINK. They've stopped worrying about frequency congestion and interference, repeater-induced signal degradation, and fresnel zone clearance fading. 23 GHz dish sizes also reduce wind loading and tower space requirements.

- DS1 (T1) Data Line

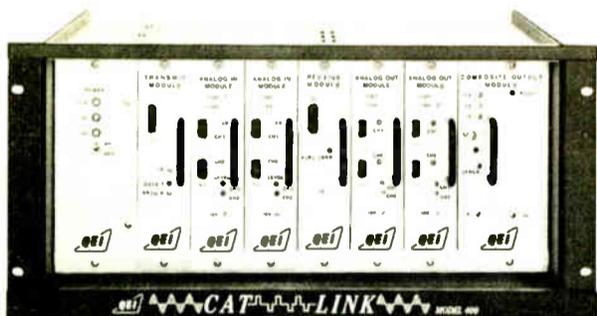
CAT-LINK is cutting phone bills for stations that don't have a clear microwave path. With CAT-LINK, a single bidirectional DS1 line replaces multiple Class A telco lines, providing multi-channel STL and TSL over the same link. Already available virtually anywhere, DS1 service is getting cheaper every day.

- Fiber Optic

CAT-LINK and its optional fiber optic modem provide direct connection to discrete fiber.

- Twisted Pair

CAT-LINK will drive up to 5000 feet of twisted pair wire without repeaters. Four wires provide full two-way multi-channel capabilities.



Turn the weak link in your signal chain into one of the strongest.

Call QE1 toll-free at 800-334-9154 for more information on CAT-LINK—the digital STL/TSL for the 90's...and beyond.

QE1 CORPORATION
 ONE AIRPORT DRIVE • P.O. BOX 805 • WILLIAMSTOWN, N.J. 08094
 24 HOUR SERVICE HOTLINE (609) 728-2020
 TEL (800) 334-9154 • FAX (609) 629-1751

QUALITY • **E**NGINEERING • **I**NNOVATION

Circle 145 On Reader Service Card

FROM THE TRENCHES

by Alan Peterson



Lamenting Lafayette

Dear JG,

Merry Christmas from the Nutmeg State. Hope 1991 turns out to be a great year for everybody. And that our troops come home real soon.

Astute readers of RW may have caught my ad recently in the Broadcast Equipment Exchange, requesting old Lafayette catalogs (boy, those ads really work!). My intent was to research the company's line of musicians' amps and instruments. The deeper I got into the pages, though, the more I got lost in this once-great company.

No single event per se inspired this interest in Lafayette Electronics, but several encounters suggested to me the time might be right. I found one of their old "Sound-On-Sound/Echo" reel machines dead in a closet some time back while visiting WNJY-FM, Riviera Beach, Fla. Low power stereo amps occasionally surface at garage sales and the CB radio I bought in 1977 (and still use today) is a Lafayette HB-740; for \$9.95 I got a 40-channel rig, antenna and PA speaker. Oy, such a bargain.

Having been bitten by the electronics bug very young on Lawn Guyland, trips to Lafayette's main store on Jericho Turnpike in Syosset were frequent pleasures in the '60s. The place was incredibly huge and easy for a youngster to lose himself amongst hi-fi systems and amateur rigs. How often I thought about "stowing away" behind a display 'til after closing and have the whole place to myself overnight... except for those *o&#! ultrasonic alarms.

The gear they sold always had that "La-

fayette Look," too. Just as an Art Deco dresser would stick out in a room filled with Shaker furniture, a piece from the Big L was instantly recognizable when displayed with other makes. It just flat-out looked like it cost only \$49.95! With speakers!

Off to one side of the store was their "scratch and dent" room, where inexpensive, slightly-bruised merchandise was piled to the ceiling, wrapping around the walls. "Slightly bruised" was entirely too polite; honestly, the stuff looked like it got caught between a rail disaster and a Who concert. But for near-nothing cashwise, it was a great education in the workings of cassette and record changer mechanisms, tuning sections and PC board repair.

Speaking of PC boards, cracking a Lafayette cabinet way back gave many tech-types a glimpse of the future: green metal.

Domestic-made TVs and radios had chassis with a flat-grey galvanized look. Imports, meanwhile, had peculiar looking brackets, hold-downs and levers made from metal with an unnatural yellowish-greenish glint. How weird did that look the first time you saw it? Further proof aliens visited the Earth.

Even the wait for the catalog to come in the mail was an adventure. The anticipation of the next great revelation to spring forth from Syosset, N.Y. was excruciating. Was I ever disappointed? Never. From the cheapest resistors to the largest stereos, the crummiest-sounding guitar fuzzboxes to four-track reel machines, it was all there in glorious four-color offset.

And the innovations were truly priceless: "Now in Four Channel Quadrophonic Sound." "Three-Band Psychedelic Color Organ" (twenty years later I still want one). "Now with Integrated Circuit!" (Yeah, but what does it do?). "Forty Channel with Sidebands."

It would've been fascinating to see Lafayette introduce CDs, DATs or even VCRs to America, but it wasn't to be. My last encounter with the company must have been in the early '80s when they seemed to move towards all-consumer hi-fi and scaled back on operations. By this time, other importers got into the act, competition got stiff and the company picked up the unflattering nickname of "Laff-A-Lot" in some circles.

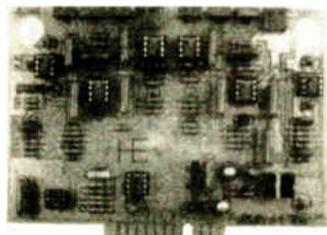
Right around this time Radio Shack was picking up a lot of steam, too. So with a sigh and a fizzle, Lafayette Radio and Electronics went for a swim and, like Atlantis, never came back up.

If something were hot, you could bet you'd find it in the catalog. Well-priced, plentiful and dependable—like the VW Bug, that was Lafayette.

And that's 1990. Talk to you next year. Al

INTRODUCING THE HALL Electronics

ITC Replacement Audio & Cue Cards



Update your ITC Premium Series Cart Machines to State-of-the-Art Performance Levels & Greatly Improve Reliability Too!

Call for Specs, Pricing & ITC Rebuilding Services
(804) 974-6466

1305-F Seminole Trail, Charlottesville, VA 22901

Circle 45 On Reader Service Card

Al Peterson still uses his HB-740 near Danbury, Conn. His handle is "KayBag" after his license: KBAG-9812, and his guitar fuzzbox still sounds crummy. Write him c/o RW.

If Your Only Excuse For Not Buying An ITC Cart Machine Has Been Money, You Just Ran Out Of Excuses.

Introducing
the Series 1 cart
machine from
ITC. As the world's
leading cart
machine manufac-
turer, we under-
stand how to make

a superior cart machine. And the new
Series 1 cart machine is superior.

Equally as important, we realize
each station has a different need and
a different budget. That's why we
designed the new Series 1 with all the

features you need at a
realistic price.

Pound the
buttons. Flip
the switches,
jam a cart in

and yank it out a few



hundred thousand
times. We've built
the new Series 1
to take anything
you can dish out,
24 hours a day,
365 days a year.

So before you

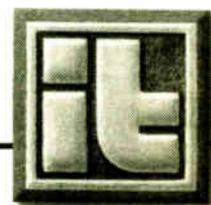
mortgage your program director
or settle for something of less value
than ITC, check out the new Series 1
today.

You won't need an excuse to
buy one.

For more information contact ITC at
(800) 447-0414; from Illinois call collect
(309) 828-1381. To order, call one of ITC's
authorized distributors:

Allied Broadcast Equipment	(800) 622-0022
Audio Broadcast Group, Inc.	(800) 999-9281
Broadcast Services Company	(800) 525-1037
Broadcast Supply West	(800) 426-8434

In Canada, contact
Maruno Electronics, Ltd., at
(416) 255-9108
Outside the U.S. and Canada,
contact your local ITC distributor.



International Tapetronics Corporation... The World Leader in Cartridge Machines

The Cart You Can Count On



From The Supplier You Can Count On

It only makes sense to stick with something if it's working for you. That's why, year after year, broadcasters keep buying Audiopak cartridges from BSW. Audiopak carts are designed and manufactured for consistency, durability, and exceptional audio performance. The industry standard A-2 with 605 tape offers "workhorse" performance and outstanding longevity. The A-3, with revolutionary "neutral-design" casing and high-performance 613 is perfect for stereo recording and playback. And the A-4 goes a step further with advanced 614 tape that delivers a crisp, clean sound which rivals CD quality. No matter what your requirements, Audiopak carts give you the longevity, consistency and performance you need. And when you buy them from BSW you'll get the same prompt delivery, great pricing and professional service that thousands of broadcasters have come to depend upon.

BSW[®]

BROADCAST SUPPLY WEST

America's Full-Time Broadcast Supplier

1-800-426-8434

ORDERS • INFORMATION • SPECIFICATIONS
BSW • 7012 27th Street W • Tacoma, WA 98466 • FAX 206-565-8114

Circle 151 On Reader Service Card

Orban 290RX: What The Doctor Ordered

by Ty Ford

BALTIMORE To a production person, a spot is like a landscape. Sometimes the landscape is serene and beautiful, sometimes it's rocky and dangerous. Because most production people have a heightened aural acuity (meaning they hear more stuff than you do), their sense of where it all should go and how it should sound when it gets there enables them to make that landscape look like a "National Geographic" poster rather than a passport photo.

There are too many things about hearing that we don't really understand. Like how listeners make value judgments about a sponsor based not only on the copy and its delivery, but how the spot sounds on the air. No one I know of has yet to document the exact nature of the direct relationship between quality audio in spot production and quality attributes of the sponsor, but most people would agree that one exists.

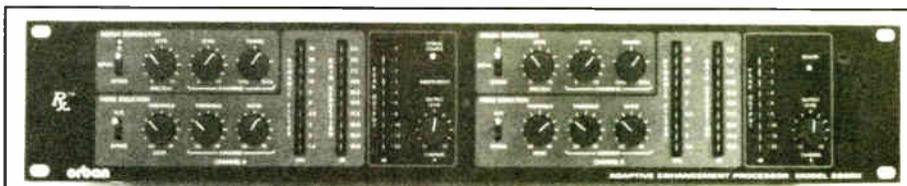
dynamic phase and amplitude equalization." That's followed by a two-stage dynamic single-ended noise reduction circuit.

It takes a somewhat gifted ear to know how much of each section to use. At some point, the "brightening" performed by the restoration circuit creates high frequency noise; removing it requires more of the single-ended

PRODUCER'S FILE

dynamic noise reduction. The trick is to find the window, in which the restoration and noise reduction circuits do their jobs best, without counteracting each other's effect.

Because audio sources may vary widely in frequency response and noise, the 290RX is not a "set-and-forget" kind of box. To get maximum performance, you need to fine tune the controls for each situation. Sure, you



The Orban Adaptive Enhancement Processor Model 290RX.

We can theorize that FM is perceived as "better" than AM due to its wider frequency response and reduced noise. Although the stereo versus mono question can be raised, in my book it's lower on the ladder than the first two. Thus, all other things being equal, it should follow that any produced spot with frequency response and low noise characteristics equal to the other programming with which it is in context, should be judged acceptable. Those that are excessively muddy or noisy should be judged unacceptable.

Because the first thing to deteriorate in an audio signal is likely to be the upper frequencies, and the first thing to replace it is likely to be noise, it would seem that a device that increases high frequency response while simultaneously reducing noise would be a good thing to have in the rack.

And here it is

Take, for example, Orban's Adaptive Enhancement Processor, the Orban 290RX. Assuming that most standard production studios are capable of producing audio of proper bandwidth without noise, you might think, "If my audio sounds OK now, what do I need this sort of thing for anyway?"

Before I answer, you should know what the Orban 290RX actually does. Put most simply, it makes things sound "brighter" and reduces high-frequency noise.

The 290RX is a two-channel stereo box that adds upper harmonics to the audio passing through it. It also performs "spectral restoration" which the company explains as "a form of dy-

can get by with using moderate amounts of each section to create a signature sound, but that's just plain lazy.

Creative processing

The two main application areas for the 290RX are creative processing of original audio and remedial processing of substandard audio. Original audio—from a microphone, musical instrument pickup or various synthesizer/sampler tone generators—can often benefit from the kind of processing the 290RX performs.

Because of the additional high-frequency content the processing provides, dynamic mics can be made to sound more like condenser mics. Non-acoustic instruments with direct pickups such as electric guitars and electric basses can be processed for more "bite."

Synthesizer sound patches created with a limited bandwidth to "save space" in a device's memory, and sampled sounds recorded using limited bandwidth sampling frequencies (or just poorly EQ'd) can also benefit from the 290RX "restoration" process.

The dynamic filtering and downward expander section is equally helpful in reducing simple high-frequency circuit noise, noise from non-cancelling instrument pickups and unwanted ambient noise when mics are used. You can also reduce synthesizer sound patch and sampler whine often associated with those devices.

Noisy air studios, remote broadcasts and STL links are also prime candidates for the 290RX. Mic processing

(continued on page 21)

Psyching Up for Overnights

by Thomas L. Vernon

HARRISBURG, Pa. It takes a lot of organization and planning to run a good engineering department, whether it's a solo operation or one with a large staff. One area that requires lots of foresight is preparing for overnight maintenance shifts.

With most stations almost constantly in ratings, the time when the transmitter can be off the air is a valuable resource. If properly utilized, major repairs can be completed, and equipment peaked to perfection. Squandered, it is a period when equipment is torn up and barely put back together in time for 5:30 a.m. sign-on.

This month's column will look at the psychological and organizational preparation and skills necessary for a productive overnight session. We'll discuss ways to make those 5 1/2 hours as productive as possible.

Getting organized

It's best to begin planning a few days in advance. Start with a written list of everything you'd like to accomplish.

Assign a high priority to investigating changes in transmitter readings. Now is the time to catch small problems before they turn into major crises.

Don't plan on doing too much in one overnight. Experience will tell how many projects you can safely fit into the time available. The main criterion for a project being on your checklist is that it can be done at no other time.

Use your final project list to produce a materials checklist. Include everything you'll need to complete projects: tools, test equipment, parts, air filters, manuals, and even label tape. Don't leave anything out. Gather everything at the transmitter site at least a day before the overnight.

Check items off the list as they're in place. If you're working with assistants, be sure they're familiar with your ideas. Discuss ways you can divide up responsibility to make the best use of your time.

If you've ordered parts, open the boxes and verify that these indeed are the ones that you ordered. There's little worse than opening boxes at 3:00 a.m. and finding that what's inside doesn't match the packing slip, or that the most critical parts were back ordered.

Take equipment manuals home and review any adjustments or alignment procedures you will need to make. It might help to write down some of the more complex procedures in your own words.

Some complex ideas and procedures may best be visualized using bubble charts or flowcharts. This is especially true when other people need to understand your ideas. Preparing this documentation isn't as formidable a task as it once was. Creativity programs such as Inspiration allow for quick and easily modifiable diagrams.

Getting psyched

With a priorities list, parts list, and other documentation in place, it's time to talk about psychological planning. Being mentally prepared and in the right frame of mind for an overnight is critical to your success. During quiet periods, pre-visualize what you're going to do. Try and see every step in your mind's eye.

By doing this, you may discover something that was left off your list. Also, this

mental dress rehearsal will allow you to work more efficiently, since you will have "been there" before. Such mental preparation will allow you to approach the overnight with a sense of calm and self-confidence.

Try and get a few hours of sleep before working. Even with rest, your sleep cycle will be disrupted, and you may not have the edge that you're used to. This rest period may also be a good time to do your pre-visualizing.

STATION SKETCHES

Safety is an important consideration when planning overnights. Working alone in a high voltage environment without enough sleep can be dangerous. Try to have someone with you, preferably a person who knows CPR. Or at least have someone call and check up on you occasionally. Also, be ready to duck out if a thunderstorm appears.

If you are working alone at a remote transmitter site, be sure that your car is secured, and lock the fence and transmitter building behind you. This should prevent any unwanted encounters with the local night life.

Getting started

It's important to dress in something that allows unlimited freedom of movement, which you can get completely filthy in. Sweat pants, heavy socks and a T-shirt work well for me. It's also good to remove rings and watches before starting work. It's surprising how fast a gold ring heats up with a little current flowing through it, not to mention the damage it can do to a circuit. As for watches, exposure to high RF fields doesn't do much for their accuracy, even the supposedly non-magnetic types.

Before beginning any transmitter work, take a full set of meter readings, and note the position of all tuning controls. This will give you a "normal" reference for later use.

Do major work on the transmitter or associated equipment right after sign-off, while you're most alert and your energy level is highest. Keep a written record of your work.

After each project or major step is completed, put the covers back on and make sure the transmitter still operates. This may seem annoying and time consuming, but it beats trying to trouble-shoot a transmitter that won't operate after you've made several major changes, and you don't know which one is causing the problem.

It's a medically proven fact that an engineer's brain cells begin to turn into steel wool around 4:00 a.m., resulting in diminished concentration and irrational thought. Time for a break. Have someone make a pizza run for you, or pack a thermos and sandwiches. Food and caffeine are important at this hour of the morning. Now is a good time to jot down notes on what's been accomplished so far, while the details are fresh in your memory.

Winding down

With your energy level and alertness waning, work on some of the minor projects. Clean the inside of the transmit-

ter, change air filters or take blowers apart and clean them.

One useful project is to check all the interlock switches with a DVM. Switches that show more than a half ohm when closed are probably packed with microdust, and should be worked over with a good spray cleaner until they act properly. Doing this will probably save you at least one emergency call in the next year.

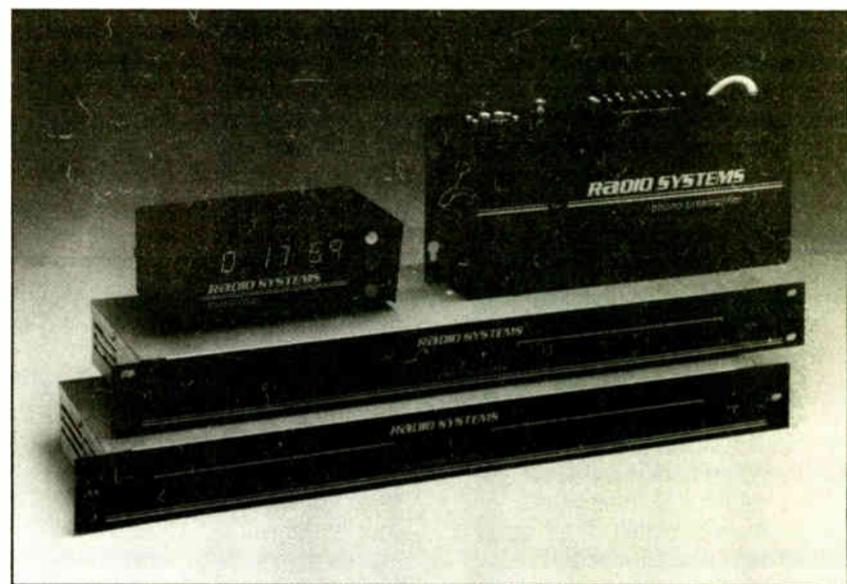
Allow time to get everything put back together and cleaned up before sign-on. Have the studio operator turn the transmitter on and take readings. This will verify that remote metering and control are still intact.

Stay around for about a half hour after sign-on. If anything major is going to go wrong with the transmitter, it will probably happen now.

If everything has been planned and organized properly, you can look back over your list, congratulate yourself on how much was accomplished, and head off for some well deserved rest. If not, you may find the clock creeping close to 5:30 a.m. with a transmitter that won't go on, wishing that you were anywhere but at the radio station.

■ ■ ■

Tom Vernon, a regular RW columnist, divides his time among broadcast consulting, computers and instructional technology. He can be reached at 717-367-1151.



Get One Free!

Now, buy any three Radio Systems studio products at our already-low direct prices, and get the fourth free. Mix and match as you like! You write the order.

The savings are tremendous. Consider just one example: Order three TM-2R timers and one stereo DA-16. Our normal low price would be \$820; you pay only \$495.

Call Radio Systems, your factory-direct source. No dealers, no markup, just great products. Call 1-800-523-2133 to order today.

TM-2R	Our popular remoteable six-digit up-timer. Crystal reference.	\$165.
DA-16	Stereo 2 x 8 distribution amplifier. Individually adjustable, active balanced outputs.	\$325.
DA-8	Mono 1 x 8 distribution amplifier.	\$255.
PA-1	The industry's best phono preamp.	\$225.

RADIO SYSTEMS INC. 110 High Hill Road P.O. Box 458 Bridgeport, NJ 08014-0458
609/467-8000 800/523-2133 FAX 609/467-3044

[| | | | | | | | | |]

DETAILED FM INTERFERENCE STUDY AND 3 ARC SECOND (DMA) TERRAIN DATA

- Invaluable For Short-Spaced FM Stations
- Determines Interference Received And Generated
- Directional Antennas Considered
- Examines 360 Radials Using 3-Sec or 30-Sec Terrain Data
- Retrieves All Potential Interfering Facilities
- Compares Protected Contours of Proposed and Conflicting Facilities
- Computes Allowed ERP & Signal Strength For Each Radial Azimuth

For further information, please call the Sales Department at (800) 368-5754 or (301) 652-8822 in the Washington, DC area.

dataworld®
A Service of DW, Inc.

P.O. Box 30730, Bethesda, Maryland 20814

FAX (301) 656-5341

(301) 652-8822 (800) 368-5754

Circle 41 On Reader Service Card

World Radio History

Circle 62 On Reader Service Card

Getting the Most from AM DAs

Editor's note: Following is the first in a three-part series on maximizing the performance of AM directional antennas. The remaining installments will run in the next two issues of RW.

by Tom Osenkowsky

Part I of III

BROOKFIELD, Conn. Every AM directional station can expect a visit from an FCC field agent at anytime during the next two years. Why? The Commission has become increasingly concerned about DAs causing interfer-

ence by not conforming with FCC rules and regulations.

Recent FCC statistics showed that 24 percent of AM DA stations visited from October 1989 through July 1990 had monitor point field intensities in gross excess of licensed limits. Thirty percent of the AM DAs had parameters at variances from licensed limits.

To ensure that every licensee—not just AM DAs—comply with all applicable rules and regulations, the FCC recently adopted "selected enforcement" procedures. This means stations can be visited by a field agent more frequently and for specific items.

The FCC has reassigned many of its office staff to field positions, effectively increasing the number of inspection personnel. As mentioned earlier, antennas are not the only items checked. The public file and its contents, tower lighting and painting, EBS compliance, and other technical violations fall under the scrutiny of selective enforcement procedures. But it's DAs we're concerned with here.

By way of explanation

Many AM DAs have had little or no maintenance over the years, attributable to poor economy, FM competition and lack of DA experience by the engineer servicing the facility. Few station managers can be convinced easily to sink money into their antenna systems when they believe little or no benefit other than obtaining the "right numbers" will result.

In almost all cases, however, if careful attention is paid to "doing it right," a DA retuning job can yield noticeable signal increases and fidelity improvement—more often than not without tremendous technical expense. A proper retuning will make you FCC legal at the same time.

Over the past several years, new computer techniques have evolved that can be used to critically analyze a directional antenna system's performance. For example, it is possible to determine what a DA pattern and common point impedance sweep will look like at the sideband frequencies as well as at carrier.

Many DA and non-DA antenna systems were designed and constructed at a time when modern computer modeling was not available. Also, many consultants simply adjusted the phasor controls for the desired monitor point values, did a proof, and billed the station. Little, if any, attention was paid to feeder line matching and the common point impedance sweep, let alone what the radiation pattern looked like at the sidebands.

Today's broadcast engineer must realize that maintaining a station within FCC rules is only part of the job. Affording station management every option to deliver the strongest signal in the marketplace can many times mean the difference between red and black ink in the accounting ledger.

