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Radio World®

Vol 13, No 14

Radio's Best Read Newspaper

July 26, 1989

NAB, EIA Bar Meeting Access

by Judith Gross

Washington DC In a move that walks a thin line between antitrust guidelines of the Electronics Industries Association, the EIA and the NAB held a closed meeting here in early July to discuss a certification mark.

The NAB has been trying to rally support for the concept, which would identify AM radios incorporating the NRSC standard and other improvements.

But an NRSC meeting held at last September's Radio '88 convention, in which receiver manufacturers were invited to discuss such a mark, had a disappointing turnout among radio makers, with only five manufacturers participating.

Because those five represented engineering staff for the receiver manufacturers, the NRSC has been since trying

to interest the marketing arms of the companies through the EIA and the idea for a meeting at EIA headquarters sometime during the summer was born.

Since that time, the idea has been under discussion at NRSC meetings, which are held jointly by the EIA and NAB and—under EIA standards activity guidelines—are required to be open to "all technically qualified members of the industry, including representatives of user groups where appropriate, irrespective of membership in EIA."

Not an NRSC project

The original intention was for the certification mark to be an NRSC project, but according to patent and copyright law, such a mark or marketing device would need to be implemented by a trade association such as NAB or EIA,

according to Michael Rau, the NAB's VP of Science & Technology.

Rau originally told RW that the meeting was among staff of the EIA and NAB only, and as such could be closed to press coverage and those not invited.

But EIA Communications VP Tom Lauterback later explained that the meeting could not be closed because manufacturers would be present to discuss marketing issues.

At the start of the meeting, NAB AM

Improvement Committee Chairman Art Suberbielle said he was glad to see press coverage of the meeting in order to "get support for the idea from broadcasters."

But just prior to the meeting's start, Lauterback and EIA VP and Assistant Counsel Gary Shapiro informed RW that they had decided to close the meeting to press and requested RW to leave.

Another industry journalist, Leonard Feldman, who writes for *Audio* and other

(continued on page 15)

Sikes Tapped for FCC

by Charles Taylor

Washington DC After two weeks of hedging, the White House nominated Alfred Sikes 28 June for a five-year term as chairman of the FCC.

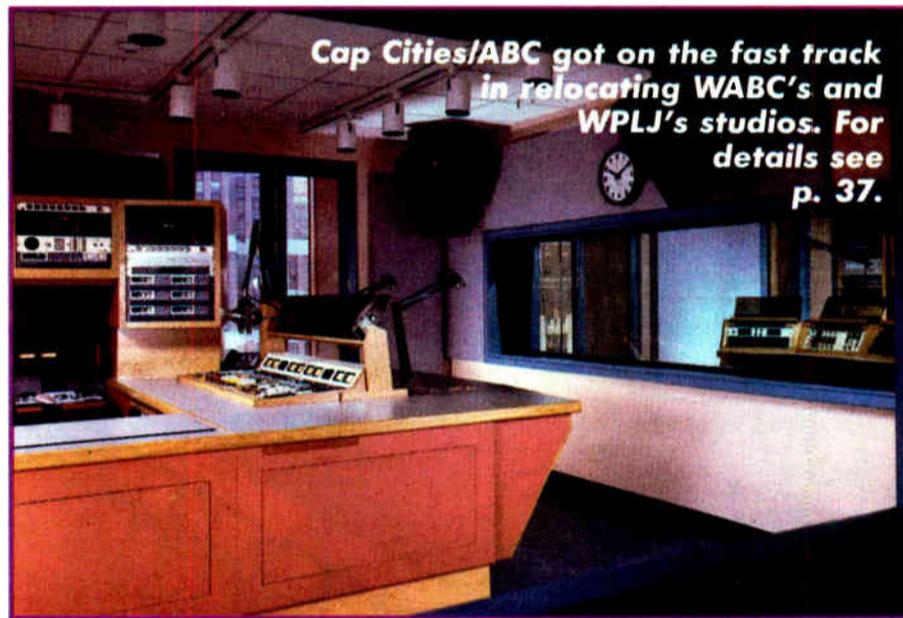
The nomination of Sikes, currently assistant secretary of Commerce and administrator of the National Telecommu-

nications and Information Administration (NTIA), follows the 16 June nomination of Washington attorney Sherrie Marshall and Illinois Commerce Commissioner Andrew Barrett to vacant FCC seats.

Multimode study

Sikes was most recently associated in radio circles for the NTIA's involvement in an AM stereo report in 1987 that sug-

(continued on page 3)

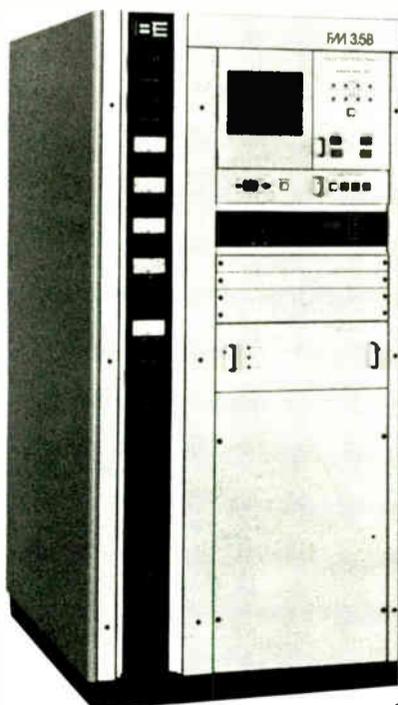


Al Sikes

nications and Information Administration (NTIA), follows the 16 June nomination of Washington attorney Sherrie Marshall and Illinois Commerce Commissioner Andrew Barrett to vacant FCC seats.

Sikes was originally expected to be nominated with Marshall and Barrett, but the White House delayed the nomination, reportedly because Sikes was quoted about the impending nomination

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FMX Will Move HQ

by John Gatski

Greenwich CT Broadcast Technology Partners, Inc., the developer of FMX, plans to move its headquarters from Greenwich, CT to Bloomfield Hills, MI by 1 August in order to consolidate its technical operations with its marketing headquarters.

The location change is part of a shift toward more intense promotion of the FM stereo-enhancing technology, which will include exploration of foreign markets, according to BTP President Emil Torick, who will maintain BTP leadership from Connecticut.

"You might say we are shifting from developing the technology to the marketing mode," Torick said.

The move comes on the heels of controversy spawned by a negative evaluation of the FMX system by a team working at MIT which included Dr. Amar

(continued on page 13)

NEWS BRIEFS

ABC Keeps Stations

Washington DC The FCC ruled 6 July that Capital Cities/ABC can keep its radio and TV stations in four of the five largest US markets, under new cross-ownership rules.

Since the merger of Capital Cities and ABC in 1986, the network has held stations in New York, Chicago, Los Angeles and San Francisco under a temporary waiver.

When the FCC loosened ownership requirements, the Commission said it would allow requests in major cities where there were at least 30 separately owned and operated TV or radio stations. Cap Cities argued successfully that there are 94 in New York, 79 in LA, 105 in Chicago and 57 in San Francisco.

Stations involved are WABC-TV, WABC-AM and WPLJ-FM

in New York; WLS-TV, WLS-AM and WYTZ, Chicago; KABC-TV, KABC-AM and KLOS-FM, Los Angeles; and KGO-TV and KGO-AM, San Francisco.

New NAB Joint Board, Radio Chairmen

Washington DC William Sanders, president and owner of KICD-AM/FM, Spencer, IA, was elected to a one-year term as chairman of the NAB Radio Board of Directors. He succeeds Lowry Mays, who was elected NAB Joint Board chairman.

Elected vice chairman was David Hicks, president and CEO of Hicks Broadcasting Corp., Kalamazoo, MI. He succeeds George Hyde, Jr.

Sanders and Hicks also will sit on NAB's Executive Committee.

Minority Business Seminars Planned

Washington DC Broadcast Capital Fund (BROADCASTCAP) will conduct a series of 10 regional seminars to train minorities looking for broadcast ownership opportunities.

Co-sponsored by the Interra-

cial Council for Business Opportunity and funded by the Minority Business Development Agency of the US Department of Commerce, the series will be conducted through September.

Host cities include New Orleans, Washington, Dallas, San Francisco, San Diego, Miami, Memphis, Cleveland, Kansas City and St. Thomas in the Virgin Islands.

For more information, contact Anna Johnson at 212-779-4360.

NPR Names Starling Senior Engineer

Washington DC National Public Radio named Michael Starling senior engineer for engineering and operations.

Starling, who has a J.D. emphasizing broadcast law and regulation, has worked in broadcasting for 20 years, most recently as CE for KPBS-FM in San Diego. He also has worked in Swaziland as a consultant for the Swaziland Broadcasting Service, helping to develop its radio network and training chief engineers.

In the position, Starling will establish NPR's technical position on legal and regulatory matters affecting radio.

New Station Totals Revealed

Washington DC An FCC report on broadcast station totals in the US shows a moderate increase from the totals a year ago.

The number of domestic radio stations as of 31 May was 10,546, an increase of 252 from March 1988.

The number of AM stations was reported at 4953, up 41 from 4912. FMs numbered 4200, a gain of 142 over 1988's total of 4058.

There were 1393 FM educational stations in May, up 69 from 1324 last year.

WHY DIDN'T SOMEONE THINK OF THIS BEFORE?

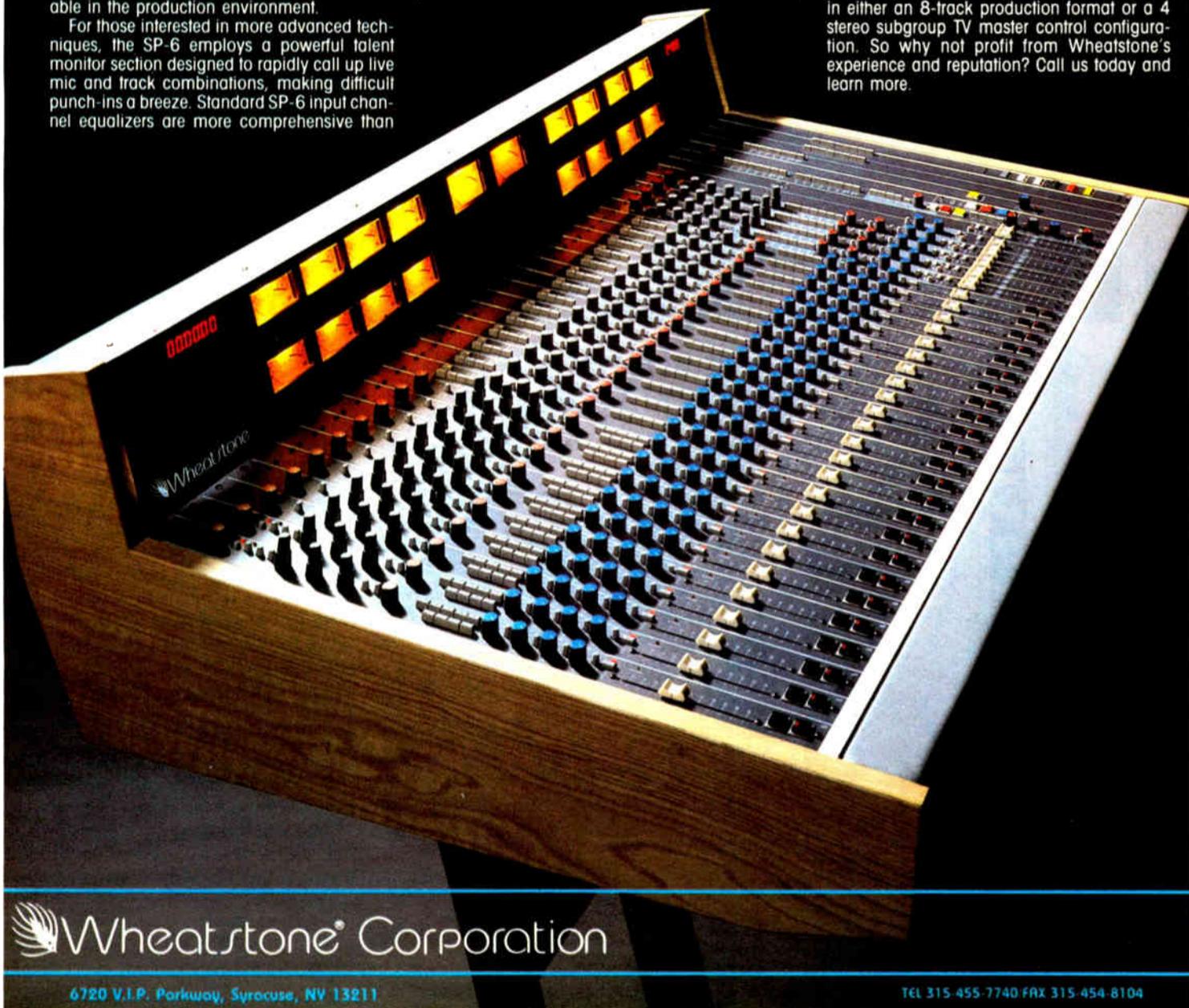
A FAST-PACED PRODUCTION CONSOLE

THE WHEATSTONE SP-6 AUDIO CONSOLE lets production people quickly accomplish 8 and 16-track work, yet easily handle routine transfers and dubbing operations. With its unique track monitor section it can facilitate simultaneous stereo mixdown during the multitrack session — almost halving typical production time cycles. Input channels are laid out just like an air console, with machine starts below the channel fader, so staff familiar with on-air consoles can quickly become comfortable in the production environment.

For those interested in more advanced techniques, the SP-6 employs a powerful talent monitor section designed to rapidly call up live mic and track combinations, making difficult punch-ins a breeze. Standard SP-6 input channel equalizers are more comprehensive than

those supplied as optional items on competing products, allowing much greater creative freedom. Input channel auxiliary send sections are designed to be the most versatile in the industry, providing 4 different auxiliary buses to allow digital delay, reverb, talent foldback, and mix-minus feeds. Stereo input channels can provide either mono or stereo effects sends. Even more, the SP-6 has 4 auxiliary effects return inputs that allow effects to be recorded onto the multitrack or sent to the monitor buses.

The SP-6 provides independent headphone, control room and studio monitor feeds, as well as stereo cue/sole. Control room and studio mute and tally functions are independently dipswitch selectable on individual input channels. Additional studio modules may be ordered to accommodate larger, multi-studio installations. The SP-6 may be configured with any combination of mono and stereo input modules, in mainframe sizes ranging from 16 to 32 or more inputs. The console is available in either an 8-track production format or a 4 stereo subgroup TV master control configuration. So why not profit from Wheatstone's experience and reputation? Call us today and learn more.



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Circle 16 On Reader Service Card

World Radio History

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Keep Lights Working, FCC Warns

John Gatski

Washington DC Prompted by a fatal helicopter collision with an unlighted cellular phone tower last March and other near misses, the FCC has issued a reminder to broadcasters to have tower lights operational or risk possible revocation of their license.

Any tower taller than 200 feet or one near an airport must have FCC specification markings and warning lights to alert approaching aircraft.

These lights must be inspected daily and if a light is out for more than 30 minutes, the local FAA flight service station must be contacted immediately. The flight service station must also be notified when the light is operational again.

FCC Public Service Section spokesman Ana Curtis said several recent incidents have forced the FCC to scrutinize tower lights and to reemphasize the importance of keeping the lights in working order.

In the fatal helicopter crash near Coinjock, North Carolina, a Dare County medical helicopter crashed into a 240-foot cellular phone tower, resulting in the deaths of the pilot and the on-board medical technician.

The tower, owned by Centel Cellular Co. of Chicago, did not have its beacon operational, according to the FAA and FCC. The tower was constructed by L & R Communications of St. Louis.

Although the National Transportation Safety Board could not determine whether the non-functioning light caused the crash, "I'm sure there are going to be some civil suits," resulting from the incident, Curtis said.

Curtis said the company also could be subject to a fine.

Besides the license revocation option, a broadcast tower owner or user can face a fine up to \$10,000 if the FCC determines the tower is improperly marked or lit.

Curtis said that the FCC conducts periodic tower inspections and scrutiny of light maintenance records. The FCC also is considering more surprise inspections.

For more information, contact Ana Curtis at 202-632-7240.

Sikes is Nominated

(continued from page 1)

gested that AM stereo receivers should be made compatible with both Kahn's ISB and Motorola's C-QUAM systems over recommending a single transmission standard.

"The most direct way to break the current market deadlock would be to ensure compatibility between AM stations and AM stereo receivers," the report said.

However, neither the NTIA's report, nor a statement by the Commission reaffirming its so-called "marketplace" decision on an AM stereo standard have had any dramatic bearing on AM stereo acceptance which currently stands at 14%, the majority in favor of the C-QUAM system.

There is speculation, however, that if Sikes' nomination to the Chairman's slot is approved, the Commission could be persuaded to address the AM stereo issue again.

In a statement released following the

Commission nomination, Sikes spoke of the importance of the communications sector, which he said "helps enable improved productivity, better health care and wider distribution of better education."

Eddie Fritts, NAB's CEO and president, said in a statement that NAB had enjoyed an excellent working relationship with Sikes in his role as assistant secretary of commerce and NTIA chief.

"We look forward to a productive relationship," Fritts said.

If approved by the Senate, Sikes, Marshall and Barrett, along with current commissioners Patricia Diaz Dennis and James Quello, would compose a five-member Commission for the first time since April 1987.

Current Commission Chairman Dennis Patrick resigned from the Commission 4 April pending the appointment

of a replacement.

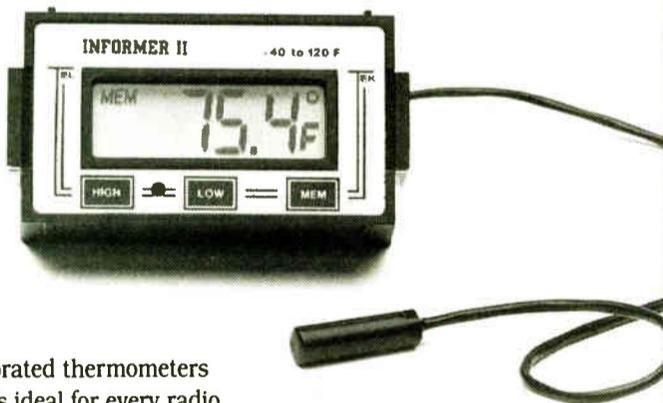
The fate of Commissioner Patricia Diaz Dennis remains somewhat uncertain. Her term officially expired 30 June, and though Dennis had indicated an interest in remaining on the Commission, she was not guaranteed the position.

In June, she disqualified herself from participating in a number of issues affecting the telephone industry because she was discussing a job with the Cleveland law firm of Jones, Day, Reavis & Pogue, which has placed a number of telephone-related filings before the Commission.

The Senate has not made a move to nominate a replacement for Dennis, thus speculation is that she will likely remain in the position through the next Congressional session, which will end in 1990, according to an FCC public affairs spokesperson.

Quello's term expires in 1991. For more information, contact the FCC at 202-632-5050.

Havin' A Heat Wave?



The **Informer** calibrated thermometers come in two models ideal for every radio station. The **Informer II** has a large LED readout, high and low memories with reset, and range from -40 to +120 degrees. An AA battery powers the unit for up to one year, and the 50 foot probe line and triple sealed sensor mean you stay cozy while giving the forecast.

To measure temperature in transmitter buildings, Bradley has designed the **Informer TX** just for you. The unit provides an output of 10 millivolts per degree (100°F equals one volt) and is perfect to interface with your remote control. Users need to supply 5 to 12 volts for operation.

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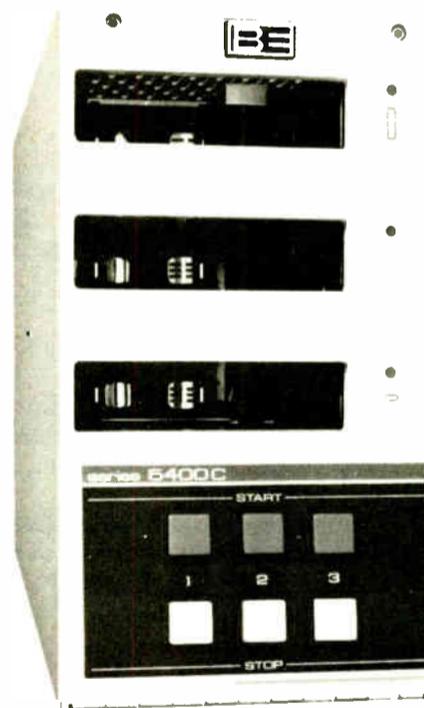
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World Radio History

Circle 79 On Reader Service Card

When the Doors Clang Shut

by Judith Gross

Falls Church VA Gee, a journalist can get Secret Service clearance to cover Presidents and potential Presidents but gets **unceremoniously ejected** when a bunch of industry mucky- mucks get together to find out if we can get a **mark on radios** telling folks there's been an **improvement in AM** (or has there?).

What I want to know is, **what** are they trying to hide?



It's no well-kept secret that the **certification mark** idea, you know, let's tell them we got better AM radios without really improving things for AMers, has gone over, oh let's say about as well as a **lead balloon**.

At NRSC meetings, technical reps **can't agree** on the specs for the mark. First AMers were asked to give up 5 kHz of allowable bandwidth. Now they are being **asked to settle** for mono radios only twice as wide as your average telephone—7.5 kHz—which don't even include the expanded band.

And they should be **grateful** for even that little morsel, at a time when AM listening is down to 23%.

The **receiver manufacturers** haven't exactly been jumping at the chance to obtain a certification mark. One meeting held last September had a **paltry half-dozen** out of a possible 180 manufacturers show up and one held two weeks ago at the EIA had—I want to say about two but I can't really tell you—**RW** and your old buddy **JG** were asked to leave.

Let's forget for the minute that that impolite turn of events seems to fly in the face of **anti-trust** legal guidelines which strictly govern EIA activities including meetings, especially those involving marketing or any kind of standardization. Let's let the lawyers duke that one out.

But a reporter covering an important industry meeting becomes **the eyes and ears** of the readers . . . in this case, AM

broadcasters and others who are passionately concerned about AM's survival.

What the NAB and EIA really did was to **slam the door on AMers** who are fighting for their lives.

Getting better radios and a way to generate consumer interest in them through a certification mark isn't a frivolous topic for discussion in a casual for-members-only country club over coffee and doughnuts.

It's the **critical concern** of 5000 stations in this country, one half of whom have decided not to fritter away their hard earned cash on NAB membership.

When two powerful industry organizations get together and decide to lock interested parties out, they are **thumbing their noses** at the very individuals they claim they are trying to help.

Those doing the locking out say that they keep the meetings closed so there will be more of "a **free exchange of views**." What needs to be asked is, "How free and whose views?"

Are they saying that participation by the AM broadcasters would **interfere** in the agendas they are trying to push? Heck, we all know that a **dictatorship** is more efficient than a democracy.

But with the so-called "inefficiency" of full industry participation comes a chance to represent **everyone's interests** more fully.

Didn't that come through loud and clear with the **NRSC standard**? If ya don't read about it in these pages you won't be able to support it or get it modified to help your stations.

And if we get shut out of meetings, you get shut out too.

Like to tell you how the certification mark meeting went, how the idea is being received among the folks who will

make the radios on which listeners will (or will not) hear your **improved fidelity**.

Like to tell you, too, that those making the decisions from the hallowed halls of **1771 N Street** and **1722 I Street** in DC, want to include broadcasters in the process of getting improved radios.

But I can't say that because you can't hear much from **out in the hallway** and the general tone of the way this entire thing was handled seems a **little too arrogant** to care what the 5000 AM broadcasters whose futures are at stake think.

But you don't have to be **shut out** of the process. Let 'em know what you think. Maybe they'll keep reporters out of the meeting, but if you **squawk loudly enough**, they'll have to count you in.

'Course, you may only get to hear

tions ought to beware of a company calling itself **American Music Licensing**.

The **Boise, Idaho** company (hardly the entertainment capital of the world, as Vernon pointed out) has sent typewritten letters to stations, complete with smiley-face to tell them they **owe money** for playing certain well-known songs.

Vernon's call to the company resulted in a conversation with one "Sally Sun," who said she was actually the composer of such oft-played tunes as *The Street Where You Live*, *The Gambler*, *Mandy*, *I Can't Smile Without You*, etc.

And guess what she wants from these stations? Yep, **licensing fees**. Apparently BMI and ASCAP, who legitimately get the fees, are onto the scam—so don't send AML any of your hard-earned dough, even though Sun claims they "stole" the songs from her.

Right. And I suppose she also penned the *Star Spangled Banner* in her spare time, too.

☆☆☆

Gee, **Delta Electronics' Chris Wilk** leads an exciting life, doesn't he?

First the guy gets **married at Circus Circus** during the NAB show in Las Vegas. Then, fresh back from his honeymoon he heads out to the **California desert** to install three C-QUAM stereo systems.

He parks his van out in the middle of nowhere, where the saguaro cactus grows tall and you don't have to bother locking your doors. He completes the installs in the **middle of the night**, and wearily heads back to the hotel, looking forward to a good night's sleep.

Chris grabs for his duffle bag, and lo and behold it's gone! The tool box and briefcase are right there where he left them on the seat, but some **desert creature** done made off with Chris' duds.

Jim Van Meer of Van Meer Creative, Delta's ad agency, penned this visual statement on Chris' plight. And the California desert patrol were told to put out an APB on any **suspicious prairie dogs** sporting red suspenders and a WFIL T-shirt, still, apparently, at large!

Heard something interesting? Spill your guts to Earwaves. Write PO Box 1214, Falls Church VA 22041, or call me at 703-998-7600. Best tidbit of the month wins a coveted second edition Radio World mug.



Buddy, can you spare a splatter monitor?

what's going on through the eyes of those who have a **vested interest** in appearing to do a good job for you . . . but maybe that's better than getting no view at all.

☆☆☆

Here's a good one from **Vernon Stanfill**, GM and CE of **WFGH**, the public station in Fort Gay, WV, who tells me sta-

Media Touch Systems offers the Ultimate Broadcasting Multi CD System... Touch Screen Control of Sony Multi CD Machines (60-CDs).

The resulting interactive system is both **revolutionary & practical**. It is **powerful & flexible & yet cost effective**.

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During automated segments the system will cue & play cuts from a predetermined play list, created in advance or downloaded from a separate music scheduling system.

The system virtually eliminates daily library entry & retrieval, CD handling, manual logging, cueing errors, & the confusion associated with daily programming activities.

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- 2 MTS 9802 Interface Cards for CDK-006
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Users Can Help With AES Digital Interface

by Robert A. Finger

Socacus NJ Digital audio is steadily finding its way into broadcast operations. As the variety of equipment increases there is a greater need to interconnect components to digitally transfer and digitally process the audio signal.

The AES/EBU interface specification (AES3-1985) was developed for this purpose and intended for use in a general professional digital audio environment.

Many organizations including the broadcasting community participated during this effort and equivalent specifications are being adopted by ANSI, CCIR and IEC.

GUEST EDITORIAL

The industry is now entering the next important phase—widespread implementation and use of the interface. Different facilities may have different needs and should be aware of the increased capabilities as well as the practical limitations of new equipment.

To help both manufacturer and user, the AES is developing an "Engineering Guideline" which is intended to complement the interface specification and clear up some misunderstandings that have arisen relative to the AES3-1985 standard.

NAB enters the process

The recent NAB meeting (30 April) on interfacing digital systems was extremely helpful to the AES Standards Working Group and the digital audio community

in general.

The AES Subworking Group on Implementation of the Interface, chaired by Steve Lyman of the Canadian Broadcasting Corp., needs practical feedback which can only be provided by users of this new equipment.

For example, what happens when an AES/EBU interface is connected to a jack field that was designed to carry analog audio is one practical consideration in which many NAB members are interested, and may be in a position to answer.

The interface standard does not cover such a broad application with many variables.

AES standards work is open to all qualified persons; AES membership is not required. AES greatly appreciates and welcomes NAB's assistance and participation in the standards process.

Consumer vs. professional

Another important benefit the NAB meeting provided was an opportunity to explain the difference between consumer digital audio interfaces and the AES/EBU interface.

They are different specifications developed by different groups and should not be considered versions of each other.

It is true that the timing of audio data and ancillary data (V,U,C,P bits) are the same, but beyond these facts the similarity begins to fade quickly.

There are differences electrically as well as in the definition of "U" and "C" bits.

As if life were not complicated enough, there are different consumer digital audio interface specifications.

This situation is less important to consumer equipment operation because the application is tightly controlled, but it may be highly critical if one tries to adapt these units to industrial/professional applications.

NAB has greatly aided the educational process which is often necessary when new methods are introduced. This needs to be continued.

General interface may be difficult

One interface specification which covers all technical requirements including cost necessities of the very different consumer and professional industries might be very difficult to achieve in practice.

Even within the latter there are applications which are very diverse. Multichannel operation is one such case in point.

Interface chips are available for the consumer formats. Chips are under development for the AES/EBU professional format, and hopefully availability will be forthcoming shortly.

Users need to work with manufacturers during the standardization process to minimize unwanted surprises on both sides. It is not too late for NAB and its membership to influence this process.

Robert Finger is chairman of the AES Standards Working Group on Digital Audio Interfacing and is with Matsushita Electric Corp. of America, the parent of Panasonic/Technics.

The Radio Improvements Bill sponsored by New Jersey Congressman Matthew Rinaldo gives radio in general and AMers in particular some welcome support from an unexpected ally.

The Bill would insure that all radios manufactured would include both the AM and the FM band and that radios which receive FM in stereo would include AM stereo as well.

This move is similar to a previous act of Congress which required the inclusion of UHF channels along with VHF channels on TV set tuners, which led to an increased acceptance of UHF.

The Bill would also insure that translators are not abused and prevent the FCC from adopting policies which would add to interference on either band.

It also requires the Commission to look for answers to the problem of interference to AM caused by other means.

The Rinaldo Bill has the support of the NAB but is already meeting with resistance from the consumer electronics industry. In addition, it has a counterpart with a similar Bill introduced in the Senate.

While industry organizations such as the NAB have the resources to lobby for legislation which will help AM, the means to help determine the Bill's outcome is available to every taxpaying citizen, including broadcasters.

Now is the time for those concerned for AM's future to make their views known through phone calls, letters and telegrams to their Senate and Congressional representatives.

Radio talk show hosts have already rallied public opinion on matters of the Congressional pay raise and Presidential nominations.

It's time for them to turn their attention towards their own plight and rally the cause for AM's technical survival. There may never be a better opportunity to influence how AM will sound to future listeners—and if it will continue to be heard at all.

An apathetic approach won't stem AM's erosion. Urgent and vocal support for both the House and Senate Radio Improvements Bills is a must.

—RW

In addition to developing implementation guidelines and compatible updates to the standard by way of defining presently reserved bits, coordination of these proposals with other international standards bodies such as IEC and CCIR

is a part of AES activities.

These tasks require as much industry support by direct participation as possible.

Yes, NAB and its members can make an important difference—now!

READERS FORUM

Sympathy for standalones

Dear RW:

I 100% completely agree that all standalone AMs (including daytimers) should get first crack at an FM. That is and has been a stated goal of the NAB Daytimers Committee, of which I am Chairman. For this to happen it will require a fundamental change in licensing procedures at the FCC.

The problem is that the FCC (at least up to now) will not (I emphasize "will not") guarantee an FM license to an "existing AM licensee." That means that any new allocation is "open for grabs" to any applicant.

Under current policy it means the "existing AM licensee" may or may not win.

Except in the Northeast, Class A frequencies can still fit in most towns. For many standalones it's not a question of "availability," but rather the question of "being able to win" and the length of time and money required to do it.

We're still trying to determine if the "Daytimers Preference" has any meaning in competitive applications. If the FCC goes to a lottery, the preference could be meaningless and the addition of other channels won't help standalones or daytimers.

For anything to help these stations it is essential that the FCC adopt a policy that will permit the substitution of an FM channel for an AM channel or the

use of one for an existing station. Unless this happens all proposals are fraught with additional competition for daytimers and standalones.

Bayard H. Walters, President
The Cromwell Group, Inc.
Nashville, TN

AM stereo and super power

Dear RW:

Two things about the April 12 column of *Old Timer*. First, about AM stereo automobile receivers. Seems to me that I read somewhere, maybe in Chrysler auto literature, that all the Chrysler AM-FM stereo receivers, for 1989 and later, would be AM stereo also. The literature for the receivers for my 1989 Plymouth Voyager van did not discuss any AM mono receivers.

Second topic, super power FM stations. I recall that there were several FM stations that were licensed for as much as 250 kW ERP, notably WRAL-FM, Raleigh, one or two in the Detroit area and one or two in the Ann Arbor, MI area.

These three localities were the only ones that I ever remember seeing, and the references would be the early 1960s Broadcasting Yearbooks. Perhaps you have access to those who know the background of the high power operations or (who have) personal memories of this.

Sheldon Daitch
San Francisco, CA

Radio World

Vol 13, No 14 July 26, 1989

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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. Application to mail at second-class postage rates is pending 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 1989 by Industrial Marketing Advisory Services, Inc. All rights reserved.

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Next Issue RW
August 9

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Rinaldo Introduces Radio Quality Act

by John Gatski

Washington DC Many in the radio industry are applauding New Jersey Congressman Matthew Rinaldo's latest effort to bring comprehensive technical improvements to the troubled AM band.

The Radio Quality Improvements Act of 1989 was introduced 21 June by Rinaldo, a Republican from New Jersey. The legislation is a companion bill to the proposed radio renewal bill Rinaldo co-sponsored earlier this year.

The law would prohibit FM-only receiver manufacturing by 1992, require all FM stereo radios to have AM stereo, ask the FCC to find ways to decrease AM interference and allow "homesteading" for daytime AMers on the proposed expanded band.

The legislation also would require the FCC to adopt rules and policies to reduce interference on AM and FM. The Commission would also have to conduct a study of non-broadcast source AM interference within 90 days after the bill's adoption.

In addition, the bill would limit FM translators to a station's service area only, except when an outside area has no other radio service.

No AM stereo standard

The bill, however, does not require the FCC to adopt an AM stereo standard, which the Commission declined to act on in 1982 and 1988. Rinaldo introduced a law last year mandating the FCC to choose an AM stereo standard, but that law did not make it out of committee.

The AM bill's provision allowing homesteading by existing daytimers could have a double benefit by filling up the expanded band (1605 kHz to 1705 kHz) and alleviating overcrowding on

the existing band, according to the bill's proponents.

Under the proposed legislation, stations approved for the expanded band would also be allowed to simulcast on their existing band frequency for five



Representative Matthew Rinaldo

years. After five years, the station would turn in its license for the lower band frequency, but the FCC would not allocate it to another station.

In introducing the AM bill before Congress, Rinaldo said legislative actions can help reverse a severe erosion of AM listeners.

"AM radio is the original radio service and it has provided millions with their first news and entertainment. I don't think any of us wants to see the AM band wither away, especially when there are actions that Congress can take to preserve and improve AM radio," Rinaldo said.

NAB Science and Technology VP Michael Rau said the association is totally behind Rinaldo's bill.

With regard to the mandatory AM/FM

receiver, Rau said: "I think it would alleviate a lot of concern in the AM industry that receiver manufacturers would not put AM in their receivers."

It would not be a burden for manufacturers since few of them have dropped AM from radio receivers, he added. But he was less confident about manufacturers being required to add AM stereo.

The expanded band

The assignment of daytime AM stations to the expanded band is an initial step to get stations on the band, but it will not be a cure-all for existing band overcrowding, Rau added.

The band will only accommodate about 300 stations and they have five years to relinquish their existing frequency, But every little bit helps, " he said.

Several station managers and CEs have also reacted positively to the bill.

"I knew it was coming," WLAM-AM, Maine GM Ron Frizzell said. "It's a step in the right direction."

Frizzell said he would like to see the bill require quality receiver standards for AM as well as AM stereo.

"AM stereo does not automatically mean it is a good radio," he said.

WMAQ-AM Chicago CE Margaret Bryant said she was excited about the prospects of the Rinaldo bill.

"I definitely think it's a step in the right direction," she said.

All-band will help AM

Bryant said an all-band radio ensures that listeners will always have the option of AM and that the "homesteading" provision is the fairest way to reduce congestion on the lower AM band and help the daytimers.

As for an FCC-mandated report and proposed remedies for non-broadcast interference, Bryant said "it's about time somebody did something."

Motorola AM Systems Manager Frank Hilbert said passage of Rinaldo's bill may accelerate acceptance of AM stereo.

Although the Rinaldo bill is conspicuous by its absence of any mention of an AM stereo standard, Hilbert said that

such a mandate is still a goal of many in the industry.

"I would love it," he said. It would help speed it (acceptance of AM stereo), too."

House Telecommunication and Finance Committee Minority Counsel Terry Haines said Rinaldo and the other sponsors of the radio renewal reform bill will work hard to get both bills through Congress.

In its June Radio Board Meeting, the NAB also adopted similar objectives to help AM including the formation of a task force of AM-concerned broadcasters who will work closely with the consumer electronics industry.

For more information, contact Matthew Rinaldo at 202-225-5361, Ron Frizzell 207-784-5401, Margaret Bryant at 312-445-6080, Michael Rau at 202-429-5346, Frank Hilbert at 312-576-0554 or Terry Haines at 202-226-3400.

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FROM THE TRENCHES

by Alan Peterson

Dear JG:

Well the impossible happened last month.

The central NY station I'd been calling

"home" decided humor didn't belong on afternoon drive and gave me an unceremonious heave-ho. I'll let you know where I land so I can continue to aggra-

vate you with my mail.

I've gotta tell you something I'm gonna miss. Those years I worked there when I maintained a house in western Massachusetts, I used to enjoy driving the Thruway to the Mass Pike, tuning in the Class IIIs and IVs all thru-out Upstate Noo Yawk.

Working up to where I had in my career (a top-rated FS/AC 5 kW), it was great fun to tune in stations with ancient-sounding gear, peculiar processing and verrry muffled jingles from 1974.

Cautious pleasure

Does this sound callous? It isn't. My listening was purely pleasurable.

For one thing, it reminded me of my earliest days of working the trenches,

having to wrestle with the same lame equipment . . . the blunt stylis on rippled records, the KERCHUNK cart machines, the 250-watt backup Xmitter that needed retuning every eight minutes . . . AAARGH!

The hardest, hungriest years of my career, but the ones that taught me the most.

It also reminded me to keep watching over my shoulder.

Any minute now, that young woman or guy spinning the afore-mentioned rippled record, struggling to properly say "Double-yoo" and doing whatever to decipher that station log typed on a 1933 Underwood special will be applying for the same job as I am, and will stand a superb chance of getting it.

Listening to these small but great stations were warnings that great talent was on its way. (By the way, these kids never forget. When they say to you all starry-eyed, "Wow! You work in *East Nowhere??*" be nice to 'em, otherwise you're in for a rough time ten years from now.)

Sense of pride

And when the owner/GM/engineer (same person) is on doing his own show, it's a pleasure to think about what it took to put the place on the air. The hours, the money, the jerks who have worked for him . . . and yes, the old gear and the rippled records.

There's pride in the old boy's voice when he speaks on the air with a sparkle that says "this place has my name on it" that transcends the mid-fifties production music and boxy-sounding room resonance.

Here's the sad part—it isn't the loss of my job that will keep me from listening to those great stations. It's the satellite formats everybody is switching in to economize and give the station a BIG sound.

Honestly, I have no gripe with the syndicators (hell, I wish I had a gig that good) . . . it's just the loss of so much of what I tune in for.

Whither the spots?

There are such great things to be said about local AM heard on the road that "12-in-a-row" FM plants can't give me.

When's the last time you really heard a hardware store spot? A fishing tackle spot? Peterson's Liquor Store and Laundromat? God, I love it!

Yeah, times are tough for the smaller station owner with an AMer. Automating or going on-the-bird are probably the best things he/she can do and I understand and support that. It's just that it makes for a longer drive on Route 90.

It makes for more first-time broadcasters who may know little more than 12-in-a-row or what time to key back to the satellite channel after a weather break (I refer to the grass-roots DJ who gets a job without the benefit of college).

And it makes for an overall peculiar sound when the clean 15 kHz stereo signal butts up against a 4 kHz cart machine with hiss to spare.

I'm gonna miss my job and all of those stations I called "friend" for so long. Hang in there gang. Onward and upward,

—Al

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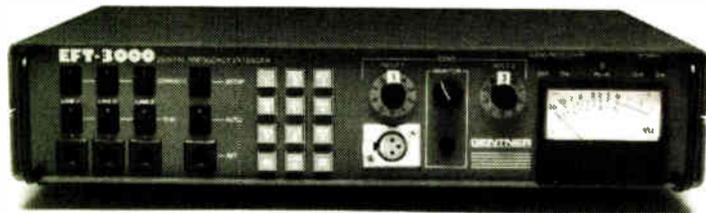
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What to Expect from Radio '89

by Janet Elliott and Stan Salek

Washington DC Broadcast engineers will discover an exciting program of technical seminars, reports and panels at Radio '89 12-16 September in New Orleans.

Three full-length seminars begin on Tuesday, 12 September with a brand new offering: Technical Aspects of Shortwave Broadcasting.

Also offered are the Digital Radio Station Workshop, 13 September and the 21st AM Directional Antenna Seminar, 14-15 September.

AM/FM engineering

Two separate technical paper sessions cover the timely aspects of AM and FM radio broadcasting.

The AM session will have papers on NRSC radio implementation by a radio receiver manufacturer; NRSC transmission system implementation and meeting new FCC requirements; transmitted bandwidth measurement using a spectrum analyzer and splatter monitor; and staff reports on the NAB reduced sky-wave and low-profile broadcast antenna projects.

FM-related technical papers include a report on receiver design tradeoffs by Rick Zerod of Ford Motor Co., progress reports from the NRSC-FM Subcommittee regarding current multipath and composite transmission studies, and updates on recent FCC actions affecting FM

broadcasters.

These include a tutorial on FM directional antennas and Class A station upgrades.

There are also four special engineering panels this year, on remote control, PCs, engineering management and interference.

The four specialties

Since the advent of "dial-up" transmitter remote control systems, many questions have arisen about their legal usage.

Stations have enjoyed the greater flexibility they afford, but are unclear as to whether they may reassign the station control point to any telephone at will, as this technology allows them.

Experts at the session on remote control will discuss the technical operation and legalities of this issue, including EBS and logging responsibilities.

A very popular panel in 1988, "Computers for Broadcast Engineers" will have an updated demonstration of software and hardware on everything from modem communications to technical documentation on a PC.

The discussion on management for engineers, lead by Judith E.A. Sheets of the Calument Group in Calument City, IL, will evaluate personal strengths and weaknesses and present resources for developing communications skills including options for further study and training.

Sheets delivered a very successful presentation on professional development for engineers at the NAB Spring Convention.

In "Interference: Its Causes and Cures," broadcast engineers and utility company officials will take a look at broadcast interference—investigating sources, corrective actions and the role of the FCC.

Special engineering seminars

This year we've added "Technical Aspects of Shortwave Broadcasting" to the special seminar list which already includes the "AM DA Seminar" and "Digital Radio Station Workshop."

The shortwave seminar is included with all engineering registrations at no extra charge. A small additional materials fee is charged for the "Digital Radio Station" and "AM Directional Antenna" Seminars.

"Technical Aspects of Shortwave Broadcasting" will begin the convention schedule on Tuesday, 12 September. This new seminar will explore how and why broadcasters are operating commercial shortwave stations.

Speakers will review the technical complexities, listener response, and the financial viability of these stations.

Particular emphasis is placed on transmission including antenna systems, transmitters, and specialized audio processing. Michael McKenzie from commercial shortwave station "Superpower" KUSW, Salt Lake City is scheduled to host the presentation segment.

An afternoon tour of the transmission facilities of WRNO Worldwide follows as an integral part of this seminar. WRNO, New Orleans is a commercial shortwave station that has been operating successfully since 1982.

Digital radio station workshop

Following a successful debut at Radio '88, the "Digital Radio Station Seminar" to be held on Wednesday, 13 September, will cover all new topic areas.

Industry experts will discuss such topics as sampled-data theory, digital transmission techniques and audio storage including DAT/CD technology.

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Areas of special emphasis in 1989 include an in-depth, but generic tutorial on CD player maintenance and troubleshooting by Laura Tyson of Denon Professional Products, a staff progress report on recent efforts to develop a standard broadcast digital audio interface format, and coverage of digital audio STL/transmission links and digital audio processing.

A panel of engineers will relate their experiences with digital audio system conversion and answer participant questions.

Additionally, a special guest speaker (yet to be named) will address a timely and related topic at the Second Annual Digital Luncheon (included with this seminar).

21st Directional Antenna Seminar

Any engineer responsible for the proper installation, maintenance and operation of an AM directional antenna system will find the NAB "Directional Antenna Seminar" valuable.

The course, which is held this year on Thursday and Friday 14-15 September, is programmed by Carl Smith of Smith Electronics, Inc. He is a recognized authority in the area of AM directional antennas and has published many books on the subject.

Participating in addition to Smith are: Alan Gearing, Jules Cohen & Associates; Karl Lahm, Karl D. Lahm & Associates; Steve Kramer, Steve Kramer Consulting Engineers; and Ron Rackley, du Treil, Lundin & Rackley.

Engineers are invited to discuss their individual directional antenna problems with the country's leading authorities on this topic.

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If you are an NAB member, your station has already received information on how to register for Radio '89 and the three seminars.

You must register by 11 August to take advantage of the lower registration fees.

Join us in New Orleans for the Jazziest Radio Show of the Year!

■ ■ ■

Janet Elliott is director of operations and Stan Salek is a staff engineer with the NAB's Science and Technology department. If you need more information or have questions please call NAB Science and Technology at (202) 429-5346.

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World Radio History

FMX Developers to Relocate

(continued from page 1)

Bose of the Bose Corporation.

"It has nothing to do with the Bose report. This is purely a business matter to have engineering and marketing work with each other in the same place," BTP Director of Marketing Ben Micznik said.

Under one roof

The business end of FMX Inc. had been based out of the Detroit area, where its president, consulting engineer John F.X. Brown is located.

"The relocation will bring these activities into closer proximity with market-

ing and licensing operations already situated in Bloomfield Hills," Brown said in a recent statement.

FMX Inc., is the managing partner of BTP, which also numbers NAB among its financial partners.

The technology is in use at about 100 stations nationwide, according to BTP, but only one company manufactures the FMX generator for stations. Companies are just starting to produce FMX-equipped receivers and Sprague Semiconductor is now making the FMX chip, according to BTP.

Many stations and potential FMX product manufacturers have taken a

wait-and-see attitude with FMX, in part due to the recent publicity surrounding the Bose report.

No lease

Torick, a co-inventor of FMX, said it was a good time for the company to move to a new location because the lease expired on its headquarters at the old CBS Publishing building in Greenwich, which BTP has occupied for the past few years.

CBS withdrew from development of the project several years ago, but support from NAB, among others, and the formation of BTP kept the Connecticut

operation going.

Although Torick is still president of the company, he will move to a new private office in Connecticut. FMX co-inventor Tom Keller will remain at his office in Virginia as a continuing partner in BTP.

Former VP of Engineering Tom Rucktenwald left BTP in April, returning to his former job at Sony.

BTP's 30 other employees have been offered their positions in Bloomfield Hills, but not all have said whether they will make the move, according to Micznik.

Unsure about technical support

The move from Connecticut and the uncertainty of the future of some of the technical staff has left some engineers wondering whether there will be enough technical support from the company to help a technology that has not completely satisfied its critics.

Some stations broadcasting FMX wonder whether technical support to engineers will take a back seat to a slick

"This looks like more of a marketing move than a technical move."

marketing strategy.

Midwest Family Stations Engineering Director Geary Morrill said his main technical contact at BTP, Jim Monahan, has decided not to remain with the company.

"I have absolutely no idea who I will be working with," Morrill said.

Midwest Family Stations is testing FMX at two stations in Lansing, Michigan. Morrill said he needs BTP's technical support because of a 57 kHz paging subcarrier's incompatibility with FMX that has not yet been fixed at WMMQ.

"I am very concerned that this could backfire on them (BTP)," Morrill said. "This looks like more of a marketing move than a technical move."

Natural step

On the other hand, other engineers said the move to Bloomfield Hills is a natural step for BTP and will not affect the company's technical service to its customers.

Wayne Mulligan, VP of Engineering at Buckley Broadcasting, said Bloomfield Hills is a better headquarters for BTP because it is just outside Detroit, where most US cars are manufactured.

He said BTP also has assured him the support for his five stations using FMX will not be reduced as a result of the move.

BTP said technical support will continue to be as strong, if not stronger than before.

"That is the number one thing that will remain covered," Keller said.

BTP has promised continued technical support to engineers already using FMX and new stations that buy the technology, Micznik said.

For more information, contact Emil Torick at 203-622-2804, Ben Micznik or John F.X. Brown at 313-540-4380 or Geary Morrill at 517-393-1010.



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World Radio History

Closed Meeting on AM Mark

(continued from page 1)

trade publications but said he was attending the meeting "as a consultant to EIA" was not asked to leave. However, a reporter for *Broadcasting* magazine was previously told by Rau that the meeting would be closed.

Shapiro, when asked if the request that RW leave violated EIA's antitrust guidelines said "I wrote the guidelines and I can interpret them as I see fit."

Straw proposal on the table

A proposal drawn up by NAB to implement the certification mark was discussed at the last NRSC meeting held at the summer Consumer Electronics Show in Chicago in early June and was on the agenda for the July meeting as well.

Although the NRSC standard gives

of engineering, Valerie Schulte and Barry Umansky from NAB's legal department and Stan Salek from NAB Science & Technology were also present, Rau noted after the meeting.

Rau conceded that the meeting was originally intended to include more receiver manufacturers but became primarily "a meeting between NAB and EIA staffs."

However, the fact that EIA members were present puts the meeting in the grey area of standardization and marketing which have stringent restrictions under EIA legal guidelines.

Both Rau and Lauterback said after the meeting that it had been a successful give-and-take between those present, although Rau again expressed disappointment at the small number of manufac-

urers present.

Lauterback said EIA members were receptive to promoting new radios for AM but that no commitments were made at the meeting. "The question of a certification mark is just that, a question," Lauterback said.

More info requested

Rau said that the Receiver Task Force set up by the NAB Board to act as a liaison between broadcasters and receiver manufacturers will now set about providing "information" requested by EIA members at the meeting.

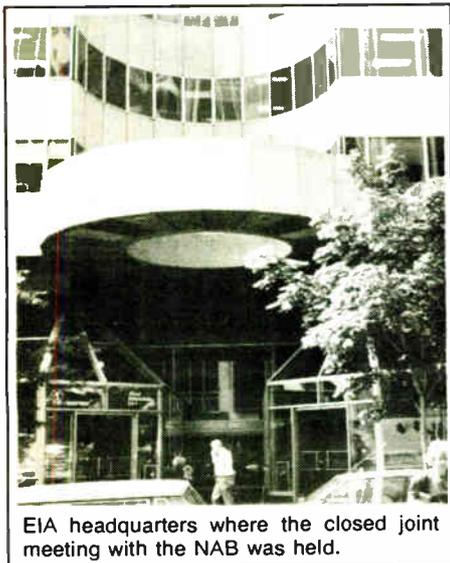
He declined to elaborate on the type of information requested but said that the Task Force will also designate \$30,000 to "bicycle the idea of a certification mark around to receiver manufacturers."

Of the decision to keep the meeting closed, Lauterback maintained that the antitrust guidelines do not state that the EIA has to allow news media into a meeting, and that originally he was unaware of that fact.

Rau said that the meeting was closed so that "manufacturers present would feel free to speak freely with NAB and EIA staff."

When questioned whether the exclusion of news media doesn't also exclude the 5000 AM broadcasters who read about such meetings in the trade press Rau said he would be "happy to talk about the meeting with whomever was interested, after the fact."

For more information call NAB Science and Technology VP Michael Rau at 202-429-5339 or the EIA at 202-457-4900.



EIA headquarters where the closed joint meeting with the NAB was held.

stations allowable bandwidth to 10 kHz—a 5 kHz reduction from the FCC's previous occupied bandwidth—the certification mark proposal calls for only a 7.5 kHz response in new radios. It includes the NRSC deemphasis curve but does not require AM stereo or the expanded AM band.

Rau has said that receiver manufacturers would be more accepting if the 7.5 kHz and the exclusion of stereo were among the mark's requirements than they would be of wider bandwidth response when considering new radio designs.

But one manufacturer's representative present at the early June meeting, Dick Kennedy from Delco Electronics which manufactures General Motor's car radios, told NRSC members that even 7.5 kHz would be too wide for new AM radios.

"If you're saying we need to make a radio that is 7.5 kHz, then we're simply not interested," he said.

Since then, the specifications for a certification mark to help AM have not yet been decided.

Poor turnout

Representatives of only two receiver manufacturers attended the closed-door July meeting; David Birch-Jones, manager of audio products for Philips, and Marty Zanfino from high-end audio specialists Harman Kardon (JBL et. al) were present.