Design considerations

DA design methods employed up until recent years usually produced inefficient patterns. Symmetrical arrays (those with towers in-line, and certain parallelograms) produce nulls on both sides of the array center line. This means that there are up to twice the number of necessary nulls in the pattern.

In the past, some of these nulls were thought just to be mere inconvenience, because they fell over cow pastures or unpopulated regions. In today's world these areas may be heavily populated with condos, shopping malls, etc., and

the station may no longer adequately serve the audience it needs to remain competitive in the market.

Many DA patterns designed prior to 1980 were "augmented" during their standard pattern conversion. If no partial or complete proof-of-performance has been filed with the FCC lately, it may be possible to increase signal in the null areas by taking advantage of the direct ratio method adopted by the FCC when assigning monitor point limits.

If your array was arbitrarily adjusted without using precise mathematical or computer modeling, it is possible that the actual pattern may not be as good as it can be even though a proof may lead you to believe otherwise.

Improved proof analysis

Proof analysis up until recently involved tedious curve fitting using overlaid conductivity graphs on a light box. In many instances, if the radial inverse distance field didn't look right, some measurement points were "thrown out" until the data matched desired values. No real assurance was available that the radial(s) had the greatest possible

signal allowed by FCC rules.

Analysis tasks are now relegated to a computer and X-Y plotter, yielding a superb amount of precision. Moment method analysis of DA arrays allows the consultant to accurately predict operating parameters and

design or re-design a phasor that will produce optimum pattern and impedance bandwidth, drastically cutting down on field tuneup time. Phasors designed using electronic circuit analysis computer programs eliminate guesswork and allow optimum use of components already on site.

Taking advantage of the aforementioned modeling techniques could give your station the edge on FM competition and generate a very noticeable audio and RF signal improvement while correcting any FCC parameter violations.

Moding

For the symmetrical arrays I described earlier, there exists a technique referred to as "moding." For these arrays there exists a number of operating parameter combinations (2 for two towers, 4 for three towers, 8 for four towers, etc.) which produce the identical radiation pattern but with different operating impedances and power distributions. Moding your array will produce the most stable and efficient pattern while insuring optimum audio fidelity when combined with a proper phasing (re)design.

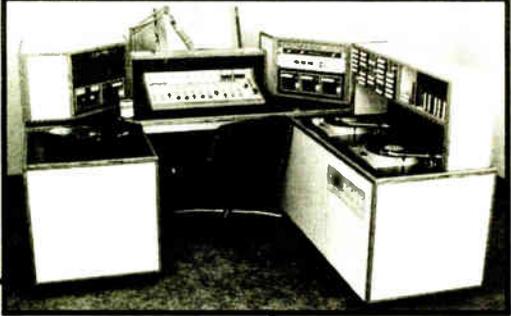
International broadcasters utilize DAs in order to "beam" their signal into a desired area, as do many domestic broadcasters. Pattern bandwidth for these stations is of prime importance. Since the majority of the audience resides in the major lobe, its pattern must remain consistent at the sidebands.

In Part II we will look at a basic approach to AM DA improvement.

Tom Osenkowsky is CE of WLAD and an occasional contributor to RW.

GET IT RIGHT
FROM HARRIS ALLIED

ONE SOURCE




WORLD CLASS PRODUCTS



WORLDWIDE SUPPORT

with the resources, design expertise and unparalleled worldwide capabilities:

HARRIS ALLIED SYSTEMS

Harris Broadcast Division is one of the largest and most respected manufacturers of transmitters, antennas and related RF products worldwide. Allied Broadcast Equipment represents the largest selection of audio and studio equipment in the world—over 5000 products from more than 250 manufacturers. Together, we offer total program management with engineering and design expertise that ranges from facility layout and site preparation to furniture design, from equipment specification to final verification of performance.

When you work with Harris Allied Systems, you work with people who know broadcasting and communications from conception and design through final sign-on and documentation. So you can be most confident that your project will have a functional, ergonomic layout like the ones pictured here. You can be sure that all of your equipment will meet the highest standards of form, function and reliability. You can then concentrate on the other important aspects of managing your facility.

From transmitter building (prefabricated or constructed on-site), to transmitter installations, towers, antenna systems and even terrestrial microwave links, the experts at Harris Allied Systems will ensure total systems integration and performance.



HARRIS ALLIED SYSTEMS

217-222-8290

FAX 217-224-2764

P. O. BOX 4290 • QUINCY, IL 62305-4290

©HARRIS/ALLIED 1990

"Call me, I'm interested." Circle 33.

"Send me literature." Circle 110.

Orban's Prescription for Highs

(continued from page 18)

requires a mic preamp to raise the signal to the -10dBu to +8dBu input range of the 290RX.

Remedial applications

The 290RX is also good for "doctoring" substandard audio that makes its way into your studio. There are, of course, limitations to what can be done, but it's safe to say that you can make a horrible tape sound better than bad, and a bad tape sound almost good.

The worst possible situation, and most hopeless, is a recording that has lots of tape hiss and very muddy sound. At this point the effective window of the 290RX gets very small. As you try to restore the high-frequency content, you need more and more of the noise reduction to control the increasing amount of high-frequency noise.

This is not to say that the 290RX won't improve this worst-case scenario to some degree, it will. It's just that there are some miracles even Bob Orban has yet to perform.

Because the downward expander doesn't know the difference between noise and reverb or other trailing echo-type effects, it will also "turn down" the amount of reverb ringing out over quieter passages. If for some reason you accidentally used

too much reverb on a mix, the downward expander section of the 290RX could be used to reduce the effect to some degree.

More typically, if you're using the 290RX after a noisy synthesizer with its own reverb (like the Roland MT-32), as you increase the noise reduction to get a cleaner sound, you "turn down" the reverb ring-out. The obvious answer is to use reverb downstream of the 290RX, after noise reduction has occurred. That way you'll be driving your effects unit with a cleaner sound.

The controls and displays are laid out in a logical, easy to understand manner. Features such as separate by-pass switches for both the restoration or noise reduction sections and the "Detail" position on the restoration switch, which lets you hear exactly what that section is adding back to the signal, help you get the most from this box.

The restoration section has separate spectral level, harmonic tuning and harmonic level controls for each channel. The noise reduction section allows separate control of the threshold and expander ratio as well as the threshold of the dynamic filter.

The harmonic level control varies the amount of second harmonics and sum-frequency intermodulation. The harmonic tuning control is used to select

what frequencies are sent to the harmonic generator.

The spectral level control works with more subtlety than the harmonic level control. According to the manual, "The spectral restoration processor is a program-controlled equalizer. It achieves spectral restoration by adding the output of a first-order high-pass filter to the main signal. The amount of filtered signal that is added is controlled by a VCA whose gain is determined by an analysis of the input signal."

The expander offers 0 dB to 25 dB, separately displayed for each channel. The "soft knee" design allows expansion to start very low at threshold and gradually increase as gain reduction increases. In stereo couple mode, both expander gain reduction circuits track together.

The "intelligent" dynamic low-pass filters allow you to "filter" out high-frequency noise between 1.4 kHz to 40 kHz. According to the manual, "The filter threshold control determines the level of high-frequency energy (with reference to the input) that first causes the dynamic low-pass filter to increase its bandwidth . . . The dynamic filter display is a useful guide to setting the control because it shows the bandwidth of the low-pass filter at every moment."

Inputs and outputs are via XLR and barrier strip connections on the back panel. The manual is well-written, easy to understand and guides you through unbalanced or balanced connections, impedance and grounding considerations. List price is \$1,200.

At the bottom line, the real issue is how good the 290RX can make you sound. Imagine the scenario in which an advertising agency sends a poorly engineered spot to your station—tons of mud, and you can't re-cut it. Knowing that you can do something to improve the spot means a lot, especially when it ends up on your air.

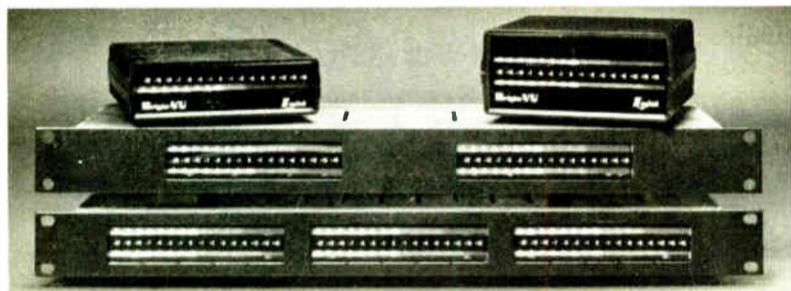
In addition to saving you and your audience's ears from the slings and arrows of outrageous audio, you'll feel even better when it's played in its original horrible form on the station across town. Finally, if the agency bothers to listen to both stations and notices the difference, they're more likely to blame the other station for the problem than accepting the truth that they did a bad job producing or dubbing the spot.

■ ■ ■

Ty Ford is an audio producer/voice talent. He hears things most people don't. Sometimes those sounds are real. Reach him by phone at 301-889-6201, via MCI mail (#347-6635) or via America Online (Tford).

IT'S AIR TIME!

DO YOU KNOW WHERE YOUR AUDIO IS ?



Bright-VU LED Audio Level Displays

Sometimes, a VU meter just doesn't tell you enough. For instance, if you're watching input levels to a tape or STL, a standard VU meter can't move fast enough to show sharp audio peaks which can saturate your tape or distort your sound.

Or, if you're trying to watch audio levels from across the room, a VU meter does little, if any, good.

That's when you need a Logitek Bright-VU LED Audio Level Display.

Bright-VU displays respond almost instantaneously, so you see the full extent of every audio peak. But, if loudness measure-

ment is what you need, don't worry. A rear panel switch selects either peak or average response.

And, with its highly visible, color coded LEDs, the Bright-VU can easily be seen and read across a large room, making it perfect for network and cable control rooms, duplicating rooms or any place where equipment is spread out beyond arms length.

Balanced bridging inputs make the Bright-VU a snap to install. And, if space is a problem, our rack-mount units are only 1 RU tall. Whether you need a rack-mount or stand-alone version, Logitek has a Bright-VU problem solver for you.

Logitek

When it has to work right!

Call 800-231-5870. (In AK, HI and Canada 713-782-4592)

Circle 80 On Reader Service Card

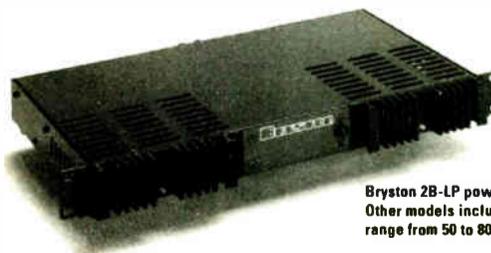
AMPLIFIERS AND CONTROL PREAMPLIFIERS DEDICATED TO THE BROADCAST AND VIDEO PRODUCTION INDUSTRIES



Bryston BP-5 preamplifier

Bryston approaches the broadcast and video production industry requirements for high quality, musically accurate, and reliable power amplifiers and control preamplifiers with the same integrity and commitment to excellence that has earned Bryston its leading position in the Canadian power amplifier industry for the past 15 years.

Whether your requirements are for, 50 watts, 800 watts or anything in between Bryston amplifiers can satisfy your every power need. Standard features include such things as dual power supplies, completely independent stereo channels, balanced XLR connectors, clipping indicators, gain controls, rack mounting, and bridgeable switching.



Bryston 2B-LP power amplifier. Other models include Bryston 3B, 4B and 6B with output range from 50 to 800 watts.

When a highly versatile and reliable control preamplifier is needed, then the Bryston BP-1, BP-4 or BP-5 provides all the flexibility required by the professional broadcast and video production industries. Features include such things as balanced XLR connector, cartridge load adjustment, high overload threshold, 1 space rack mount and fully discrete gain blocks. For further information contact:

BRYSTON

Bryston Marketing Ltd.
Tel: (416) 746-0300 Fax: (416) 746-0308
Brystonvermont Ltd. Tel: 1-800-673-7899

FULL TWENTY YEAR WARRANTY

Circle 131 On Reader Service Card

**GET IT
RIGHT**
FROM HARRIS ALLIED

**REVOX
PR99 MkIII**



**As close to
perfect
AS ANALOG
TWO-TRACK GETS**

Take a close-up look at these professional features:

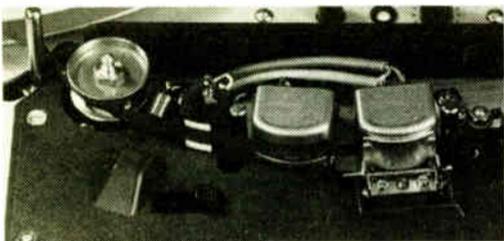
True Auto-Locator with Zero Locate, Address Locate and Repeat Functions plus fast search-to-cue with 0.5% accuracy.



Motion-sensing transport control for safe, smooth tape handling.



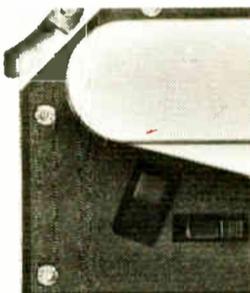
Die-cast head block is precision-machined and mounted on a die-cast deck plate to ensure absolute alignment.



Balanced inputs/outputs for easy interfacing.



Edit mode switch defeats the tape lifters and makes the fast wind buttons "momentary acting" to help you find audio cues fast.



On-board editing block for fast, convenient splices.



Ready/safe switch includes easy-to-see status indicator—no more accidental erasures.

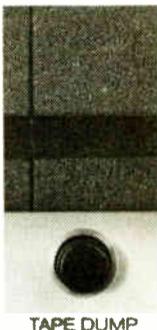


Vari-Speed with -33%/+50% range.



For professional features at a practical price, no other two-track can match the Studer/Revox PR99 MkIII. For professional service and practical advice, no other distributor can match Allied.

Tape Dump button for extra convenience.



TAPE DUMP

VU meters are calibrated to ASA standard and include adjustable Peak LEDs.



**HARRIS
ALLIED**
BROADCAST EQUIPMENT
800-622-0022
CANADA 800-268-6817

STUDIO EQUIPMENT • HARRIS RF PRODUCTS • SATELLITE GEAR • TRADE-INS • TURNKEY SYSTEMS

© 1990 HARRIS/ALLIED.

"Call me, I'm interested." Circle 3.

"Send me literature." Circle 85.

WORKBENCH

Tweaking Resistors And Rectifier Tubes

by John Bisset

FAIRFAX, Va. Though precision resistors are usually within everyone's reach, there are times when short cuts need to be taken just to keep things running. Rummaging through a drawer of 20% resistors is one solution, but if you have a triangular file in your tool box, here's another.

Say you need a 5.1K ohm resistor. Get a 5K carbon composition resistor of higher wattage than what is in the circuit and file a notch in the resistor body. When you measure the resistor, you'll see that the value has increased. The more you file away, the higher the resistance value goes.

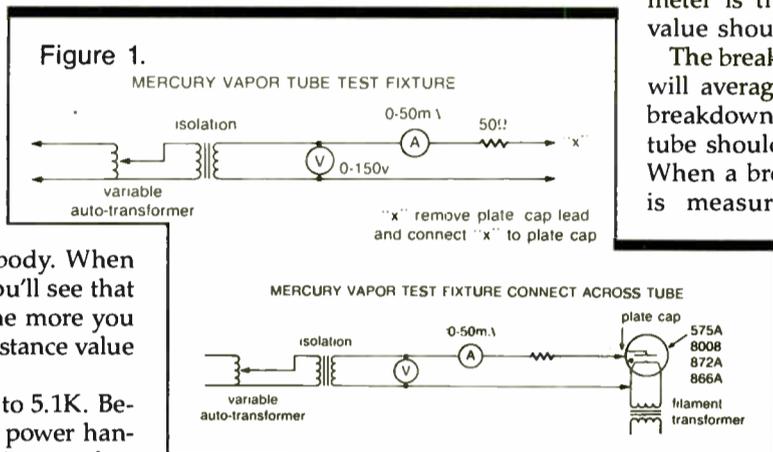
Stop filing when you get to 5.1K. Because the filing reduces the power handling capability of the resistor, select the closest standard value below what you need (so a minimum of filing will be required). To protect the composition material, paint the filed resistor with clear fingernail polish. Though not intended for a permanent fix, these "budget precision resistors" can help you in a pinch.

★★★

I know it's hard to believe, but there are a good number of stations that still employ mercury vapor rectifier tubes in their low and high voltage power sup-

plies. Though solid state versions are available, many stations are unable to afford the replacement cost.

Leo Wilson, a broadcast engineer in Hopkinsville, Ky., has come up with a circuit that permits checking these tubes, to prevent loss of program time due to



arc back. If your transmitter still uses the 800B, 872A, 575A, 866A or similar mercury vapor tubes, this circuit is for you.

Leo recommends making a monthly check of each tube, and logging the results. As the mercury vapor tubes age, they require a higher voltage for breakdown, and will fire later in the conducting half cycle. His circuit allows you to measure the breakdown voltage of the tube, and through this measurement, determine when the tube should be replaced.

Figure 1 shows the test fixture needed to make these tests. An isolation transformer and a variable auto-transformer that will give an adjustable output of from 0 to 75 volts AC are needed. An AC voltmeter is connected across the isolation transformer winding. A 0-50 mA DC meter is used to monitor current flow.

The plate cap is removed from the tube and the filaments are turned on. To test the tube, slowly increase the applied voltage from zero to where the current just begins to flow, as seen on the ammeter. At this point, the peak voltage of the RMS voltage as read on the voltmeter is the breakdown voltage. This value should be recorded.

The breakdown voltage of a good tube will average 10 to 15 volts. When the breakdown voltage reaches 30 volts, the tube should be tested more frequently. When a breakdown voltage of 50 volts is measured, the tube should be replaced.

Leo adds that for best results with mercury vapor rectifier tubes, the filaments should be left "on" at all times.

★★★

We'll wrap up this issue with a factory maintenance tip for owners of Technics cassette decks. If you've ever experienced an intermittent "running away" of the transport section of the deck where the motor revs up to a very high RPM (sounding just like a jet engine!), try the following solution.

On the main control board and the reel motor and plunger board are jack and plug assemblies. Remove the jack and plug and clean thoroughly with a zero residue contact cleaner spray. After cleaning both parts, plug in and unplug

the jack several times, to further remove any oxidation.

Additionally, locate the jack and plug assembly on the capstan motor drive board and perform the same procedure. Technics advises that oxidation of these jack and plug assemblies causes this problem, which is corrected by proper cleaning.

...

John Bisset recently left Delta Electronics to concentrate on Multiphase Consulting, a contract engineering company. He can be reached at 703-379-1665.

HARRIS ALLIED

Radio World Bulletin Board



News and tips you can use are on line right now...

How to size a backup generator...File #147; UL wire and fire codes...File #489; Convert dBs to others...File #116; Design an LTU...File #293; Sentry automation demo...File #373; Calculate ERF (FM)...File #297; All you want to know about ModMinder (R)...File #413; and hundreds of others.

Check our bulletin board menu—by the time you read this we will have the Audisk demo for you to download.



The Allied/Radio World BBS Menu

MAIL: [E]nter Mail [S]ale Prices [R]ead Mail [L]ast Callers [S]can All Mail [T]ime & Date [N]ew Mail Only [W]elcome New Person [M]ail Activity [#]Phone Directory [H]ot News [J]unque/Trade-in

UTILITIES:

[?]Menu Choices [O]utline of BBS [C]hange SIGs [G]ood-bye [B]oiler Plate [X]fer Help

REGISTERED USER AREA:

[P]assword Change [U]pload a File [Q]uestion [I]ndivi File Download [V]erify Your SIGs [A]lpha File Listing [D]ownload File/List [Z]Hard-software Info

Carriage Return for Selections

MODEM SPECS:

8 Bit • No Parity • 1 Stop • 300-2400 Baud No Filtering

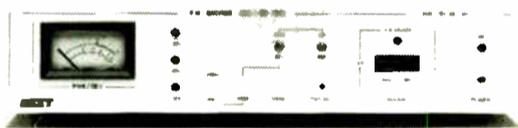
Call the Bulletin Board 317-935-0531

World proven. And improved.

First, there was the original TEX-20 FM exciter from BEXT. It was bulletproof. It was priced right. It found its way into over two thousand FM stations around the world. Owners raved.

Next, this popular exciter was redesigned.

Front panel frequency selection, a BEXT advantage, is now accomplished in 10 kHz increments. Custom phase locking is provided for compatibility with external references. The TEX-20's internal layout is now completely modular, so testing and service are accomplished easily and quickly. The capacity to run on 24 volt DC is added. Main operating parameters are brought out to the back panel for remote control, including remote raising and lowering of output power. Specifications are enhanced.



Now, stations have found the TEX-20 "flawless" and "perfect in every way" (we're not

making this up). Nearly three thousand are in the field, in most cases with BEXT amplifiers at the output. More and more FM's are finding that they don't need to spend more to get more reliability, features, or performance from their transmitters.

The TEX-20 is a phase locked loop exciter with continuously variable output power from 2W to 20W - other BEXT exciters produce up to 80W. Our FM amplifiers are available from 100W to 30,000W (the solid state, broadband, 250W and 500W are our most popular). Delivery is prompt, direct from our San Diego offices.

Call BEXT today for more details on our wide range of products.

739 5th Avenue
San Diego, CA 92101
619-239-8462



The BEXT 24-hour service hotline: 619-448-2651

FCC Modifies Translator Rules

by Howard L. Enstrom

MOUNT DORA, Fla. Last month we discussed site location and receive antennas as they relate to a system's transmit signal quality.

I intended to discuss translator signal coverage this month, but I've had to preempt the subject to report important news from the Commission. The FCC has adopted new FM translator rules, and we are coming to the end of the freeze on commercial translator applications.

New translator rules

On Nov. 8, the Commission acted on MM docket 88-140. Report No. DC-1747 is a two-page release highlighting the new rules. It states that coverage contour of a translator providing fill-in service will be defined to be congruent with that of the primary station for respective classes.

Under the rules, an FM translator's protected contour will be defined at 1 mV/m. Translators may be owned by either the commercial FM station being rebroadcast or an independent entity, provided the translator's coverage contour is encompassed by the primary station's coverage contour.

Commercial translators providing fill-in service may use any terrestrial means

to obtain the primary station's signals, while also using aural intercity relay frequencies on a secondary basis. Financial support arrangements are left to the affected parties.

LOW POWER LOWDOWN

Further, FM translators may not be licensed to a commercial FM broadcast station if the translator's coverage contour extends beyond the primary station's coverage contour.

Commercial primary stations may provide no financial support beyond technical assistance to such FM translators.

Waivers for white areas

For "white areas," (areas outside the protected contours of any full-time aural service) the Commission will be favorably disposed toward waiver requests to permit commercial primary station ownership and financial support of translators, and signal relay by any terrestrial means, including the secondary use of aural intercity relay frequencies.

Local announcement and emergency warning rules remain in place, as does prohibition against translator-

originated programming.

Procedures were adopted to resolve mutually exclusive applications.

The FCC has also limited "major change" for FM translators to a change in output frequency or geographic area that changes or increases, but that does not decrease the 1 mV/m coverage contour by more than 10 percent of the previously authorized coverage contour.

FM translators would remain exempt from multiple ownership rules. No AM-FM cross-service will be permitted.

The Commission retained its existing rule prohibiting the use of translators solely to relay signals of a primary station to more distant translator facilities. It also clarified rules about licensees who may operate multiple FM translators within the same area upon a showing of need.

Non-reserved commercial channels

Under the new rules, all FM translators may operate on any of the 80 non-reserved commercial channels. The 20 reserved, non-commercial educational channels will be available for non-commercial educational FM translator use.

A maximum effective radiated power standard has been reduced from the proposed 1.0 kW to 250 W.

Power and antenna height combinations have been established for translators operating beyond a primary station's coverage contour, yielding seven kilometers for areas east of the Mississippi River and Southern California and 13 kilometers elsewhere.

Requests to waive the distance requirement will be favorably considered upon a showing that the service to a greater distance will reach only a "white area." For NCE FM translators, the distance waiver will regard "white areas" as those areas not served by a full-service public radio station.

Standards are clarified for antennas, and criteria have been adopted for interference to FM and TV channel 6 stations. Existing translators will be "grandfathered" from compliance with the new technical rules until they pose interference problems, at which time compliance will be required.

Three years to comply

Existing stations must comply with the new service rules within three years of the report and order's effective date. Waiver requests may be granted for extended "grandfathering" periods for licensees who show that service to the public would be

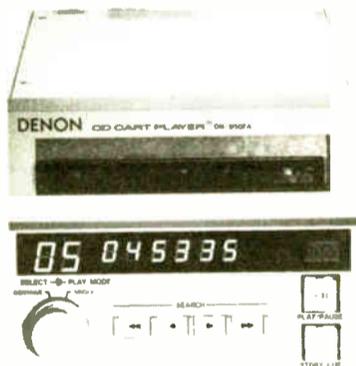
(continued on page 26)

Ease of Carts, Quality of CD?

Rugged CD Cartridge, instant cueing, full remote & EOM connections and Digital Display make the DENON 950FA easy to use.

Real time D/A conversion, four times oversampling and active balanced outputs provide unparalleled CD performance.

YES!!



**DENON
950-FA
CD CART PLAYER™**

For friendly service, fast delivery and great value contact your nearest Northeast sales office. They have all the details.



**NORTHEAST
BROADCAST LAB, INC.**
"Serving The Broadcast Industry Since 1961"

Main Office
P.O. Box 1179 • S. Glens Falls, NY 12803
Tel: 518-793-2181

Mid-Atlantic New England Southwest
Tel: 215-322-2227 Tel: 603-483-1002 Tel: 214-612-2053

Buy Direct.

Model DA-8 Mono 8 Output Distribution Amplifier	List \$345.	Direct \$255.
Model DA-16 Stereo 8 Output Distribution Amplifier	List \$425.	Direct \$325.

Now you can buy the industry's most popular *Distribution Amplifiers* direct from the manufacturer at fantastic savings. Just pick up the phone and call *toll-free*. It has never been so easy to save money on quality broadcast equipment.

Your Factory Direct Source.

RADIO SYSTEMS INC.
110 High Hill Road □ P.O. Box 458 □ Bridgeport, NJ 08014-0458
609/467-8000 □ 800/523-2133 □ FAX 609/467-3044

C270



\$3,995

2-TRACK

With Center Track
Time Code \$5,995

C274



\$4,995

4-TRACK

C278



\$5,995

8-TRACK

REVOX OPEN REEL RECORDERS. HIGHER QUALITY. LOWER PRICES.

THE C270 SERIES This exciting new line of recorders provides you with all the traditional Studer Revox benefits—mechanical precision, electronic sophistication, supreme sound quality and superior support—adding up to state-of-the-art analog recording technology. The C270 is available in 2, 4 and 8-track versions with or without remote/autolocator.

BEST BUY Compare the “street” price and performance of any C270 Series machine with the competition, and you’ll find there is no competition. The die-cast deck plate and head block, the precision mechanics and a host of powerful features tell you any C270 Series machine will last as long as you need a reel-to-reel in this emerging era of digital workstations. And in the digital future, you’ll need analog recorders that will sound good—for a long time. That’s why your last reel-to-reel should be a Studer Revox.

TIME CODE . . . OR NOT The C270 2-track version offers optional center track time code for effortless synchronization to picture or sound. The C274 4-track and C278 8-track are both equally adaptable to production or post. The optional remote/autolocator stores 18 start/stop addresses and provides full transport and channel remote control to fit into any professional studio environment.

LOGGING TOO For station logging applications, special super low speed versions of the C274 and C278 are available with built-in time/date code generator and reader with search capabilities, providing up to 25 hours of continuous audio on one reel of tape.

Call your Studer Revox Professional Products Dealer—or Studer Revox direct—to discuss all the details. Or simply call **800-366-4900** to receive our C270 series color booklet.

C270 Remote/Autolocator



STUDER REVOX

Studer Revox America, Inc. • 1425 Elm Hill Pike • Nashville, TN 37210 • (615) 254-5651
New York (212) 255-4462 • Los Angeles (818) 780-4234
Studer Revox Canada Ltd., Toronto (416) 423-2831

© 1990 Studer Revox America, Inc.

Circle 141 On Reader Service Card

World Radio History

Translator Changes

(continued from page 24)

unduly lost as a result of compliance with the revised rules.

This is how federal procedures work: Perhaps by Dec. 1, the new rules will be published in a report and order document. Between 30 and 60 days later, the new rules become effective. Then, 60 days after that, the freeze on commercial translator applications will be lifted.

There are some departures from the proposed rules: maximum ERP and translator distances from a primary station's coverage contour. But for some unfathomed reason, the FCC retains and divides the nation with a magic marker

at the Mississippi River (and Zone I-A, below the 40th parallel in California and islands) for translator operation.

Phooey—there are boonies in New York state, and metropolitan areas in Kansas. Fortunately, the Commission says it will be predisposed to consider requests to waive the rules.

The new rules prompted FCC Commissioner Sherrie Marshall to say, "Translators have the potential to undermine our allocation scheme, (but) this decision goes too far and throws the baby out with the bathwater . . . This decision may well be to deny the benefits of FM translator service to significant portions of rural America."

Commissioner Ervin Duggan added, "On one hand, we need to be concerned about localism, about the viability of full-service stations, especially in small and rural markets. Too many imported signals may indeed undermine continued local service by incumbent FM stations."

"On the other hand, we need to be concerned about the public's interest in diverse voices and viewpoints.

I commend these commissioners for their vision. I also question the real value of local service by full-service FMs in larger cities.

As for the adopted rules, it appears that existing rules permitting satellite-fed input signals for NCE translators remain intact, and from my perspective that's good. FM translators are gaining in stature because they do things—they have listeners.

Effective coverage, jargon we use to describe it and how it's best done, will be next month's subject.

Howard L. Enstrom is a broadcast consultant. He has owned and managed an AM station and is president of FM Technology Associates, Inc., specializing in engineering design and sale of FM translator equipment. He can be reached at 904-383-3682 or by FAX: 904-383-4077.

DAB's Options for Spectrum at WARC

by Steve Crowley

WASHINGTON The FCC has launched a formal inquiry into the development and implementation of DAB services in the U.S. On a parallel track is the Commission's Notice of Inquiry on WARC-92 issues, which addresses DAB allocation matters.

The DAB NOI was prompted by the filings of three U.S. firms seeking to provide a variety of DAB services.

Satellite CD Radio, Inc. says that if it receives permission to use the 1460-1530 MHz band, it will provide 34 channels of local terrestrial DAB service and 66 channels of satellite DAB service across the

U.S. Its transmission technology is being developed by Stanford Telecommunications, Inc.

Radio Satellite Corporation (RSC) has filed an application to construct and operate an earth station that would provide 10 DAB channels through the mobile satellite system of the American Mobile Satellite Corporation, to be launched in 1993. The satellite downlink frequencies will be 1530-1559 MHz and 1626.5-1660.5 MHz.

RSC has the advantage of asking for satellite capacity that's going to be in place anyway. The hurdle the company faces is convincing the Commission that DAB is a permissible ancillary service under the FCC's satellite rules.

Strother Communications, Inc. (SCI) has asked the FCC to institute a rulemaking proceeding to allocate spectrum and create rules to establish a terrestrial DAB system, with preference given to existing AM and FM stations. Part of the SCI plan is the cessation of AM and FM broadcasting once there is sufficient digital receiver penetration, thus making those bands available for other uses.

SCI is seeking 40 MHz as low in the VHF and UHF spectrum as possible, in order to take advantage of favorable terrestrial propagation characteristics.

The FCC is seeking answers to several questions during its inquiry. Among these is whether existing radio stations should get a priority in a new DAB service and whether there should be a "set aside" for new non-commercial operations.

Also under consideration is the part a satellite component should play, and whether some audio service should be provided on a subscription basis, or as a more traditional broadcast service.

Spectrum is another major issue: How much is needed and where will it come from? An answer is needed for the World Administrative Radio Conference (WARC) in Spain in February, 1992.

The WARC administrative council has adopted an agenda item to consider

(continued on page 31)

CONSULTANTS CORNER

THERE'S A LOT OF TALK ABOUT MIC PROCESSORS... THIS IS THE ONE MOST PEOPLE ARE LISTENING TO!

FOR OVER 4 YEARS THE 400 HAS BEEN THE INDUSTRY FAVORITE — HERE'S WHY:

- Ultra low noise, low distortion discrete mic preamp
- 3-Band Equalizer specially contoured for spoken word.
- Post EQ patch-point for additional processing effects
- Exclusive use of the patented Valley TA-101 VCA as the central audio processing block
- Proprietary Linear Integration Deflection Compressor processes the voice for consistent level control without compromise to the on-air personality's delivery
- Complementary interactive Expander eliminates background noise
- Effective De-essing for both "normal" and "heavy" sibilance problems
- Easy-to-read LED gain reduction meter
- Switch selectable input/output vu metering with adjustable reference level
- Variable output gain control
- Switch selectable micline output level
- It's backed by Valley's 21-year record of customer satisfaction

MODEL 400 MIC PROCESSOR



IN STOCK FOR IMMEDIATE DELIVERY CHECK WITH YOUR DEALER OR CALL US 1-800-800-4345



VALLEY INTERNATIONAL INC.



Stereo Play \$1875 List

BROADCAST SERVICES/EME

The Davis Communications Group, Inc.

The Preferred Source... for all ITC products.

ITC Series 1

The last cart machine you'll ever buy...

An ITC Series 1 cart machine placed in service today will perform well into the next century. ITC has set the standard for long-term reliability, outstanding factory support and unsurpassed performance. We've priced the Series 1 to fit every budget.

Call today:
800/525-1037

The Trials of New Ownership

by John Cummuta

DOWNERS GROVE, III. Most football fans—indeed, most Americans—remember a couple years ago when much-admired Tom Landry was booted out as the head coach of the Dallas Cowboys. It was a messy thing, and it left many people aghast. The team had changed ownership, and the new owners wanted their own people running the show. They had every right to make the changes. The problem was the way they made the changes.

People who work at broadcast stations are in much the same position Coach Landry and his staff were, when it comes to ownership changes. Management changes probably happen in radio more frequently than in professional sports, and they can be handled just as badly as the Dallas mess.

As a manager, you have a serious responsibility to your people, when going through an ownership or leadership change. Whether your station is being acquired by new owners or is just getting a new general manager, the chances of important staff changes range somewhere between good and definite.

Most station managers have come up through the ranks and have developed relationships with key people they trust. They'll likely want to bring some of those people on board with them.

This likelihood makes many staff members justifiably nervous. They feel either that their own job may be in jeopardy or that they may be working for a new boss. Either change can cause stress and all its unproductive manifestations.

Loss of control

The main reason that a change in one's working situation causes stressful reactions is that people feel out of control. Loss of control of one's life is probably one of the major causes of human ills in the world today. That may sound overstated, but examine the things that drive people to alcohol or drugs, crime, divorce and a host of other non-constructive actions: Loss of control in some area of their life is usually a contributing factor.

You can count on the fact that, when station leadership is going to change, people will feel that, "Things might start happening that won't be good . . . and I will have no control over them." Adding to the lack of control are the waves of uncertainty that roll through the staff. They don't know whether their fears are overstated, understated or completely unfounded.

How you can help

Try to take as much of that uncertainty away as possible. You may not be able to change the realities of what will actu-

ally happen, but you can at least give your people a clear picture of how it will go down. That will help—if the new management will cooperate with you.

The first step will be to find out (if you can) what the incoming leadership really plans to do. It is possible that they will keep you in the dark about their true intentions, but you can't worry about that. Assume that they will be forthright with you most of the time.

ENGINEERING MANAGER

Keep in mind that your own position may be one that they intend to put someone new into, so they may be reluctant to talk with you about it. You can, however, come to them from the perspective that you're trying to help your people through the transition.

Ask the new leaders what their short-term and long-term goals are, for both the station and the staff. Tell them that you feel it is in *their* best interest to be honest and forthright with the staff. Tell them that, even if the personnel news is bad for the current staff, you think you can hold things together better if people know the truth than if they feel they're being deceived.

The reason you're asking about short

and long-term goals is that these two perspectives will give you clues about pending personnel changes, even if the new leadership claims that there won't be any. If their short-term goals are stability and "keeping things just the way they are," but their long-term goals imply significant changes in direction, focus or results, you can put two and two together and assume that the long-term picture contains some different players.

Ask the new leadership where they see the present staff fitting into their plans. If they can't give any clear responses to that, you have another clue that they intend to make changes.

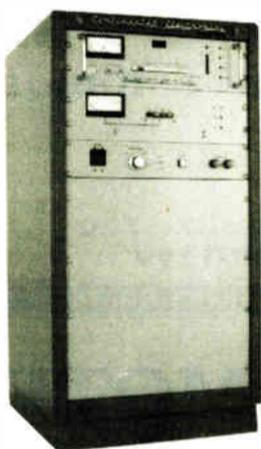
Tell them that the uncertainty is causing problems and productivity losses and that it will only get worse if the people aren't given some solid information about the future. Keep putting these requests in the perspective that it is in the best interests of the new leadership to keep the present staff on their side.

Be honest

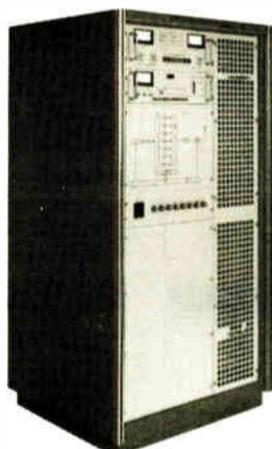
Once you've found out what you can from the new leadership, be honest with your people. If you've concluded that the new management is lying, resist the temptation to participate in the lie by stringing your people along, thinking that this will put you on the good side of the new leaders. Integrity is a hard-

(continued on page 31)

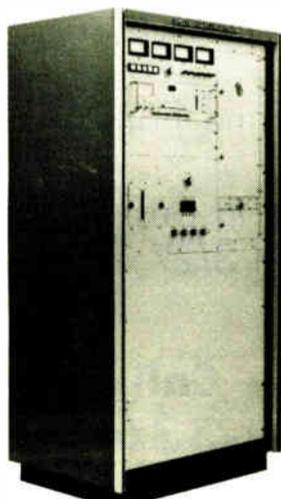
COMPLETE YOUR DEFINITION OF "CLASS A," CALL CONTINENTAL ELECTRONICS



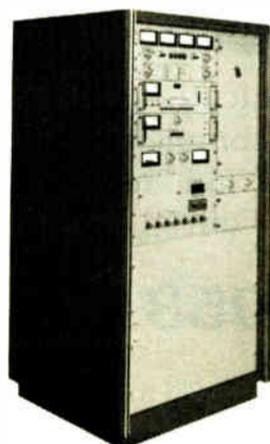
500/1000W



3.8 kW



2.5 kW



5 kW

Continental Electronics is here to assist you with your new definition of "Class A." You can increase power, increase revenue base, and expand your listening audience by upgrading your transmitting facility.

Continental has engineered four transmitters to meet your needs. The 500/1000 Watt transmitter is single phase and is only 42 inches tall. This transmitter and the 3.8 kW are totally solid-state and designed for high efficiency and reliability.

The 2.5 kW and the 5 kW transmitters are single tube transmitters. All Continental FM transmitters include an internal harmonic filter and the Ultimate 802A Exciter.

For service after the sale, call the Continental 24-hour tech line. At Continental, service is an attitude, not a department.

So, call your Continental Sales Manager to get the complete definition of "Class A."

continental electronics corp.



P.O. Box 270879 Dallas, Texas 75227
Telephone: 214-381-7161 Fax: 214-381-4949 Telex: 73398

PRODUCT SHOWCASE

For more information on the products shown below, circle the appropriate Reader Service No.(s) on the enclosed Subscription/Reader Service card or contact the advertiser directly.



SPORT IV-A

THE AFFORDABLE ALTERNATIVE

MICRO-TRAK



\$799.50

TONE/PULSE DIAL
4 MIC INPUTS
1 LINE INPUT

DURABLE CARRY CASE YOUR BEST SPORTS BUY

The Sport has been the standard of the industry since 1977. Over 3000 units are in use at stations, colleges, and churches across the world. If it's time to upgrade or add sports...then SPORT IV-A.

CALL 413 733-8743

H&E MICRO-TRAK 165 Front Street Chicopee, MA 01013

READER SERVICE NO. 118

Digital DJ[®]

The *first* complete low-cost Digital Audio hard disk system for broadcasters

- Scrap Your Cart Machines
- Retire Your Carousels

Digital DJ replaces all your old audio Cart sources with high quality *digital* audio from a computer hard disk.

Priced from **\$1,995.00**

Multi-day Satellite programming is a snap. Full ID, liner rotation and live assist options. Easy operation. Eliminate your paper Log. It's all on the screen including live rotating tags & copy, news and lists.

Traffic & Billing Systems
New LOW Prices!

	New	Original
EZ Log:	\$ 695.00	\$ 995.00
Simple Log:	1,495.00	1,995.00
Super Log:	2,495.00	2,995.00

All interface to Digital DJ

Call for 60 page brochure - Our 10th Year

900+ Stations

The Management

1-800-334-7823 - 1-817-625-9761

P.O. Box 1-36457 Ft. Worth, Tx. 76136

READER SERVICE NO. 149

WANTED!

Your product or services ad here

Reach 20,000
Radio World readers

Call
1-800-336-3045
now

WireReady Newsroom Software

WireReady captures AP, UPI and other newswires with computers for a fraction of the cost charged by wire services and other *big system* vendors. ElectionReady, election software and StormReady, storm cancellation software are also



available as free options for a limited time. NO WEEKLY FEES. Simple buy-out price of \$549. 24hr toll-free support and free upgrades for \$99/yr. GST has installations all

over the U.S.A. and our customers will testify to WireReady's ease of use, power, and unparalleled support. Need a computer? Get everything you need including WireReady and a complete computer package for as low as \$65/mnth. This is half what you probably now pay for in paper and ribbons.

(800) 833-4459

Gerstmann Software Technologies

P.O. Box 2356 Framingham, MA 01701 (508) 820-7284

READER SERVICE NO. 52



AUTOMATICALLY

- Switches to backup or tertiary stereo audio source when main audio source loses a channel or is missing
- Switches both outputs to the channel with audio when one channel is missing from a stereo source
- Corrects audio polarity if it is reversed
- User programmed time delays and sequencing
- FULL alarm outputs and total remote control
- ON-LINE audio monitoring and stereo audio switching
- Locate at Transmitter site for full REDUNDANCY
- Locate at Studio site to monitor studio audio and make instant corrections for console, cart/tape, or satellite programming errors.

AND MUCH MORE...CALL FOR DETAILS

Model **MLW-1**

TITUS TECHNOLOGICAL LABORATORIES

77 Kreiger Lane Glastonbury, CT 06033

(203) 633-5472

READER SERVICE NO. 42

ATTENTION STATION OWNERS

In Pennsylvania, New York, Ohio & West Virginia

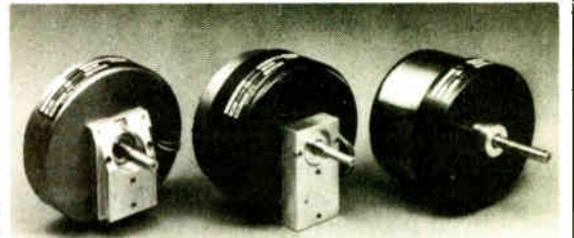
Diversified Communications Systems now offers complete engineering services. Let us solve your problems! Call:

814-756-3053

Diversified Communications Systems
9139 Route 18
Cranesville, PA 16410

READER SERVICE NO. 29

CAPSTAN MOTORS



Now is the time to get your reel-to-reel or cart machines up to snuff or to fix that one on the shelf that needs a new motor. Beau Motors is the originator of external rotor capstan motors for the broadcast industry and can repair or replace any of its products regardless of age and can repair or replace most other manufacturer's products as well.

BEAU MOTORS DIVISION

Manger Engineering, Incorporated
Bethmour Road, Bethany, Conn. 06525
Plant: 79 Rossotto Drive, Hamden, Conn. 06514

203-288-9351

READER SERVICE NO. 109

The VISION MOBILE STUDIO



Increase your **MOBILITY, VISIBILITY, PROFITABILITY**... with a powerful, compact, fully equipped, easy to use mobile remote broadcasting studio, designed for your needs.

VISION MOBILE STUDIOS

VOYAGER RV CENTER, INC.
79 OLD PALATINE ROAD
WHEELING, ILLINOIS 60090

PHONE: 1-708-537-1770

FAX: 1-708-537-1899

READER SERVICE NO. 78

PROMOTE

Your product or service here

In Time For NAB

Advertise in our 1/23, 2/20 and 3/27 issues

Call
1-800-336-3045
now to reserve space

A Guide to Trouble-Shooting Amplifiers

This is the eighth in a 12-part series called Amplifier Fundamentals. Northern Virginia Community College will offer 1.2 CEUs (continuing education units) to registered students who successfully complete the course and an examination mailed at its conclusion. To register, fill out the coupon to the right.

by Ed Montgomery

Part VIII of XII

ANNANDALE, Va. Before we begin this lesson, a correction. In Part VI (RW, Nov. 21, p. 13), Figure 3 should indicate that Q₁ is an NPN transistor.

Solid state amplifiers have an incredibly long life span. For example, telephone companies have designed circuit boards containing amplifying and switching circuitry with lithium batteries soldered onto the board. These small-signal devices will run years without any attention given to them.

However, occasions do exist when an amplifier must be analyzed to determine what component has failed.

Transistors and diodes, as well as passive components, are often soldered directly to the printed circuit board at the time of manufacture. Patience in desoldering these components is a must. Heat from the soldering iron can lift the copper foil off the board, resulting in further damage to be repaired.

The soldering iron also can cause sol-

DC voltage required to operate an amplifier.

In this particular case, the amplifier was forwarding computer data, and the output was always garbled. Using a multimeter, all voltages looked acceptable, yet nothing worked. It was not until an oscilloscope was used that the problem was solved.

Capacitor C₁ had opened! The circuit was no longer capable of smoothing out the DC pulses for D₁ and was forwarding pulsating DC to the amplifier circuitry. I had never thought of checking for an open capacitor, up to that point. Usually capacitors short and cause fuse F₁ to burn out. I learned never to assume anything about components from that experience.

It is important to have a schematic diagram to guide you in determining what the signal path is for an amplifier. An oscilloscope can assist you in determining where amplification stops or where distortion is introduced.

Figure 2 is an illustration of a three stage amplifier. The bold line indicates the signal path. The input is capacitively coupled to Q₁. Capacitor C₁ "isolates" the input from the amplifier. Any failure in components prior to C₁ will have minimal effect on the amplifier's operation.

DC voltages are shown for proper operation of the amplifier. Transistors Q₁, Q₂ and Q₃ are directly coupled. If the junction of any of these components fails, the voltages will change. If Q₂ shorts out, the voltage across the emitter, base and collector will be essentially the same.

Signal injection can be used to test for amplification, using a capacitor to couple a signal into the transistors. It is important to do this carefully so as to not overdrive the device. A "click" test using a resistor can also be used to determine if a device is working.

This test is actually introducing a pulse into the system by taking a resistor of several thousand ohms and connecting it momentarily between the collector and base of the transistor. This will cause the transistor's current to increase, generating a pulse.