Almon Clegg from Denon America was present as a consultant to NAB, Feldman as a consultant to EIA, Ted Snider and Suberbielle represented the newly-formed NAB Receiver Task Force; George Hanover, EIA executive director

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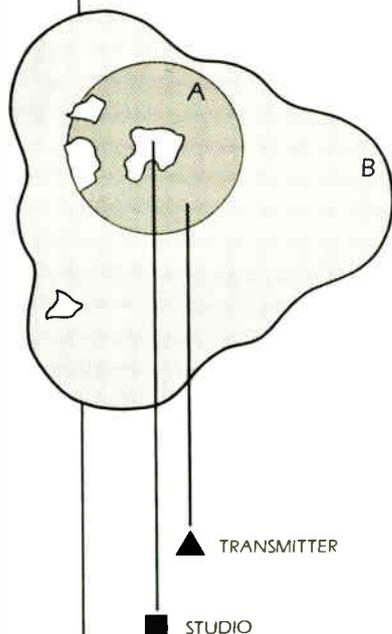
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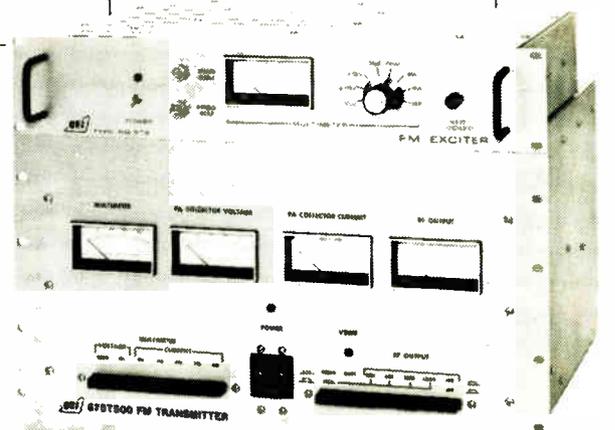
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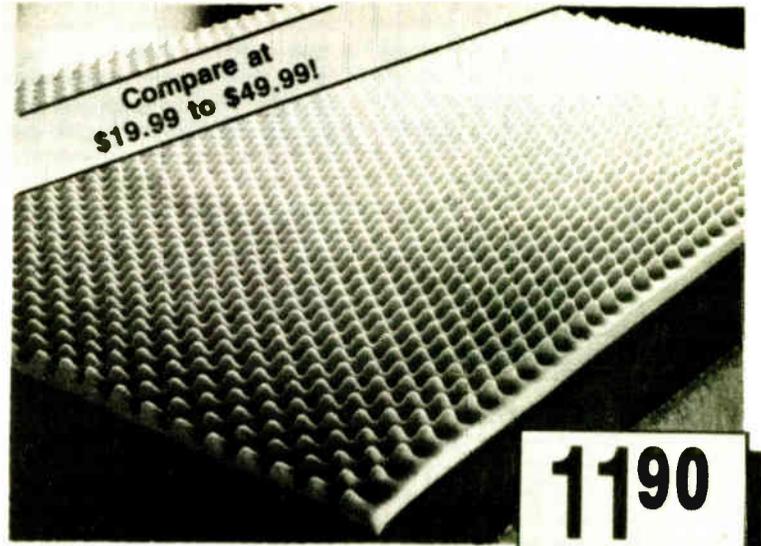
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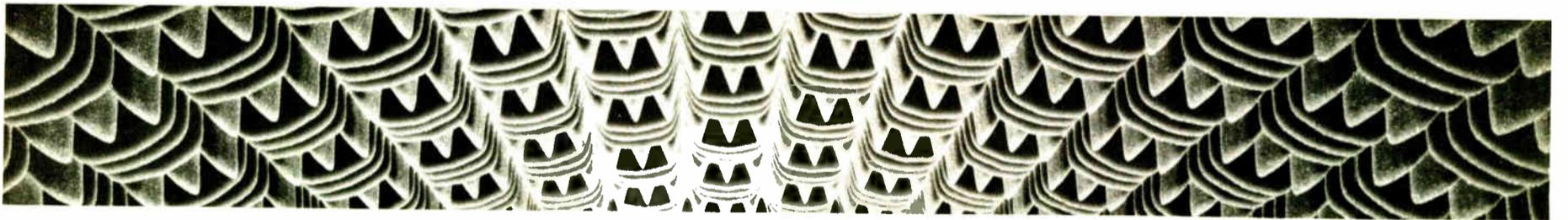
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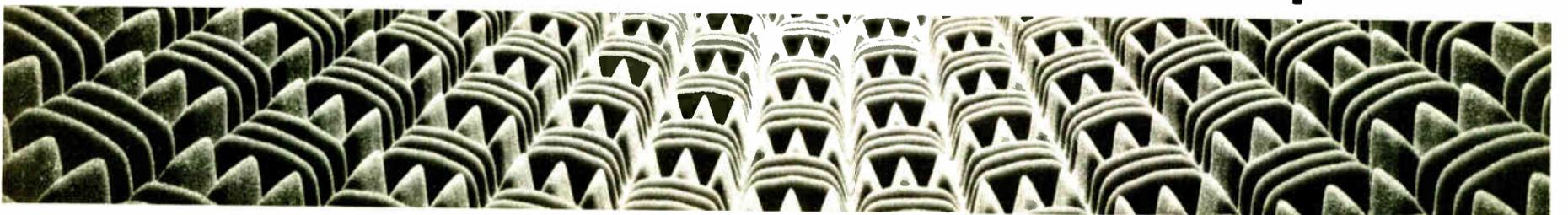
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Talk Radio Influence Criticized

by Charles Taylor

Washington DC Despite recent controversy over just how far talk radio hosts should be allowed to push their views over public airwaves, radio managers deny that rallying listeners by taking a stand is irresponsible and they defend stations' rights to offer commentary.

Commissioner James Quello addressed the issue with some disdain at the 1989 NAB convention, criticizing what he called a "kind of Messianic binge" from reaction-oriented radio talk show hosts.

He centered on the recent effort in Seattle where a personality on KING-AM convinced listeners to send 75,000 tea bags to protest a proposed Congressional pay raise, which in turn created enough nationwide hoopla to help defeat the bill.

Shows of strength

In other markets, talk radio hosts have encouraged listeners to boycott Exxon products following the company's oil spill disaster, while other hosts have organized boycotts of music by Cat Stevens, who as an Islamic condemned Salman Rushdie for writing "The Satanic Verses."

"You have a First Amendment right to editorialize but . . . it was irresponsible editorializing," charged Quello. "There's a little bit of abrogation of licensing

responsibility that could climb in there."

Those in the industry do not agree. "Talk radio is not objective. It is not journalism," said Bill Jennings, PD at KING-AM, which prompted the tea bag stunt. "It is definitely opinionated and

"Talk radio is not objective. It is not journalism."

it should be because conversations start with opinions. You don't get people thinking unless there is some sharp opinion there with passion."

Jennings added that while disc jockeys may push their opinions, a forum always is readily available for listeners to present opposing viewpoints. "That's the only way we'll be a public service in the long run and have staying power," he said.

Talk radio officials also said that recent national publicity questioning the format's validity holds little weight.

"Negative publicity generally comes from national media types who evidently see radio guys who have a bit of flash and dash and are colorful—because by the very nature of what we do we have to be—as some sort of a threat to their influence," said Jerry Williams, a long-time talk show host at Boston's WRKO-AM.

Williams also is president of the Na-

tional Association of Radio Talk Show Hosts (NARTSH), formed last month at a first-time meeting in Boston to promote the talk format and function as a clearinghouse for information on topics and guests.

Jennings agreed with Williams. "I've heard criticism from the Congress," he said. "I've heard it from the bureaucrats, but I haven't heard it so much from the public."

Reaction from Congress

That criticism from Congress, however, could create a backlash for the industry as a whole when legislators meet on issues affecting radio.

Particularly vulnerable is the influential HR-1136, "The Broadcast Radio Quality Improvements Act of 1989," which could pave the way for major improvements for radio broadcasters.

NAB Executive VP James May said the hoopla created by talk show hosts, particularly over the Congressional pay raise issue, certainly has made Congress more aware and more sensitive of the genre.

But, "that awareness is not positive," May said. "They are not going to engage

in retribution, but the activities of talk show hosts are clearly going to make our job of affirmatively enacting legislation more difficult."

For station managers, Williams said the recent publicity will persuade more stations to try their hands at the format.

"We're finding that there are people wanting to get into it (talk formats) in smaller cities over satellite because it is saving AM radio in major cities to a great degree," he said. "So I see it as very positive among most radio stations."

From a management standpoint, the publicity appears to have had no effect on belief in the format, despite the sometimes-sensational approach that talk hosts employ on the air.

"I don't think anything that's happened is going to change the way WABC is operating. We are a controversial talk radio station," said Frank Weinhaus, president and GM of WABC, a New York talk radio station. "I would expect that we would continue regardless of the type of publicity that's out there."

Said Jennings, "If (management) pulls back the reins on the format, you're really defeating what the format is intending to do—to completely mirror what our Constitution is founded on."

"It's the most spontaneous, creative, intricate in-radio today. You cannot pre-program the words of your callers, your guests or your hosts," he added. "You never know what's going to come out. That's why it's fun, that's why it's interesting and that's what makes the format go."

For more information, contact Jerry Williams at 617-236-6800.

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Digital Thermometer Design

by Thomas L. Vernon

Harrisburg PA As the dog days of summer drag on, do you know how hot it is at your station? Not what the weather service 18 miles away says, but right outside your studios?

Maybe the cost of buying a commercial digital thermometer gets you hot under the collar. Cool down—this month's *Station Sketches* describes how digital thermometers work and how you can save dollars by making your own.

STATION SKETCHES

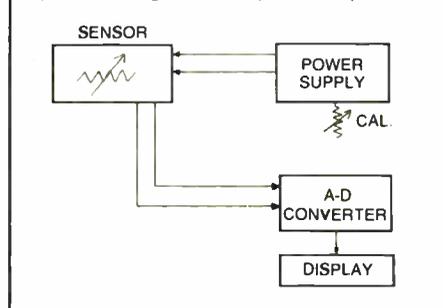
Over the years, electronic thermometers have used several types of sensors. Earlier types used a thermistor, which is nothing more than a resistor with a non-linear temperature/resistance relationship.

Others, like the early ESE types, used four or five 1N914 diodes in series. Ordinary bipolar transistors can be used, and in recent years several very accurate temperature sensor ICs have become available at reasonable prices.

Basic operating principles

Most electronic thermometers work on pretty much the same principle, as illustrated in Figure 1. In the studio there's a box with a well-regulated power supply and some sort of display device, be-

Figure 1. No matter which type of sensor is used, electronic thermometers rely on the temperature/voltage relationship for their operation.



it a panel meter with the scale altered for temp (in older types), or a 3½ digit LCD display.

Usually the power supply has some sort of calibration control to adjust the voltage to the sensor. The control box is connected to the remote sensor with about 200 feet of two or four conductor cable.

The temperature transducer itself is mounted in a small enclosure which allows free air circulation, but blocks out direct exposure to sunlight and the elements.

In operation the power supply carries DC current through the cable to the sensor and is returned to the studio for metering. The value of the return current depends on surrounding air temperature. Usually the return line current is amplified and used to shift the frequency of an oscillator, hence A-D conversion.

Finally, the BCD output drives the dig-

ital display. Some commercial devices have added bells and whistles such as separate displays for degrees Celsius and Fahrenheit, provisions for driving slave units and resolution two or three places beyond the decimal point. The basic theory of operation remains the same, however.

Placement is important

Where and how the outdoor sensor is located has a profound effect on the system's accuracy. Generally, the farther

from the studio or other buildings the better. The idea is to locate the sensor in areas of freely circulating air and to avoid dead air pockets.

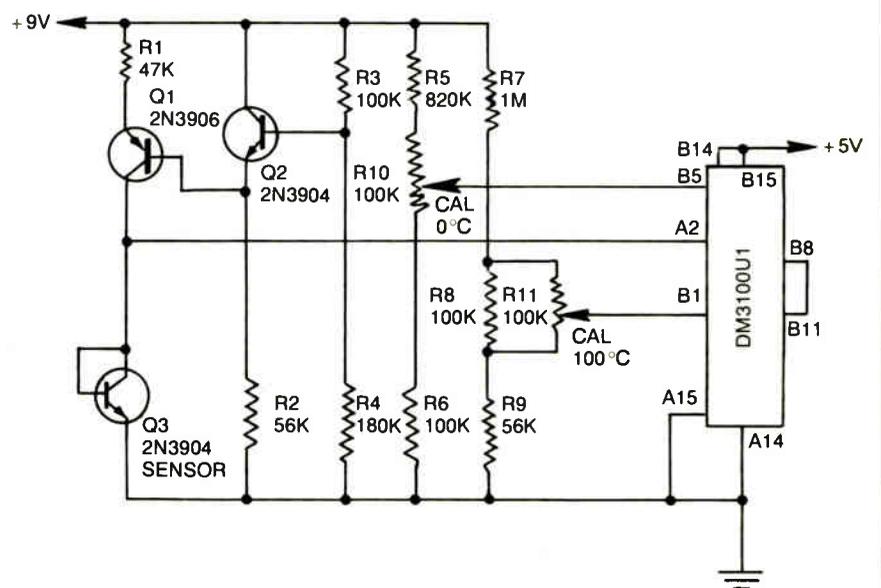
In the inner city, where this is not possible, rooftop installations are the only solution. Here it is important to locate the sensor as high above the roof as possible and as far away as possible from exhaust fans and air conditioner ducts.

The only remaining caution is not to mount a sensor near the tower base. Even if it doesn't get destroyed by a direct lightning hit, the sensor can be damaged by static currents.

When securing the cable run to the studio, be sure to use black cable ties in-

(continued on page 33)

Figure 2.



Pitfalls in Owning a Piece of the Action

by Barry Mishkind

Tucson AZ It is hard to think of a broadcast professional who wouldn't like to own his or her own radio station.

In many cases, we look around a station and *know* we could run the facility better and be more responsive to the needs of the community (not to mention having a better sounding facility).

An added frustration is that stations like that seem never to spend a dollar on the physical plant unless they are off the air. Nonetheless, the manager's parking space always seems to have a new luxury car in it. And the sales manager doesn't do so badly, either!

ECLECTIC ENGINEER

So we dream about seeing our name on the FCC Ownership Report forms. The question is: How to get there? Maybe by winning the state lottery, receiving a large inheritance or having Michael Anthony of the famed *The Millionaire* TV show of the '60s visit us on behalf of his employer.

(Yes, there is also the FCC "lottery," also known as "comparative hearings," but few of us have the requisite funding to enter that club.)

There is actually one more alternative.

It's available mainly in the smaller markets, at new or struggling stations. It's also a path filled with problems.

You can calibrate your internal alarms to go off when the station owner asks,

What you get . . . may have more sizzle than substance.

"How would you like a piece of the action?"

Usually, what the station owner is offering is stock in lieu of payment for services. Sometimes you are asked for cash, but usually it's a way to avoid paying for construction or other extensive work.

Truly tempting

It sounds good—a locked-in percentage of profits from now on. What you get, though, may have more sizzle than substance.

In fact, asking engineers about ownership yields varying responses. Those who have no experience in ownership love the idea. Those who have been there wouldn't touch it with the proverb-

(continued on page 30)

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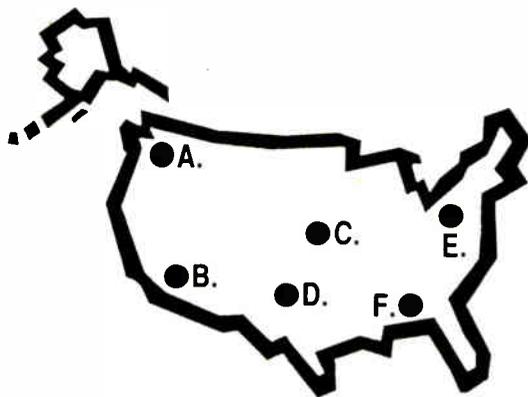
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Sony Joins Recordable CD Team

by John Gatski

Tokyo JAPAN It isn't yet a recordable CD for the consumer, but a new product from Japan puts the industry one step closer to that possibility.

Taiyo Yuden has announced that it will use its record-once CD laser technology in a partnership with Sony to produce short-run compact discs for professional uses such as radio broadcasting and recording studios.

The partnership, called START Lab (Sony-Taiyo Yuden Advanced Recording Technologies) will use a system that would allow production of up to 10,000

duplicate CDs for specialty recordings that broadcasters or studios may require.

Taiyo Yuden, best known for its "That's" audio tape, will produce the discs, costing about \$27-\$30 each, depending on length. Sony will produce the recorders and the short-run recordings will be done at the START facility.

Demand for short run discs

"As the applications for compact discs continue to grow and become more tailored to individual demands, the need for small-scale production of select discs

has arisen," a Sony press release said of the venture.

START plans to produce 3-inch and 5-inch discs that will contain sound and information, such as read-only information discs for computers (CD-ROM).

Current CD players will be able to play the discs, but the record-once system is not aimed at the consumer market, according to the two companies.

Taiyo Yuden said last year it would not offer consumer-recordable CDs until the current copyright controversy over Digital Audio Tape (DAT) is settled.

Organizations representing recording artists, such as the Record Industry As-

sociation of America (RIAA) believe recordable CDs pose more of a copyright threat than DAT.

Despite START's professional direction, RIAA spokesperson Hilary Rosen said recordable CDs and the recorders will eventually filter down to the consumer.

Consumer CD recording?

"We know its going to be a consumer product. It's just a question of when," Rosen said. "We will be watching and hope they (audio manufacturers) will talk with us before they go ahead with it," Rosen said.

Rosen said recordable CDs for professional use is OK, but such a system for the consumer could result in widespread piracy of copyrighted music of the recording artist.

In a related development, RIAA and other organizations that oppose consumer DAT equipment with the ability to record digital-to-digital (CD to DAT) may soon hammer out a compromise with manufacturers that is agreeable to both sides, Rosen said.

Most companies have been reluctant to heavily market such consumer DAT machines in the US because of intense opposition and a fear of litigation over the copyright controversy.

If companies and recording organizations agree to a technical standard that will preclude the potential to mass-produce home DAT tapes, manufacturers could concentrate on marketing consumer machines, according to industry sources.

For more information, contact Taiyo Yuden at 03-833-3981 in Japan, Sony at 03-448-9841 in Japan or Hilary Rosen at 202-775-0101.

Multipath Testing On

by Charles Taylor

Allentown PA General Motors, Ford Motor Company, Delco Electronics and other broadcast manufacturers have joined forces with Harry Simons, CE of WAEB AM and FM here, in a research project that will explore ways to defeat multipath interference.

The project's first phase, to be launched at the end of July, will involve taking measurements with spectrum analyzers, chart recorders, distortion analyzers, field intensity meters and multipath analyzers in a number of spots in the WAEB listening area, which contains mountainous terrain and is considered among the worst multipath regions nationwide.

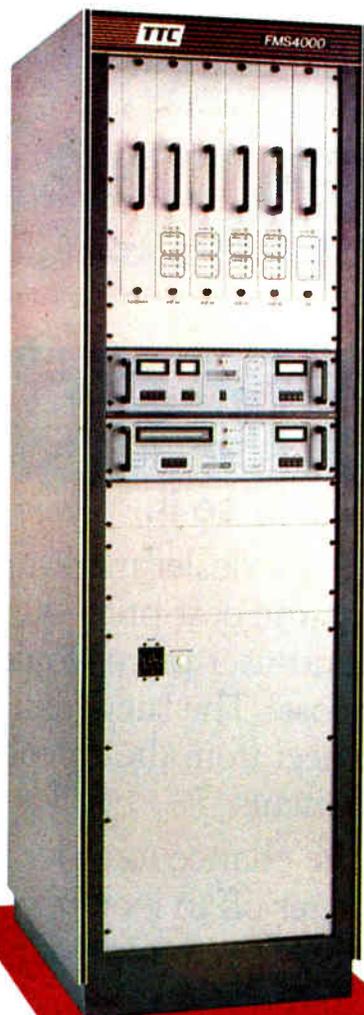
Various adjustments then will be made at the WAEB transmitter and the testing process will be repeated. The results will be fed into an on-board computer and recorded on digital tape for later study.

"The aim of the research is to move dealing with multipath from an art to a science," Simons said.

Better broadcast equipment

Ultimately, the information will be shared with the FCC and the National Radio Systems Committee—which conceived much of the test criteria—in hopes of providing manufacturers with infor-

(continued on page 33)



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Collecting on Payment Owed

by John Cummuta

Downer's Grove II I recently received a very kind letter from a reader that included some suggestions for future article topics.

One of the issues he thought would be interesting to RW readers is the task of trying to get paid for work you've done for a client. Collections.

Well, because last month's column finished a short series on direct marketing techniques designed to get and keep clients, I suppose that it's a natural segue to move right into getting them to pay you for your work.

Prevention is the best medicine

The best way to handle a collection problem is to not have one in the first place. It's simple.

ENGINEERING MANAGER

Don't do business with dishonest people and get paid for everything up front.

Ah, if it were only that easy. But there are some things you can do to avoid the worst kinds of collection situations.

If the work you are going to do for potential clients is extensive, it can be well worth your while to check around with likely suppliers and even Dunn & Bradstreet to find out whether they pay their bills.

Also take a visual inventory of the general symbols of cash flow at the station, such as fairly modern office equipment and studio equipment, decent furniture and reasonable quality employees.

The next step is to get it in writing. Don't be put off by big friendly smiles and lines like "I've always just done business with a handshake." If you hear or see that kind of behavior, a red alert should be flashing in your brain.

No respectable business person disdains written agreements. Plus, asking for one shows that you too are a professional, and you expect to do business like one. Should you ever have to seek judicial recourse to get your money, the written agreement is your ammunition.

Get some money up front

Try to get at least a third of your fee up front, a third on completion and a third within thirty days of completion. That will work in most cases, presuming that you know what your fee will be. But in any case, try to get at least a deposit on the front end.

There are a couple of situa-

tions where you may have trouble getting front money. One is when you are just getting started, and you have no track record to prove that you are worth the money.

The other is when you are dealing with large, bureaucratic companies. In both cases you should get a written agreement,

and at least a purchase order—also called a "PO."

Should you be given a "PO," be sure to read the fine print, because it sometimes includes the terms of payment. You may find that the purchase order gives them the right to hold payment until thirty days after the completion of a project,

when you may be hoping to get partial payments during the course of the work.

Watch out for prospects who agree too easily. If they engage your services without discussing your rates or estimates for the project, it could very well be that they're not concerned about the price, because they

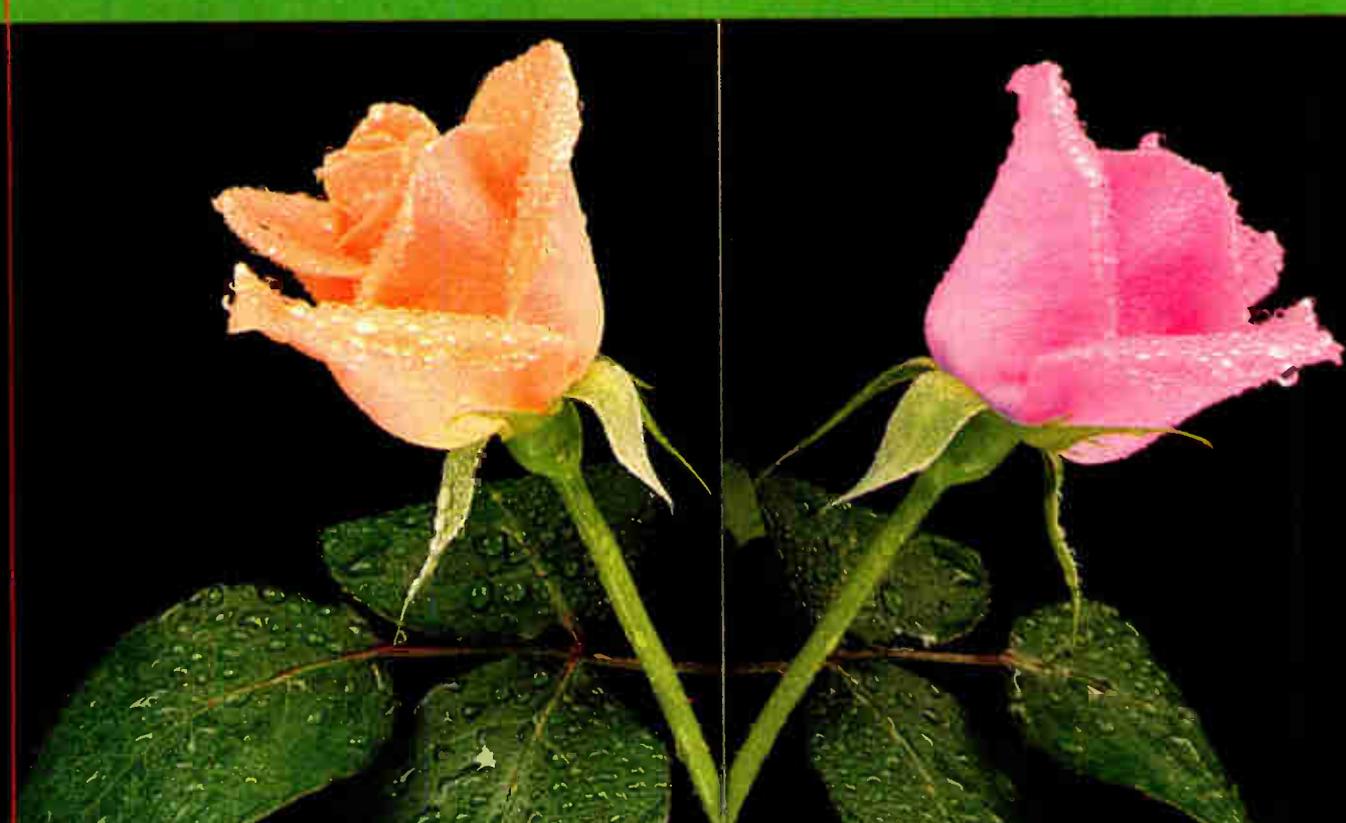
have no intention of ever paying it.

If you get a commitment for partial payments at certain progress points in a project, make sure that you and the client agree, in writing, exactly what those progress points are and what evidence will prove their arrival.

One good strategy for getting your money promptly is to add a little incentive. I've found that I can get paid rather quickly if

(continued on page 35)

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In Search of a More Thorough Education

by Ty Ford

Baltimore MD In a recent *Producer's File* (24 May 1989) I spoke about the differing realities that exist between academia and the real world as they relate to radio and audio production.

I suggested the primary problem is that some educators, especially those who determine the media studies programs, are creating programs that don't teach skills necessary for graduates to get jobs.