Such a test is not recommended for power transistors. The resistor must only be connected for an instant to protect it from conducting too much current. In Figure 2, the "click" test could be performed on Q₁ first and Q₂ second. It would not be advisable to perform it on power transistor Q₃.

Resistance analysis is also helpful if the manufacturer supplies the information for you. Typical resistances for the amplifier, when disconnected from the power supply, are given. When trouble-

NORTHERN VIRGINIA COMMUNITY COLLEGE
 Director of Continuing Education, Annandale Campus
 8333 Little River Turnpike, Annandale, Virginia 22003
 (703) 323-3159

Social Security No. _____

Please enroll me in the Community Service Program listed below:

Name _____ Home Phone _____
FIRST NAME MIDDLE INITIAL LAST NAME

Address _____ Business Phone _____

City _____ State _____ Zip Code _____

Course Title Amplifier Fundamentals Fee \$ 35.00

Course Code BCST 91601 Course Date(s) and time _____

How did you learn about this course? Received brochure in mail, Newspaper advertisement, Library, Referral Radio/TV announcement Other

Enclosed is my check payable to Northern Virginia Community College. I understand that enrollment may be limited and if the course is cancelled for any reason, my check will be refunded in full.

For office use: SA 91 RU 97 SD 91 RU 98

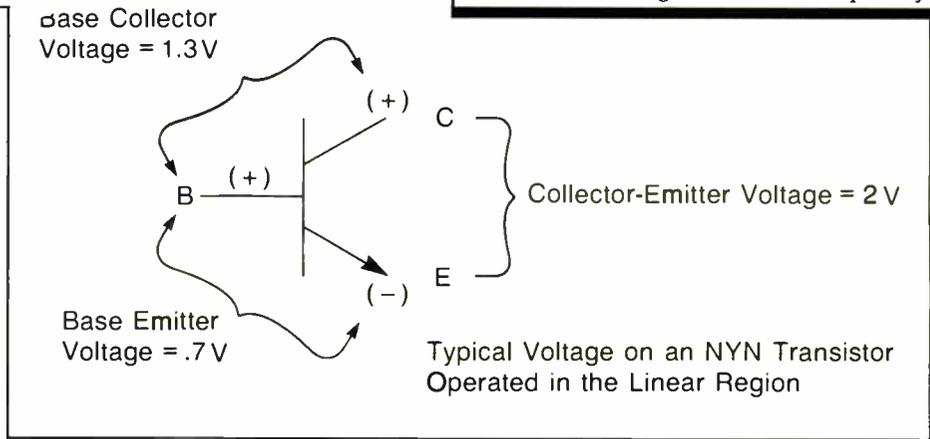
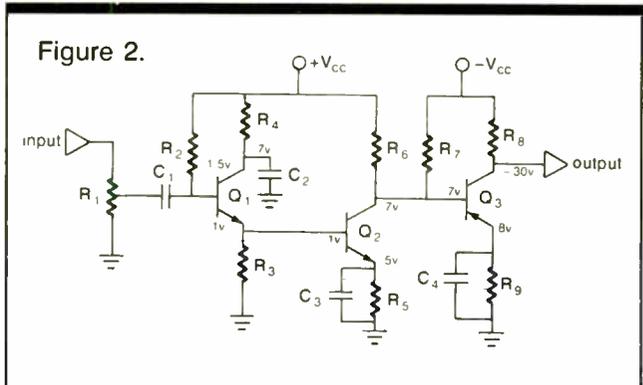
shooting, the amplifier's resistance and specific locations are compared with the published values. When they don't

tor is good when, in fact, it cannot function within the circuit.

The biggest problem in solid state circuits is intermittence. This occurs in a device that will work some or most of the time. Often one will operate the equipment until the component fails and then trouble-shoot, but ordinary trouble-shooting can cause the device to start operating again!

Another way to test these devices is to heat them or cool them down. This can be done by isolating individual components until the defective one is discovered.

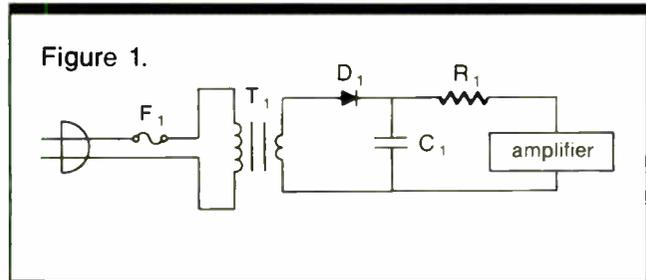
There are no quick easy solutions to trouble-shooting. Skill is developed by



match, a problem is discovered. In-circuit and out-of-circuit transistor checkers are also used. These instruments give valuable information but do not reflect the exact operation of the amplifier. They can indicate a transis-

analyzing defective equipment, preferably around a seasoned technician.

Ed Montgomery currently is an electronics teacher in the Fairfax County school system. He can be reached at 703-971-6881.



der "bridges" when removing and re-installing components. Bridges are drops of liquid solder that have fallen across adjacent pieces of foil that were not intended to be connected. These bridges will prevent a circuit board from functioning properly, even though you assumed it to be repaired.

Errors like this, or replacing diodes and transistors the wrong way, can cause hours of frustration. Because solid state circuitry is so small, often manufacturers do not repair it; rather, they throw away the entire board and replace it with another.

Regardless of this "throw away" repair technology, it is still important to understand how to trouble-shoot to establish the location of a failed component. This will make it easier for you to converse with the manufacturer and decide just what has to be replaced.

The first approach to a circuit when troubleshooting is to check for power. Is the DC or AC source providing the necessary voltage to operate the circuit? If AC power is being used, is it rectifying the signal to provide DC to bias the transistors?

Figure 1 is a simplified illustration of a power supply converting AC to

MORE RADIO PROS ARE TAPING TO THE NTH DEGREE WITH DIC//DAT.

The radio world is turning to DIC//DAT, the one DAT best suited for airplay. Ultra-consistent tape. Ultra-strong shell.

For ultimate performance even faced with the most... enthusiastic use.

Call toll-free for information
1-800-DAT-1-DIC.
 In New Jersey, 201-224-9344

DIC//DAT
120XR
DAT
 Digital Audio Tape
METAL PARTICLE TAPE

SHOWN ACTUAL SIZE

Playing the PC Shell Game

by Barry Mishkind

TUCSON, Ariz. Over the past couple of columns, we've been discussing the need for and ways of maintaining computer hard drives. One important factor we covered was to reduce file fragmentation.

If you have run a defragger, you already may be seeing an improvement in computer operations. Therefore, let's take the next step in managing computer assets.

While you may not need much in the way of menus if your computer is dedicated to a single application, most computers have two or more programs and two or more users. Eventually, new users wander the halls wailing, "How do you start such and such?"

KEYBOARD CONNECTION

One way to deal with this is to write a series of batch files. The user then enters "wp," for example, to start the word processor; "db" might start a data base; and so on.

A little menu text file is all that's necessary to add screen reminders for the forgetful. Peace returns to the computer room.

Still, that leaves the person who has to maintain the computer and sort out difficulties when batch files conflict or new programs must be added. Seeing what's there and why can be a frustrating series of "dir" and "type" commands.

Enter the shell

That's where the shell comes in handy. A shell is a program that allows you to list easily on the screen and view the programs on the disk. It overcomes the limitations of DOS

that allow you to see only one file at a time and in one direction.

XTreePro Gold from Executive Systems, Norton Commander from Symantec, and PCTools from Central Point Software lead the pack of commercial shells available.

At first, shells were little more than

ture you like.

XTreePro Gold, version 1.4, opens with a very visual tree structure, combined with a series of keystroke commands that appear at the bottom of the screen. Or, if you have a mouse, you can point to and click on files and operations you wish to use.

A shell is a program that allows you to list easily on the screen and view the programs on the disk. It overcomes the limitations of DOS that allow you to see only one file at a time and in one direction.

a listing of files, with their date and size. There were commands for copying and deleting files and other DOS functions implemented in a visual way. This allowed the user to move files around, make backup copies and delete files that were empty or no longer needed.

Over the years, these programs have become increasingly sophisticated. Features are added with each release, such as file viewers, file compression, disk space viewers, backup and defragmentation, etc. Each of these programs also has unique features to try to stand out from the others, at least until the other programs catch up.

Choosing which one of these to install and use is largely a matter of preference. What follows are some clues to decide which program may be the best for you. Your local computer shop will likely have demos set up to give you a real live "feel" for each.

Picking up the best

Indeed, it's hard to go wrong with any of the leading disk managers. Probably the biggest decisions go to which kind of display and operation struc-

Features that have been added to XtreePro Gold include an autoview function to see not only text files, but spreadsheets and databases in the native formats. That means that you can browse through files without starting the application normally. It speeds searches considerably.

You can launch applications directly from XTreePro Gold, which will shrink to a small kernel while you are doing something else. (In fact, there is a built-in menuing feature that can be set up to run self-contained batch files.)

XTreePro Gold also allows you to create and extract archived files. This reduces the disk space needed to save such files. You also can view the files without extraction. Unfortunately, XTreePro Gold uses the PKARC format (also an adapted XTree format). This is a few steps behind current archive standards such as PKZIP and something that should change in a future release.

XTreePro Gold's history file is nice if you do the same kind of copying or deleting over and over. XTreePro Gold saves your past commands and brings them up with a press of the "up" arrow. You can reuse or edit and use any previous command.

The Norton Commander, version 3.0, from the folks that brought you the Norton Utilities, is another shell that packs a lot of features in an efficient engine.

The Commander can be set to start up with a tree, a directory listing, both, or two different directories. It's your choice. Also available is a menu to launch applications,

which is manipulated by arrow keys, mouse pointing, or programmable hot keys.

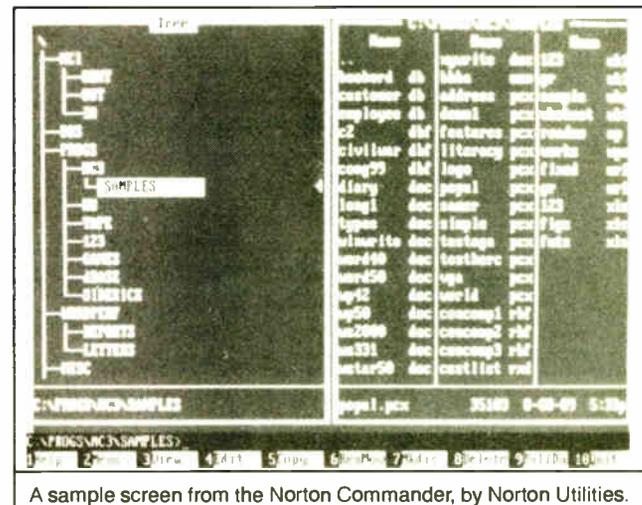
As if that weren't enough, the Commander also has a DOS prompt available for keyboard input at all times. With all these choices, getting to and from files and directories is quick and easy (See Figure 1).

Like XtreePro Gold, the Commander has file viewers and your choice of an internal editor or your favorite word processor. Additional features include an automated MCI Mail routine to send and receive electronic mail, and a link to tie two computers together—great for laptop-to-desktop copying.

The Commander also has a screen blanker to clear screens that have been sitting for a pre-set time. This is handy both for security and preventing burn-in on some screens.

All in all, the Commander is a fine companion to the Norton Utilities, each doing a specialized job extremely well.

PCTools, now in version 6.0, is something of an all-things-to-all-people pack-



A sample screen from the Norton Commander, by Norton Utilities.

age. To call it a shell is to ignore the wealth of features in the entire package, everything from file compression to backup to disk data recovery.

As a shell, PCTools, like the other packages, features a configurable display. Commands are accessed by a pull-down menu, making mouse navigation especially easy.

A windows option

If you are a Microsoft Windows 3.0 user, another choice that makes excellent use of the graphics capabilities of Windows is Becker Tools from Abacus.

Most Windows users already are tired of the limitations of the file manager. Becker Tools allows easy listing, copying, deleting and undeleting of your disk files, all without having to shell out to DOS to use the other packages we've mentioned.

Special icons allow file selection patterns to be changed quickly and easily. The "Toolbox" adds most of the DOS-type functions you will need.

Unfortunately, like the Windows File Manager, missing from Becker Tools at this point is a file viewer to see what's inside your files. Likely, it will come along soon.

All in all, you can't go far wrong with any of these programs. They will give you a good view of what's happening on your computer's hard disk. And that can save you a lot of headaches.

Barry Mishkind is a consultant and contract engineer in Tucson. He can be reached at 602-296-3797, or on FidoNet 1:300/11.

Grab a pencil! It's Sine Systems' second annual year end . . .

Pop Quiz

Complete the following section if you currently have a dedicated loop remote control:

- I am paying more than \$20 per month in dedicated loop charges. False True
- My remote control is frequently damaged by lightning.
- My remote metering calibration drifts out of tolerance frequently.
- My remote control requires costly, hard to obtain, and difficult-to-install, parts.
- I often wonder if my remote control will work when I need it the most.
- I would like to check my transmitter remotely without having to go through a DJ.
- I would like direct, emergency access to my transmitter from the nearest telephone.
- The last time my remote control got hit by lightning, I got hit with a \$500 repair bill.

Complete the following section if you currently have a dial-up remote control:

- My remote control is somewhat difficult for non-technical personnel to operate.
- My remote control took more than one hour to install and program.
- I have to consult my instruction book to make a simple programming change.
- I could have put my kid through college with what I paid for my remote control.

Complete the following section if you currently do not have a remote control:

- It would be valuable to control my transmitter or automation system remotely.
- I could reduce staffing or other costs by simulcasting with a sister station a portion of the day with my transmitter remote controlled.
- I would find it beneficial to establish a "control point" outside the station for nighttime or weekend operation.
- I would tell Saddam Hussein his mustache was on crooked for a remote control that could pay for itself and start saving money in as little as 15 weeks.

If you answered two or more questions with "true" you need to call us for a free information kit on the industry's most cost-effective remote control: the RFC-1. It's built to last, yet it's inexpensive, easy to install and simple to operate. Join the ranks of satisfied RFC-1 users all over the country and next year you'll pass our quiz with flying colors!

For more information call:
(615) 228-3500

Thanks to all for another great year! Best wishes from . . .

SINE SYSTEMS

3704 Ingleswood Cir. S., Nashville, TN 37216-3310

Now shipping software version 3.06! Call about upgrade kits.

Discover the Difference

orban



DAB at WARC 1992

(continued from page 26)

the allocation of frequencies to the broadcasting satellite service for sound in the range of 500-3000 MHz. Last summer, the item was modified to accommodate complementary terrestrial sound broadcasting within this allocation. There's considerable question as to whether this includes a stand-alone terrestrial DAB service; for now, the FCC isn't ruling it out.

The FCC has formally proposed three frequency band options for DAB. One option is the UHF-TV band. Originally, the FCC said it would not consider reallocations from the UHF-TV spectrum because of concerns that adequate spectrum be made available for high definition television. But because so many proponents consider UHF spectrum suitable for DAB, it is now being put forth as an option. Specifically, the FCC is considering 728-788 MHz (channels 57 to 66) on a shared basis with television.

A second option is 1493-1525 MHz. The satellite proponents say it would be most economical for them to operate around these frequencies.

This band is now heavily used for

Surviving a New Owner

(continued from page 27)

won virtue. Don't throw it away—particularly in what will probably be a losing cause anyway.

On the other hand, don't create panic if you're not sure yourself. Your goal is to take uncertainty out of the situation, so don't add to it.

If you are given the word on planned personnel changes by the new owners or management, be direct with those people. Hopefully you will have worked out a plan with the new leaders to help people who will be replaced to find other positions. This help can come in the form of generous severance or by giving them time and flexibility to apply and interview for other jobs.

Remember, you're a leader, and your responsibility to your people is to provide leadership, especially during difficult times like major station changes.

Sooner or later

Hopefully, you'll never go through a major ownership or leadership change that brings with it wholesale personnel replacements, but if you stay in broadcasting for more than a year or two it's almost inevitable.

Make no mistake about it, it will be a stressful time for you. It will, however, also provide an opportunity to show admirable leadership qualities to both your people and the new management. In the long run, that integrity will be worth far more than any individual job you might hold.

Life is about change. True leaders make change as tolerable as possible for the people they lead.

■ ■ ■

John Cummuta is president of Advanced Marketing Concepts, Inc., a broadcast management and marketing consulting firm, and a regular RW columnist. He can be reached at 708-969-4400.

aeronautical telemetry by both the U.S. government and the private sector. It's about half the spectrum sought by Satellite CD Radio, Inc., which proposed to share the 1460-1530 MHz band with telemetry users. The FCC concluded, however, that sharing would not be possible without interference to aeronautical users, and proposed instead the smaller, exclusive allocation.

A third option is an allocation in the 2390-2450 MHz band. This band is now largely used for industrial, scientific and medical equipment (ISM) such as microwave ovens and medical diathermy equipment.

Of the three bands proposed, the one preferred for terrestrial DAB would be the UHF-TV band. At these lower frequencies, attenuation from buildings and foliage is less. Also, with the Eureka system, on-frequency repeaters may be placed further apart without causing interference to each other.

The NAB has commissioned its own spectrum study, with the goal of determining the amount of spectrum needed to accommodate all existing AM and FM broadcast licensees with DAB facilities. It is hoped this study can be completed by the end of 1990, and thus aid the FCC before its plans for WARC are finalized.

Because of the satellite emphasis of the WARC agenda item, it's likely that the frequencies chosen for DAB at WARC will be above 1400 MHz, which would not be good for terrestrial use. It would still be possible to use other frequencies for terrestrial DAB, however, subject to the requirement that interference not be caused to other countries.

■ ■ ■

Steven J. Crowley is a consulting engineer with the Washington, D.C. firm of du Treil, Lundin & Rackley, Inc., 1019 19th Street, NW, Third Floor, Washington, D.C. 20036. He can be reached at 202-223-6700 or by FAX at 202-466-2042.

RK-RACK SYSTEM AUDIO SIGNAL PROCESSING



COMMON FEATURES

THREE RACK UNITS OF SPACE
INPUTS & OUTPUTS HAVE
AUDIO TRANSFORMERS
COMMON POWER SUPPLY-
100, 120, 240, 50/60 Hz
REDUNDANT POWER SUPPLY FOR SAFETY
SCREW TERMINALS FOR
INPUTS & OUTPUTS

10 MODULES FOR AUDIO NEEDS

RK-PA	RK-AGDA
RK-VCADA	RK-DAADJ
RK-MLD	RK-ALC
RK-DA	RK-SC
RK-LA	RK-SB

SEND FOR FREE CATALOG

SESCOM INC.

2100 WARD DR.
HENDERSON NV 89015 U.S.A.
702-565-3400, 800-634-3457, FAX 702-565-4828

Circle 17 On Reader Service Card

High Yield CD



The Technics SLP170

When it comes to receiving a great return on your investment, look to the SLP170 CD player from BSW and Technics. No other machine offers so much for so little...such as: Durable linear motor transport for accurate tracking. Auto-cue-to-music for fast and sure cueing at the beginning of audio, and Technics exclusive MASH digital-to-analog converter that dramatically improves sound quality.

Maximum yield from minimum investment...get it all with the SLP170 from BSW.

BSW®

BROADCAST SUPPLY WEST

America's Full-Time Broadcast Supplier

1-800-426-8434

ORDERS • INFORMATION • SPECIFICATIONS

BSW • 7012 27th Street W • Tacoma, WA 98466 • FAX 206-565-8114

Circle 127 On Reader Service Card

“Other guys imitate us, but the originals are still the greatest.”

First they tried to copy StereoMaxx™, now ModMinder™. Are the engineers at Modulation Sciences too inventive for their own good? It's beginning to look that way.

StereoMaxx showed program directors around the country that AM or FM stereo could sound wider, fuller, bigger. And that an enhanced stereo image could be as devastating to the competition as extra loudness. Our competitors poo-pooed the concept at first, but they've acknowledged that StereoMaxx works flawlessly and does everything we promised. How? By introducing their own imitations.

Now, those imitations can't duplicate StereoMaxx's patented design. So they can't deliver the ear-grabbing punch and excitement StereoMaxx adds to any stereo format, on any kind of radio. In fact, it's hard to imagine anything the copy-cats could do that StereoMaxx can't do better.

Last year the Modulation Sciences engineering team did it again—with ModMinder, the first digital peak modulation measurement device. Again, our competitors scoffed. Some even charged that ModMinder wasn't legal.

The questions were finally laid to rest by an FCC Declaratory Ruling affirming the legality of ModMinder's design and operating principles. Today, hundreds of stations are using ModMinder to get all the modulation they're entitled to, along with the cleanest signal possible. And once again some of the same people who tried to destroy ModMinder by spreading rumors are now trying to profit from our innovations by announcing copies of our product.

StereoMaxx. ModMinder. Two one-of-a-kind products. Both available right now, from one company that really believes in new ideas—Modulation Sciences. For more information, call us toll-free at (800) 826-2603.



modulation sciences, inc.

12A World's Fair Drive • Somerset, NJ 08873

Tel 908-302-3090 • Fax 908-302-0206 • Toll Free 800-826-2603

BUYERS GUIDE

Cart Machines and CDs

Dura Trak 90 Hits the Spot

New Cart Machine Brings an End to Motor Noise And Muddy Playback at Christian WGCA

by **Jim Taylor, Ops. Mgr. WGCA-FM**

QUINCY, Ill. At WGCA-FM, we broadcast contemporary Christian music and entertainment digitally via com-

USER REPORT

compact disc and DAT sources. We rely heavily, however, upon the ease, speed and convenience of tape cartridge machines for our spot loads.

WGCA went on-air in September 1987 with two of the leading cartridge machines of that time. But before that first year was over, we had begun to experience such serious problems with motor noise and muddy playback that we decided an immediate equipment change was in order.

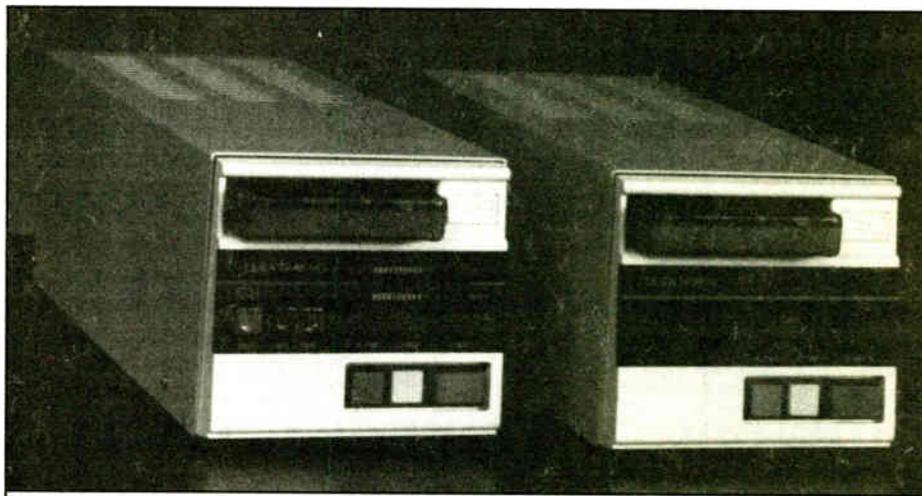
As a music-intensive station with the latest in modern digital music production, the quality and performance of our analog cart machines quickly became a critical link in the overall chain. Most of our programming and spot sets feature the same type of music. WGCA listeners and staff could hear the significant variance between the audio of each. I found that situation simply unacceptable.

Research into the other cartridge machines available at that time revealed some potential candidates, but the budget restrictions most new stations experience had us nearly convinced that a high-quality yet economical solution could not be reached.

Bob Arnold, audio sales manager at Broadcast Electronics, suggested we field test BE's soon-to-be-introduced Dura Trak 90 cartridge machine.