The idea that college teachers who "teach their students to think," because teaching them "to do" would cause their institute of higher learning to be considered merely a trade school, hit home hard enough to get a few teachers to call me.

PRODUCER'S FILE

As I had expected, there are teachers who would like to teach skills that would help a graduate get a job. However, many of them are bound by administrative policies as to what they teach, and how.

The Roper study

Several years ago a survey called The Roper Study was commissioned by the RTNDA (Radio-TV News Directors Association). Gary Hansen, of WKBN in Youngstown, Ohio, was on a committee that oversaw the report.

According to Hansen, the study laid out the argument made by the industry that college graduates don't hit the workforce with the kinds of skills that can get them hired.

Of the many solutions possible, putting more professionals on school accreditation panels, using student affiliates to attract more professionals to the campus and the development of programs in which teachers are hired as paid interns in the professional sector made the most sense to me.

The problem with teacher/interns is that many teachers feel their time is better spent cranking out words to be published in various journals. The bottom line here is that school administrations like to see their names in print. This rather obvious marketing tactic is used to attract attention and *money* to the institution.

John Phelan, marketing manager for the Professional Products Division of Shure Brothers, had an answer for the concern that teachers who spend time as paid interns would have less time for writing and publishing papers.

In his experience, working with organizations such as the AES can improve a teacher/intern's chances of getting published.

Where's the money?

Barry Sherman is head of the Telecommunications Department at the University of Georgia. His response to The Roper Study quoted the 1986 Forbes Annual Survey of Corporate Contributions.

It showed only 25% of telecommunications companies (including common carrier, telco, satellite, cable and broadcast) made contributions to higher education (according to a 1984 study).

While telecommunications were ranked #7, petroleum and gas were #1 with 45.1%, chemicals #2 with 43.1%, paper #3 with 34.6%, finance #4 with 30.3% and printing and publishing #5 with 28.3%.

But wait a minute! Publications by companies like Shure Brothers, Tascam and Fostex are testimony to the realization by the industry that more needs to be done to educate the user.

The argument that much of this information is too product-specific—or not expressed in appropriate academic fashion—smacks of snobbery. More to the point, there are too many academic bureaucrats following administration guidelines that have more to do with statistics than preparing students for a career.

Education gets a break

Before I get accused of "academia bashing," it's only fair to mention that colleges and universities have better things to do with their dollars than to run out and buy R-DAT machines for the media studies labs.

some educators . . . are creating programs that don't teach skills necessary for graduates to get jobs.

In real life, schools don't expect every student who takes a radio production course to become a platinum production rat. As a teacher, if you can light up 10% to 20% of a class, you're doing well.

As a rule, that 10% to 20% already have a passion for the subject. Some already have home studios, others are already working at the school station or in local commercial radio. It's unfortunate, but true, that some of these students have more practical experience in some areas than their teachers.

Louisa Nielsen, executive director of the Broadcast Education Association (BEA), believes that the industry and the academy need to work more on working together.

She has found that professors who move up the scale in appointments and tenure seem to be those who work in a friendly relationship with the industry. According to Nielsen, "Those in industry who stay at the top are also working with smart people in the academy."

"We can see the day where it will be a win-win situation. We can see the day when we will realize that we are allies and not opponents."

Covering all bases

She also noted that there has been a change toward the preference for multi-skilled people. Just knowing how to do one thing well is not enough. Tighter

(continued on page 31)

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by Chuck Springer

Lamar CO During the early days of FM radio, many AM stations were adding sister FM stations to their operation. This had its advantages in flexibility of programming for a different audience and another source of income.

Also came the disadvantage of having an air staff for the AM and the FM station. Many stations chose to automate one of the two stations to limit expenditures in the staff budget.

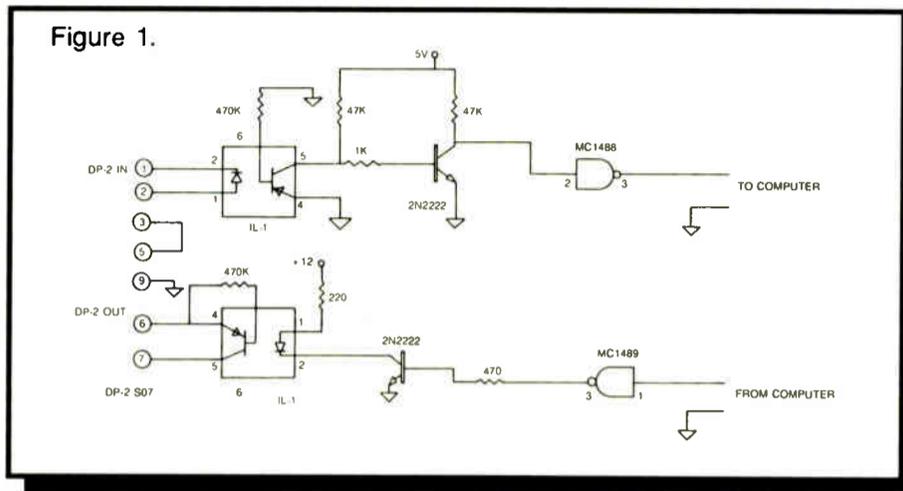
GREAT IDEA

Today automation has continued to serve radio around the world for various reasons. Automation machines have advanced along with the computer.

But some of us who have either inherited or purchased one of the older models have had to try to work around

the sometimes limited flexibility of these machines.

At KSEC we have had an SMC DP-2 automation machine since the late '70s.



It has served us well and we have been able to work around its limited program memory and other out-of-date features.

No memory backup

One hardware feature our automation machine lacked was a way to back up the memory (there is an optional cassette loader for the machine but it was considered too expensive at the time).

I looked around the station to see if there was anything just lying around that might do the job. In my quest I found an old seldom-used IBM compat-

ible computer with a serial RS-232 port. The two-fold challenge was to build the interface hardware to the automation machine and then write the software to

it consists of the conventional 5 V regulator and two zener diodes to obtain -12 V and +12 V for the MC1488. All of this can be mounted into a small case with connectors installed.

If you are installing this on an SMC DP-2 you will connect the automation side of the circuit to the full duplex output connector, SO-7, with a 9-pin connector.

The other side will connect to your computer, typically using a DB-25 connector with pin 7 ground. The MC1488 signal will go to pin 3 and the MC1489's signal will go to pin 2.

Software considerations

If you happen to have an old TRS model 4P around, you do not need to write any software because Tandy provided a communications program with the 4P. I used the 4P for three years before converting to the IBM format. Just follow the procedure in the TRS manual for uploading and downloading a file.

If, on the other hand, you are using an IBM compatible computer, you may need to write a small program to do the work if you do not have a communications program.

For a copy of software for the device, written in BASIC, send an IBM-formatted disk, with a self-addressed stamped envelope to: Chuck Springer, 1302 S. 12th, Lamar CO, 81052.

The program seems to work well. It does not have any frills, and is very straightforward. You give it the band rate and whether you want to download or upload, and it does the work.

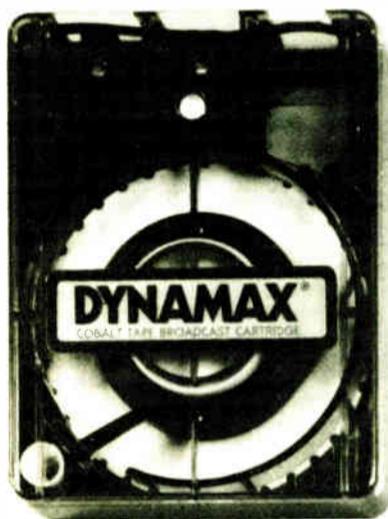
When either uploading or downloading automation memory, it seems best to work in small chunks of the automation memory so error checking is easier. The DP-2 manual has a procedure for copying the memory to cassette; just follow that procedure to use the computer program.

The program and hardware will also work with many other automation systems that have the capacity to dump memory to cassette.

So next time you have a power outage and the backup battery is dead or you have to shut the power off the unit to service it, you will be assured that you will not have to spend hours punching all those numbers in again.

Chuck Springer is CE of KLMR-AM/KSEC-FM, in Lamar, CO. He can be contacted at 719-336-2206.

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upload and download memory. The first was probably the easier to do.

The DP-2 and many other automation machines use a 20 or 60 mA current loop to input and output data from the automation machine, so direct wiring from the computer's RS-232 was not possible.

All that needed to be done was to build a small circuit like the one shown in Figure 1 to convert the current loop to the RS-232 signal.

Circuit operation

Operation of this circuit is very simple. Current from the DP-2's output port drives the LED in the optoisolator on and off. This signal is then buffered by the 2N2222 transistor.

The buffered signal is then amplified by the MC1488 to a +12 V and -12 V signal, which is the standard for any computer's RS-232 serial port.

Going the other direction, the computer's RS-232 signal is converted to TTL logic by the MC1489. This TTL signal is then buffered by the 2N2222 and controls the LED in the IL-1 optoisolator.

The transistor output goes to the automation where the collector is given a positive voltage and the emitter grounded to make a small current amplifier with the combined circuit.

The power supply is not shown since

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Circle 76 On Reader Service Card

World Radio History

Giving Old Consoles A New Lease on Life

by Bill Higgs

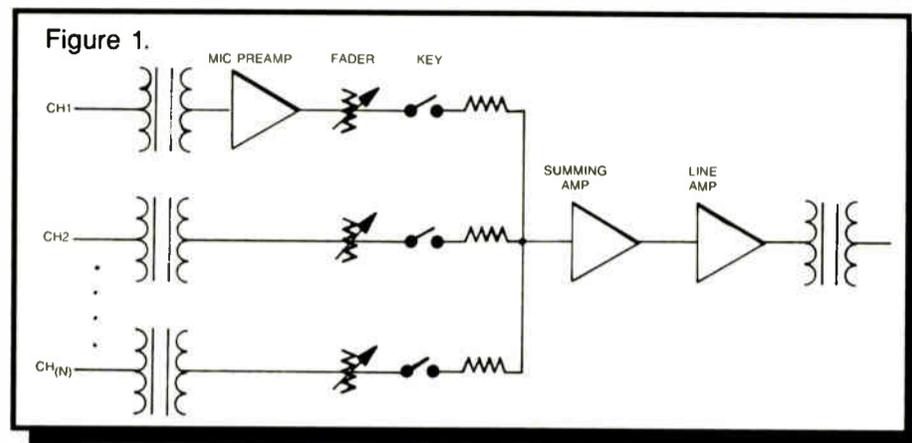
Louisville KY Old consoles never die, it seems, they just lose their fidelity. Outdated radio boards, like transmitters, are rarely relegated to the scrap heap. They generally find their way into the attic or garage, where they are given an occasional salute during the annual cleanup.

Nostalgia? Probably. But I suspect that part of our hesitancy to toss them out is respect for a well-made piece of equipment. Venerable warriors with names like Gates, GE, RCA, and Western Electric were our partners in the exciting moments of radio in its prime.

BOTTOMLINE BROADCASTER

Enough of this or we'll be getting the hankies out. These old warhorses were built sturdily, and most have held up well. Most consoles from the '50s and '60s had real live step attenuators, fader knobs the size of a steering wheel, VU meters big enough to see and enough switching to open a small telephone company.

Radio of this era required versatility;



one board typically could handle two or more studios plus a disc transcription (remember these?).

The basic concepts designed into this equipment were sound, and still are. I know of a couple of old Gates yards and Collins flat-panels still in daily on-air use.

The problem is in keeping them sounding decent: tubes have aged and are getting hard to find, resistors have changed in value, and electrolytics have gone south. In short, the disco toy from Radio Shack sounds better.

In the next several columns, we'll look at the basic design of an audio board and ways of making its innards as up-to-date

as possible. And, we'll try to do it at a cost of less than \$100 per output channel.

A look inside

The basic layout of almost all broadcast boards is shown in Figure 1. Most have three active stages, including the microphone preamplifier. In some cases, Sparta for instance, the summing ampli-

high turns ratios. The TL071 is an FET input device, so it will pretty much resemble a grid to the transformer. If the original used a push-pull arrangement, float the center tap.

R4 is in the circuit to add a fixed load to the transformer, and also to keep the preamplifier from oscillating if the transformer is disconnected or unplugged.

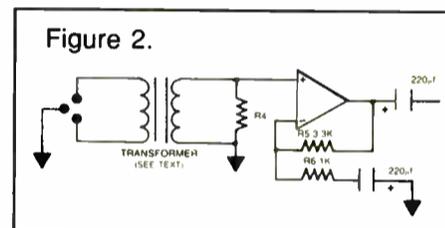
With mic-to-grid transformers, start with a value of 470K and work down until you begin to see high-frequency roll-off. Early solid state gear usually looked at about 1K to 10K ohms.

Is it old-fashioned to use an input transformer at all, when differential inputs are so common today? Probably, but I have had nothing but trouble with differential inputs at mic level, particularly with high gains.

Transformers prevent ground loops, provide their own common-mode rejection and provide free voltage gain. Older Triad, UTC, and Stancor units will render good service. They are also much happier with RF.

Analyzing the circuitry

The circuit is fairly simple, and designed to deliver 12 dB gain plus the voltage gain of the transformer. The capacitor to ground may not be needed, depending on any DC input currents present.



The output capacitor is there to keep DC off the fader and thus to eliminate clicks and pops when the key is turned on and off. If your board has 600 ohm faders add a 100 ohm resistor in series with the output when using a TL071.

In terms of gain, you are shooting for the same level that the line inputs of the console originally required, usually -10 dB to 0 dB. If more gain is needed, increase the value of R5. The max for this circuit is about 20 dB.

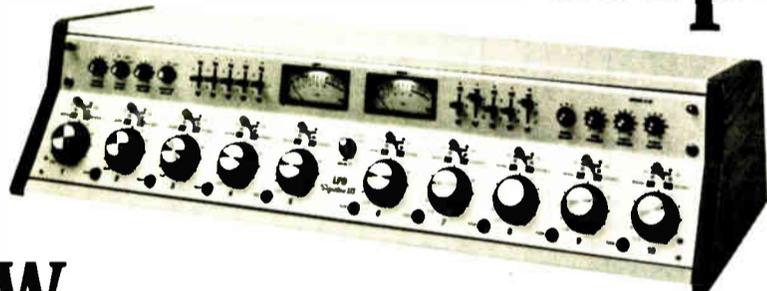
Use a power supply of ± 15 volts and you should have plenty of headroom. Bypass the supply rails at the chip with both $1 \mu\text{fd}$ and $.1 \mu\text{fd}$ capacitors and keep the wire lengths as short as possible.

Check the preamp out with test headphones and pat yourself on the back. Soon the old warrior will ride into battle again.

■ ■ ■

Bill Higgs is on the engineering staff of WHAS-TV, was CE for WXLN/WFIA and has also done station consulting work. He has a PhD. in Theology which helps explain his patience with small market radio. He can be reached at 812-945-9414.

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Plan of attack

Begin with the microphone preamplifier. Figure 2 shows the circuit I have found most successful. The IC is either an NE5534A or a TL071. If the console was tube-type, the TL071 is a better choice due to the higher input impedance.

The input transformer is the existing mic transformer. Most tube preamps had an input impedance on the order of a megohm or so, so the transformers had

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Transistors in Typical Usage

This is the eighth installment in a 12-part series called An Introduction to Active Devices. Readers who have registered with Northern Virginia Community College can receive continuing education credits from the college upon successful completion of an examination administered at the end of this series. To register, contact the Director of Continuing Education, Annadale Campus, 8333 Little River Turnpike, Annadale, VA 22003, or call 703-323-3159. The fee for the course is \$20.

by Ed Montgomery

Part VIII of XII

Annadale VA Whether using a bipolar or field effect transistor (FET), the primary use for the device is to control current flow or establish a prescribed voltage in a circuit.

A very small change in emitter-base

current can create a significantly larger change in emitter-collector current in a bipolar transistor. A small change in gate voltage can produce a significant change in source-drain current in a FET.

Figure 1 illustrates family characteristic curves for a bipolar transistor operating with the emitter grounded.

The emitter-base current is expressed in microamps at the right of the graph. Collector voltage is on the bottom and collector current is on the left.

Note in this illustration that the transistor's collector voltage is set at 10 V. If the emitter-base current is varied between 60 and 180 microamps (curves A and B), the change in collector current will be between 3.25 and 7.75 milliamps (points D and E on the graph).

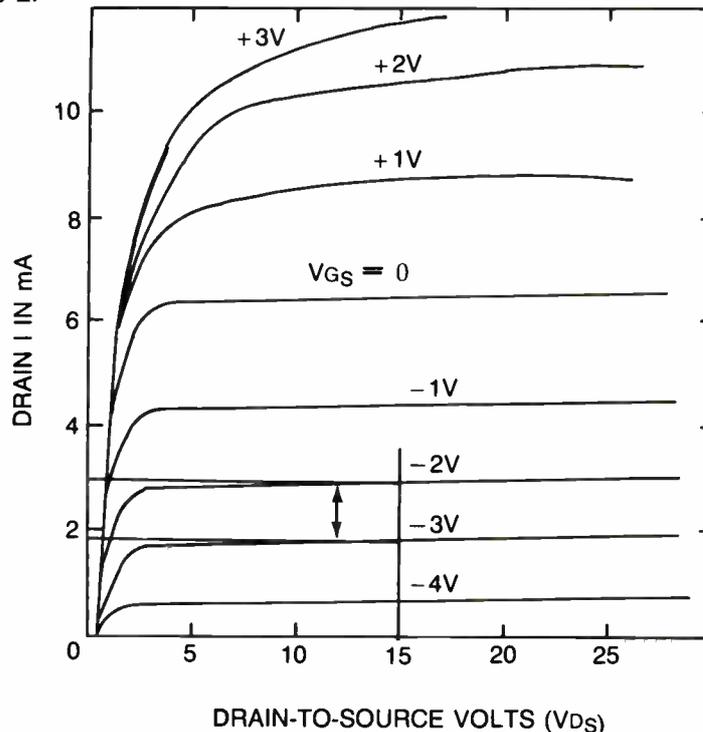
A 120 microamp change in the base-emitter current results in a 4.5 milliamp change in base-collector current.

This ratio of collector current to base

current change is known as Beta (β), as mentioned in a previous lesson. Beta is defined in Equation 1 and illustrated with the data expressed in this paragraph.

The current change at the collector is

Figure 2.



$$\text{Equation 1. } \beta = \frac{\text{CHANGE IN } I_c}{\text{CHANGE IN } I_b} = \frac{dI_c}{dI_b} = \frac{.0045}{.000120} = 37.5$$

$$\text{Equation 2. } gm = \frac{\Delta I_D}{\Delta V_{GS}} = \frac{(\text{Change In Drain Current})}{(\text{Change In } V_{GS})}$$

37.5 times greater than the current in the base. This is an illustration of how a transistor can amplify.

When the device is operated in a manner where the base current is constantly changing it is said to be operating in a linear manner. The base current variations are causing corresponding but greater current variations at the collector.

no current flows.

Figure 2 is an illustration of the family of characteristic curves for a field effect transistor (FET). Note that the terminology on the X and Y axis reflect the drain current and drain-to-source voltage. The family of curves designated V_{GS} indicate the voltage between the gate and the source.

Pinch-off voltage

It is often important to know what level of V_{GS} will stop all current flow from the source to drain. This is known as the pinch-off voltage designated V_P or V_{PO} . This voltage cuts off all current flow in the device.

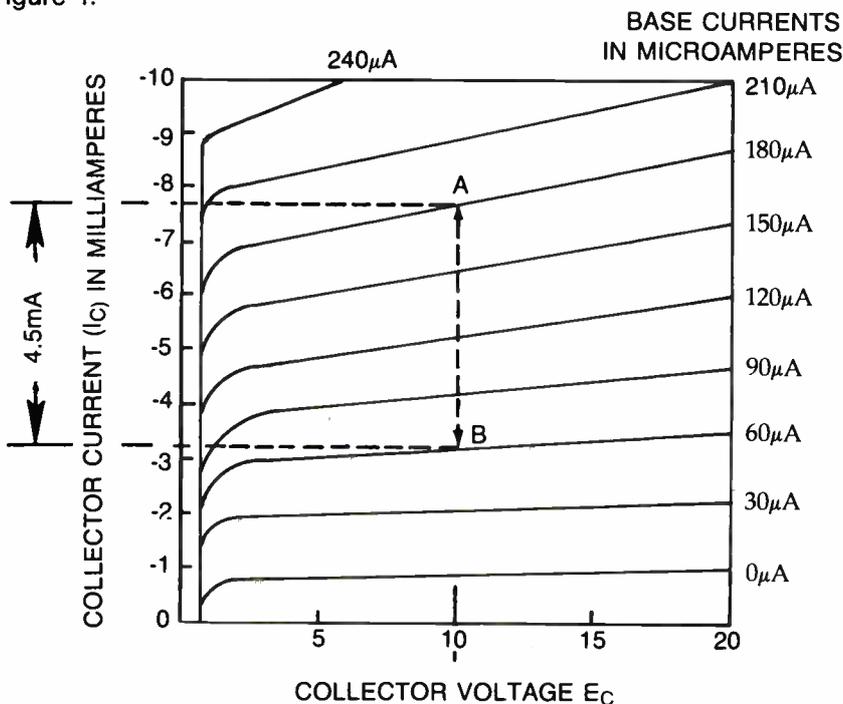
Using the FET family of curves is the same as using the bipolar curves. If our device is operating at 15 volts and V_{GS} varies from -3 to -2 volts, there will be a change of approximately 2.1 mA in drain current.

When the FET is used to amplify signals its ratio of input to output signal is important to know. This relationship is the effect the gate-to-source voltage V_{GS} has on the drain current I_D . It is known as transconductance (gm) and illustrated in Equation 2.

The greater the change in I_D resulting from a change in V_{GS} , the higher the gain or amplification of the FET. Transconductance "gm" is expressed in siemens or mhos.

Ed Montgomery currently is an electronics teacher at Thomas A. Edison High School in Fairfax County, VA. He has taught broadcast engineering at Northern Virginia Community College and worked as a broadcast engineer for several radio stations.

Figure 1.



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Station Ownership Perils

(continued from page 18)
bial ten-foot pole.

The course of wisdom is to think long and hard before committing to any equity arrangements with a station owner.

Bill Croghan of KCEE/KWFM explained a major pitfall that catches those who have never run a business before: "The difficulty with those who say 'If I were running this station, I'd ...' is that they really don't

know the problems entailed in actually running a business."

"The reality of finding the money to pay bills and make payroll is not quite as glamorous as one might think," Croghan said. "The choices that have to be made on a regular basis are just not fun."

Croghan also noted that most stations offering deals are usually struggling, if not plainly unprofitable. "I just don't want the headaches," he said.

Asked if he'd like to have a piece of a station, Richard Haskey of Western Wireless Works put it this way: "There seems to be something wrong with the phone connection. I thought you asked if I'd like to be an owner!"

Other pitfalls

Haskey noted that many things can go wrong when one gets involved in ownership. He pointed out that there are many

places for money to exit before getting to stockholders.

For instance, stockholders might find at the time of sale that a station's debts might equal or exceed the selling price. Or, management fees have somehow dissipated gross profits faster than a bleeder resistor.

Remember, those cars out on the lot did not simply appear out of thin air!

Haskey summed up his philosophy. "I think nothing pays your bills better than cash."

Yes, there are those who fare well. Sometimes an owner rewards a long time faithful em-

ployee. Or, more likely, it was an investment by someone who used his accountant and lawyer well.

Ownership tips

If you are interested in following up opportunities in ownership, there are several key points to remember.

First, regardless of any idealism we may have about it, radio is a business. There are bills that must be paid, as well as the payroll and taxes.

That means that the majority owner (your partner) will not necessarily be as interested in those public affairs ideas you have until the station is quite profitable; then they may say there is no free time available to do PA shows.

Also, kindly, honest-looking faces do not necessarily verify the personal character of your

Having a clearly written agreement is essential to success.

partners. Look carefully for "cooked" books and "strange" looking expenditures. Did the sales manager really need three weeks in Hawaii to meet with an ad agency?

Know the station policies before investing. Having a clearly written agreement is essential to success.

Tough purchasing choices

Since the heaviest capital expenses usually involve the engineering department, there are often tough choices that need to be made regarding equipment purchases. You must be ready for a number of different arguments for delaying various expenditures.

"Well, if you want to see a profit this quarter, you'll have put off the new cart machines until September," is one form of pressure. Another is, "Are you sure you can't rebuild that one more time?"

While we do answer those kinds of questions every day, it does take a lot of fun out of our investment when it becomes an added burden to our basic job.

Of course, there are still other things to consider, but that's what those lawyers and accountants are for!

Nevertheless, if your dream is to own a radio station, or part thereof, by all means go for it. There is nothing more stimulating than an investment in an industry you love. Just keep your eyes open and avoid the pitfalls.

Barry Mishkind, aka RW's "Eclectic Engineer," is a consultant and contract engineer in Tucson. He can be reached at 602-296-3797.



TRUTH...

OR
CONSEQUENCES.

If you haven't heard JBL's new generation of Studio Monitors, you haven't heard the "truth" about your sound.

TRUTH: A lot of monitors "color" their sound. They don't deliver truly flat response. Their technology is full of compromises. Their components are from a variety of sources, and not designed to precisely integrate with each other.

CONSEQUENCES: Bad mixes. Re-mixes. Having to "trash" an entire session. Or worst of all, no mixes because clients simply don't come back.

TRUTH: JBL eliminates these consequences by achieving a new "truth" in sound: JBL's remarkable new 4400 Series. The design, size, and materials have been specifically tailored to each monitor's function. For example, the 2-way 4406 6" Monitor is ideally designed for console or close-in listening. While the 2-way 8" 4408 is ideal for broadcast applications. The 3-way 10" 4410 Monitor captures maximum spatial detail at greater listening distances. And the 3-way 12" 4412 Monitor is mounted with a tight-cluster arrangement for close-in monitoring.

CONSEQUENCES: "Universal" monitors, those not specifically designed for a precise application or environment, invariably compromise technology, with inferior sound the result.

TRUTH: JBL's 4400 Series Studio Monitors achieve a new "truth" in sound with

an extended high frequency response that remains effortlessly smooth through the critical 3,000 to 20,000 Hz range.

And even extends beyond audibility to 27 kHz, reducing phase shift within the audible band for a more open and natural sound. The 4400 Series' incomparable high end clarity is the result of JBL's use of pure titanium for its unique ribbed-dome tweeter and diamond surround, capable of withstanding forces surpassing a phenomenal 1000 G's.

CONSEQUENCES: When pushed hard, most tweeters simply fail. Transient detail blurs, and the material itself deforms and breaks down. Other materials can't take the stress, and crack under pressure.