Our system—the first Dura Trak 90 record/play cart machine manufactured by BE—still is in regular service today. So far, we have found no comparison in quality or durability.

As programmer and operations manager, I want consistent audio quality with



The Dura Trak 90 from Broadcast Electronics gave WGCA spot/music quality consistency.

The quality and performance of our analog cart machines quickly became a critical link in the overall chain.

a bottom line we can afford; on-air talent seeks ease of use and engineering demands durability and easy maintenance. The Dura Trak 90 satisfies each of these requirements.

Its heavy construction allows the machine to take everything our on-air staff can dish out while continuing to deliver

the excellent on-air audio our demanding listening audience has come to expect from WGCA.

a call to the BE customer service group.

I've been told that Broadcast Electronics has introduced an improved version of the Dura Trak 90, the Dura Trak 90A. The only change in this new model is the addition of the same DC servo motor as BE's top-of-the-line Phase Trak 90 cart machines.

Unfortunately, as well as WGCA's current Dura Trak 90 continues to perform, it may be some time before I'll have the chance to check out that new Dura Trak.

Editor's note: For information on the Dura Trak 90 cartridge machine (or its successor, the Dura Trak 90A), contact Bob Arnold or Ted Lantz at Broadcast Electronics Inc.: 217-224-9600; FAX: 217-224-9607, or circle Reader Service 16.

BUYERS GUIDE INDEX

Broadcast Electronics Dura Trak 90 Cart Machine
by Jim Taylor, WGCA-FM **33**

Radio Systems RS-2000 Cart Machine
by David Seavy, KROC **34**

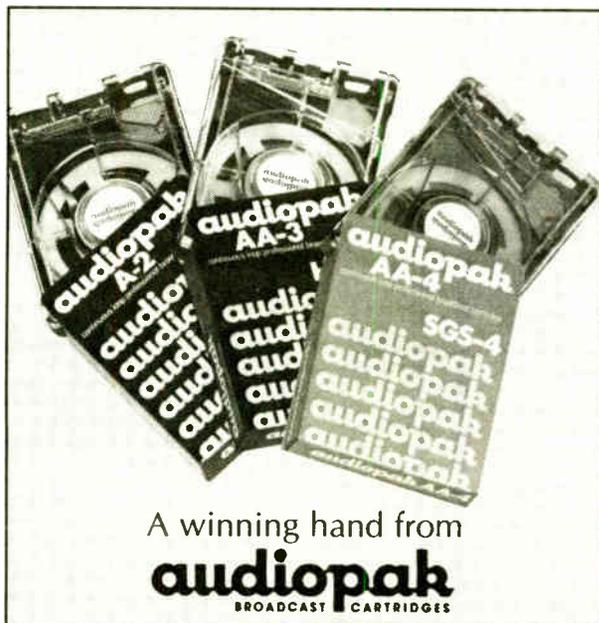
Studer A727 CD Player
by Stephen Cellum, WNYO-AM/FM **37**

Sony CDK-006 Audio Disc Loader
by Hagai Gefen, Gefen Systems **37**

ITC Series 1 Cart Machine
by Richard R. Lucas, WJNO/WRMF **41**

Denon DN-970FA CD Cart Player
by Kent Randles, KZAP **42**

Also, Technology Updates from 360 Systems, Henry Engineering and Fidelipac; Information from Technics.



A winning hand from
audiopak
BROADCAST CARTRIDGES

RADIO PRODUCTS DIVISION

800/525-1037

Four Oaks, NC 27524
FAX 919/934-1537

Pick a cart... any cart!

It's a sure bet — whichever Audiopak cart you choose, your spots, promos and music will come up aces, no matter whose deck you use! Any way you cut it, with Audiopak's high-quality, precision carts and our economical pricing, you'll never miss a trick!

audiopak
BROADCAST CARTRIDGES

from

The Preferred Source.

BROADCAST SERVICES/EME

The Davis Communications Group, Inc.

RS-2000 Performs for KROC

by David Seavy, CE
KROC

ROCHESTER, Minn. Familiar problem: KROC needed new cart machines. New solution: the RS-2000 from Radio Systems.

Several new models are on the market, so I shopped carefully. This cart machine has some impressive features. The hold-down system is solid: It uses four separate top rollers made out of a material called delrin, and a left-guide block of delrin supported by compression springs. Other machines I inspected use copper tongues or molded

plastic parts. In my experience, both tend to wear out.

The deck plate is half-inch thick machined aluminum; switches are big and illuminated, making the front panel easy to use. There's no microprocessor, so repair is not difficult and noise rejection is good. Three removable circuit boards seat into gold-plated mating connectors, which I prefer over edge cards.

More consistent tape travel

The machine uses a cool-operation solenoid with a low-voltage design that operates off constant current. This provides more consistent tape travel than do

solenoids that rely on rectified AC lines or regulated voltage. The entire machine runs very cool.

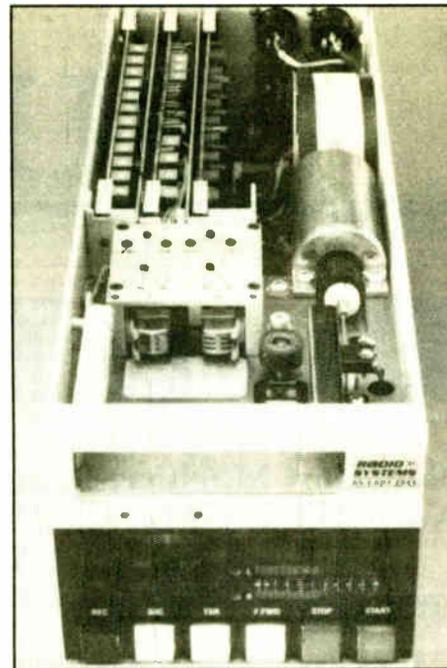
The motor is a crystal reference direct-drive DC servo; it doesn't rely on the power line for speed reference, and there are no belts to slip or break.

USER REPORT

So right up front, the quality was apparent. But whistles and bells are important too, and this machine is loaded with them, including a timer, three cue tones, fast forward, cart-not-cued lockout and a 1K tone defeat.

Audio inputs and outputs are on XLR connectors. You can raise and clean the pinch roller by holding the play button. And a splice detector is activated by pushing the record button three times.

Adjusting the azimuth of the heads is simple, because Radio Systems put



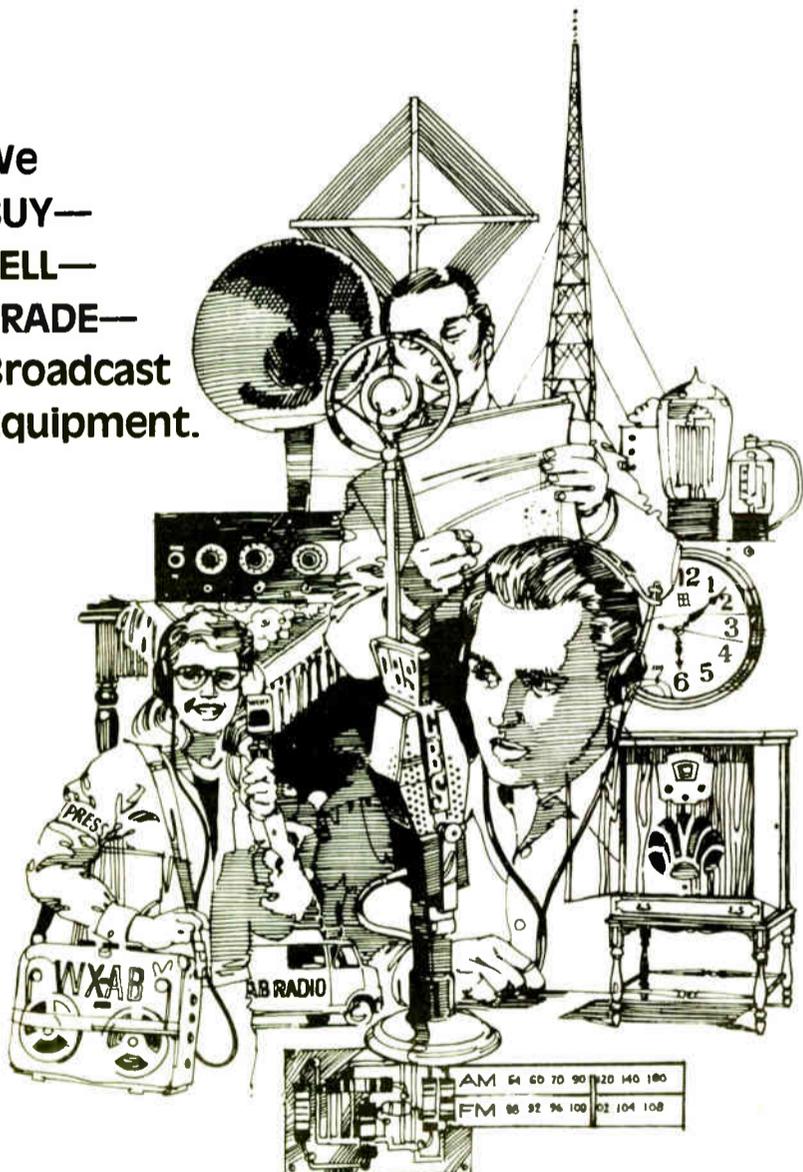
The RS-2000 cart machine from Radio Systems allows KROC the best sound it has ever had.

Here at KROC, where most of our music comes from CDs, we need the highest possible audio quality. The RS-2000's audio chain has no transformers.

GET IT RIGHT
FROM HARRIS ALLIED

YESTERDAY, TODAY, TOMORROW.

We
BUY—
SELL—
TRADE—
Broadcast
Equipment.



At Harris Allied Equipment Exchange, we accept TRADE-INS, SELL NEW and USED gear and selectively BUY used radio equipment. Call us today. Let us help you, economically!

HARRIS ALLIED
EQUIPMENT EXCHANGE

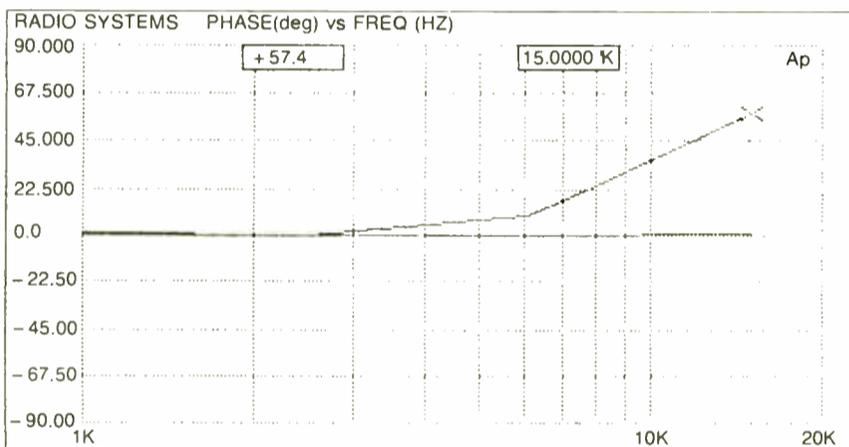
FAX 317-966-6321

317-962-1471

635 SOUTH E ST. • P.O. BOX 1487 • RICHMOND, IN 47374

©HARRIS/ALLIED 1990

CHART A STEREO PHASE CORRECTION ON THE RS-2000 CART MACHINE.



The upper cart is almost 58% out at 15 kHz but still within NAB standards. The same cart with phase correction is virtually indistinguishable from 0.

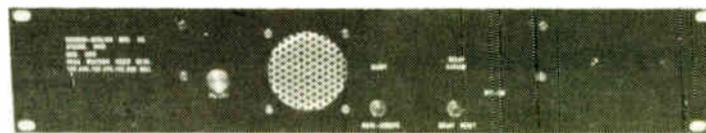
recessed adjustments on the front panel. Major settings like tone sensors, bias, meter settings and EQ are accessible at the top of the circuit cards.

The machine provides both high and low frequency EQ.

The first stage of the audio path provides 20 dB of unequalized gain, using a matched transistor pair (LM394) and half of a 5532. This gives excellent noise and transient performance.

(continued on page 41)

WEATHER RADIO Model CRW



Price \$540.00

Sensitivity .28 microvolts for 12 dB quieting. All 3 frequencies. Alert tone demutes receiver, closes relay and gates audio to 600 ohm rear terminals. Another set of rear terminals has continuous 600 ohm audio output. Double conversion crystal controlled, crystal filter in first I.F., ceramic filter in second I.F. Dual gate MOS FET front end. 50 ohm coaxial input. Adjacent channel (j25 kHz) down to 70 dB. 19" rack mount, 3 1/2" H, all metal enclosure. In stock—available for immediate delivery.

GORMAN REDLICH MFG. CO

FAX 614-592-3898 • 257 W. Union St. • Athens OH 45701 • 614-593-3150

Buy anything we make,

The DAT Standard.

We all know it: broadcasters are a constant lot. Despite DAT's great promise, at first most Radio stations, TV stations, and production houses took a wait-and-see attitude toward the new format.

But today, five years after the format was unveiled, two years after the RS-1000 was developed, and on the brink of a consumer DAT introduction, RS-DAT has emerged as the Pro DAT Machine. This means that over 300 units are now in use at such prestigious institutions as ABC, CBS, the U.S. Navy, BBC, Mutual, Canadian Broadcasting Corporation, KFIH in LA, WQCD in NY, Greater Media, and hundreds of others.

RS-DAT is the perfect automation machine. Because it's the only one with end-of-message cue and broadcast standard remote control, it easily connects to all existing systems. And remote cue access adds a whole new creative dimension to automation programming.

In fact, all of the prestigious automation companies whose logos appear on this page have integrated RS-DAT into their automation systems and recommended it to their customers for the best DAT performance. RS-DAT is tested and ready for automation, or as a live source in your air studio, or for DAT archiving.

The world is going DAT—RS-DAT—the one that works. Call today or contact your fine computer directly about RS-DAT for automation.

RADIO SYSTEMS INC.
110 High Hill Road • P.O. Box 458 • Bridgeport, NJ 08014-0458
609-467-8000 • 800-523-2133 • FAX 609-467-3044

INTRODUCING RS CART 2000. A great new cart machine.

What is every good and true thing in the world today but an idea that has been put into action? The RS CART 2000 is the most exciting new idea in the broadcast automation field. It is a true revolution in the way we think about and use our carts. It is a true revolution in the way we think about and use our automation systems. It is a true revolution in the way we think about and use our broadcast equipment.

It is a true revolution in the way we think about and use our broadcast equipment. It is a true revolution in the way we think about and use our broadcast equipment. It is a true revolution in the way we think about and use our broadcast equipment.

RADIO SYSTEMS INC.
110 High Hill Road • P.O. Box 458 • Bridgeport, NJ 08014-0458
609-467-8000 • 800-523-2133 • FAX 609-467-3044

SATISFACTION GUARANTEED.

What's going on in the broadcast business? Let me tell you what we understand the RS Series means to you. It means that you can get the most out of your investment in broadcast equipment. It means that you can get the most out of your investment in broadcast equipment. It means that you can get the most out of your investment in broadcast equipment.

It means that you can get the most out of your investment in broadcast equipment. It means that you can get the most out of your investment in broadcast equipment. It means that you can get the most out of your investment in broadcast equipment.

RADIO SYSTEMS INC.
110 High Hill Road • P.O. Box 458 • Bridgeport, NJ 08014-0458
609-467-8000 • 800-523-2133 • FAX 609-467-3044

and don't pay for it!

Radio Systems announces the most amazing new lease program in broadcast.

Buy an RS Series Console, or any package of our products. Put no money down, and make no lease payments until next summer.

This special program isn't a come-on with hidden costs or high back-end charges. Radio Systems will pay the *first six months* of your lease for you as an incentive to buy now. Your monthly payments, when they do begin, will still be low, with no special conditions.

Radio Systems products have always been a great value. And now, you can own them at no cost until well after your Christmas billings are collected.

Contact a Radio Systems sales engineer for an exact quotation and payment schedule on the package of studio products you need today.

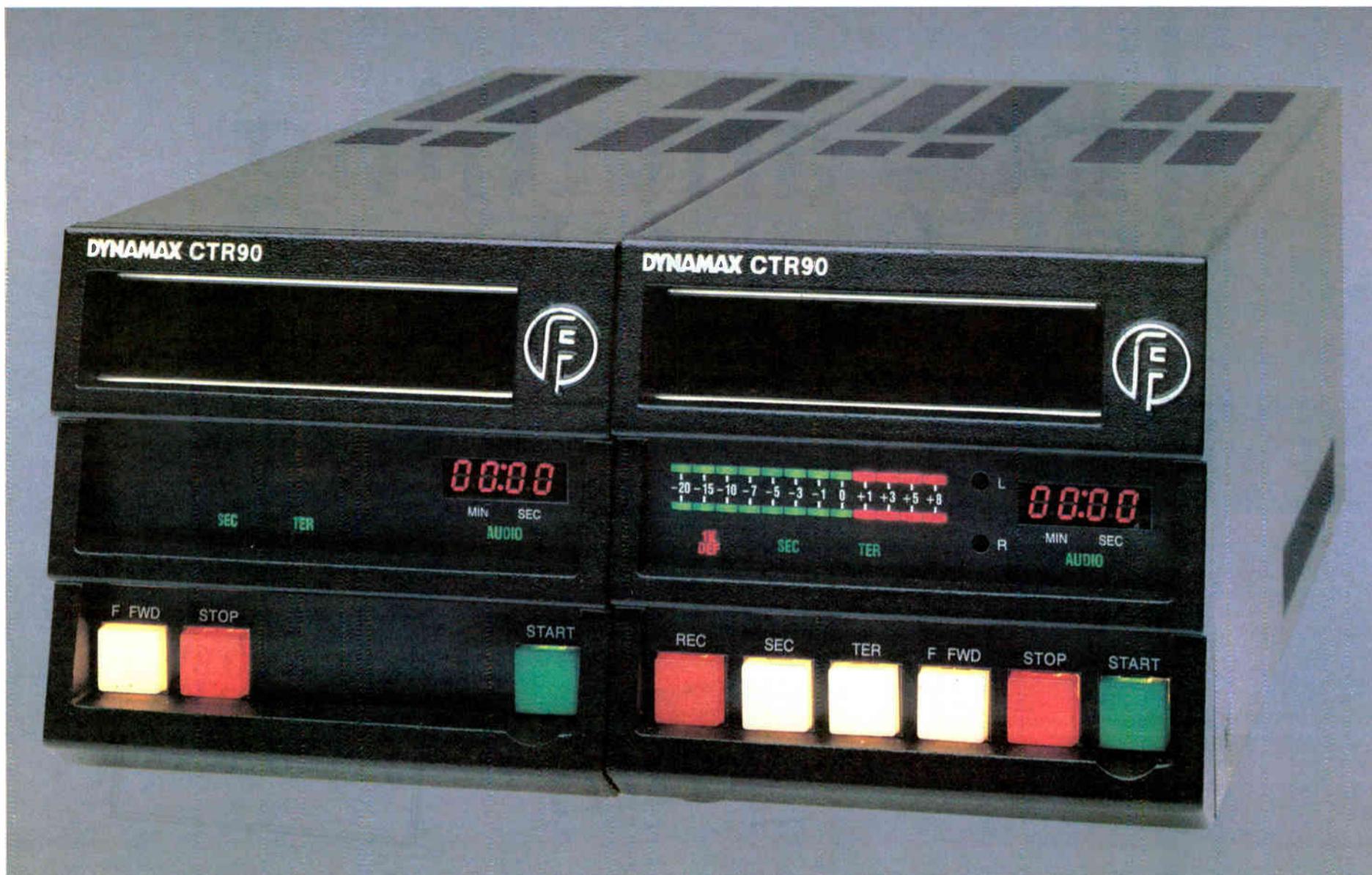
Three examples of how leasing from Radio Systems can work for you:

Buy This	Pro List	Pay Now	54 Payments Beginning in 6 months
Console Package:			
(1) RS-12 Console	\$6,495.	\$0	\$167.
Cart Machine Package:			
(1) RS-2004 Rec/Play Stereo	\$2,895.		
(3) RS-2002 Play Stereo	\$7,185.	\$0	\$252.
Console & DAT Package:			
(1) RS-12 Console	\$6,495.		
(2) RS-1000 DAT	\$7,990.	\$0	\$362.

Lease prices are approximate; rates may vary. Rates are based on five-year lease with 10% buyout. Customer makes no payments for the first six months. Credit approval required; simple form application for packages under \$15,000.

RADIO SYSTEMS INC.
Manufacturers of Professional Broadcast Equipment

110 High Hill Road □ P.O. Box 458 □ Bridgeport, NJ 08014-0458 □ 609/467-8000 □ 800/523-2133 □ FAX 609/467-3044



The New Dynamax® CTR90 Series Sounds as good as CD on the air

With a -81 dB signal to noise ratio, the new Dynamax CTR90 Series is the best piece of equipment that we have ever built. And, we're convinced, the best cartridge machine ever built. What's more, the CTR90 Series outperforms other elements of the broadcast chain, including typical STLs, excitors, transmitters, and even the best audiophile quality receivers.

In addition to Dolby HX Pro™ Headroom Extension and DNR® Dynamic Noise Reduction, the CTR90 Series provides many useful features including Extended Scale VU/PPM Metering, a Real Time Minutes & Seconds Timer, Active Balanced

Inputs & Outputs, and both XLR and "D" type Input/Output Connectors. All models are ruggedly constructed to Dynamax standards, with toroidal transformer based powering, constant current solenoid drive, DC/PLL motor control, and an improved high stability Head Bridge with non-interactive adjustments.

And, believe it or not, the new and fully loaded Dynamax CTR90 Series is about the same price as our CTR10 Series, the most widely accepted cartridge machine worldwide for the past 4 years. So, if you want top value, and cartridge performance comparable to CD, try the Dynamax CTR90.

Call your Dynamax Dealer or Fidelipac for a complete CTR90 Series brochure.



Fidelipac Corporation □ P.O. Box 808 □ Moorestown, NJ 08057 U.S.A. □ TEL 609-235-3900 □ FAX 609-235-7779 □ TELEX 710-897-0245

CTR90 Series Signal to Noise Ratio

-81 dB, "A" Weighted, referenced to 250 nWb/m, with DNR active. -70 dB, "A" Weighted, referenced to 250 nWb/m, with DNR inactive.

Dolby HX Pro Headroom Extension originated by Bang & Olufsen and manufactured under license from Dolby Laboratories Licensing Corporation.

DNR is a registered trademark of National Semiconductor Corporation under U.S. Patents 3,678,416 and 3,753,159.

Studer A727 Logs Reliability

by Stephen Cellum, DE
WNYO-AM/FM

NEW YORK This week in New York I saw a CD player selling for a mere \$99. So why on earth should I pay \$2,695 for a Studer A727?

Can it really be that much better than

the generic consumer model in its snazzy black box that costs four percent as much as the Swiss thoroughbred?

I guess I'd have to say yes, since we have eight 727s—along with two of the older A725s—in our radio facility. First of all, the price seems to fluctuate erratically and you can probably buy 727s for

around \$2,200 (although within the last year we bought some for \$1,704 each).

Our oldest 727 has been running for two years, probably logging 10 hours of operation a day, without adjustment, servicing or any other form of human intervention. They sound good, too. The four-times oversampling decoder is built around a Philips dual digital-to-analog converter chip.

Easy connection

Connecting the A727 to other equipment is easy. The audio outputs are at a nominal +4 dBu level and are provided on XLR-type connectors. The interface for the control logic of the A727 is very flexible. A 25-pin D-connector on the back of the unit allows you to remote almost any function.