TRUTH: The Frequency Dividing Network in each 4400 Series monitor allows optimum transitions between drivers in both amplitude and phase. The precisely calibrated reference controls let you adjust for personal preferences, room variations, and specific equalization.

CONSEQUENCES: When the interaction between drivers is not carefully orchestrated, the results can be edgy, indistinctive, or simply "false" sound.

TRUTH: All 4400 Studio Monitors feature JBL's exclusive Symmetrical Field Geometry magnetic structure, which dramatically reduces second harmonic

distortion, and is key in producing the 4400's deep, powerful, clean bass.

CONSEQUENCES: Conventional magnetic structures utilize non-symmetrical magnetic fields, which add significantly to distortion due to a nonlinear pull on the voice coil.

TRUTH: 4400 Series monitors also feature special low diffraction grill frame designs, which reduce time delay distortion. Extra-large voice coils and ultra-rigid cast frames result in both mechanical and thermal stability under heavy professional use.

CONSEQUENCES: For reasons of economics, monitors will often use stamped rather than cast frames, resulting in both mechanical distortion and power compression.

TRUTH: The JBL 4400 Studio Monitor Series captures the full dynamic range, extended high frequency, and precise character of your sound as no other monitors in the business. Experience the 4400 Series Studio Monitors at your JBL dealer's today.

CONSEQUENCES: You'll never know the "truth" until you do.



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Circle 17 On Reader Service Card

World Radio History

Seeking Education

(continued from page 23)

budgets are forcing people to wear more than one hat.

According to Nielsen, now 38, "We are in a new era. The corner was turned when my generation became teachers. We are more involved with social and institution change. Most of us have a balance of experience and education. Being in 'the heart of the beast' is the thing to do . . . knowing that you have to do everything."

One fact mentioned by Nielsen, perhaps the most important of all, is often overlooked because of its simplicity. "You have to be a learner in order to succeed. Students have to be taught this by examples set by their teachers."

The well-developed ability to continue learning throughout your career means that you will not "dead-end" yourself by refusing to accept new technology. Those who are intimidated by new and changing technology to the point that they reject it deserve to get eaten alive.

ISO education

Finding the right teachers and schools is equally important. If you're going the college or university route, Nielsen suggests you contact the chairman of the appropriate department. Find out what careers their curriculum offers. According to Nielsen, if you can't get the right answers from the chairman, a professor or the chairman's executive assistant, it's a good indication that this is not the school for you.

Nielsen believes in the benefits of both faculty and student internships. Unfortunately, most broadcast facilities claim to have no money and little time for interns to "shadow" their workers.

Attempts in other areas of study have found that faculty internships work better than student internships, with two benefits. First, the teacher becomes directly involved with the business community. Second, this method is more efficient because the teacher then communicates the knowledge to the whole class. Who foots the bill?

A possible solution would be internships underwritten by stations, manufacturers and the schools. If all parties chipped in to fund a faculty internship for a three-month summer period, the amount paid would be somewhere near the figure the teacher would be able to get teaching a lighter summer course load.

In addition to learning more about what each company had to offer, the teacher/intern would also get a first-hand look at what products worked best in real applications. This, in turn, would provide the manufacturers with additional input to help them make better decisions about their products and features.

Do it yourself

If the thought of going back to school turns you off, but the idea of learning more turns you on, use the Do It Yourself method.

Textbooks aren't always the best source of knowledge when you're trying to learn about sound. This is especially true when you're dealing with equalizers, compressors, gates, expanders, reverbs and delays.

First Light Video Publishing has come

up with a better idea. It's a series of three video tapes: "Shaping Your Sound with Microphones," "Shaping Your Sound with Reverb & Delay" and "Shaping Your Sound with Equalizers and Gates." The lessons are well thought out and do an excellent job in explaining the technology and its uses.

The Professional Edition for schools, libraries, non-profit off-air showing (including closed-circuit school broadcast), comes with a 40 page work book with exercises to help you learn the skills covered in the video, at a cost of \$119.

The Individual Study Edition features

the same video tapes with an eight page study guide for \$59.95 per tape.

Tom Lubin's on-camera work, the graphics and visual examples work together in a very natural and understandable way. For more information call Andy Romanoff at 800-777-1576.

For \$2.50, Shure Brothers' "Guide To Better Audio" booklet takes an even more basic look microphones and mixers in only 25 pages.

On the other end of the spectrum is John Watkinson's "The Art of Digital Audio." As the jacket states, this is three books in one. First is an introduction defining basic concepts and terminology. Second is a theory book that builds on the introduction to deal with more advanced topics. Third is a reference book showing how the theory is put into practice.

This is one of the more serious digital books I've come across. It covers the stuff that design engineers chatter about during coffee breaks. It would be easier for me to eat an elephant than to make my way through this book.

Teac has a series of good books about basic multitrack recording. Fostex has good primer on synchronizers. A lot of this material is out there just waiting to be picked up and read. My advice? Get off your butt and DO IT!

Again, if you know of any really good schools for radio/audio/production, please give me a call. I would like to develop a list of colleges and trade schools which come with recommendations.

■ ■ ■

Ty Ford, audio production consultant and voice talent can be reached at 301-889-6201 or by MCI mail #347-6635.

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Receiver-Induced Interference

by Steve Crowley

Washington DC FM interference is generally caused by factors external to the transmitting and receiving equipment. It may be from other stations, or from the same station if multipath propagation is bad enough.

Ultimately, though, the desired and undesired signals combine in the receiver and if that signal ratio is not great enough, the listener will experience interference.

Not only can interference occur due to undesired signals from co-channel or adjacent channel stations, it can also occur

when stations separated in frequency by the receiver's intermediate frequency (IF) serve common areas with high signal strength.

Receiver-induced effects

IF interference has been well documented and is taken into account in the FCC's separation requirements.

Blanketing interference, due to overloading of the receiver front-end by signals of high field strength, is also dealt with in the FCC Rules.

Less well understood is the phenomenon of receiver-induced third-order intermodulation effects (RITOIE). It is not

taken into account in the allocations process, but must be considered when planning a new station, or modifying an existing one.

Equation 1.

$$E_{out} = A_0 + A_1 E_{in} + A_2 E_{in}^2 + A_3 E_{in}^3 + \dots = \sum_0^{\infty} A_n E_{in}^n$$

If it isn't, the new facility may either be subject to interference, or may cause interference, forcing it to reduce power.

RITOIE typically occurs in the vicinity of co-located transmitters, or between transmitters located a mile or two apart.

A station having a relatively weak signal, usually transmitting from a distant facility, is the victim.

Signals from the co-located transmitters will mix within the receiver to produce new products within the FM band. Two frequencies combine in a 2A-B manner and three stations can combine according to the relation A+B-C.

As an example, suppose two co-located transmitters are transmitting 92.3 MHz and 96.3 MHz, respectively. The resultant third-order products are 88.3 MHz and 100.3 MHz.

If the co-located transmitters produce sufficiently high signal strength, interference will occur to stations on those product frequencies.

Why does this interference occur in a properly functioning receiver? It's because of the non-linear behavior of the receiver's mixer stage.

A basic network expression

Any electrical network can be characterized by the series expression shown in Figure 1. Here the E terms represent the input and output voltages and the A terms represent constants.

CONSULTANTS CORNER

The first term of the series, a constant, can be likened to a bias condition. The next term is first-order, or linear—the output resembles the input, scaled by the constant. We would like nothing but this term in a linear amplifier.

Next is the second-order, or quadratic term. This term characterizes desirable mixer behavior. The FM signal is mixed with the receiver's local oscillator.

The resultant output contains replicas of the original two frequencies, second harmonics of those frequencies and sum and difference frequencies. Because of the frequency selectivity of the IF amplifier stage following the mixer, the difference frequency is passed and later detected.

Fly in the ointment

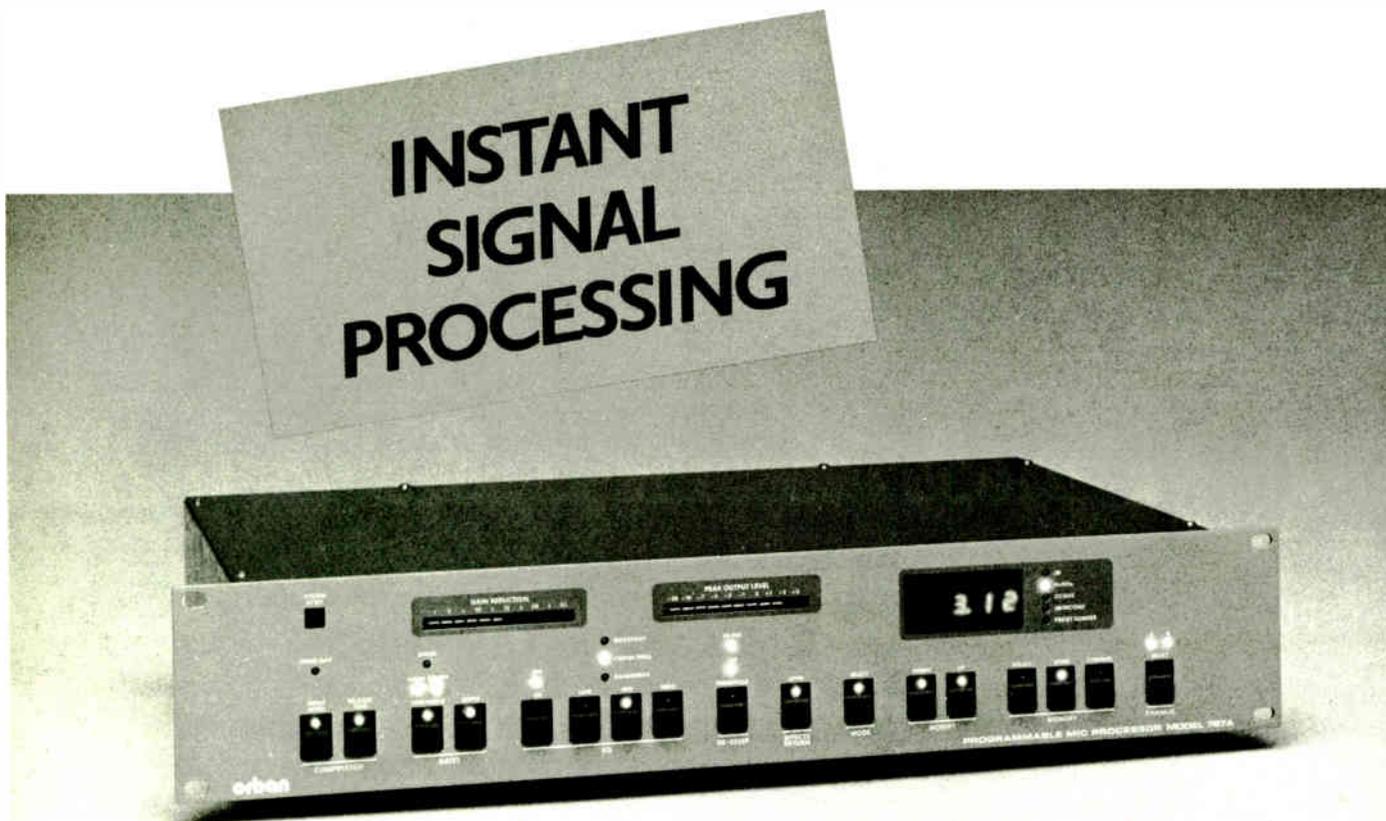
The next term—the third-order, or cubed term—causes our problem. It's a by-product of the non-linear mixer characteristic that produces the desirable second-order term, so we can't get rid of it.

If we put a single frequency into the third-order term, we get the original frequency and a third harmonic. Applying two FM signals results in the intermodulation terms 2A+B and 2A-B. The term 2A+B falls well outside the receiver pass-band.

The term 2A-B is the most common form of RITOIE, though, as mentioned above, the A+B-C combination can also occur.

Because the third-order products may be close to the desired frequency, they cannot be filtered out after the mixer. Filtering at the receiver front-end may reduce the amplitude of the signals causing RITOIE but, in practical terms, sufficient filtering when the interfering station is close in frequency to the desired is not possible.

(continued on page 35)



Orban's new digitally-controlled 787A Programmable Mic Processor integrates an unprecedented combination of vital signal processing functions into one powerful, compact package. It delivers fully programmable **mic- or line-level** processing with access to 99 memory registers through MIDI or RS-232 interfaces, or a console-mounted remote control. All you do is add the talent.

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Thermometer Design

(continued from page 18)

stead of white. White ties are not designed for outdoor use and will deteriorate in about a year due to the sun's ultraviolet rays.

Like every other piece of equipment in the station, digital thermometers are prone to RF interference. In most cases, the usual array of ceramic disc caps and ferrite beads will solve the problem. In extreme cases however, it may be necessary to replace the standard unshielded cable with the shielded variety, and make a good connection from the shield to station ground.

Calibrating the thermometer

Now that you've got the beast installed, all that's left is calibration. For this you'll need a mercury thermometer; alcohol thermometers are simply not accurate enough.

To calibrate the low end, immerse the sensor in ice water and set the low cal trimpot for 32°, or 0° if you're on the Celsius scale. The high end is set with the probe in boiling water.

Sometimes it's difficult to get boiling water at the remote site. If you're far from an AC outlet, a coffee can filled with water, heated by a blowtorch, will do the trick nicely.

Of course there's no guarantee that the sensor will be perfectly linear for all points between 32° and 212° Fahrenheit. That's where the mercury thermometer comes in handy. Immerse both units in water of varying temperature and note any discrepancies.

Remember that mercury thermometers are much slower to respond to changes in temperature than their electronic counterparts, so wait a few minutes before taking readings. If your temperature sensor is mounted on a large Weather Service-type enclosure with other instruments, you may want to permanently mount the mercury ther-

mometer there as well.

A more thorough method of calibrating these devices involves the use of an accurate DVM. Some manufacturers will provide a temperature/voltage calibration chart you'll also need, unless the unit is new and you can make up your own.

Start by connecting the DVM to the return line from the sensor. Note the voltage reading and temperature display. They should match the values on the calibration chart. If you don't have a chart, keep a log of the readings.

Temperature changes can be simulated by varying the voltage going to the sensor from the power supply. At each degree change you make in temperature, note the DVM reading of return voltage.

Severe non-linearities point to a bad sensor and/or corroded connections. This is a common problem if you are located near the ocean.

Roll your own

If commercially available units are beyond your reach, you can build your own digital thermometer accurate to 10.5 C for about \$25 worth of parts from Digi-Key or Jameco. Such a device is shown in Figure 2.

This one was derived from a Datal-Intersil data sheet, but similar devices are available from Analog Devices, Analogic, API Instruments and a host of others.

Data sheets from these companies are just a phone call or letter away and they usually have interesting application notes as well. With a little ingenuity and a few more parts, you can build a thermometer with all the extra features of the commercial devices at a fraction of the cost.

♦ ♦ ♦

Tom Vernon, a regular RW columnist, divides his time among broadcast consulting, computers and instructional technology. He can be reached at 717-249-1230.

WAEB to Test Multipath

(continued from page 20)

mation to build better receivers, transmitters and other equipment, Simons said.

Also, "the NRSC would be able to put together a paper that could be distributed to GMs and CEs of radio stations showing how to deal with parameters in a specific way and expect these kind of results," he added.

The results also will provide FM broadcasters with information to reduce multipath interference at the point of transmission, Simons said.

The idea for the research project was spurred during a meeting of the NRSC FM subcommittee in which Ted Schober, a nationally known expert on multipath and broadcast consulting engineer at Radiotechniques Engineering Corp., spoke on the topic.

"I had made a couple of suggestions at the meeting about things that could be done in relation to research," Simons said, "and General Motors called me a week later and said they liked the ideas and wanted to know if we could get together and perform some tests."

The company's interest, he said, will help GM develop a new circuitry for FM receivers: "They're going to take the characterization of multipath here and

program that into their multipath simulator at Delco and this is the model they'll be using in development of their new radio," Simons said.

Mobile test laboratory

Also assisting with the project are Delco Electronics, which will provide a mobile test laboratory; and Ford Audio, which will furnish radio receivers for field research and engineers. Electronics Research and Continental Electronics will also contribute equipment and technical assistance.

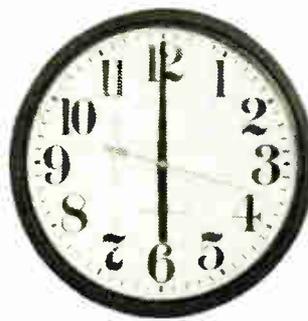
D&R Communications will provide tower-related services such as removal and reinstallation of the WAEB-FM antenna from its tower in Slatington, PA. Schober will serve as technical consultant.

Within the six months of tests, WAEB, a CHR-formatted FM, will be taken off the air a total of about 25 hours, which presents an interesting dilemma.

"I haven't figured out how we're going to explain this to listeners yet," Simons said. "I think we're going to have to make some sort of publicity campaign out of the fact that we're conducting these tests."

For more information, contact Simons at 215-434-4424.

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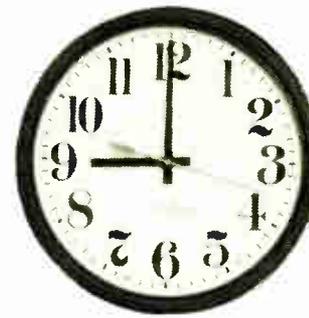
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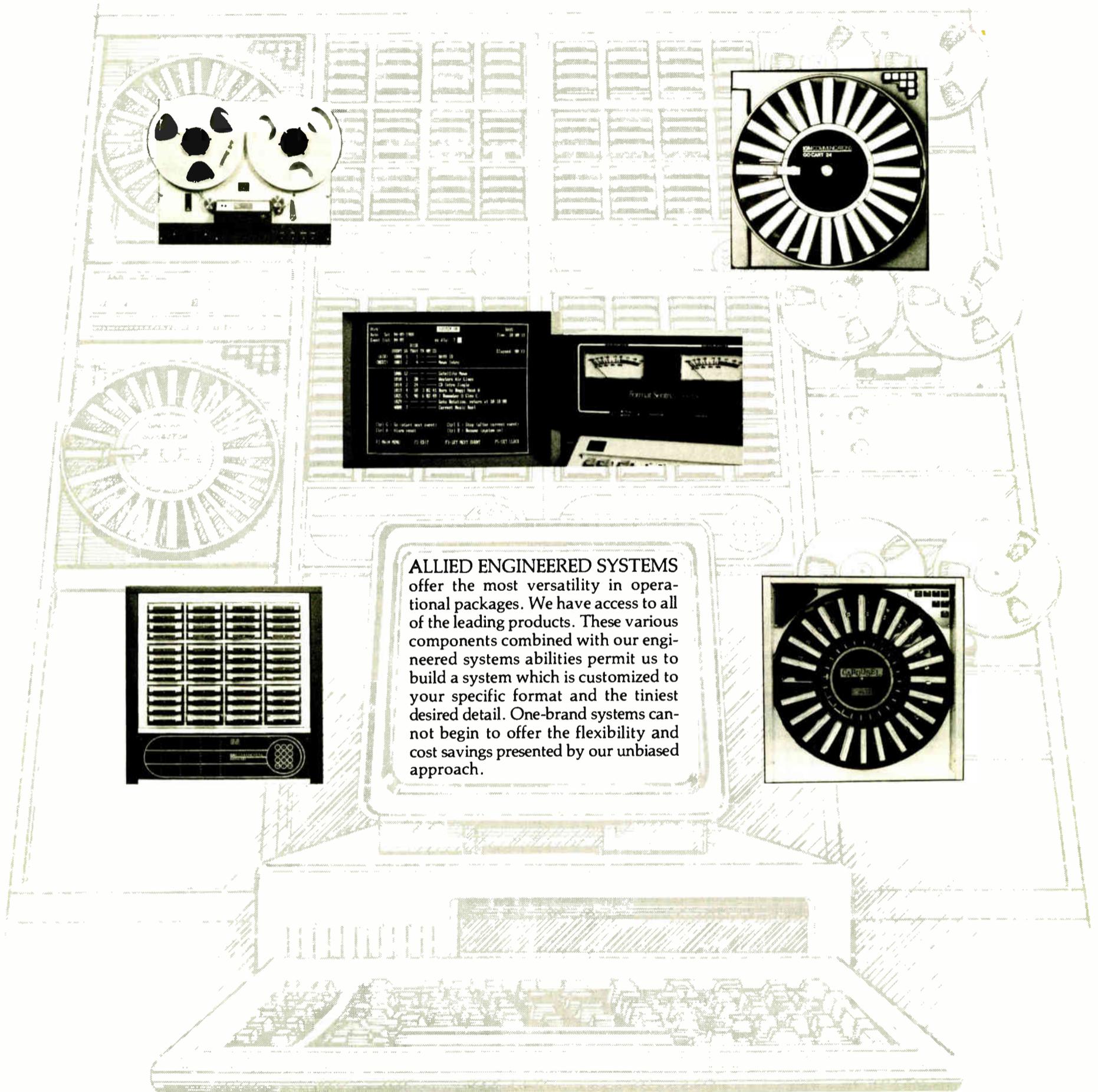
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Basic Ideas for Debt Collection

(continued from page 21)

I offer a discount for rapid payment. A typical amount is a two percent discount if the bill is paid within ten days, as opposed to the standard thirty days.

You can be even more creative than that. You might offer a five or ten percent discount for half up front, half on completion. Use whatever works for your cash flow, but make it feel good for the client too.

The collection process

When collecting for your services, the first step you must take is to present the client with a clear and complete bill. Include as much detail as practical, because a standard excuse is that, "I don't know what I'm paying for here." Make sure the invoice or bill includes a due date.

At monthly intervals after the original bill, you send statements that list all outstanding invoices or due payments from the client. If you have an ongoing, multi-project relationship with the client, this is a convenient way to see where they stand with you each month.

Once a given payment is overdue, it is time for a courteous letter, using diplomatic language, but plainly asking for the payment. It's a good idea to include a copy of the original invoice, so they can't claim they never saw it.

Once a bill reaches sixty to ninety days past due, it's time for a more insistent, less diplomatic letter. Again, include a copy of the original invoice and a copy of the original agreement that the client signed. This lets them know that you

have them locked in, from a legal perspective.

The next step is a phone call. Here's where you'll wish you had a cousin who broke people's legs for a living. However, although you're at the point of wanting to resort to threats of physical violence and arson, resist the temptation—everything you say can and will be used against you in a court of law.

Don't be put off by a receptionist or other screen. Get through to the actual culprit.

When all else fails

Finally, you may have to tell the client plainly that you have no recourse but to take legal action. Just keep in mind that

if you do make this threat, be sure that you don't back down. If you don't get paid at this stage, turn the claim over to a collection agency or a lawyer.

You definitely want the reputation of being hardnosed about getting your money. Getting served with a notice that you are bringing suit against them will usually be enough to break the money loose from the most stingy clients; but if they still refuse, you may find that they are not unwilling to pay but rather unable to pay.

In this case, you are probably better off working out a settlement with them than pursuing the case legally. If you do go to court, it could cost you several hundred dollars in legal fees plus at least a

day of your time.

In the final analysis, you will need to determine for yourself whether a particular amount owed to you is worth the investment necessary to retrieve it.

The best place to avoid a collection problem when the job's done is to make the right decisions before the work starts. Get the terms of your arrangement in writing and try to get a substantial portion of the money up front. These are two good insurance policies that things will work out just fine in the end.

And when you've done a good job for a client, don't be shy to ask for payment, because it's *your* money they're holding.

■ ■ ■

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 312-969-4400.

Receiver-Induced Third-Order Effects

(continued from page 32)

The network equation continues with a fourth order term, a fifth order term, and so on. Fortunately, these terms are not significant contributors to interference—at least in FM broadcast- ing.

The first step in identifying a potential RITOIE problem is to use the 2A-B and A+B-C equations to see if there are any frequency combinations of concern. Remember, you want to know if you will cause as well as receive interference.

Examining the potential frequency combinations is a natural for the computer, and several public domain computer programs are available. If there are no co-channel or adjacent-channel "hits"

(adjacent channel hits being less of a problem), you should be OK.

Finding out that theoretical hits exist is useful information, but that doesn't necessarily mean there will be interference. A more complicated problem is to relate the field strengths of all stations in the equation to the potential for interference. This is possible by taking into account typical characteristics of receiver antennas, pre-selectors and mixers.

A lengthy history

RITOIE has been extensively studied and documented. In Minneapolis, when five Class C stations co-located downtown, distant stations suffered interference. Since 1979, the FCC has required

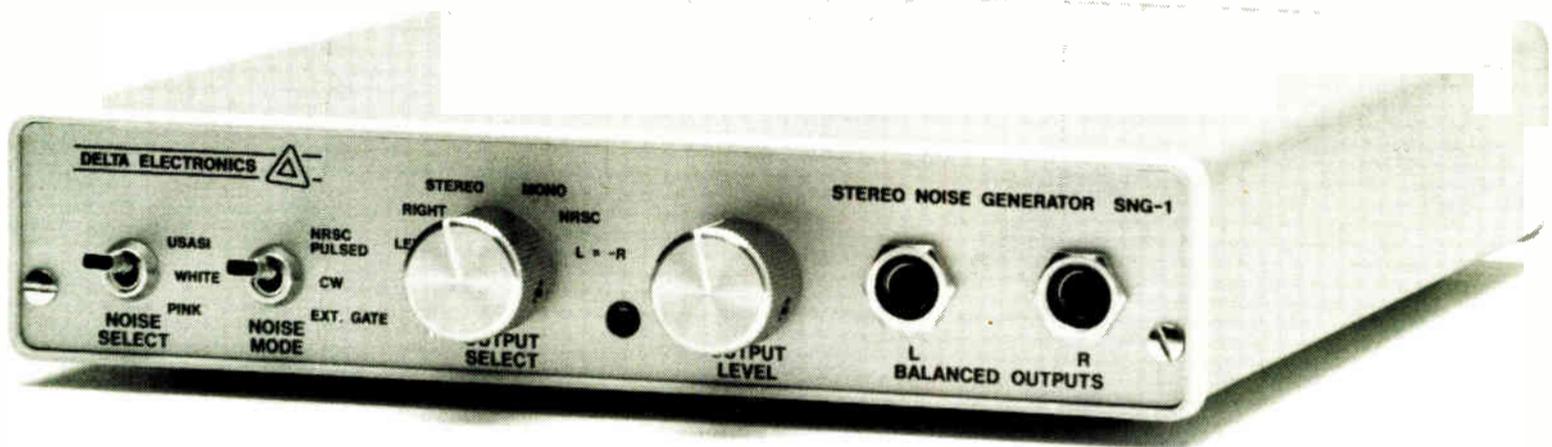
the co-located stations to operate at half-power to reduce the interference. Now all are moving and co-locating with the affected stations in order to operate at full power.

RITOIE is not taken into account in the FM allocations scheme. The FCC recognizes the problem, though, and on the current FCC Form 301 the applicant is held responsible for evaluating the RITOIE, and for correcting it when it occurs. Exactly what form this evaluation takes is left to the applicant.

■ ■ ■

Steve Crowley is an engineer with the Washington, DC-based firm of du Treil, Lundin & Rackley. He can be reached at 202-223-6700.

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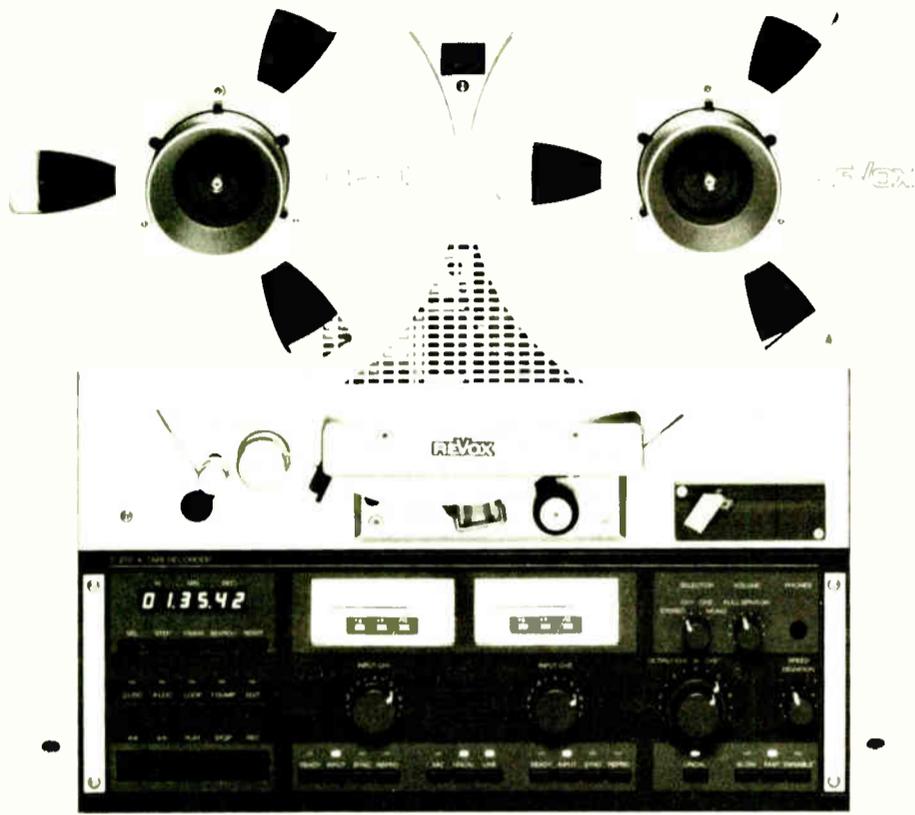
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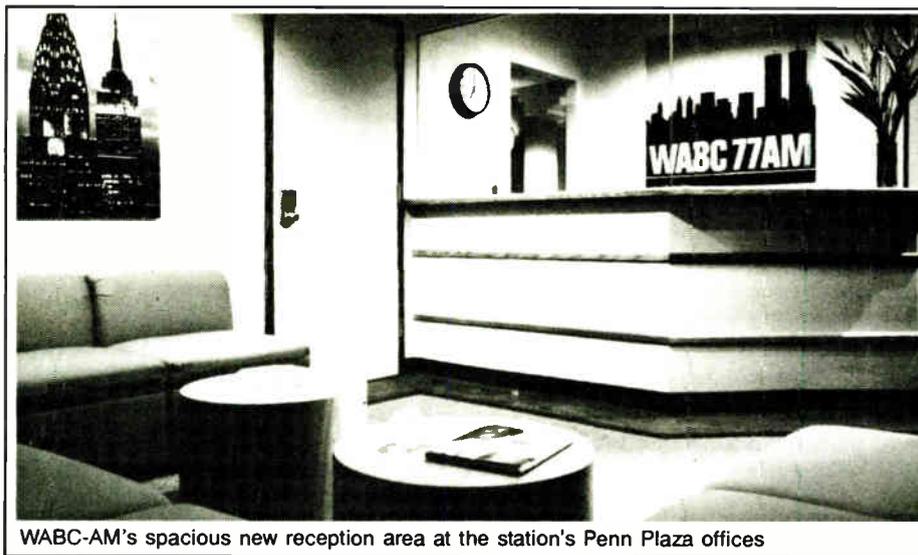
Fast Track Studios: Relocating WABC, WPLJ in the Big Apple

by Dee McVicker

Part I of II

Tempe AZ With a staggering 60 miles of wire and cable to lay new ground-work, Cap Cities/ABC uprooted a radio institution: the Big Apple's WABC-AM and WPLJ-FM. The stations were moved from their high-rise complex on the Avenue of the Americas, bringing with them only their call letters, personnel and a few incidentals.

They were in a hurry to leave. The eight-month gestation of a totally new WABC-AM and WPLJ-FM took on Mach speed as the group scrambled to get out from a 25-story building they had once owned but now needed to relinquish to new leasers.



WABC-AM's spacious new reception area at the station's Penn Plaza offices

FACILITIES SHOWCASE

The lease settlement could be days away, or months, and ABC Director of Engineering Al Resnick was confronted with the reality of what most engineers only dream of doing: designing and building an all-new radio complex from the ground up.

Along with the absence of equipment and furniture, Resnick was lacking other

vital elements for the project, not the least of which were time and CE Winston Lloyd, who had just retired.

There were budgets to be reviewed, equipment to be evaluated and a new location yet to be sought and brought up to the group's acoustical standards. All against a clock that had more to do with the whims of lease politics than the order of time.

A task force assembled

Jack Williams of Pacific Recorders & Engineering teamed up with Jack Peters of Descon Interiors, Inc.; Robert Hansen

of Robert A. Hansen Associates, Inc.; and Dick Schumeyer of Spectrum Broadcast Services, to join in Cap Cities/ABC's race for time and new studios. Midway through initial planning, the team welcomed new CE Bill Krause as he started his tenure with Cap Cities/ABC.

The "fast track" project began its first leg of the journey down memory lane with the group taking full advantage of the stations' collective history to make value judgments in equipment and studio needs.

"Believe it or not, WABC-FM (now WPLJ) played the symphony. It then

wound up with an automated underground rock format in the early '70s and stayed that way until about the mid '70s, at which time the programming split and went from AOR to finally what it is today," said Resnick.

Predominantly designed for a Top-40 AM format, the Sixth Avenue studios showed the technical wear of the outgrowth of the FM station and the waning of AM as a music medium. "The FM facility was a completely unexpected facility," added Resnick.

Given that snippet of history, the group made every effort to plan for unexpected changes. They were aiming for flexibility that could deliver audio anywhere in the new location, without the patch cords, Christmas Tree connections and barrier strips that had become the mainstay of routing at the previous technical complex.

They were also resolved to capture the FM's energetic Top-40 playlist and the AM's news/talk format in both studio design and equipment.

Poured concrete saves space

On 24 October, the group began construction of the new facility on the 17th floor at 2 Penn Plaza—over New York's bustling Pennsylvania Station and adjacent to Madison Square Garden.

The approximately 30,000 square foot location needed considerable work before housing the AM and FM.

Available on a broom-clean contract, with only windows, columns and plumbing, the block-long facility needed to be partitioned for offices and studios as well as fabricated for acoustical integrity.

(continued on page 39)

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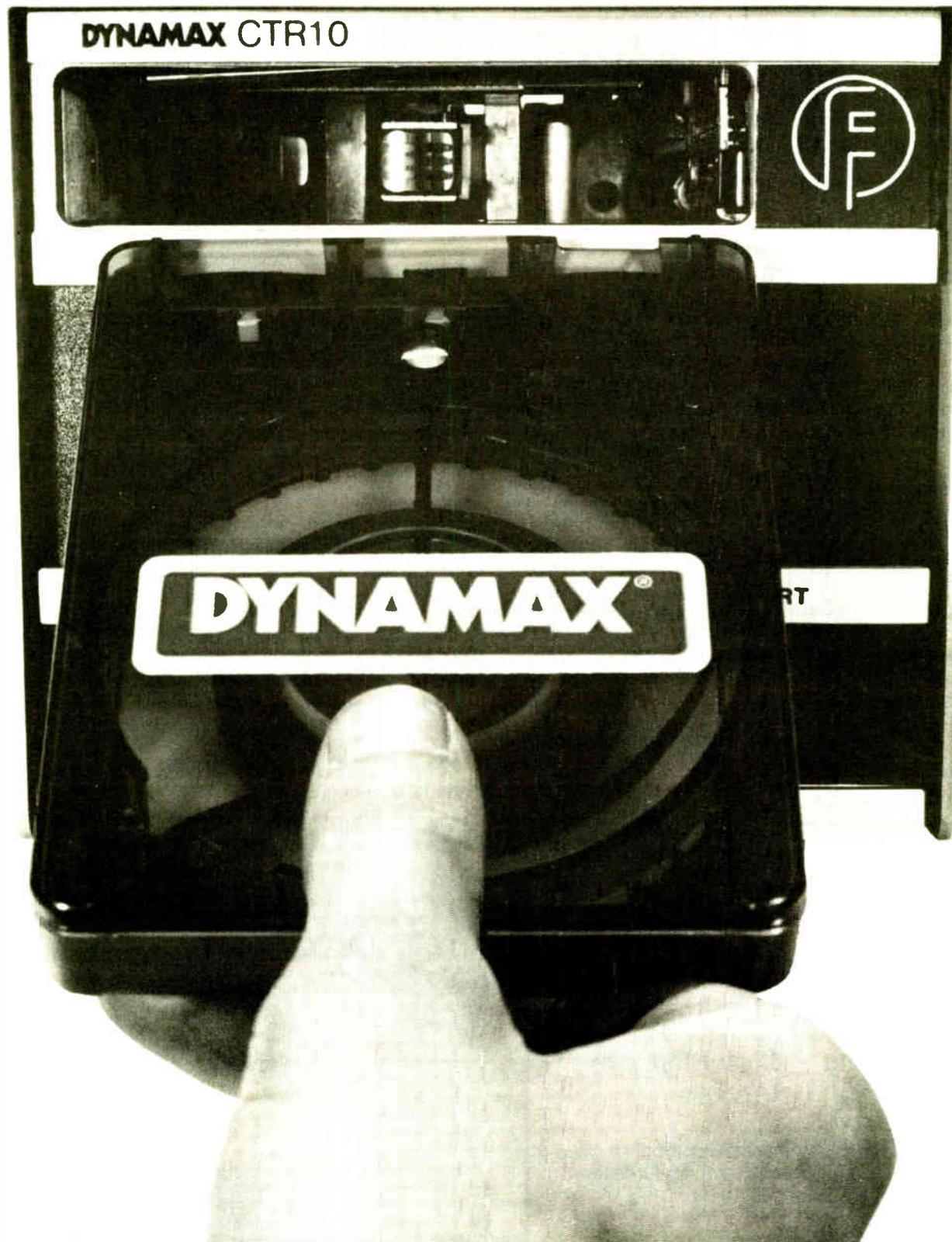
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Taking the Fast Track

(continued from page 37)

Of considerable acoustical merit was the construction of the building. "Rather than a metal deck with two inches of concrete on top of it, it is all poured concrete," explained acoustic consultant Robert Hansen. This news was met with enthusiasm by the team; by all indications, sound flanking would not be a persistent problem and an isolated floor would not be necessary.

The access floor, a series of 2'x2' panels on pedestals, houses the stations' audio, video, telephone and electrical services.

With approximately 60 miles of cabling underfoot, an isolated floor would have meant a drastic reassessment of the facility.

Ceilings leaked noise

While the group was spared the consequences of an isolated floor, they were not as fortunate with their assessment of the ceiling. On the floor above the new studio complex are the Madison Square Gardens executive offices, with several employee kitchens that promote such noise makers as dishwashers, ice machines and the like.

Leaking through the ceiling, the noise from that equipment would have made things difficult for the stations, particularly in light of the FM's format. "WPLJ (FM) also does high-level production," explained Hansen.

After much deliberation, Hansen recommended an isolated ceiling to protect both enterprises from each others' activity noise. The ceiling structure, a spring isolated support with suspended dry wall, took up 14 inches of an already restraining 14-foot vertical space—a small price to pay to ensure friendly diplomatic relations within the building.

Also chipping away at linear space

was the air handling system. "One of the biggest problems in a high-rise office building is duct work, which is restrained by the columns, the beams. You really don't have, say, 16 feet (of linear height). You may, in some cases, be 9 foot, 6 inches to the underside of a beam," explained Hansen, who found

To accomplish this, the Robert A. Hansen Company applied sound absorptive panels to studio walls with an ear toward the expected workload of the studios. "Understanding the type of equipment they're going to have, the loudspeakers they're intending to use . . . these are all essential persuasions in the room acous-

formed Hansen, "you would see the ceiling as a reflected image."

And, because some of the studios would be looking out over the street below—and the vehicular noise that has made New York City famous—Hansen suggested casement windows for these studios.

Hinged on both sides to open up as a pair of doors might, the casement windows are placed a foot away from the building's windowing to protect the studios from the noises of New York traffic below. "So you really have double glazing, so to speak," explained Hansen.

Fast track delivery

In one engineering and design effort, Pacific Recorders & Engineering began building cabinetry and equipment that would fit a studio complex approximately a city block long.

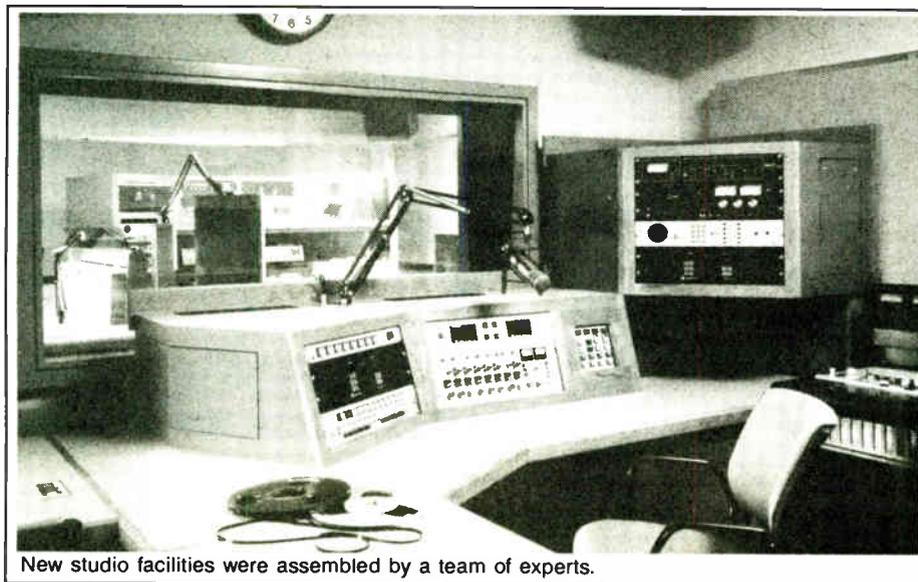
Over 17 roomfuls of cabinets would be built by the company's cabinetry department in a few months' time, a work order that paled in comparison to the company's detailed engineering of equipment and system components to accompany that cabinetry.

On 31 January, just three months after construction began at 2 Penn Plaza, two 42-foot Mayflower vans left PR&E's California plant and headed for New York City with WPLJ's and WABC's first shipment of studio furniture and equipment.

Next: The studios' construction takes off on a "fast track."

■ ■ ■

Dee McVicker is a free-lance writer and regular contributor to RW. To inquire about her writing service, call 602-899-8916.



New studio facilities were assembled by a team of experts.

it challenging to work ducting under beams while trying to maintain a 9-foot ceiling throughout.

Designing duct work

The size of ducting, meanwhile, was being carefully modeled for desired aerodynamic characteristics. "We tried to design an air handling system that handles thousands of cubic feet per minute in areas that require slow duct velocity, so that it doesn't sound like Niagara Falls on the air," recalled Resnick.

"The velocity of air in the duct work is not up to 2000 feet per minute; we get it down to a thousand and slowly get it down to 600 (feet per minute). This is where sizing the ducts comes into it," informed Hansen.

Hansen also tackled other noise problems that could pose a threat to WABC's and WPLJ's listening audience. "Your ears are far more sensitive to energy arriving laterally rather than vertically, so we try to balance it out," he said.

tics," Hansen noted.

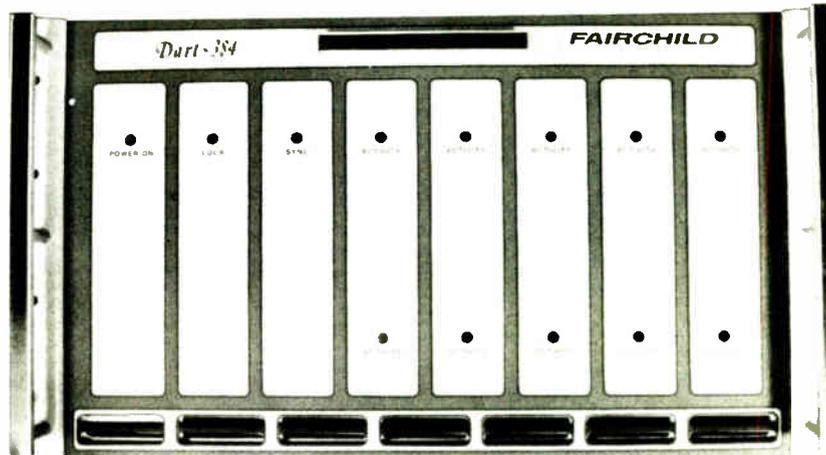
The majority of studio doors were given double acoustic seals and the studio-to-studio windows were made of laminated glass. "We designed the windows to provide us with the acoustical separation we wanted between studios," said Hansen. The window glass was also sloped to dissuade track lighting glare from infringing on visual communications between studio operators.

"If the glass is zero degree slope," in-

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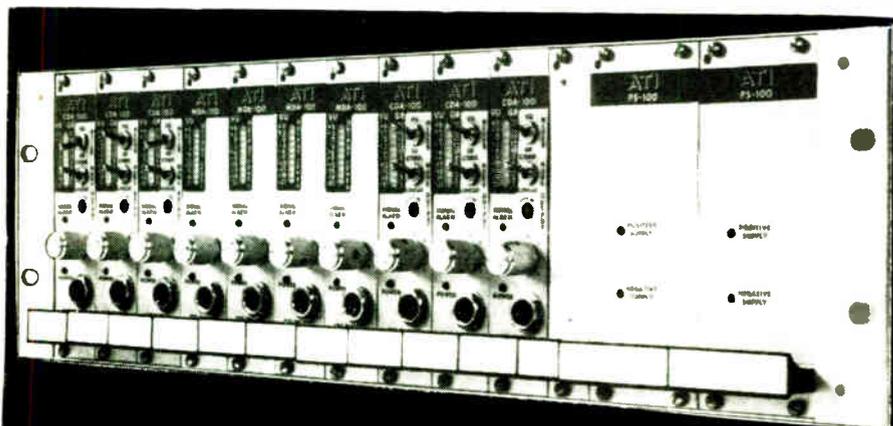


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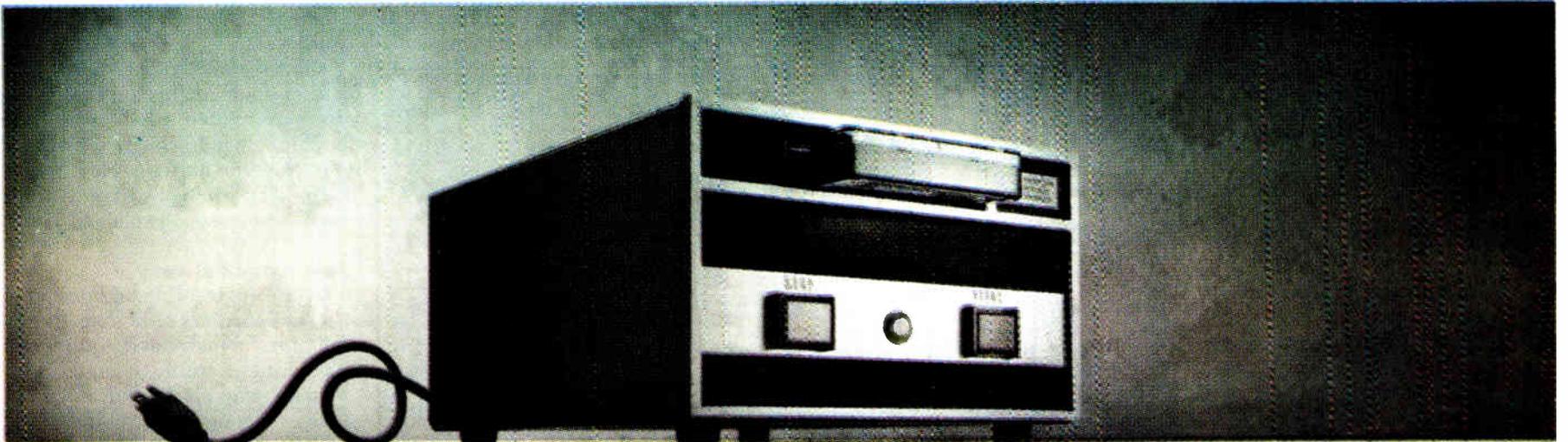
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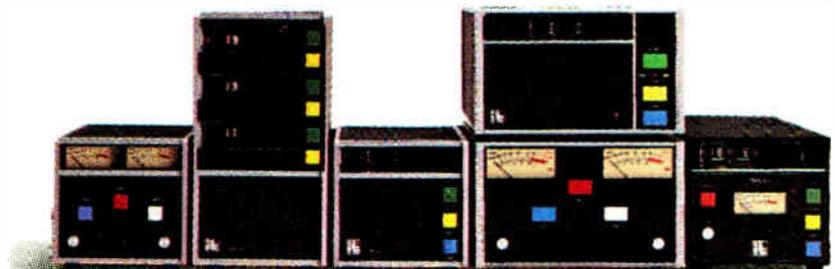
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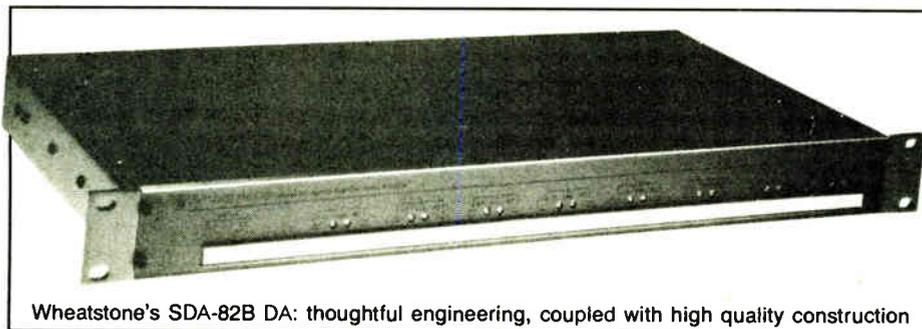
Studio Equipment & Audio Switchers

Wheatstone DA Wins Kudos

by Dave Edwards, CE
WNR-AM/WNTQ-FM

Syracuse NY When Radio World asked me to review the Wheatstone SDA-82B distribution amplifier, my first reaction was to wonder what anybody could say about a distribution amp that has not already been said. You put a signal in and get a lot of signals out. Surely there was not much of a story there.

But walking over to our equipment



Wheatstone's SDA-82B DA: thoughtful engineering, coupled with high quality construction

USER REPORT

racks and gazing at the stack of SDA-82 B distribution amps bolted in place refreshed my memory as to why I liked this DA so much. So there really was something to write about after all.

The first thing that gets your attention when looking at these DAs in the rack

is their sleek appearance. The color scheme is a refreshing gray and gray-blue instead of the black or beige so common with other amps. The box fits into a single rack space and is about nine inches deep.

External features

What is most appealing is that an active DA will blink at you with green rectangular LEDs. This is part of an innovative level setting and audio presence indicator scheme that I'll describe more

fully in a moment.

Across the face plate, just below the individual gain controls, is a write-on strip. This is a very handy feature, for it enables you to label the inputs and outputs of your DA where they can be seen.

After all, we do this for patch bays, why not for DAs? I still have scraps of paper with input/output designations on them taped to my other brands of DAs.

The rear of the unit sports a departure from barrier strips with the use of amp connectors and gold-plated pins. This

gives the back of the unit a neat and finished look when it is wired up, and there is a real advantage to being able to move inputs and outputs around with an amp connector as opposed to unscrewing barrier strip terminals when wiring changes have to be made.

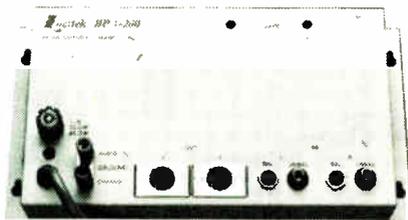
As I mentioned earlier, the DA has input and output LEDs on its face plate for the purposes of level setting and of indicating audio presence. When setting up the DA the input LEDs will light up when the input signal is at +4 dB.

LEDs light the way

Likewise, the LEDs located next to the output controls will light when the output level is at +4 dB. This makes level setting a snap. The LED threshold setting for both inputs and outputs is field changeable, with trim pots for various OVU references if values other than +4 dB are desired.

The ability to check for the presence (continued on page 57)

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The Switch is On at FRN, with ITC Router

by Brian Williston, CE
Florida Radio Network, Inc.

Orlando FL The Florida Radio Network recently decided it was time to plan a means of automation that would han-

USER REPORT

dle the complex problem of switching audio from the multitude of possible sources to each of our four modulators.

Internal audio distribution was desired as well. The system would have to be able to handle the large amount of audible traffic entering and leaving the building.

International Tapetronics Corporation (ITC) introduced us to its latest pet project, The Audio Switcher (A modest name, once you know what this computerized masterpiece can accomplish).

The Audio Switcher takes up only 28" of rack space, which includes the master control unit (this is where the programming is input and the metering is done) and two I/O modules (each is capable of providing 64 input or output terminations, made via screw terminals located on the rear panel).

Machine control module

A matrix module (which is a real gem; this unit electronically connects inputs to outputs through the use of a revolutionary thick-film hybrid IC) and a ma-

chine control module are also available.