The most useful feature for us was the fader start control, which disables all of the front panel controls (even the power switch) when the unit begins playing the CD. Thus, no more program interruptions caused by a jock accidentally unloading the CD playing on the air.

Unfortunately, this feature can be a little annoying in the production room. It makes it necessary to turn the CD module off and listen in solo or cue to skip around to different parts of a CD.

The A727 has some other nice features. One we use a lot is Autostop, in which the player's Pause indicator will begin flashing 15 seconds before

the end of a cut, which is handy when you don't know aurally how a track ends. An open collector logic output is available from this signal so you can hook it up to a bright light in the studio to arouse those snoozing jocks before the track ends.

Index scanning

A numeric keypad provides the usual functions of locating different tracks, and Index Scan will position the player to different index points within each track. It would be nice to have a little more flexibility in locating different points in a

USER REPORT

track. There are less expensive players that allow you to locate, say, 1 minute 23 seconds into track 2 by entering that information directly.

You can find any part of a CD by using the Forward and Reverse keys, but reaching the middle of a 20-minute track that way can be tedious. There also is a Modulation Start or Autocue function that allows you to cue to the beginning of sound on a track.

Everyone here is happy with the A727s. I wish they didn't cost as much as they do, but I think they are worth the money.

♦ ♦ ♦

Editor's note: For information on the A727 CD player, contact Dave Bowman at Studer Revox: 615-254-5651; FAX: 615-256-7619, or circle Reader Service 37.

Sony CDK-006 Boon For Gefen Systems

by Hagai Gefen, President
Gefen Systems

WOODLAND HILLS, Calif. The year was 1987, and I was working on a new database concept for cataloging and searching sound effects libraries on quarter-inch audio tape and MAG film for two studios in Hollywood.

I came across a new product from Sony, the Model CDK-006 audio disk loader, which is a large CD changer that operates much like an old 45 Seburg "juke box." It is capable of holding 60 CDs on a removable tray.

You can take any number of CDs and place them in the CDK-006's tray slots, log the information of the CDs into a computer and then insert the tray into the CD changer. The computer first searches for sounds based on a description from the CD database and then plays the sounds at random or from selections made from the computer screen.

We placed the 28-CD sound effects library created by Sound Ideas (based in Canada) in slots 1 to 28 on the CDK-006 tray. We then went on to create a database for the library by typing the company's catalog into an IBM PC computer (which became Gefen Systems's own product, the M&E Organizer system).

Sony's CDK-006 is basically a "black box." You must connect an external controller to make it play the CDs. There is no local control available for CD play functions, but with the help of an IBM PC or Macintosh computer, you get access to all the play functions, as well as other important numerical information vital to controlling the music or effect flow.

The CDK-006 is a durable and mechanically stable CD changer. Its relatively small size (20"×13"×17") allows for placement of the machine(s) in a 24-inch rack, and the removable trays make replacing CD libraries quick and efficient.

The unit's mechanical arm travels above the tray, picks up a CD, places it on a vertically mounted CD player, spins the CD and plays. It takes approximately 15 seconds to load or switch between CDs from the tray location to the player unit and virtually no time to switch between tracks on the same CD.

We were also able to use the Sony CDK-006 to make a CD music system (called Sound Touch). Using an optional touch screen and/or infrared remote control keyboard, we are now able to play 60 to 120 on-line CDs at random or from a pre-programmed "playlist."

For more information on the CDK-006 CD jukebox, contact Clayton Blick at Sony: 201-358-4196, or circle Reader Service 12.

USER REPORT

It's hard to stop.
It's hard to stop.



What is it about the Signature III that keeps so many leading station groups and consulting engineers coming back for another, and another, and...? Is it this console's unparalleled record of reliability and longevity? The LPB Signature III's easily maintained modular electronics? Its excellent RFI immunity? Or is it designed-for-radio features like the following:

- 3 inputs per channel
- Identical Program 1 and Program 2 output busses
- Remote starts on all channels (except channel 1)
- Mono/stereo input switch (on stereo consoles)
- Components and connections clearly labeled for painless installation and easy maintenance

Chances are, it's all of the above. But whatever the reasons, leading stations and engineers across the country demand Signature III's "unstoppable" performance. In fact, they've made it one of the most popular consoles ever built. If you've been spending too much time inside your console lately, contact your broadcast equipment dealer or call LPB for full information and specifications at (215) 644-1123.

LPB Signature III audio consoles are available in 6,8,10 and 12 channel stereo and 6,8 and 10 channel mono configurations.

LPB®

28 Bacton Hill Road • Frazer, Pennsylvania 19355
Tel: 215-644-1123 • Fax: 215-644-8651



Auditronics' new 210 may look like more of the same, but...

Our new 210 radio console looks remarkably similar to our 12-year-industry-leading 200 radio console...until you look beneath the surface. Inside the 210 you'll find improvements in every section you can hear and use. From our new lower-noise input preamplifiers to our new transformerless output modules. From our new overbridge and broader acces-

sory selection to our standard clock/timer with sequencer capability that you can slave to your house system.

All-new modules include an upgraded telephone interface with direct recorder output that doesn't require an input module or third bus. All output modules are identical full-featured stereo so you can interchange at will, and you'll need fewer spares.

Manufacturing innovations throughout the 210 allow us to deliver Auditronics' quality at a price you'll find very attractive. In addition, you get our factory-direct warranty service for the first year, backed by Auditronics' legendary lifetime technical support.

Your radio console for the 90s is the Auditronics 210.



auditronics inc.

3750 Old Getwell Road, Memphis, Tennessee 38118 • 901-362-1350

Circle 77 On Reader Service Card

World Radio History

Cart Machines Hold Their Own

by Charles Taylor

FALLS CHURCH, Va. In the 20 years since its introduction, the cartridge machine has become as much a staple at radio stations as bread and milk are to America's grocery lists.

It's a simple fact that in stations from Cheyenne, Wyo. to New York City, the familiar cart is applied to missions as vital as music airplay and spot recording/play.

Because of their popularity, manufacturers over the years have devoted great

effort to improve sound quality and to develop features that will make cart machines all the more appealing.

As a result, the cart machines of 1990 are said to rival their more technically advanced compact disc counterparts in over-the-air sound quality, while maintaining the ease of use that has kept them so appealing.

"It's a tried and proven technology. The cost of the medium is very inexpensive and basically, it's a foolproof device. Everybody in the broadcast industry knows to push a green button to oper-

ate it," said Jim Woodworth with ITC.

By the end of the decade, however, some in the industry say that the impending influence of digital technology

and flutter correction, some say the medium is as good as it's going to get.

"There's not much left to do—instead of using metal, we're now using space age plastics, which are stronger and cheaper. Otherwise, I think we've hit the peak as far as sonic technology goes," said Woodworth.

INDUSTRY ROUNDUP

will threaten the cart machine. Some go so far as to say that digital's influence could eventually turn today's staple into tomorrow's curious relic.

Cart battles reel-to-reel

The cart made its broadcast debut in 1969—a time when reel-to-reel was the predominant source for station playback and recording. The new medium quickly became a fundamental broadcast element because of its operational simplicity and competitive cost.

But there were limitations, particularly in sometimes inferior sound quality. Since then, while most cart machines' functions have remained basically the same, sound quality has seen drastic improvement. "The last 10 years have shown a terrific refinement of the medium," said Dan Braverman, president of Radio Systems. "They were always convenient. Now they are both convenient and sound good."

With improvements also seen in phase

Digital yes, but when?

With digital revolutionizing some aspects of audio, many claim that it's only a matter of time before the technology overtakes other professional playback and recording gear. Even now, Denon is introducing a write-once compact disc-based cart deck to markets outside the U.S.

But there are major obstacles ahead, observers agree, before carts become a thing of the past.

"Over the last few years with the introduction of digital, its benefits have started to draw the attention of the broadcast market. We're now beginning to understand the advantages of digital audio recording and playback mechanisms. But we have yet to see something designed especially for them," said Don Bird with 360 Systems.

"The cart machine will be around as long as any of us in the industry will be alive, certainly because of small market users who won't be able to afford digital,"

(continued on page 46)

People . . . Energy-Onix has announced the appointment of Ernie Belanger as VP of sales. Belanger formerly was sales manager of Barrett Associates, a California-based broadcast distributor.

JVC Professional Products Co. has named Sidney Sterchele national service manager, responsible for the organization and supervision of all JVC product training programs for employees, dealers and users.

Digital Audio Research named Gillian Blackburn to its Pro-Audio sales team. Previously, Blackburn worked with digital and audio equipment sales in Europe.

Alactronics, Inc. recently hired Jan Parry to head up its field services division. Parry formerly served as senior broadcast engineer for the Christian Science Broadcasting Center in Boston.

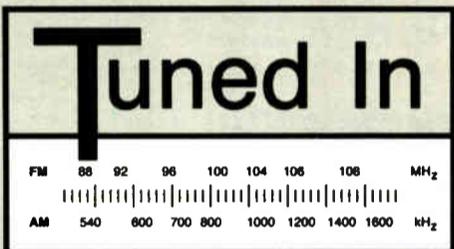
Relocations . . . Benchmark Media Systems has relocated to a facility

nearly three times the company's former size, to accommodate more design, production and engineering space. The new facility is at 5925 Court Street Road, in Syracuse, N.Y.

The Sales and Marketing Co. of Sony Business Professional Group will move to a new headquarters at 3 Paragon Drive in Montvale, N.J. The move is designed to accommodate a recent expansion and will involve all national sales, market-

ing and product management functions.

Acquisitions . . . Otari Corp. of California, has announced its acquisition of King Instrument of Westboro, Mass. This acquisition is part of a strategy outlined by Chairman M. Hosoda to diversify Otari's business. Otari also acquired Sound Workshop Inc. and Digital Creations Corp., of New York in June 1989.



Rebuilt Power Tubes

Econco

Approximately
One Half The Cost Of New
3,000 Hour Unconditional Guarantee
Some Of The Tubes We Rebuild

- | | |
|-----------|-----------|
| 3CX2500F3 | 3CX3000A1 |
| 3CX3000F7 | 4CX5000A |
| 4CX10000D | 4CX15000A |

5762 / 7C24

Call For Our Price List



Econco
1318 Commerce Avenue
Woodland, CA 95695 USA
Telephone: 916-662-7553
Fax: 916-666-7760 Telex: 176756

Circle 19 On Reader Service Card

GET IT RIGHT
FROM HARRIS ALLIED

SINGLE PLAY

The Denon DN-950FA CD Cart Player™ gives you direct-to-air CD quality. Plus the cart-style operation and unmatched reliability of Denon's industry-standard CD Cart System, already on the air at over a thousand radio stations nationwide. Allied, the CD Cart System experts, has it in stock now at a price that's anything but standard: ONLY \$1589.00 each, including 50 CD Carts.

HARRIS ALLIED
BROADCAST EQUIPMENT

800-622-0022
CANADA 800-268-6817

- STUDIO EQUIPMENT
- HARRIS RF PRODUCTS
- SATELLITE GEAR
- TRADE-INS
- TURNKEY SYSTEMS

"Call me, I'm interested." Circle 35.

"Send me literature." Circle 96.

360's Alternative to Analog

by Don Bird, Dir. Mktg.
360 Systems

TARZANA, Calif. 360 Systems is generally known in the audio industry as the originator of the first digital storage and playback systems for industrial applications. Recently, this experience with digital audio systems has been focused on the problem of creating a viable digital cart machine for broadcast use.

A two-year research and development project at 360 Systems has resulted in the DigiCart, scheduled for release in January. To provide an acceptable alternative

to analog tape carts and automation systems, it was essential that the DigiCart emulate certain cart-like features and

TECHNOLOGY UPDATE

functions. Another design criteria was that the DigiCart should easily interface with current analog equipment, to minimize studio re-design and user education.

Resembles cart deck

Outwardly, the DigiCart looks and operates much the same as analog carts. It has large illuminated stop, play and record buttons, secondary and tertiary cue indicators, and a drive for removable cartridges. The rear panel carries balanced XLR connectors for audio; EIA-232/485 serial ports for automation, logging and remote control; a remote connector for transport controls and their lamps; and contact closures for the cue outputs.

The DigiCart's front panel includes a Cue Select knob to "dial up" cues for playback, and a 40-character fluorescent display that indicates titles, running time, and other useful information in plain English. As an alternative to the front panel controls, a rear panel keyboard port allows connection of a standard "AT" style keyboard for titling.

Audio is recorded with 16-bit linear resolution using the latest oversampling technology and linear-phase filters. Recording may be done in mono or stereo, at selectable bandwidths of 10, 15, or 20 kHz, with sample rates up to 48K. The digitally encoded audio is stored on rugged, removable Digital Audio Disks.

The disks are enclosed in a hard plastic shell about the size of a CD "jewel box" and possess a much longer life-

span than tape carts. A single Digital Audio Disk will hold up to 10 minutes of 15 kHz stereo (20 minutes mono), and different formats can be contained on the same disk.

Besides the removable cartridge drive, the DigiCart's SCSI buss accommodates an additional internal hard disk, and as many as five external hard disks. Total combined storage time, including all optional drives, is upward of 25 hours.

Error correction

An extensive error correction scheme is used to maintain perfect audio reproduction. Bandwidth and format information are stored on a header for each cue, which the DigiCart reads to correctly configure itself for playback. Frequency response is 10 Hz-20 kHz, with 18-bit playback resolution; dynamic range is 92 dB, and interchannel phase

stantaneous.

Additionally, cues may be selected for playback while another cue is playing. The DigiCart's "stack mode" is a natural extension of this: Lists of cues can be created, stored as a playlist in memory, and recalled for continuous back-to-back playback from a single start command.

DigiCart's various software functions are divided into three menus. A Utility Menu provides file management: naming, copying, deleting and moving cues. A Setup Menu selects options such as replay lockout, pause, repeat, scan files, and auto-play modes. An Edit Menu includes non-destructive editing features: head and tail trim, fade in, fade out, and output level adjust for individual cues.

The DigiCart has been revised prior to its scheduled release in January. Following the DigiCart's first showing at the 1990 NAB convention, new features have been incorporated into the design. A BCD automation port is now included as a standard item, and internal RAM expansion is available for greater buffering capability. Spot rotation and several

Compare Audio Switchers

Compare 360 Systems' AM-16 switchers to the high-priced alternatives. You'll find excellent audio quality, a powerful feature set, and a price that won't overpower your budget.

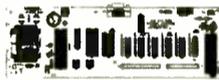


The **AM-16/B** is a complete 16 x 16 audio routing system designed specifically for small to medium-sized applications. Features include electronically balanced inputs with adjustable gain, non-volatile storage of crosspoint connections, a bi-directional EIA-485 serial interface, and a redundant power supply with low-hum toroidal magnetics. Compare audio quality too, and you'll find specs like a bandwidth of DC to 50KHz, THD + N below .005%, an SNR of 105dB, and crosstalk of -99dB!



AM-16/R Remote Control Panels provide multi-station remote capability with source/destination lock-out.

AM-16/CR Circuit Card Remote kits make it easy to construct custom remote panels.



AM-16/E Expanders add parallel channels, for creating stereo and multi-level systems.



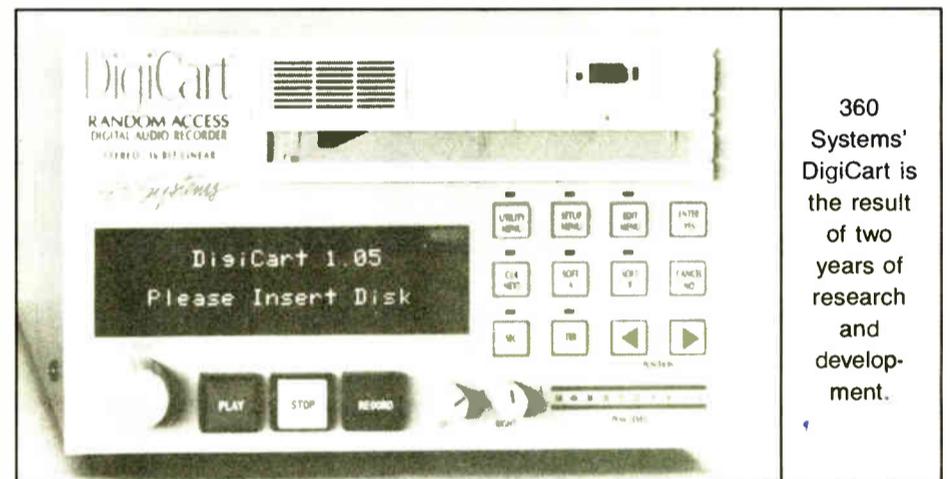
Patch-It™ Software allows fast on-screen control of crosspoint connections from a Macintosh computer.

Call or write to 360 Systems today for a technical brochure, and discover just how affordable excellent quality can be.

18740 Oxnard Street, Tarzana, CA 91356
Phone (818) 342-3127 • Fax (818) 342-4372

360 Systems
MADE IN USA

Circle 13 On Reader Service Card



360 Systems' DigiCart is the result of two years of research and development.

error is less than 0.5 degree.

In addition to excellent audio quality, one of the most powerful features the DigiCart offers to broadcasters is random access of every audio file on a disk. Any cue may be selected for immediate playback and, since the beginning of each cue is buffered in RAM, start time is in-

other software features have also been incorporated in the final design.

Editor's note: For more detailed information on the DigiCart and other 360 Systems broadcast products, contact Don Bird at 360 Systems: 818-342-3127, FAX: 818-342-4372, or circle Reader Service 31.

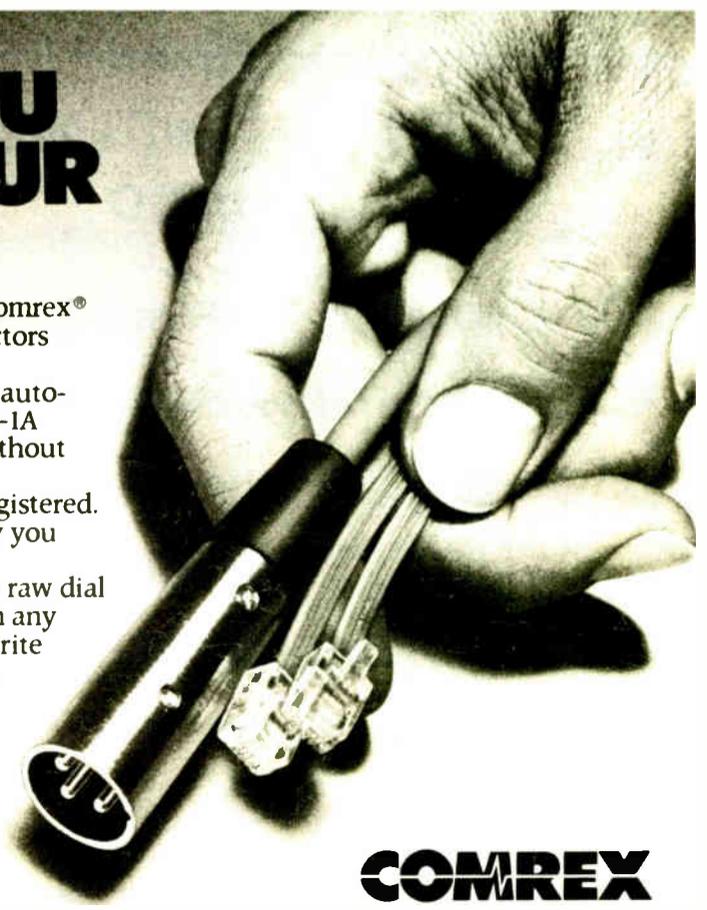
HERE'S ALL YOU NEED TO USE OUR COUPLERS

It's easy to put your audio on the phone with Comrex® broadcast couplers. Just plug in the standard connectors and you're ready to go.

Two models are available. The Comrex TCB-2A auto-answer coupler makes "listen lines" a snap. The TCB-1A manual coupler lets you send or receive program without interfering with normal phone use.

Built specifically for broadcast, both are FCC registered. And both provide clean audio and the dependability you expect from Comrex.

Comrex also makes frequency extenders to turn raw dial lines into broadcast quality. For more information on any Comrex product, call toll-free 1-800-237-1776. Or write Comrex Corporation, 65 Nonset Path, Acton, MA 01720. Tel. (617) 263-1800. TWX 710-347-1049.



COMREX

Circle 81 On Reader Service Card

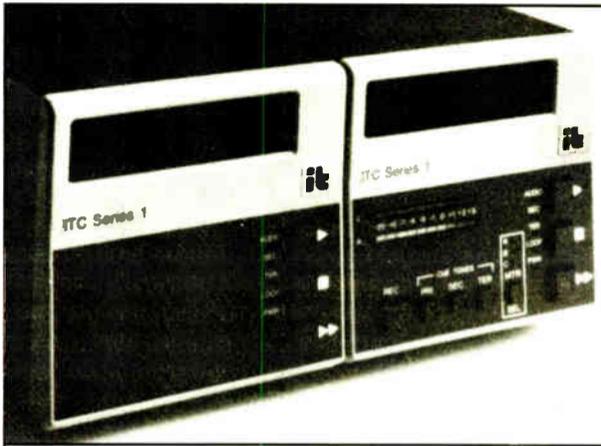
Series 1 Is the One for WRMF

by Richard R. Lucas, CE
WJNO/WRMF

WEST PALM BEACH, Fla. With four cramped workstations where all the editing is done and news voices and actualities flying fast and furious, the newsroom at WJNO/WRMF can be an awfully busy place.

Within the setting, our 20-plus year old cart machines were becoming unreliable, not to mention antiquated. So in searching for replacement machines I not only was concerned with cost and reliability, but also physical size and the inclusion of all the bells and whistles needed to make our air product flow.

These requirements made the choice of ITC's Series



The ITC Series 1 fit WJNO/WRMF's needs for cost, reliability and physical size.

1 obvious to me. This seemingly mundane-looking machine is packed with some goodies we engineers could only dream about just a few years ago, not all of which are immediately apparent.

Stereo-mono sensing

Another unique feature of the Series 1 is the sensing capability between stereo and mono modes. With a simple jumper change, you can enable the machine to playback left channel-only audio to both the left and right output amps. It's ITC's answer to an on-going problem we deal with daily: how to make stereo and mono carts compatible for use on both AM and FM.

This engineer is impressed. In fact, I wouldn't be at all reluctant to use these machines for FM stereo

It has all the goodies you'd expect in a top-of-the-line machine in their least expensive model.

playback where we're presently using the ITC Deltas. To me, the Series 1 is a better buy at \$800 less.

Having no provisions for auto-azimuth control, I wouldn't use them for critical applications, such as recording stereo music or spots, but for a good utility cart machine, the Series 1 will be a tough one to beat. Add to this the now-legendary ITC factory support and their two-year full warranty, and you've got a winner.

Editor's note: For more information on the Series 1 cart machine, call Bruce Helling at ITC: 800-447-0414; FAX: 309-828-1386, or circle Reader Service 39.

USER REPORT

1 obvious to me. This seemingly mundane-looking machine is packed with some goodies we engineers could only dream about just a few years ago, not all of which are immediately apparent.

Cool running

The first thing I noticed about the machine is how cool it runs, when compared with other cart machines. The power supply is a switching type, thereby eliminating a bulky, heavy power transformer, along with its magnetic field.

This makes the machine very flexible in that any AC line voltage between 94 V and 240 V will work fine with no jumper changing—great for our Florida brownouts. Another reason for its cool running is the new, dual-

winding solenoid. One winding provides the initial torque to engage the pinch roller, the other takes over to hold it in at considerably less power. Thus, the machine runs cool, even after hours of heavy or continuous use.

Other, less apparent features include a hard-surface nickel-plated, die-cast aluminum base plate with cast head brackets and cart guides. The hold-down springs are of a unique roller bearing type, and all active components are included on four plug-in boards—the mother board contains only traces, no active components.

The motor is a DC servo-type, the same Papst motor as used in ITC's 99B series. Heads and pinch rollers are also interchangeable with the rest of the ITC line.

Our programmers are pleased with the machine's full line of features. All three standard cue tones are accessible from the front panel for special editing, along with switchable LED VUs that include bias and cue

RS-2000 Excels at KROC

(continued from page 34)

The RS-2000's electronic stereo phase correction on playback is especially important to me since so many of our carts were recorded on other decks. The circuit uses all-pass voltage-varying fil-

replace every deck in the station with the RS-2000. Radio Systems has treated me well, and their products are un-touchable.

Editor's note: For more information on Radio Systems' line of cart machines, contact Paul McLane at 609-467-8000, FAX: 609-467-3044, or circle Reader Service 48.

Over the next two years, I plan to replace every deck in the station with the RS-2000.

ter networks requiring no adjustment and correcting for phase error on every cart we play, regardless of source.

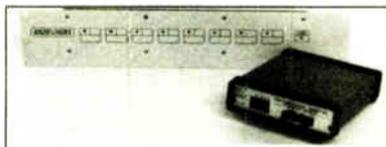
Chart A shows the difference in phase performance. The top line of this factory test sheet shows the phase error of a cart that meets NAB standards, without phase correction. The bottom line shows the same cart, with the RS-2000's phase correction engaged.

We can also take advantage of the machine's encode-decode flutter compensation, which puts a special pilot tone on the cue track. Radio Systems says that their flutter compensation will reduce flutter by 50 percent.

Over the next two years, I plan to

SINE SYSTEMS

DIAL UP REMOTE CONTROL



- ★ Up to 64 Channels of Status, Control & Metering
- ★ User Programmable Dial Out Tolerance or Status Alarms on Six Channels
- ★ FCC Legal
- ★ One Year Warranty
- ★ User Friendly
- ★ COMPLETE 8 CHANNEL SYSTEM STARTS AT LESS THAN \$1,400!

Call Your HE Sales Engineer Today!



(804) 974-6466
1305-F Seminole Trail
Charlottesville, VA 22901

Correction

In the Nov. 21 Buyer's Guide article, "Sidekick WYNY's SCA Solution," Modulation Sciences' phone number should be listed as 908-302-3090. The company's FAX is 908-302-0206.

GET IT RIGHT
FROM HARRIS ALLIED

DOUBLE PLAY




The only thing better than a Denon DN-950FA CD Cart Player™ is . . . two of them. You get back-to-back CD capability and added security. Plus Denon's automatic music-sensing, quick cue and review and end-of-message functions. This perfect pair is ONLY \$2979.00, including 50 CD Carts, from the people who've sold and installed more CD Cart Players than anyone else — Allied.

HARRIS ALLIED
BROADCAST EQUIPMENT

800-622-0022
CANADA 800-268-6817

- STUDIO EQUIPMENT
- HARRIS RF PRODUCTS
- SATELLITE GEAR
- TRADE-INS
- TURNKEY SYSTEMS

KZAP Adds Denon DN-970FA

CD Cart Player Fills Double Bill As Ideal System For Production and Occasional On-Air Use

by Kent Randles, CE
KZAP

SACRAMENTO, Calif. The moment I saw a prototype of the Denon DN-970FA CD cart player, I knew it was what we needed at KZAP.

We already had two DN-950FA CD cart machines on the air and one in the production room. But those machines were designed to be jock-proof on-air and lacked production features like a search/cue knob and programmable segment play.

USER REPORT

Also, having invested in several hundred of the cartridges that the Denons use, I thought the 970 would be appropriate, flexible and easy to use. This definitely has proven true.

Easy to read

At 16" x 8½" x 5¼", the 970 player is two inches deeper and almost two inches wider than the 950. The front panel is slanted back and easy to read even when on top of a desk. It includes a big knob for

search and cue, and smaller knobs for vari-speed and headphone level.

Buttons control play/pause, standby/cue and the mode features. There is a display for vari-speed percentage. You can go up or down 10 percent and program it to default to +2 percent.

On the back panel is the AC connector, power switch, fan opening and connectors for remote control, serial remote control and "tally" (end of message, etc.), BNC connectors for external sync in and external sync out, and XLRs for digital out and balanced left and right audio out.

When you slide a loaded cartridge in and it drops into place, depending on the presets, the unit automatically cues either to the beginning of track 01 or to the first audio that exceeds one of seven programmable thresholds.

Cueing at will

If you click the search knob to choose other track or index numbers while the machine is cueing, it will cue up to what you have selected instead. You also can use the search knob to scrub forward or backward, frame by frame.

In the fast search mode, more clicks bring one-quarter speed, real time, or four or eight times regular speed. If you push the play button and then use the search

knob to find the spot from which to start, pushing the cue button will make that place the starting point.

Some consumer CD machines will let you program a segment to repeat. The 970 will let you pick the segment and then allow you to move the start and end times around with the search knob even if they are in different tracks. Next, you can loop that segment or use the Play button to start it when you need it. Finally, you can store three start/stop points from anywhere on the disc.

You may have heard some horror stories about Denon's earlier DN-950F. Notice that there was no DN-970F.

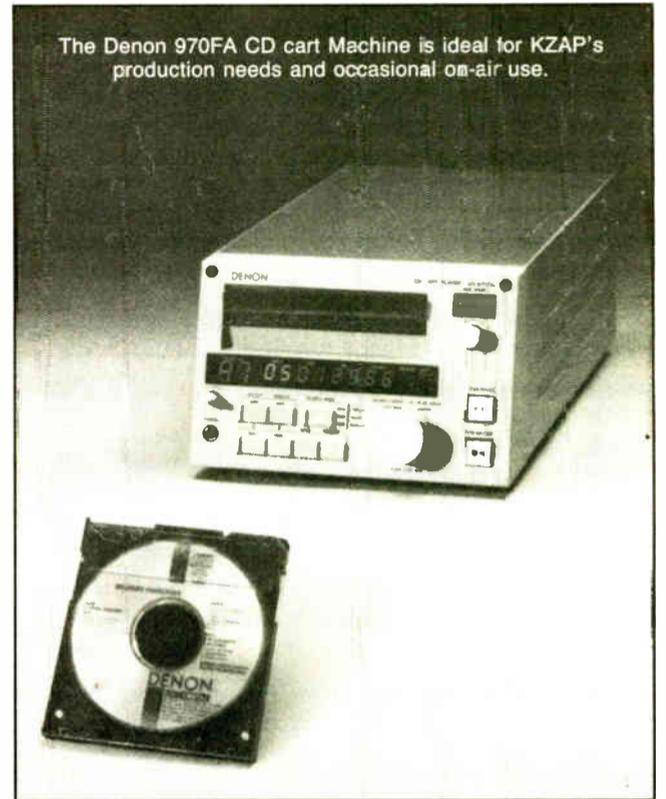
Since, cartridge handling mechanics have been beefed up, circuitry has been changed and the way the machines deal with a problem is much better.

The "F" machines would sit there skipping or jump back and forth. The "FAs" are much more civilized. Generally, they either play correctly or stop. They no

longer have to be aligned periodically. Lens cleaning is no as critical.

So now KZAP has four DN-950FAs and one DN-970FA. Even if a DN-970FA ends up being your only CD player, its ease of operation and numerous features make it an ideal machine for production and occasional on-air use.

The Denon 970FA CD cart Machine is ideal for KZAP's production needs and occasional on-air use.



Editor's note: For information on the DN-970FA, contact Laura Tyson at Denon: 201-575-7810, FAX: 201-808-1608, or circle Reader Service 116.

More Power To You.

MAXIMUM VELOCITY AND MINIMUM ATTENUATION

That's what MYAT rigid line and RF components deliver. We manufacture them using highest quality pure copper or aluminum, and thoroughly test each one before shipping. Princeton University's Plasma Physics Laboratory evaluated MYAT performance, and chose our components for their research reactor.

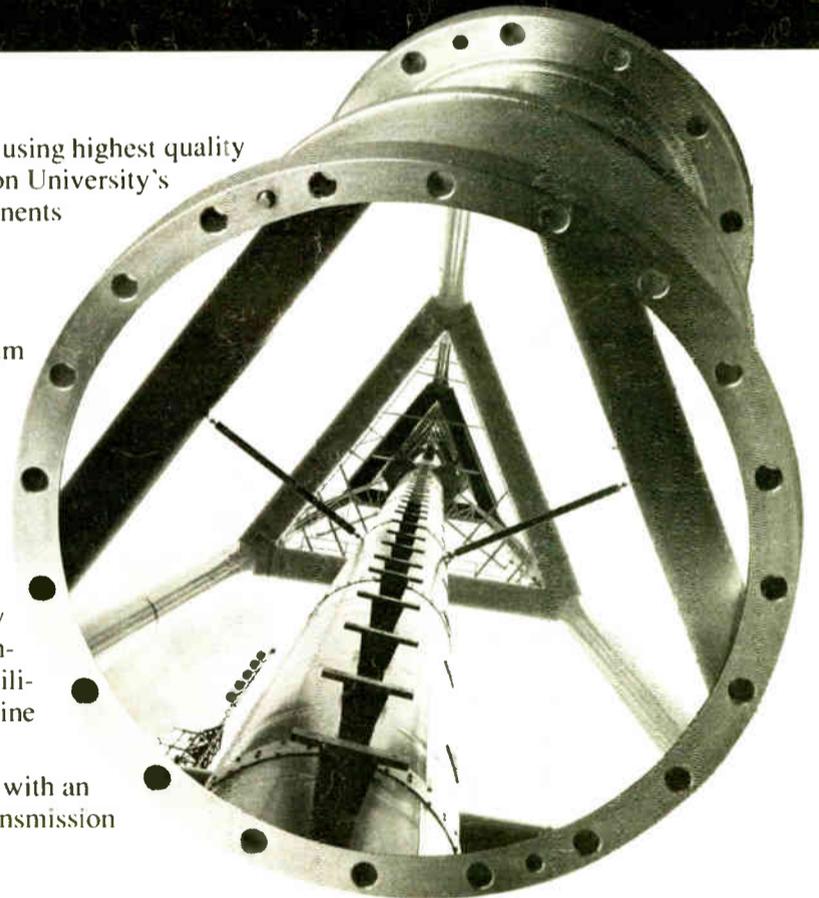
RELIABILITY AND LONGEVITY

They're important to you—and to us. So we use non-galling silver plated beryllium copper contact springs, brass elbow reinforcements and pure virgin Teflon inner supports. Every MYAT rigid line section and component is warranted for a full year. That's why you'll find the bright blue MYAT logo in transmitters and systems by Harris, Aerodyne, QEI, Micro Communications and Broadcast Electronics. And at thousands of broadcast stations worldwide.

SERVICE AND SUPPORT

Need a replacement fast? Check our catalog—virtually every item listed is ready for immediate shipment. Not sure what you need? Ask a MYAT engineer for technical assistance. Unusual requirements? Our computerized design and testing facilities turn them into "routine" projects. We did it with high-power 9¾" 50 Ohm line for KGON-FM's multi-station tower, and we can do it for you.

Whether you're planning a new tower, upgrading an older installation, or coping with an emergency, MYAT power is as close as your phone. Put it to work in your RF transmission system. Contact your RF distributor, or phone us at (201) 767-5380.



MYAT, INC.

Manufacturers of RF transmission equipment since 1951.

40 Years of Experience, 40 Years of Excellence.

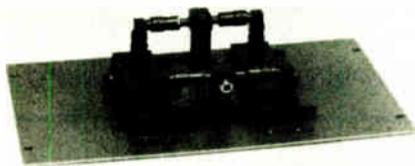
380 Chestnut Street • P.O. Box 425 • Norwood, NJ 07648 • Tel (201) 767-5380 • Fax (201) 767-4147

Circle 84 On Reader Service Card

World Radio History

MARKETPLACE

Send us your new product info. Be sure to include a black and white photo.
Send all submissions to Radio World Marketplace, P.O. Box 1214, Falls Church, VA 22041



Double bandpass filter

The Model D5948-1/6 from Microwave Filter Co., Inc., incorporates two separate 18 MHz ENG bands to protect receptions from other STL transmissions.

Rejection is 30 dB minimum at ± 16 MHz from passband centers. The filter also passes ENG band 1 and ENG band 6 with less than 3 dB loss.

For more information, contact **Bob Paul at Microwave Filter Company: 1-800-448-1666, FAX: 315-463-1467, or circle Reader Service 53.**

Stereo audio monitor

Wohler Technologies has developed the AMP-2 stereo audio monitor, which includes balanced XLR and unbalanced RCA inputs, and LED peak meters. Also included is an LED-matrix visual phase indicator volume control and balance control.

Two power amp and driver combinations handle the midrange and high frequencies in stereo and summed low frequency information is directed to a third channel.

For more information, contact **Will Wohler at Wohler Technologies: 415-285-5462, FAX: 415-821-6414, or circle Reader Service 86.**

R-TEC Systems remote

The Practically-Anywhere-Anything remote from R-TEC Systems has five user assignable and function programmable buttons to allow the user to interface to equipment via a single two-conductor cable up to a mile away.

The remote uses an MC50 Machine Controller and RK50 Remote Keypad, connected with any single twisted-pair cable to tie lines, hardwired or any link compatible with standard audio or DTMF signals.

For more information, contact **Dan Fogel at R-TEC Systems: 213-650-5256, FAX: 213-650-6639, or circle Reader Service 9.**

FM Interface study

The FM Interface study from Dataworld can be used to determine either the amount of interference received or generated by a nearby facility.

The study can also generate an allocation map, field strength, ERP and distance clearance to the site point.

For more information, contact **John Neff at Dataworld: 301-652-8822, FAX: 301-656-5341, or circle Reader Service 105.**

Pressure microphone

Neumann of Berlin has announced the TLM 50 pressure microphone, to

be marketed through Gotham Audio Corporation. The microphone features transformerless electronic circuitry in a wooden case with a swivel-ended cable for attachment to a microphone stand.

The TLM 50 is addressed from the side. The wire gauze grill is acoustically transparent leaving no interactive effect on the properties of the transducer.

For more information, contact **Jerry Graham at Gotham Audio: 212-765-3410, FAX: 212-265-8459, or circle Reader Service 49.**

Digital audio system

Basys, Inc. and Media Touch Systems have joined to produce a multi-user integrated digital audio system.

The multi-user integrated design can create news or commercial copy, control incoming audio feeds, edit, draw information from the center archive, assemble programs and play completed material.

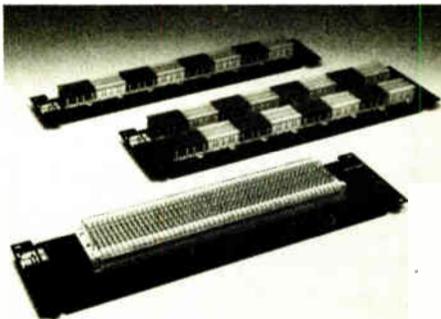
For more information, contact **Bruce Blackwell at Basys: 914-376-4800, FAX: 914-376-0865; or Jack Connell at Media Touch: 603-893-5104, FAX: 603-893-6390, or circle Reader Service 103.**

Digital storage device

The Digital Audio System (DAS) from Kingdom Technology is a storage device featuring digital audio recording and editing, audio FAX and integration with station controller automation.

The DAS can record more than 100 hours of programming as audio files which may be randomly chosen for instant playback with variable frequency response from 4 kHz to 20 kHz stereo, or two channel mono.

For more information, contact **Patricia Kohn at Kingdom: 904-664-6492, or circle Reader Service 83.**



Rack mount

The SuperPatch patch panel from Gentner is a flexible rack mount termination for wiring, capable of high wiring density.

For more information, contact **Gary Crowder at Gentner: 801-975-7200, FAX: 801-977-0087, or circle Reader Service 23.**

Definable filters

The customer definable filter concept (CDF) from Matthey Electronics gives prototype service with optional RF screening and low noise and distortion.

The CDF range gives equalized, minimized ringing and group delay control.

For more information, contact **Matthey Electronics in England: 011-44-782-577588, FAX: 011-44-782-575687, or circle Reader Service 66.**



Digital recorder

The Otari DTR-900-II is a digital audio tape recorder from Otari with PD format so tapes can be exchanged between Otari and Mitsubishi digital multitracks.

Other features include a front panel status display, 8x oversampled D to A convertors, linear power supplies for

all analog audio electronics and selectable crossfade times and curves.

For more information, contact **Sally Olson Saubolle at Otari: 415-341-5900, FAX: 415-341-7200, or circle Reader Service 6.**

Baseband enhancer

The DBE-1000/B dynamic baseband enhancer from Somich Engineering uses a stereo correlation adaptive filter for absolute pilot protection.

For more information, contact **Jim Somich at Somich Engineering: 216-526-4561, FAX: 216-526-4561, or circle Reader Service 130.**

Message repeating system

The microprocessor digital message repeating system from Neutrik can record, store and replay digitally stored information.

The system is available with three different types of memory and the ability to record 256 messages with separate cueing numbers and automatic end of message.

For more information, contact **Bill Dorman at Neutrik: 908-901-9488, FAX: 201-901-9608, or circle Reader Service**

GET IT RIGHT
FROM HARRIS ALLIED

TRIPLE PLAY

With three Denon DN-950FA CD Cart Players™, your station's CD Cart System gains even more power. Inside Denon's industry-standard CD Carts, nothing touches your valuable CDs but the laser beam. Denon's broadcast-ready balanced outputs and standard remote interface make it easy to improve your on-air sound. And the CD Cart Player experts at Allied make it easy to afford, with a tri-pack price of ONLY \$4329.00, including 50 CD Carts.

HARRIS ALLIED
BROADCAST EQUIPMENT

800-622-0022
CANADA 800-268-6817

- STUDIO EQUIPMENT
- HARRIS RF PRODUCTS
- SATELLITE GEAR
- TRADE-INS
- TURNKEY SYSTEMS

"Call me, I'm interested." Circle 67.

"Send me literature." Circle 79.

TwinMatch Offers CD Balance

by **Hank Landsberg, President Henry Engineering**

SIERRA MADRE, Calif. It's no secret that many broadcasters often use semi-professional or consumer stereo gear in their studios. Cassette decks and CD players are good examples of consumer items that work well in many broadcast applications.

There is, however, a caveat: you must interface these unbalanced (-10 dBv, Hi-Z) devices correctly with your studio gear if you expect them to work properly. If you find there isn't enough level (even with the pot on the board wide open) or if the au-

dio is distorted or lacking bass, you probably have an impedance mismatch or some other interface problem.

TECHNOLOGY UPDATE

About eight years ago we introduced The Matchbox for such interface jobs. It is a "two-way" level and impedance converter, ideally suited for interfacing the inputs and outputs of, say, a cassette deck.

But what about interfacing a CD

player? Because a CD player doesn't have any inputs, (it plays, but doesn't record) it needs only a "one-way" interface. Its unbalanced, -10 dBv, Hi-Z outputs need to be amplified to mate with balanced, +4 dBm Lo-Z studio lines.

That's where it may come in handy to utilize TwinMatch, our one-way interface designed for a pair of CD players.

TwinMatch is a dual stereo level and impedance interface that will convert the unbalanced outputs of a pair of CD players to standard balanced lines at +4 dBm. The circuitry is virtually identical to that of The Matchbox. The inputs accept an unbalanced input of -10 dBv; the input impedance is 25K ohms so the source is not loaded.

Signetics 5532 amplifiers are used to amplify the input signal to a balanced output at +4 dBm. The gain is nominally +14 dB, though trimmers are provided for gain adjustment. The outputs are electronically balanced, and will drive four 600 ohm loads to at least +24 dBm.

TwinMatch circuitry is DC coupled; there are no capacitors or transformers in the signal path. The noise floor is 85 dB below the normal output level. With at

least 20 dB of headroom, the overall dynamic range of the unit is 105 dB, actually about 10 dB better than a CD player. Direct coupling provides frequency response from DC to 40 kHz; distortion is below .01 percent.

Since most stations install CD players

TwinMatch is an ideal way to interface CD players to the console.

in pairs, TwinMatch is an ideal way to interface them to the console. Only one TwinMatch is needed for both players. It's



Henry Engineering's TwinMatch provides a one-way interface for a pair of CD players.

an easy and inexpensive way to get the job done the right way.

Editor's note: For information on TwinMatch, contact Hank Landsberg at Henry Engineering: 818-355-3656; FAX: 818-355-0077, or circle Reader Service 26.

GET IT RIGHT
FROM HARRIS ALLIED

Market Share Generator



COMTECH
3.8 Meter
Antenna



MICRODYNE
1100-FFC-X1 RDC(L)
SCPC Satellite Downlink Receiver



MICRODYNE
1100 PCDR-5
SCPC Demodulator

Leading stations all over the nation are adding market share by providing the information and entertainment their audience wants. With over 75 radio networks available via satellite, programs are available to boost your market share. Most sports-nets, state news-nets, and agri-nets are available through SCPC audio satellite.

Microdyne SCPC downconverters are the industry standard—none better for less. Microdyne PCDR-5 demodulators are feature-

loaded...more standard features than others offer as options! To complete the package, Harris Allied recommends the Comtech 3.8M high performance satellite antennas.

Improving market share... audio satellite from Harris Allied satellite. Inquire about *low monthly lease rates* as an alternative to purchasing.

HARRIS ALLIED
SATELLITE EQUIPMENT
317-962-8596
FAX 317-962-8961

3712 NATIONAL RD. WEST • P.O. BOX 1487 • RICHMOND, IN 47375

©HARRIS/ALLIED 1990

Super Wire Sale!

New stock left over from major installations and priced to sell.

Description	Quantity Available	List Price	Sale Price
West Penn 291 1 Pair w/Drain, Green	11 1000' Rolls	\$ 80/Roll	\$ 30/Roll
West Penn 291 1 Pair w/Drain, Orange	30 1000' Rolls	\$ 80/Roll	\$ 30/Roll
West Penn 291 1 Pair w/Drain, Red	3 1000' Rolls	\$ 80/Roll	\$ 30/Roll
West Penn 430 2 Pair w/Drain, Brown	10 1000' Rolls	\$130/Roll	\$ 50/Roll
West Penn 430 2 Pair w/Drain, Yellow	42 1000' Rolls	\$130/Roll	\$ 50/Roll
West Penn 430 2 Pair w/Drain, Grey	6 1000' Rolls	\$130/Roll	\$ 50/Roll
West Penn 439 4 Pair w/Drain	4 1000' Rolls	\$239/Roll	\$100/Roll
Belden 1057A 8 Pair, 16 AWG	1 500' Roll	-----	\$265/Roll
Direct Burial 17 Pair w/Copper Jkt.	1 500' Roll	-----	\$425/Roll
Alpha 2219 19 Pair w/Overall Shield	1 500' Roll	-----	\$250/Roll
Alpha 1327 19 Pair w/Overall Shield	1 600' Roll	-----	\$385/Roll
Alpha 2219 25 Pair w/Overall Shield	2 500' Rolls	-----	\$300/Roll
Alpha 6022 27 Pair	3 500' Rolls	-----	\$500/Roll
Arcor 32 Pair w/Ind. Drain	1 200' Roll	-----	\$350/Roll
RG-8 Coaxial Cable	2 400' Rolls	\$288/Roll	\$ 75/Roll
Olympic 5267 RG-213 Coaxial Cable	1 500' Roll	\$900/Roll	\$200/Roll
Alpha 18 AWG Hookup, Green	2 1000' Rolls	\$100/Roll	\$ 12/Roll
Alpha 18 AWG Hookup, Red	2 1000' Rolls	\$100/Roll	\$ 12/Roll
Alpha 18 AWG Hookup, Black	2 1000' Rolls	\$100/Roll	\$ 12/Roll
West Penn 115 22 AWG Hookup, Black	8 1000' Rolls	\$ 50/Roll	\$ 10/Roll
West Penn 115 22 AWG Hookup, Red	8 1000' Rolls	\$ 50/Roll	\$ 10/Roll
West Penn 106 12 AWG Speaker Wire	2 800' Rolls	\$ 80/Roll	\$ 40/Roll
West Penn 535 20 AWG 2 Cond.	1 900' Roll	\$126/Roll	\$ 90/Roll
West Penn 3285 20 Cond. w/Drain	1 100' Roll	\$ 85/Roll	\$ 40/Roll
West Penn 657 16 Twisted Pairs	1 250' Roll	\$145/Roll	\$ 85/Roll
West Penn 436 19 Pair w/Drain	1 100' Roll	\$127/Roll	\$ 75/Roll
Essex 25 Pair Telco Cable	1 1000' Roll	-----	\$100/Roll
Essex 25 Pair Telco Cable	1 500' Roll	-----	\$ 50/Roll
Alpha 1328 27 Pair Control Wire	1 500' Roll	-----	\$200/Roll
Belden 9463 Twin-Ax	2 800' Rolls	-----	\$300/Roll
Multi-Cable 78218SB Mic Cable	1 600' Roll	-----	\$ 60/Roll

NOTE: All wire is new and on rolls. All sales are final. TERMS: Prepay or C O D. FOB Factory (Freight additional)

RADIO SYSTEMS INC.
Manufacturers of Professional Broadcast Equipment

110 High Hill Rd. • P O Box 458 • Bridgeport, NJ 08014-0458 • 609/467-8000 • 800/523-2133 • FAX 609/467-3044

"Call me, I'm interested." Circle 15.