The machine control module can provide a variety of control options, such as momentary contact closures, latching contact closures and TTL logic control. A single module can accommodate up to 16 devices. A memory cartridge is provided to back up the memory periodically or as needed.

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DN-500 Combines Four Effects

by John Diamantis, CE
WCXR-FM/WCPT-AM

Alexandria VA Compression, expansion, limiting and peak clipping are four techniques used by the broadcast, recording and sound reinforcement industries to manipulate audio signals. They do this to protect against over-modulation as well as to create special effects.

The Klark Teknik DN-500 dual compressor/limiter/expander/clipper integrates all of these processes into a single, compact, rack-mounted unit, with two-channel operation.

The DN-500 offers complete dynamic control over both gain and problems due to noise in the signal chain. The unit also allows for greater control over distortion due to excessive peak levels.

Well-placed controls

The DN-500 is a one-rack-space high unit and at first glance may appear overly complex due to its 20 rotary controls, 14 switches and 22 LED status arrays and indicators.

However, after using the unit for a short while one gets used to the logical placement of the controls and the gain/status information displayed by the LED indicators.

The DN-500 has all of the usual controls found on most compressor/limiter units, including adjustments for compressor attack time, release time, ratio, threshold and gain. This unit also has some unique features that allow more flexibility and user-friendliness.

For instance, its variable knee control adjusts the rate of compression above the threshold point. When adjusted to "hard" the set ratio takes effect immediately.

USER REPORT

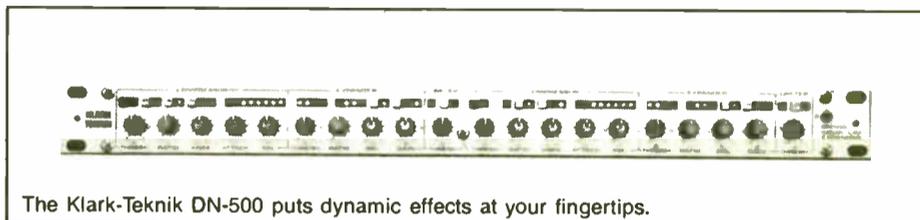
When the control is set full "soft" compression starts at a low ratio, gradually increasing to the set ratio. Settings can be selected anywhere in between.

The DN-500 ENV switch selects either user adjustable attack and release times or an automatic setting, in which response times are adjusted automatically to give an almost undetectable feel to the gain reduction.

This setting works well when using the unit as a pre-processor for your air chain or as a gentle leveler for production use. Side chain inputs for both compressor and expander allow a lot of flex-

ibility. De-essing, ducking and remote keying are also possibilities with the DN-500.

The DN-500's expander is very flexible,



The Klark-Teknik DN-500 puts dynamic effects at your fingertips.

allowing adjustments of threshold, ratio, release time and switch selectable auto/fixed attack time.

Its peak limiter puts a definite ceiling on the signal and also allows you to adjust the threshold at which limiting takes place. And along with the limiter section comes a defeatable peak clipper that will track the limiter's threshold.

Internally set response time

The limiter's internally set response time prevents any ill audible effects from too much limiting, insofar as release times seem to get longer as the depth of limiting is increased.

Physically, the DN-500 is well built, with all of its circuitry contained on two PC boards. Its audio connections are made via board-mounted XLR connec-

tors, its side chain inputs via 1/4" type A stereo jack and its power accessed via an IEC standard 3-pin connector.

Inputs are active balanced in with a transformer option available. Outputs are single-ended and possess 600 Ohm, +21 dBu drive capability. Although no schematic was available in the otherwise well written and thorough operating

manual, inspection revealed that the circuitry is based around the popular dbx 2150A VCA.

The remaining ICs are all socket mounted for easy servicing and the husky, well regulated power supply should provide years of maintenance-free use.

The Klark-Teknik DN-500 is a very flexible package of dynamic range control circuits and it allows the user to create just about any dynamic effect desired or required.

■ ■ ■

Editor's note: John Diamantis contributes often to RW. He may be reached at: 703-683-3000.

For more information on the DN-500, contact Jack Kelly at Klark Teknik: 516-249-3660, or circle Reader Service 93.

Switchers Find Niche

by Richard Farrell

Falls Church VA In the mid-seventies, Ramko Research showed broadcast radio its first audio routing switcher, the ARA1612. According to Ramko President Ray Kohfeld, its essential structure has not changed to this day.

INDUSTRY ROUNDUP

Still an expandable switcher that can go from eight-in and two-out to 128-in and 64-out, the only thing different is its name—which became the RS1616 just under four years ago—and various remote controls and controlling feature upgrades that were not originally present on the unit.

Manufacturers of audio switchers say their products sell primarily because of the flexibility that they offer to engineers. But while they may feel that routing switchers could eventually supplant patch bays, the familiar patch panel remains a mainstay in radio stations.

Switchers got good start

One would have thought that back when Ramko first brought the ARA1612 onto the scene there might have been some resistance to the idea of routing switchers coming in to replace the patch panel. Not so, according to Ray Kohfeld.

"We had no resistance at all," says Kohfeld. "We found that instead it was quite a breath of fresh air to the radio person."

Ramko's switcher, the RS1616, in its present incarnation, is controlled by everything from front panel controls to parallel or serial remote controls to IBM PC-compatible software-driven controls,

or any combination of these.

Kohfeld reports interest from the automation arena, particularly in the European market, where he says sales are strong. But even with approximately 50 switcher systems presently on order and automation headliner Media Touch using Ramko switchers exclusively in its systems, Kohfeld still speaks cautiously about the audio switcher's place in radio.

But he sees positive change in the wind. "More and more stations are converting to switchers," says Kohfeld. "And these are stations that have been around for a long time. They are updating."

Newer kids on the block

Another strong competitor in the audio switcher market has been ITC/3M, which at the 1987 NAB introduced its Audio Switcher. According to ITC/3M audio switcher product specialist Tom Becker, the Audio Switcher has seen a jump in sales of about 250% from 1988 to 1989.

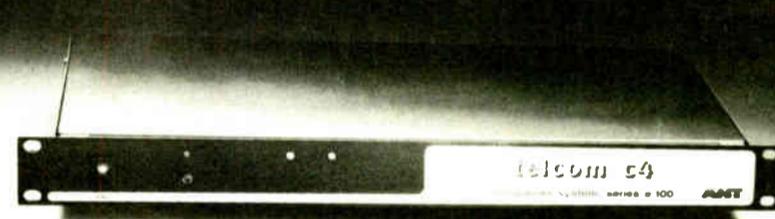
The ITC/3M switcher is a single matrix routing device, expandable from a smallest configuration of 16-input by 16-output monophonic to a maximum size of 256×256 monophonic or 128×128 stereophonic.

"Three years ago," recalls Becker, "a routing switcher in a radio station, or really in any audio application, was questioned. We have had to go through a real education process. As the months pass, more and more people are deciding that it makes sense to use a routing switcher."

"The majority of people buy routing switchers for the flexibility they offer—the ability to add new signals into the system, to change existing signals and be able to re-program a signal. You do not

(continued on page 48)

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KVEN Upgrades to DA10,000

by Dow Jones, CE
KVEN Broadcasting Corp.

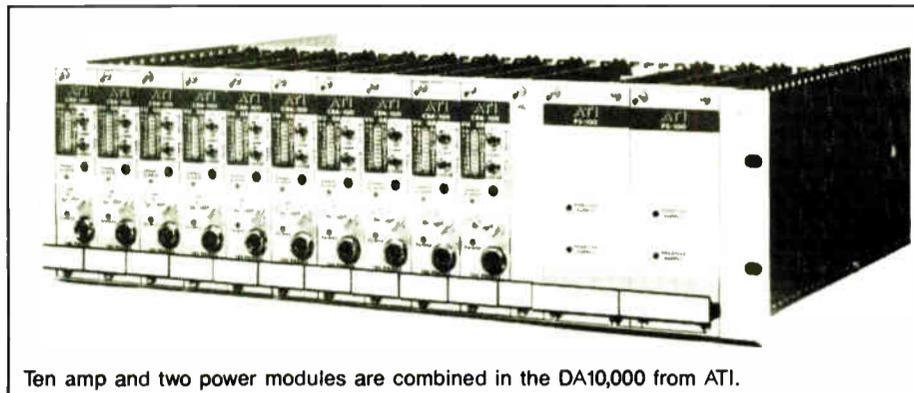
Ventura CA Five years ago I set about to rebuild the plant at KVEN broadcasting to make it a state of the art facility.

I was given the task of engineering the following: a News/Talk radio format that consists of not only the program audio out of the main air studio but also makes use of five other studios, six news network feeds, two 2-way radios, two or four sports networks (depending on the time of year), in addition to feeding the pre-delay audio to all studios and the phone system for monitoring.

It therefore was imperative to incorporate an audio distribution amplifier system just to keep us from becoming candidates for the "funny farm." (I know some radio station managers who insist

transmitter would not pass anything over 5 kHz anyway).

In my search for an audio distribution system, I found that almost all of the ones on the market were configured much the same way as the ones I had:



Ten amp and two power modules are combined in the DA10,000 from ATI.

in a 2x8 or a 1x16 configuration, each of which took up one rack unit (1.75") of rack space.

Using this configuration I would need 35" of rack space just for the audio distribution system, not to mention 20 AC power outlets, as each module had its own power supply.

Since I was familiar with Audio Technologies Incorporated (ATI), I decided to build my audio distribution system around the company's DA10,000 modular distribution amplifier system.

New system chosen

The DA10,000 combines up to ten amplifier modules with two power modules in a 5 1/4" high by 19" wide Eurocard specification enclosure that is 14 1/2" deep. All modules plug in from the front, are secured with captive hardware and present an attractive and safe enclosure allowing free convection for vertical air flow.

The basic frame provides power bussing for all positions. Individual modules are supplied with mating connector assemblies, which mount on the rear of the

card frame and plug into the power bus.

Connector assemblies provide barrier block connections with fanout strips for studio wiring. Alternate insulation displacement, mass termination connector systems allow simple plug-on audio con-

nections.

A wide variety of interchangeable plug-in modules allow an optimum system to be initially assembled at reasonable cost and expanded and upgraded as future requirements dictate.

Audio modules offer flexibility

Of the six audio modules available, five are one-input by 6-output with either active balanced or transformer outputs. Three of the modules are metered, using LED Barograph displays; one is a metered gated compression amplifier and one is a metered, remote-

controllable amplifier.

The two power supply modules each contain failure alarm contacts and the DC outputs are wired together so that the failure of one power supply module will not cause the failure of the entire system (Schottky switching diodes isolate each supply from the distribution bus).

In addition, the AC power can be split and fed to each power supply independently from separate sources for additional redundancy.

Of the available modules, I chose the IDA-100-1 for my first system. This module has independent adjustments of each output and the (-1) option includes transformers on each output.

A call from the VP

When I ordered the first DA10,000 system, I was completely surprised to receive a phone call from Ed Mullin, vice president of ATI. He was calling to find out if I wanted to receive the fanout strips in advance of the entire system so that I could pre-wire the audio inputs and outputs.

Since I was replacing existing alleged distribution amplifiers, it was not appropriate to attempt to pre-wire. I have since discovered that this is Ed's standard procedure on each order.

The installation, although not all modules were wired at the same time, went smoothly. I did follow the note in the manual that I found useful.

The note read: "Barrier block screws are tightly machine inserted by the manufacturer. Protect your knuckles by (continued on page 48)

USER REPORT

that all engineers are "graduates" of that particular institution!)

In addition to the above stated needs, I also had to deal with the studio being located at the AM transmitter site, with only a minimum of grounding within the facility. The original wiring resembled a very large ground loop. Having RF in almost all the audio throughout the facility was common.

Where the system stood

The existing audio distribution system consisted of four homemade solid-state amplifiers in a one-input, 10-output configuration. The active components were entirely LM709 op-amps.

This device pre-dated the "standard" 741 op-amp and was much noisier and had a much slower slew rate (something under two weeks to pass a 20 kHz signal; a moot point, since the original AM

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A Guide to NRSC-1 Conversion

Editor's note: The following is Part II of the author's report on NRSC-1 conversion. Part I appeared in last month's Buyers Guide.

by **William L. Ammons**
Radio Products Marketing Mgr
CRL Systems

Tempe AZ Now that you are converting to the NRSC-1 standard, there are some often overlooked areas of the transmission system that can limit and degrade your signal.

Tuning up your transmission plant along with converting to the NRSC stan-

input low-pass filters are not overshoot corrected. High-pass filters are often used to protect the transmitter against subsonic material.

If the cutoff frequency of the transmitter's filter is too high, your program ma-

mitter can not handle the density and loudness that the newer processors provide.

The truth is that older transmitters and properly designed NRSC-1 compliant processors work very well together. There

when trying to use preemphasis. Therefore, many stations have elected not to use any preemphasis.

Since a compliant processor has a sharp cut-off low-pass filter working in conjunction with a modified preemphasis curve, a large difference in the amplitude of material above 10 kHz can be expected.

Hence, the transmitter never sees audio material above 10 kHz. The difference in amplitude response at 15 kHz between a new NRSC-1 and an older, non-compliant processor can be greater than 60 dB!

Converting to the NRSC-1 standard is easy. Some stations have been able to retrofit their audio path to the standard in about an hour. We have found several common pitfalls when implementing NRSC that can degrade your transmission.

Limiter placement important

When converting to the NRSC standard, it is important where your peak limiter is placed in your audio chain. The NRSC compliant retrofit or peak limiter should be connected directly to the transmitter.

Dynamically limited audio contains short duration audio peaks with fast rise times. Most audio equipment, including STLs, phone links and audio distribution amplifiers, are unable to handle pre-emphasized, limited audio.

Inserting other audio equipment between the peak limiter and transmitter can seriously degrade your signal and render the low-pass characteristics useless.

If you have a split studio/transmitter site, and wish to control audio level before entering a phone line or STL, an AGC or combination AGC/multiband compressor would work well.

An AGC that has program dependent
(continued on next page)

Some stations have been able to retrofit their audio path to the standard in about an hour.

terial can sound tinny, with a lack of punch. Furthermore, tilt correction will not work when third order or greater high-pass filtering is used.

Properly designed audio processor systems have high-pass filtering, which negates the need for an additional filter inside the transmitter.

If you are buying new processing, specify a system that has high-pass filtering built in, combined with low-frequency tilt correction capability.

Mixing the old with the new

Many owners of older transmitters have expressed concern that modern audio processing equipment and older transmitters do not mix. The primary concern seems to be that the trans-

are two main reasons why this is true.

First, the audio frequency is cutoff at 9.5 kHz versus a much higher frequency (if any) in an older limiter. At higher modulating frequencies (above 10 kHz), the efficiency of a transmitter's modulator falls off rapidly, causing higher modulator currents (which usually cause greatly increased THD and IMD products) and more chance of damaging a marginally designed modulator transformer.

Many of the stations that have converted to the NRSC-1 standard have noticed sharply decreased modulator currents for the same peak modulation level.

Preemphasis boost

Second, the NRSC-1 standard preemphasis is a modified boost with a first order roll-off introduced at (about 8700 Hz) 17 μ sec. The net preemphasis peaks at 10 kHz and rolls off above that. The preemphasis circuits that many older limiters have is a straight 75 μ sec. (or higher) boost that often continues out to 20 kHz.

With no low-pass filter, the high frequency audio is boosted over 17 dB at 15 kHz. This is why many stations have had problems with their transmitters

SPECIAL REPORT

ard can significantly increase your coverage area and lengthen the life of your transmitter. Listed below are a few tips that we often give out.

When converting to the NRSC standard, make sure that the various low-pass and high-pass filters that are often on the input of the transmitter's audio path are taken out of service.

A poor quality audio low-pass filter that is in the circuit after a NRSC-1 low-pass filter can ring and overshoot. This will result in reduced modulation control and hence lost coverage area. Most

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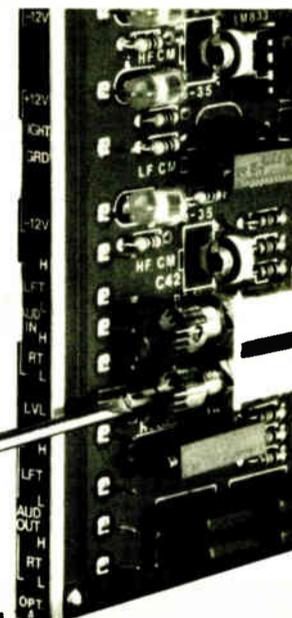
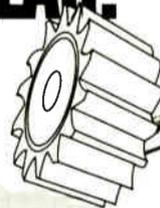
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(from previous page)

attack times will do an excellent job of controlling (or levelling) your audio level at the studio. Audio that has had only AGC or light multiband compression applied to it will also interface well with an STL or telco system.

And do not use two limiters in series. Two are less effective than one good one at the transmitter site.

After converting, the most noticeable change is the greatly reduced splatter between 10 and 20 kHz away from either side of your carrier. Many stations now report that they can receive second adjacent channel stations at their transmitter site.

On analog tuned AM radios, you will find it easy to tune to the center of the signal. On these radios, the sound will be slightly brighter, depending on IF bandwidth and slope. On wider bandwidth radios you may notice a substantial improvement in fidelity.

Improved coverage

Some stations report that their coverage area has improved after conversion. Depending on the transmission system and the type of peak limiter being used, converting will, it is true, improve your coverage area.

The coverage area increase is due to the amount of sideband energy farther than ± 10 kHz from your carrier being greatly reduced. The sideband energy more than 10 kHz removed does count as total modulation (but does not add to perceived loudness), however it is not usable energy for the listener's receiver.

Since most receiver IF band-pass responses are below 5 kHz, adding sideband energy closer to the carrier helps signal detection. A compliant peak limiter that employs a variable presence (1 to 4 kHz band) boost, for example, will further increase density (and improve vocal clarity), which helps increase detected signal loudness.

In cases where either the transmitter has limited modulation capability at high frequencies, or the antenna system has excessive amplitude roll off or asymmetrical response, your signal quality may sound cleaner also.

A cleaner signal

This cleaner signal is due to the reduction in IM products that often are produced by bandwidth deficiencies in the transmission system. Studies have shown that limiting the audio bandwidth to 10 kHz greatly lessens the higher frequency IM products of many popular transmitters.

In many cases this also greatly decreases in-band (below 10 kHz) IM products. Many stations have reported to us that they sound cleaner (with less dynamic distortion) after

converting.

One concern that some stations have had after converting to the NRSC-1 standard is the sound quality that they hear out of wideband AM modulation monitors. Since the standard preemphasis boosts audio 10 dB at 10 kHz, a wideband modulation monitor will sound excessively bright.

If you use your modulation monitor for off the air monitoring, external deemphasis/low-pass filter units are available. The function of these units is to deemphasize the signal and

low-pass filter it to emulate the sound quality of a properly produced AM radio.

The deemphasis units are fed from the audio output(s) of your modulation monitor. Converting to the NRSC-1 standard does not change the accuracy or calibration of your modulation monitor.

Tell your listeners

Once you have finished your conversion to NRSC-1 or have converted to AM stereo, let your listeners know about it. Tell them that you are on the cutting

edge of technology and that the improvements have been made for their listening benefit.

Let them know that better quality AM (and AM stereo) receivers are coming soon to the marketplace. If you broadcast in stereo, identify your station as AM stereo. Many times a station has spent a small fortune converting to stereo and has never told its listeners.

Become a source of information to your listeners about AM. Since converting to the NRSC-1 often improves your coverage, drive around and see if some of

your marginal areas (pre-NRSC) have improved. Let your listeners know that because of the improvements you have made you now clearly cover a wider area.

It's my hope that the information above answers many of your questions about conversion to the NRSC-1 standard. Feel free to write or call any of us at CRL about questions that you may have. We would be happy to hear from you.

■■■

William Ammons may be reached at CRL: 800-535-7648.

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Switchers Catch On

(continued from page 43)

have that sort of flexibility with a patch bay or even with a DA-type system," he says.

Convincing the market

Becker thinks educating the marketplace is important. "People are used to patch bays and DAs," he explains. "They are simple and straightforward. But when you say to a broadcaster: how would you like your wiring reduced by 50%, or your DAs reduced by 90%, they will think about it for awhile."

Becker notes that switchers can be used with patch panels, and that using

one does not preclude the use of the other. To this end, we must not forget, cautions Becker "that you are dealing with an active system. If lightning strikes it, and you manage to get the power back up at your station but not on the routing switcher, then you need to be able to go around it. It provides you with a second back-up."

And although Becker finds that routing switchers are not intended as a replacement for the patch panel, he still feels that in some cases that is exactly what it does.

"If you are designing a new studio," says Becker, "the need to have a patch

panel is almost non-existent. It is not going to be used as long as you have a routing switcher to get all of your signals from. So, indeed, the switcher has replaced the patch panel in certain areas of the radio station."

Here to stay

But Becker will also concede that patch panels are here for a long while to come. "An awful lot of people are used to using patch panels," says Becker. "And very rarely do you have a new product that takes the market by storm. So, yes, for the next few years people will be selling patch panels."

In fact, says Becker, "they will probably always be selling patch panels. But the amount that they are selling is going to be reduced."

Gentner Electronics' Director of Mar-

keting and Sales for the Broadcast Division, Gary Crowder, agrees with Tom Becker that switchers are not out to specifically replace patch panels. "They were designed as an alternative. Not as a direct replacement," says Crowder.

"The advantage of these kinds of switchers is that they are dependable and do not do anything to the signal, since they are passive. And above all, once you select something with a switcher it stays selected until you change it," says Crowder.

Stereo and mono signal switchers

Gentner offers two audio routing switchers, the Signal Switchers 10 and 20, both completely remotable, the 10 being stereo, the 20 mono. The model 10 selects 10 stereo channels to a stereo channel output and the model 20 selects 20 mono channels to a single mono channel output.

But that being said, Crowder too realizes that patch panels are not going anywhere. "The overwhelming majority of people still use patch panels," says Crowder.

In the end, though, radio benefits. "In the last two years we have seen a lot of companies trying to look at audio switchers," says Tom Becker, "and a lot of different people have thrown their hat into the ring, which bodes well for radio . . ."

DA10,000

(continued from page 45)

loosening them a few turns before mounting them in a rack where they are hard to reach. Doing so will make it much easier to install your pre-wired fanning strips at 3 AM."

One can tell that the writer has actually been at some station at 3 AM!

So far so good

In the five or so years since the first frame has been in service there has not been one failure (of course I just rapped my knuckles on the desk top as I wrote that). We have also added the second frame to accommodate our growing needs.

The two RM100 frames, which incorporate the 20 distribution amplifier modules (channels), take up less than a third the rack space of a "conventional" distribution amplifier system of single rack unit per channel systems.

If one is considering installing an audio distribution system or adding on to or upgrading a new audio distribution system, then the ease of installation, number of channels in a given amount of rack space, redundancy in the power supplies, power supply failure alarm contacts and the quality of its audio components require that you consider the DA10,000 modular distribution amplifier system from ATI.

■ ■ ■

Editor's note: After spending eight and a half years in the Navy, Dow Jones worked at KDKA in Pittsburgh; WZUU in Milwaukee; for Harris Corporation's service department; for Broadcast Electronics' service department; and for Cetec Broadcast Group before joining KVEN Broadcasting Corporation as CE. He is the Secretary/Treasurer of Los Angeles chapter 47 of the SBE. He may be reached at: 805-642-8595.

For more information on ATI's DA10,000 modular distribution amp system, contact Ed Mullin at ATI: 215-443-0330, or circle Reader Service 83.



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World Radio History

Syncaset Rivals the Open Reel

The Tascam Model 238 Offers Eight Channel Capability on Cassette

by Steve Keating, CE
KCSN-FM

Northridge CA Many of my professional contemporaries, when I first acquainted them with the Tascam Syncaset, exhibit the same reaction I did when confronted with the premise that a standard audio cassette can record and reproduce a total of eight channels of full-bandwidth audio material at performance levels equal to or exceeding those of open reel tape machines.

Their reaction? I don't believe it!

Well, it is true. I was given a production model of the Tascam Model 238 Syncaset to evaluate electrically and operationally.

The medium being the key element in any recording environment, and as recommended in the 238's instruction manual, I used a fresh chrome-bias blank C-60 cassette manufactured by a reputable, well-known tape manufacturer.

USER REPORT

With professional grade audio test equipment, I put the 238 through harmonic and intermod distortion tests, residual noise measurements and frequency response checks.

I referenced my input and output signals and impedances to those specified in the instruction manual and checked performance with and without the dbx circuitry engaged.

The results of my tests netted figures within one dB of those called out in the instruction book. In most instances, performance exceeded the levels listed in the manual.

Listening is key

Static or dynamic measurements of audio equipment have never told the whole story. Many maintain the final proof is in the "pudding" of listening. I subscribe to this school of thought, using established measurement techniques as a general reference in the grading of one product against another.

In evaluating the Tascam eight-channel

Syncaset, I had no other unit with which to compare it. But Tascam had pitted the 238 against other multitrack open-reel tape recorders it manufacturers in order to offer a comparison.

They found that a conventional ¼" eight-track open-reel deck, running at 7½ ips, spanned 30 to 16 kHz with 55 dB crosstalk.

Compared favorably

The Syncaset, with its tape speed of 3¾ ips, produced the same bandwidth and only five dB less in channel crosstalk! Not bad for half the tape width and half the tape speed.

Seasoned recordists will undoubtedly question the capability of the Syncaset . . . My response to such skepticism is, "try it."

The capability of a recording device to accept a wide range of audio levels has always been an important consideration. Mixing consoles have been produced that can easily process as much as a 90 dB span in incoming signal variations throughout the audible spectrum.

But it is also true that recording devices able to commit such a wide latitude in dynamic range have traditionally been very expensive and physically large.

In an effort to keep the cost of the Syncaset as low as possible, Tascam elected to exclude any input or output level controls on the unit since they intend for the recorder to be used in conjunction with one of many commercially available mixing consoles capable of routing a total of eight channels into and out of the 238.

Doubters beware

Seasoned recordists will undoubtedly question the capability of the Syncaset to adequately retain full audio bandwidth with minimal channel crosstalk on eight separate channels of a standard audio cassette tape. My response to such skepticism is, "try it."

After running the 238 through its

paces on the bench, I was anxious to "take it out for a spin" in the real world. In practice, most recording studios do not lay down a "head" tone of 700 or 1000 Hz for level reference over more than 10 seconds on a given reel.

This level reference is not intended as an alignment standard for the end user except to establish a volume reference point indicating the maximum level that can be expected from the program playback.

I recorded a 1000 Hz tone on all eight channels of the Syncaset for 60 seconds, followed by 50 Hz for 60 seconds and then 15 kHz for 60 seconds.

and the monitor gain set at twice its normal setting. In normal use, the crosstalk would not be unacceptable.