"Send me literature." Circle 61.

Circle 89 On Reader Service Card

CTR90 Boasts Sonic Superiority

by Bill Franklin, DE
Fidelipac

MOORESTOWN, N.J. One of the most significant improvements broadcasters can offer to listeners is better clarity and signal to noise ratio of the on-air signal. The new Dynamax CTR90 series cartridge machine draws upon advanced electronic design to help broadcasters bring such improved audio to their audience.

Component selection

Audio signal path designs with solid state circuitry are straightforward in the CTR90, and typical circuit topologies are

TECHNOLOGY UPDATE

easily recognizable. The CTR90 audio signal paths are all DC coupled—the idea was to eliminate coupling capacitors which add adverse distortions to signals passing through them.

There is only one capacitor in the play amp signal path, and it is a specially selected audio grade electrolytic. It connects the reproduce head to the low noise, low impedance transistor preamp stage. The reproduce head is of a hum-bucking, noise cancelling design with additional shields to minimize hum and noise pickup.

Polystyrene capacitors are used in the

The analog cart machine works effectively and reliably every day.

feedback loops for their audio quality. Tantalum capacitors are chosen to bypass critical power supply rails; their low impedance at high frequencies and their fast response maintain a very clean and stable power supply to all devices.

The OP37 op amp is specially situated at the head input stage for nearly Class A operation, slew rate of 17V/μS and low noise (MI110 dB CMR). Low amounts of negative feedback in the various amplifier stages maintain transient intramodulation (TIM) distortion to a minimum at the cost of a few additional stages.

Noise reduction

There are many good tape recorder noise reduction units available to the aftermarket. It has always been Fidelipac's policy to allow the end user to make the selection on his own. Our CTR100 Series machine addresses the interchangeability

of switching NR carts with non-NR carts by using the Cart Scan feature.

In the CTR90 design, we introduced a transparent, easily adjustable, single-ended noise reduction circuit which would benefit the end user without any interchangeability problems with older libraries of carts.

The DNR (Dynamic Noise Reduction) system from National Semiconductor cleans up the sound of noisy tape transfers and noisy source material in general. The professional version of the DNR I.C. offers more than 10 dB of noise reduction by means of a variable lowpass filter that controls high frequency cutoffs.

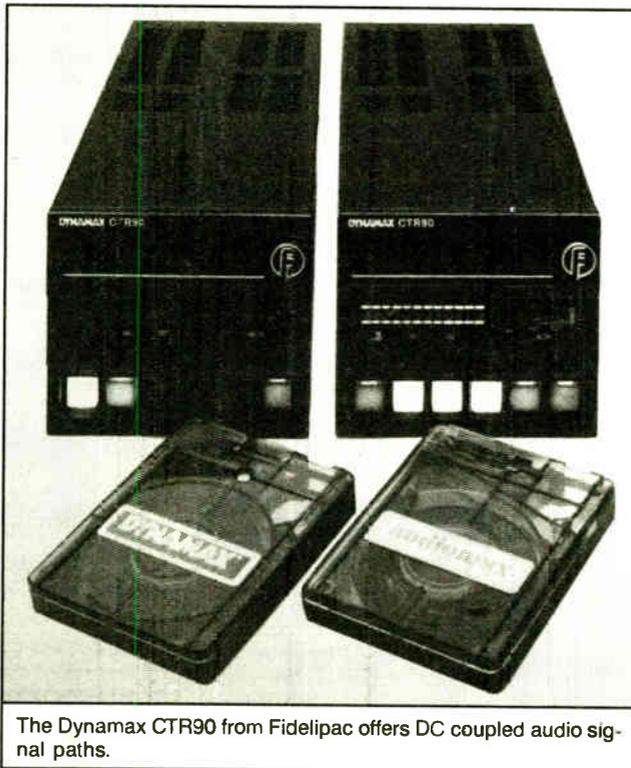
The instantaneous attack time and natural decay time make the DNR circuit's side effects inaudible and, based on our test results, constant over a wide variety of music productions. When other noise reduction systems are employed externally, or simply if the user dislikes the system, the entire DNR circuit can be removed easily from circuit by jumpers.

Record circuitry

In the record circuits, the only capacitors in the signal path are at the input to guard against any DC present from the outside world, again using an audio grade capacitor.

A DC control voltage is fed from the front panel to an Aphex VCA as a way of controlling the record input sensitivity. This keeps the input signal on the board where it belongs, rather than running the

audio signal cables all around the machine to be exposed to stray EMI fields from motors and solenoids. The VCA operates in



The Dynamax CTR90 from Fidelipac offers DC coupled audio signal paths.

take advantage of newer technologies, such as the Dolby HX Pro™ headroom extension system. The advantages that HX Pro offers can be a significant improvement to 7 1/2 IPS cart reproduction. The nature of the wide dynamics and high frequency content of the newer digital sound sources make the HX Pro function a natural solution for carting music and productions.

The Dolby HX Pro circuit controls the effects of tape saturation and the self-biasing that high frequency signals can cause to tapes during the recording process. By minimizing distortion and improving dynamic range, the HX Pro system guarantees high quality recordings on both older and newer tape formulas without any compatibility problems.

The analog cart machine works effectively and reliably every day while maintaining current music libraries. New technologies and advanced design criteria can elevate the performance of the cart machine to keep pace with newer sound sources. The superior sonic qualities of the Dynamax CTR90 series meet these criteria yet preserve the familiar rugged features and economy of the endless loop cartridge medium.

• • •

Editor's note: For more information on the CTR90 series cart machine, contact Bill Franklin at Fidelipac: 609-235-3900, FAX: 609-235-7779, or circle Reader Service 92.

Class A mode and can be used in a DC coupled circuit design.

The opportunity to design a new cart machine from ground up made it easy to

GET IT RIGHT

FOUR PLAY

FROM HARRIS ALLIED

Make a foursquare commitment to the industry-standard Denon CD Cart System with a quartet of Denon DN-950FA CD Cart Players™. They fit in a 19" rack. They look, handle and act like any other cart player — and sound a whole lot better. So what are you waiting for? Call Allied, the industry leader in CD Cart sales and installations, and ask for the four-pack price of ONLY \$5649.00, including 50 CD Carts.

HARRIS ALLIED
BROADCAST EQUIPMENT

800-622-0022
CANADA 800-268-6817

- STUDIO EQUIPMENT
- HARRIS RF PRODUCTS
- SATELLITE GEAR
- TRADE-INS
- TURNKEY SYSTEMS

AROUND THE COUNTRY —
AROUND THE WORLD

barratt associates, inc.
BROADCAST EQUIPMENT

- New and Reconditioned/Guaranteed
- Sales
- Consultation
- Turnkey Service Total or Partial

Information: (619) 433-5600 • Fax: (619) 433-1590
Orders: (800) 748-5553

Circle 11 On Reader Service Card

WIRELESS CABLE
DATABASE

(ITFS — MDS — MMDS — OFS
A1 Thru H3 Plus 1, 2 & 2A)

CURRENT
ALL 50 STATES
ON-LINE
24-HOUR ACCESS
CALL NOW!

dataworld
A Service of DW, Inc.

P.O. Box 30730, Bethesda, Maryland 20814

FAX (301) 656-5341

(301) 652-8822 (800) 368-5754

Circle 40 On Reader Service Card

"Call me, I'm interested." Circle 28.

"Send me literature." Circle 59.

CONSULTANTS

EVANS ASSOCIATES
Consulting Communications Engineers

FCC Applications, Design & Field Engineering
Broadcast Engineering Software

216 N. Green Bay Rd.
Thiensville, WI 53092

(414) 242-6000
Member AFCEE

W. LEE SIMMONS & ASSOC., INC.

BROADCAST TELECOMMUNICATIONS CONSULTANTS

1036 William Hilton Pkwy
Ste 200F
Hilton Head Is., SC 29928

(803) 785-4445

Moffet, Larson & Johnson, Inc.
Consulting Telecommunications Engineers

Two Skyline Place
5203 Leesburg Pike # 800
Falls Church VA 22041

703-824-5660
800-523-3117
Member AFCEE

Consulting Communications Engineers

- FCC Data Bases
- FCC Applications and Field Engineering
- Frequency Searches and Coordination
- AM-FM-CATV-ITFS-LPTV

OWL ENGINEERING, INC.

1306 W. County Road. F.
St. Paul, MN 55112
(612)631-1338 "Member AFCEE"

SOFTWARE

FM CHANNEL SEARCH

FM Database pool
MSDOS
EGA Graphics-Color
Broadcast Technical Consulting

Doug Vernier
Broadcast Consultant
1600 Picturesque Drive
Cedar Falls, IA 50613
319-266-8402

MULLANEY ENGINEERING, INC.
Consulting Engineers

- Design & Optimization of AM Directional Arrays
- Analysis for New Allocation, Site Relocation, and Upgrades
- AM FM TV LPTV Wireless Cable (MDS/MMDS/ITFS/OFS)
- Environmental Radiation Analysis
- Field Work
- Expert Testimony

9049 Shady Grove Court
Gaithersburg, MD 20877
Phone: **(301) 921-0115**
Fax: **(301) 590-9757**

NEW

WE NOW ACCEPT VISA & MASTERCARD



RADIO SYSTEMS ENGINEERING

FCC Applications • Design
• Installation • Field Service

Experienced & Affordable

4289 Roanridge
Las Vegas, Nevada 89120

24 Hr: **(702) 454-2085**
FAX: **702-458-2787**

Huntsville Antenna Engineering

There is hope for AM radio!
AM station unipole antennas with circular polarization & beam tilt. Broadband your present AM tower Series R shunt fed.

205-353-9232 205-353-6747

Kenneth Casey
Consulting Radio Engineer

Teletech, Inc.

BROADCAST CONSULTANTS AND ENGINEERS

- FCC Applications & Field Engineering
- Frequency Searches & Coordination
- Tower Erection & Maintenance
- Facility Design & Construction

CONTACT:
Kenneth W. Hoehn
23400 Michigan Ave
Dearborn, MI 48124
(313) 562-6873

Lahm, Suffa & Cavell, Inc.
Consulting Engineers

- Interference Resolution
- Coverage Improvement
- RF Hazard Studies
- Custom Software
- AM Antenna Improvement
- Former Chief Engineers
- Suburban Washington Based

3975 University Dr., Suite #450
Fairfax, Virginia 22030
Phone 703-591-0110
Fax 703-591-0115

THIS SPACE AVAILABLE

Call

1-703-998-7600

SERVICES

FCC's Engineering
AM, FM and TV Data Bases for your PC

Call today to request a free sample.

Communications Data Services

6105 E Arlington Blvd
Falls Church VA 22044
(703) 534-0034

BROADCASTING & ELECTRONIC SERVICES LABS

PO BOX 178
NEWTON, UT 84327
801-563-3088

BROADCAST EQUIPMENT
REFURBISHED & REPAIRED
AUDIO, VIDEO, RF, DIGITAL

15 YRS EXPERIENCE

MIRKWOOD ENGINEERING

Rural & Remote Site
Field Engineering

50 Park Ave.
Claremont, NH 03743

603/542-6784

PARAMOUNT
COMMUNICATION SYSTEMS

INSTALLATION AND SERVICE OF BROADCAST
ANTENNA SYSTEMS/TOWER MAINTENANCE & ERECTION

WESTMONT, NJ (609) 869-0222

TOWER SERVICES
Light Replacement
Routine Maintenance
Ground Systems
Painting
20 years Experience

John Nix

PO Box 13244 Salem, OR 97309
503-581-4056
1-800-321-4056

WIDEST & FINEST CHOICE OF PRODUCTION MUSIC & SFX

PROMUSIC

Call For Our Free Demo & Information On
BROADCAST Plus
Annual Rates.

1-800-322-7879

NEW-NEW-NEW

FM TRANSMITTERS
3.5, 12, 20, 25KW
\$24,000 TO \$46,000
Rebates on all models

FM-AM Transmitter Installation
Maintenance and Field Service
BROADCAST TECHNICAL CONSULTANT

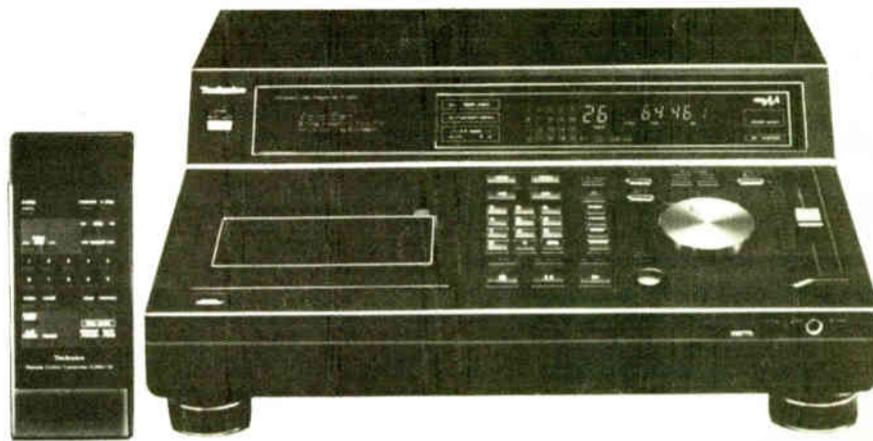
TELO TECHNOLOGY
Stanwood, WA. 98292
206-387-3558

BUYERS BRIEF

SECAUCUS, N.J. Technics' SL-P1300 compact disc player includes features such as eight-times oversampling, four digital-to-analog converters and a 4-DAC 18-bit high resolution system, along with ± 8 percent pitch control.

The CD player, designed especially for professional applications, also offers cue point memory, A-B repeat, optical and coaxial digital outputs and balanced XLR analog outputs—features not found on the company's popular SL-P1200 professional player.

For information on the SL-P1300, call Technics at 201-348-7000; FAX at 201-392-6114, or circle Reader Service 51.



The Technics SL-P1300 CD player is capable of ± 8 percent pitch control, along with 18-bit resolution.

Cart Machines Hold Own

(continued from page 39)
Woodworth said.

"Based on the current refinement of cart machines, a station would have to make a major investment (with digital) to make a very minor improvement," added Braverman. "We believe that the world and radio stations are going digital and believe that carts are dying, but it's going to be an extremely slow death. "I am certain that in the year 2000, you will be able to walk into any radio station—large or small market—and still see a cart," he said.

Digital needs a standard

Another reason for the persistence of carts, Braverman said, is that any stan-

dard for digital recording is years away. "Prudent buyers don't buy until there's a proven standard."

Bird predicted that the transition will be much more rapid.

"We will see by the end of the decade a replacement of analog, except for the lowest-budget stations," he said. "No matter how the analog guys want to pick away at it, digital will outdo analog."

The key to its successful entry in the market, he said, will be packaging. "The guys that get in with proper packaging will be the ones to help this shift to digital. We recognize that broadcasters work a certain way that's not easily changed, but digital is a pretty malleable medium."

ADVERTISER INDEX

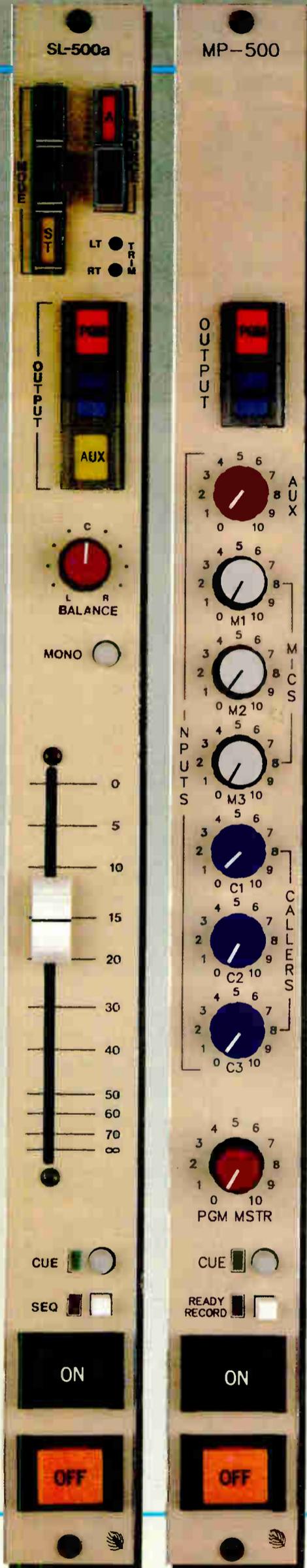
This listing is provided solely for the convenience of our readers. Radio World assumes no liability for inaccuracy.

Page No.	Advertiser	Reader Service No.	Page No.	Advertiser	Reader Service No.	Page No.	Advertiser	Reader Service No.
40	360 Systems	13	27	Continental Electronics	135	37	LPB	90
	Allied Broadcast <i>see Harris Allied</i>		19	Dataworld	41	28	Manger Eng.	109
23	Allied Bulletin Board		45	Dataworld	40	28	The Management Sciences	149
7	Altronic Research	21	29	DIC Digital Supply Corp.	123	32	Modulation Sciences	143
7	ATI	120	28	Diversified Comm.	29	8	Moseley	153
38	Auditronics	77	39	Econco	19	42	Myat	84
45	Barrett Associates	11	36	Fidelipac	47	24	N.E. Broadcast	122
23	Bext	104	28	Gerstmann Software Tech.	52	11	Orban	82
3	Bradley	44	34	Gorman Redlich	43	9	Otari Corp	95
1	BE	128	28	H&E Microtrak	118	16	QEI	145
26	Broadcast Services	107	16	Hall Electronics	45	14	Radio Systems	108
33	Bdct Services/Audiopak	101	41	Hall Electronics	22	19	Radio Systems	62
21	Bryston	131	6	Harris Allied	20,88	24	Radio Systems	65
15	BSW	63	10	Harris Allied	10,132	35	Radio Systems	111
18	BSW	151	20	Harris Allied	33,110	44	Radio Systems	89
31	BSW	127	22	Harris Allied	3,85	31	Sescom	17
4	Burk Technology	76	34	Harris Allied	32,71	30	Sine Systems	64
3	CCA Electronics	148	39	Harris Allied	35,96	25	Studer Revox	141
40	Comrex	81	41	Harris Allied	73,98	28	Titus Tech Labs	42
			43	Harris Allied	67,79	12	TTC	138
			44	Harris Allied	15,61	26	Valley International	68
			45	Harris Allied	28,59	28	Voyager RV Center	78
			17	ITC	133	2	Wheatstone	58
			21	Logitek	80	47	Wheatstone	125
						48	Wheatstone	106

Advertising Sales Representatives:

Eastern U.S., Art Constantine: **800-336-3045** Fax: **703-998-2966**
Western U.S., Jack Ducart: **800-336-3045** Fax: **703-998-2966**

It's Handled!



Customize your A-500 Console with Wheatstone's powerful accessory modules! We've handled auto-sequencing, telephone call-ins, and intercom requirements. Our auto-sequencing line input will take the rush out of back-to-back carts. Our multiphone module can handle 3 callers, 3 mics and reel-to-reel machine control all at once. Our new 8-station intercom module will link up all your studios and talent positions...

AUTO-SEQUENCING: The SL-500as input module allows the DJ to automatically sequence through a pre-loaded bank of cart or CD machines. All audio and machine control functions are handled by the module's logic circuitry. When the first ON switch is pressed, that module's associated machine automatically starts to play; when it has finished the channel is turned OFF, the next programmed module is turned ON, and its machine starts to play. Dead air and missed spots can be a thing of the past with this sequence function.

TELEPHONE/TALK SHOW: The MP-500 multiphone module offers a totally new way of handling telephone talkshow functions. Operation is simple: when the announcer wishes to do a phone segment he simply activates the MP-500 module and all mute, level, combining, and machine control functions are handled automatically. The MP-500 permits conferencing between 3 callers and 3 microphones, and provides separate multitrack tape feeds for various mic/caller signal combinations, permitting simple track punch-ins to replace razor and tape edits. This module eliminates complicated announcer set-ups, miscalls, and feedback problems.

COMMUNICATIONS: The ICM-500 module is part of a completely integrated intercom system; a family of modules available for all Wheatstone broadcast and production consoles. It even includes a rackmount version for your equipment room or remote hook-ups. It allows direct communication between 8 locations in your facility. Your intercom needs are handled by simply plugging in this module set.

TAKE ADVANTAGE of our expertise and reputation. Call Wheatstone. Let our application engineers handle your toughest requirements.

 **Wheatstone® Corporation**

6720 V.I.P. Parkway, Syracuse, NY, 13211 (tel 315-455-7740/fax 315-454-8104)

Circle 125 On Reader Service Card

World Radio History

Something Very Good Just Got **BETTER!**



A-32EX On-Air Console

Finally engineers confined to tight budgets can choose a console that won't compromise station reliability or signal integrity. After all, the A-32 is a Wheatstone console. It borrows from the componentry and design of our larger A-500 consoles, currently installed in major markets all over the country, from frontline independents to national networks.

Our new A-32EX is even better, with ample expansion room for additional inputs and a powerful family of accessory modules, including our new MP-32 talkshow module (that neatly interfaces multiple hybrids, tape recorders, announcer mics and studio-to-caller feeds), our ICM-32 six station intercom module (letting you communicate with other console locations and announce studios), and our SC-20 studio module (to provide comprehensive studio monitor, automatic muting, and talkback functions), plus multiple line selector and machine control modules, and a complete family of studio turret components.

The A-32EX console features modular construction, a fully regulated rackmount power supply, logic follow, full machine control and of course, an all-gold contact interface system. It has two mic channels and fourteen stereo line modules, each with A/B source select and Program/Audition bus assign, plus Cue switches on the line modules. Standard features include Program and Audition VU meters, digital timer, and a monitor module for control room and headphone functions. The console is also available in a smaller version (the A-20) with two mic channels and eight stereo line input modules.

The A-32EX is a perfect choice for stations planning an upgrade in signal quality and control room image. It's also a natural choice for the newsroom. So profit from Wheatstone's experience and reputation—call us today for immediate action!

 **Wheatstone** Corporation

5720 V.I.P. Parkway, Syracuse, NY, 13211 (TEL 315-455-7740 / FAX 315-454-8104)

Circle 106 On Reader Service Card

World Radio History