The next test to which I subjected the Syncaset was music played from a compact-disc player. Some of the music was digitally-mastered and some was analog-mastered.

Assigning left and right

Randomly, I assigned various left and right channels from the mixing console's input channels fed by the CD player to various pairs of channels being fed to the 238.

The program material ranged from classical to pipe organ to contemporary hard rock laced heavily with synthesizer-generated waveforms. I carefully monitored the program levels to insure that none of the channels on the Syncaset would be overloaded.

I should point out here that a conventional open-reel eight-track reel recorder using ½", 1½ mil tape contained on a 10.5" reel will only hold 30 minutes of program material.

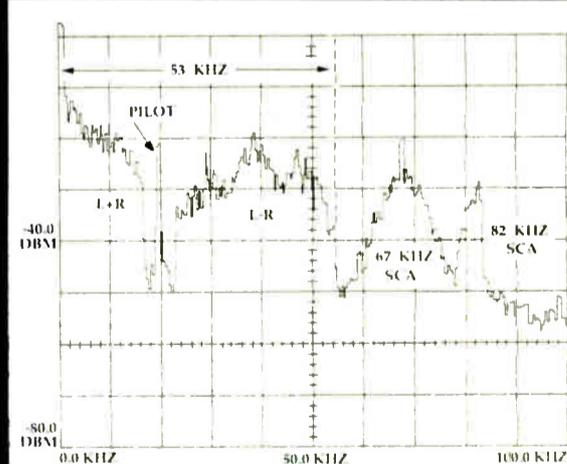
The Syncaset, running at its set speed of 3¾ ips, with a C-90 cassette will hold 22½ minutes of program material, just 7½ minutes less than that of the open reel.

My test lasted less than 10 minutes, and while listening to the playback

(continued on page 58)

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USDA: A Prime Choice for a DA

by **Hank Landsberg, Owner Henry Engineering**

Sierra Madre CA A few weeks ago Henry Engineering announced the USDA, which stands for "Utility Summing and Distribution Amplifier." ce a distribution amplifier is probably the most mundane and uninteresting piece of equipment used at the average broadcast station, we wondered what could be done to make one a little differently, one more useable and able to solve more problems for the broadcaster.

without such pitfalls is to do it with an active summing amplifier. This is the summing feature built into USDA.

The USDA is a 2-input, 4-output distribution amplifier. The two input channels can operate independently, in parallel, or as a stereo pair. The 4-output channels can operate as four independent outputs, or as two stereo pairs.

The feature that makes USDA unique is the Stereo/Mono selector switch for each of the two stereo output pairs. Either or both stereo outputs can be switched to mono with no loss in level or separation of the other output, or of the source signal.

With the USDA, you can feed a stereo signal in and get two stereo outputs, four mono outputs, or a combination of one stereo and two mono outputs, simultaneously.

Suitable for broadcast

USDA has dozens of broadcast station applications. In addition to combining stereo to mono or splitting signals for distribution, it can be used to boost low level (-10 dBm), unbalanced "consumer" audio signals to +4 or +8 dBm balanced outputs.

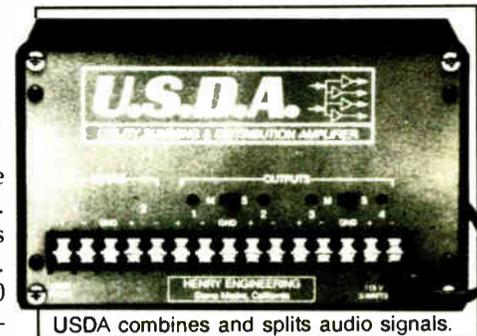
Another use could be to convert Left and Right audio inputs to "matrix" Sum and Difference outputs. The reverse can also be done; feeding USDA with Sum and Difference inputs can produce Left and Right stereo outputs.

USDA's circuitry is active and direct

coupled. The inputs and outputs can be wired either balanced or unbalanced. The input impedance is 20 kilohms (bridging), so the source is not loaded. This permits a source to feed a typical 600 ohm load and feed USDA simultaneously, with no adverse effects.

There are individual gain rim adjustments for each of USDA's four output channels. The gain may be set between -6 dB and +20 dB. The USDA will drive four 600 loads simultaneously to +24 dBm with typical distortion of .01% THD or IM.

Since the USDA is direct coupled, frequency response is from DC to over 50 kHz. The noise level (EIN) is -95 dBm. USDA is also compact (same size as a



USDA combines and splits audio signals.

Matchbox) and has an internal bi-polar power supply.

Whenever a "new" DA comes to market, most folks respond with: "So what else is new?" The USDA is new, and should solve numerous audio-related problems at broadcast stations every day.

For more information on the USDA, contact Hank Landsberg at: 818-355-3656, or circle Reader Service 84.

TECHNOLOGY UPDATE

Our answer was to add a summing capability so that the DA could be used to combine—as well as split—audio signals for distribution.

Have you ever needed to add a mono output to a stereo console? How about combining the stereo output of a tuner to feed the (mono) house PA system? One way to do this is with resistive combining networks.

Summing pitfalls

drawbacks to passive summing are either a loss of level or a degradation in the stereo separation of the source signal, or both. The only way to sum two audio signals

Marti Reduces Noise

by **Phillip Klingler, Tech Dir WOKY-FM/WMIL-AM**

Milwaukee WI Remote broadcasts are difficult at best, and any piece of equipment that can improve quality without substantially increasing cost is appreciated.

Marti Electronics of Cleburne, TX, a company name synonymous with remote broadcast receivers and transmit-

sions incorporate either 2:1 or 3:1 companding ratios to help quiet that system.

Electrical access to the audio between processing and modulator is fairly easy in our Marti transmitters, but there is little extra room. It is particularly tight in the RPT-2, the 2 W internal battery transmitter I affectionately call the "Mini-Marti."

After trying dbx encode in front of the transmitter, dbx encode after transmitter audio processing and single-ended CRL dynaflex at the receiver, I always ended up back at the original configuration.

That is not to say that noise was reduced; it was. It simply had other artifacts or inconveniences that were as bad as, if not worse than, the noise.

Offers upgrade

Marti has developed a companding upgrade that consists of two boards inside the transmitter; a redesigned audio board and a new encoding board. The receiver has one new decoder board. Only the current series of transmitters, the RPT-2, RPT-15, RPT-30 and receivers AR-10, BR-10, CR-10 and DR-10 can be upgraded.

Because the audio section has been redesigned to complement the new companding board, Marti has been able to incorporate high quality companding without external units or larger packaging.

The grass, however, is not always greener. Companding does add some distortion. But not as much as the IF filter section of the receiver.

Companding also requires close track- (continued on page 57)

USER REPORT

ters, has just such an addition: a noise reduction system that uses audio companding.

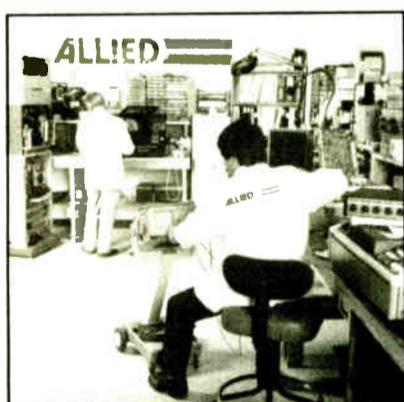
Companding is usually combined with some amount of preemphasis. The Telefunken companding chip combines a 2:1 compression ratio with a 25 microsecond preemphasis curve operating on 12 VDC. dbx's chips require both a negative and positive voltage, which increases complexity and cost.

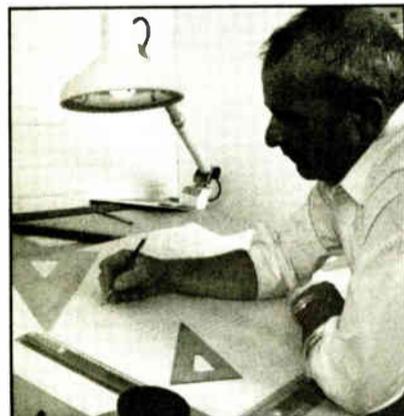
I have been using companding on our analog open reel and cart machines for some time. Most SCPC satellite transmis-



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Live Assistant Helps Out KSCQ

by Dennis Wells, CE
KSCQ-FM

Silver City NM Automation has become an option that some broadcasters view with furrowed brows and pointed looks, while others stand smiling with open arms and welcome the chance for greater flexibility in the radio plant.

Somewhere between the "Live Jock" and "Mechanized Otto" lies a viable option: live assist.

USER REPORT

In early February of 1989 the GM, PD and myself agreed that the automation unit we were currently using for off-hour programming was deteriorating more quickly than was anticipated.

Looking for a new unit, however, we found that prices were beyond the reach of our finances.

During a phone conversation with Earl Bullock of Broadcast Automation Inc., we discussed the idea of using the Live

Assistant features and requirements we felt were needed to use as a building block for rebuilding and upgrading our automation.

We ordered the Live Assistant along with three new Otari ARS-1000 reel-to-reels and three SMC-250 carousels.

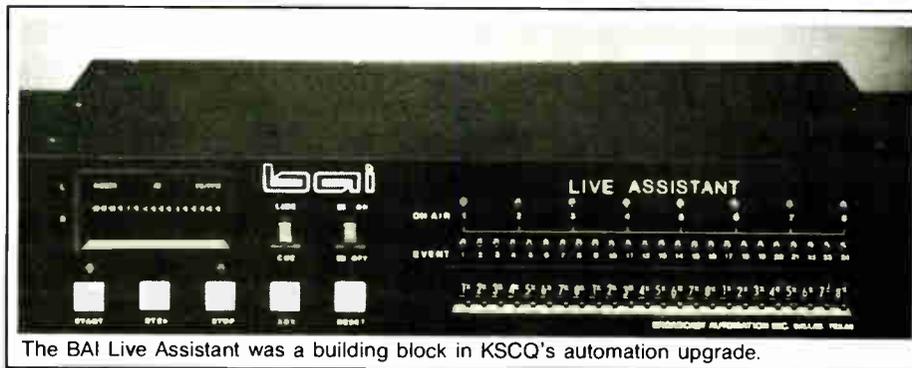
In the first week of April, Earl Bullock of BAI arrived with the new equipment and rack cabinets ready for placement and hook-up. Installation of the controller was simple and required a minimum amount of effort.

The Live Assistant was engineered and designed with an extreme amount of foresight, as the unit interfaced very

nicely with the Otaris and carousels. We also had a Gates single-play cart deck and an ITC deck, neither of which presented any problems to connect to the Live Assistant.

Once the interconnect cabling was completed and the remote start/stop functions were wired into the control room console, we were ready for a test run and a check of audio levels to and from the Live Assistant.

The controller is programmed by setting the 24 thumbwheel switches on the front panel to the desired format. One more benefit emerged here in that Position 9 will cause a reset to event #1 and Position 0 of the switch will create a skip and stop or a skip condition depending on internal jumper pin position selected.



The BAI Live Assistant was a building block in KSCQ's automation upgrade.

The Live Assistant was engineered and designed with an extreme amount of foresight . . .

Assistant live assist controller to replace the brain and associated audio circuitry of the automation unit we were using in order to have full automation control of our reel-to-reel decks and Sono-Mag Corp. SMC-250 Carousels®.

Had desired features

Although the Live Assistant was not intended for full control of automation equipment, the unit boasted all of the

features and requirements we felt were needed to use as a building block for rebuilding and upgrading our automation.

Once the interconnect cabling was completed and the remote start/stop functions were wired into the control room console, we were ready for a test run and a check of audio levels to and from the Live Assistant.

Checking it out

The input and output levels as well as impedance matching are easily set by placing the programming pins in the proper position for the desired values.

Input level is adjustable from -10 dB to +4 dB and input impedance is selectable for either 600 ohm or 10 kilohm. All eight program inputs, and the remote

Smooth sailing

Since installing Live Assistant we have experienced no operational problems during full automation control and the air staff enjoys the new-found time and flexibility resulting from live assist.

Several listeners and clients have commented on the improved audio quality and smoother music flow during our times of full automation operation.

This can be attributed to an audio bandwidth of 20 Hz to 20 kHz (practi-

cally flat), THD that is less than .1% at 1 kHz with a +4 dB input level and user selectable control of audio source for cold start/stop or fade in/fade out (or a combination of both).

A parting glance at BAI's Live Assistant reveals a full feature live assist controller offering several user selectable options, simple operation, ease of formatting, excellent audio quality and compatibility with a wide variety of broadcast equipment.

Which leaves me only to ask: Is your "Otto" dying, or does he just require a little live assist?

■ ■ ■

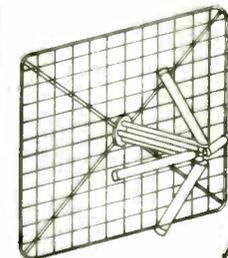
Dennis Wells may be reached at: 505-388-4116.

For more information on the BAI Live Assistant, contact Steve Walker at: 214-380-6800, or circle Reader Service 87.

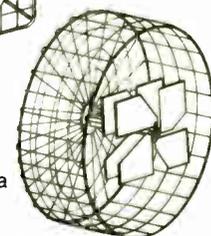


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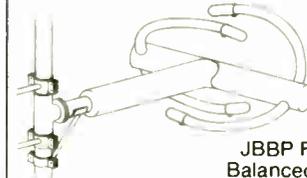
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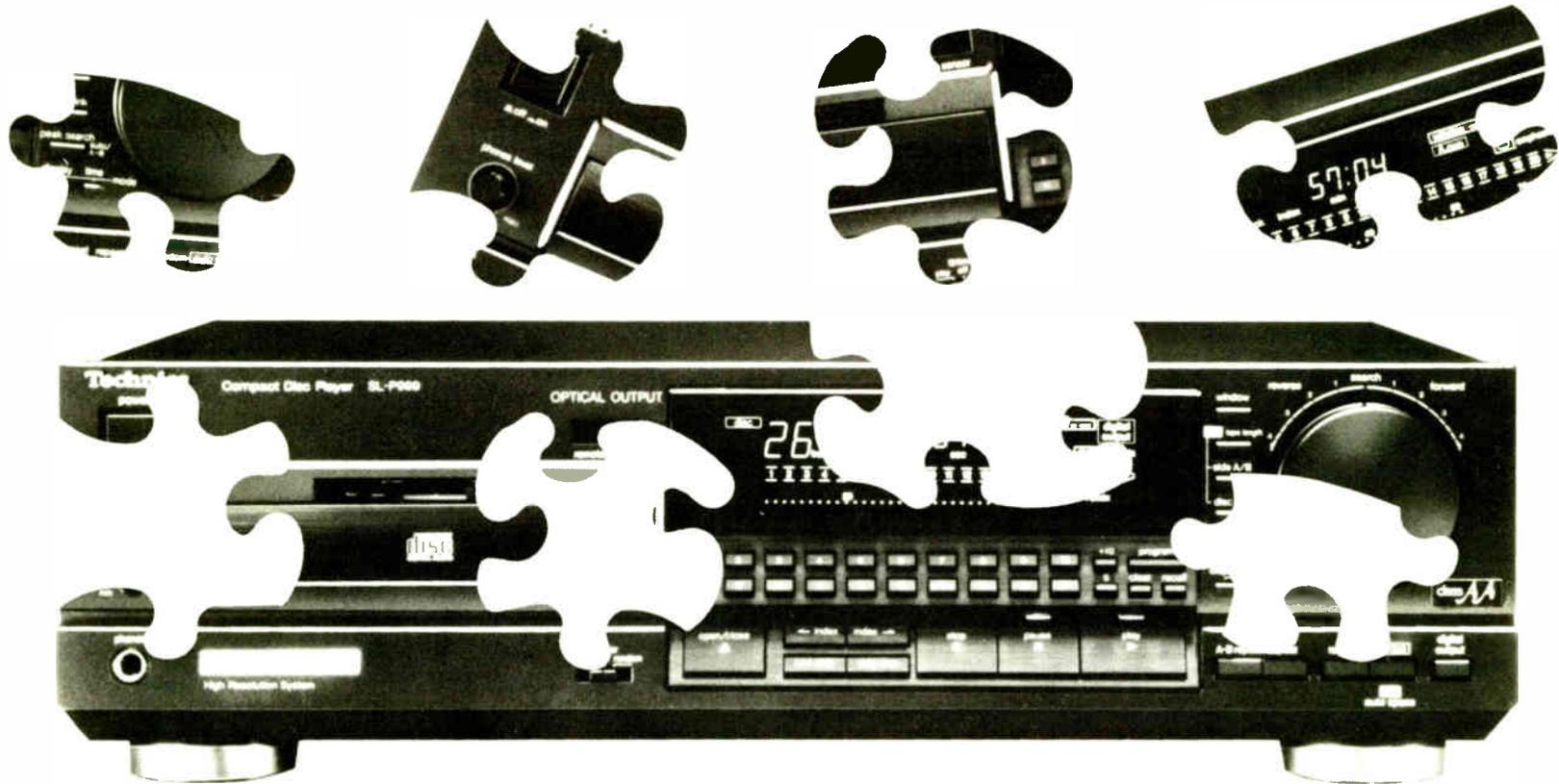
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Broadcast Equipment

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WHFS Makes News With Sine Systems

by Ken Barnett, CE
WHFS-FM/WNAV-AM

Landover MD When WHFS first decided to move its studios closer to Washington and leave WNAV behind, news was one department I was not going to have to move.

So when I first heard of the News Director by Sine Systems, I did not give it much thought because I was not in the market for that kind of equipment.

That changed with the pending sale now of WNAV. We decided to split the news department and move the FM news staff to the new WHFS studios. Alas, I had to build a news room.

Space was not a problem. However, creating a news production area with quality equipment to match what was already in use required a little thinking. I called a broadcast distributor and was told that the News Director would take care of everything I needed to accomplish and more.

Convenient size

The News Director is a 16-in by 2-out microprocessor-controlled audio production workstation. It saves space by taking up only two rack spaces and can be mounted in a desktop equipment rack.

The News Director functions as a console, distribution amp, limiter/AGC, routing switcher, monitor amp and a small bank of relays and start/stop switches.

It controls the dub functions and interaction between all news equipment, reel, cart, telephone, mics, cassette, etc. To be able to mount all of this equipment in a desktop rack is a real godsend.

The built-in functions of the News Director are, on the whole, very easy to use, although, like any new piece of gear, it takes some time to get used to. All functions are controlled from a 12-

USER REPORT

button telephone keypad that is accessible via the front panel.

The dub function lets you dub from reel to cart with a unique feature that allows the user to define the pre-roll time. You can also use the unit's 12-event timer to control the reel so that no after hours feeds are missed.

A talkback function can be programmed for push-to-talk between the mic and telephone or two-way. A front

panel dub 1/4" jack is provided to interface a portable news cassette machine. With 7 W of built-in power, a monitor amp is not necessary; it drives a JBL Control 5 monitor nicely.

No level worries

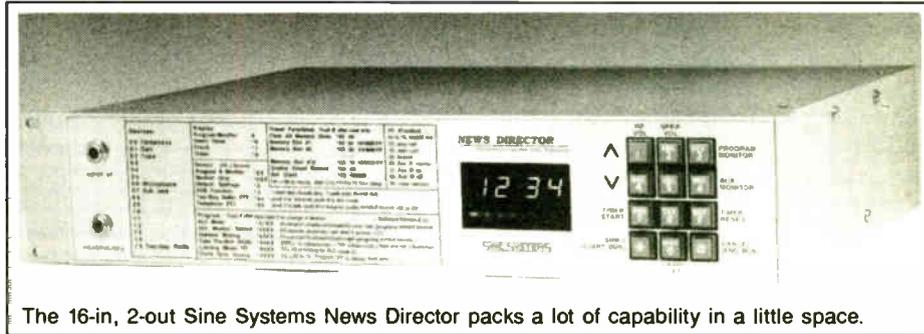
The News Director's 15-line inputs are jumper selected to either -25 dBV to -5 dBV or -10 dBV to +10 dBV. Mic input level is -52 dBm nominal. The outputs are actively balanced, monau-

ment together and building relay interfaces with the News Director; it is all there on the punch block.

It might be a neat trick to try to remote the keypad and clock/bar graph display. This would add to the versatility and should not be too difficult.

Labor saver

The News Director solved WHFS's news production problems and it is truly a great news box. Its design seems to be



The 16-in, 2-out Sine Systems News Director packs a lot of capability in a little space.

ral, at +4 dBm.

Operators do not need to worry about levels; a built-in AGC takes care of that and the News Director also has plenty of headroom before clipping.

I must admit that I cheated when I installed my News Director. I was able to obtain cables pre-wired from my distributor (left over from NAB). The News Director is wired via three 26-pin insulation displacement connectors. The simplest way to hook up the box is to bring the connectors out to a punch block.

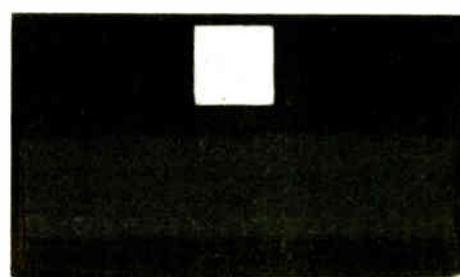
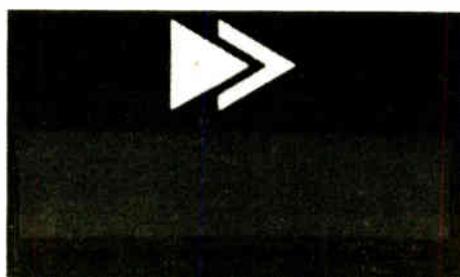
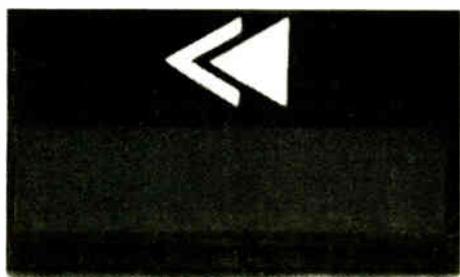
You will not have to mess with pulling all of the individual pieces of equip-

good and all parts are easily accessible. The ICs are in sockets and the box does what it says it will do. If saving time and space and getting the job done are priorities in your news room, then I suggest you look into the News Director.

Editor's note: Aside from his work at WHFS, Ken Barnett is also a partner in Conner/Barnett, Assoc., a broadcast consulting firm based in Washington. He may be reached at: 301-306-0991.

For more information on the News Director, contact Todd Harrington at Broadcasters General Store: 904-622-9058, or circle Reader Service 95.

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FRN's ITC Switcher

(continued from page 41)

Our configuration is a 64 mono input x 32 mono output, fully programmed and automated audio switch. The set-up was quite simple. We connected 64 audio sources to the 64 input terminals and connected the 32 output terminals to 32 audio inputs of various equipment including all four of our modulators, input channels in each studio and automated reel-to-reel recorders.

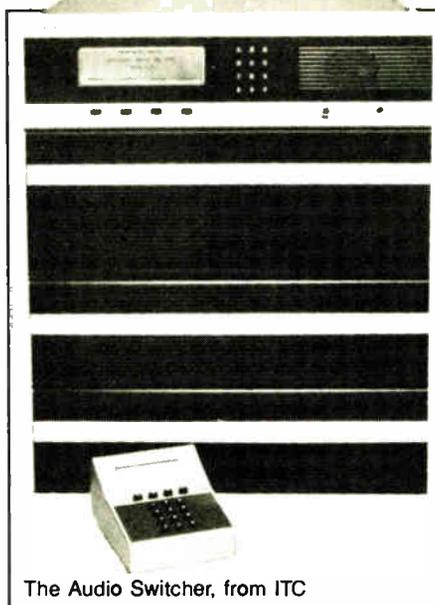
The next step was to assign a name

to each input and output. That done, switches could now be made manually, using the master control unit. The remote controls were installed in each studio and in the engineering shop.

Remote controls flexible

The remote controls are programmed separately to send any audio source to any of four locations. Each remote control unit (desktop version) has an LCD screen that allows the operator to view the names of the inputs he or she is selecting before that selection is made.

Once the selection has been made, the screen displays all four of the inputs that are connected to the four corresponding outputs. An included printer will then print a statement recording the event that just took place, including the time of day, what con-



The Audio Switcher, from ITC

nection was made and what remote or "salvo" invoked it.

But you probably want to know more about salvos.

The Audio Switcher is programmable, with up to 99 separate programs, or "salvos." Each salvo can switch up to seven sources (more if you do not use all seven in each one) at one time and perform machine control if desired.

Salvos automate news

The use of salvos plays a key role in our daily network operation. We use them to automate our news channel almost exclusively. The switcher is programmed for every hour of the day. We even have some salvos programmed to switch several sources simultaneously, as in the example of our weekend talk programs.

Our telephone system is shared with more than one studio. Therefore, at the beginning of a scheduled talk show from studio C, the output of studio C is matrixed to the MOH input of the telephone system.

Also, the mix-minus output from studio C is matrixed to the mix minus input of the telephone system. The caller audio is switched to a channel on the console in studio C and studio C is placed "on the air."

In retrospect, I do not see how we could have accomplished nearly as much as we did in the way of clean, crisp delivery of our product without this equipment.

We have received a level of technical support unequalled in the industry. I cannot think of enough good things to say about my experience with the ITC/3M switcher. There are always criticisms to make, but in this case it would be pointless, given the results that ITC/3M has demonstrated.

■ ■ ■

Editor's note: In addition to his radio work, Brian Williston enjoys boating, water skiing, and film production and editing. He may be reached at: 407-859-1100.

For more information on the ITC/3M Audio Switcher, contact Bill Parfitt at: 612-736-5019, or circle Reader Service 88.

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PRODUCTION READY

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Wheatstone Wins with WNDR

(continued from page 41)

of audio at a single glance is an excellent feature of this DA. The LED indicators derive their signal directly from the input and output ports, making them true indicators of what is going on in the outside world.

I once had a situation where in one DA all of the LEDs were active except for one associated with the left channel of one of the outputs. The reason for this turned out to be a short at the input plug of a piece of equipment in a studio. In this case the DA turned

into a trouble-shooting tool as it alerted me to a problem.

DA saves the day

Another time during a remote broadcast over an equalized phone line where the phone line had gone dead (of course, when else would it die?), I was able to confirm the line trouble while still at the remote location by having the board operator back at the studio observe the darkened LEDs of the appropriate DA.

The SDA-82B output controls for each

channel feature multiturn pots. If you have set levels with trim pots, where the slightest twist can mean a change of a couple of dB, these multiturn pots are for you.

The smooth operation of the multiturn pots allows precise level setting to within fractions of a dB. They also are immune to changes of level due to vibraton—tweaking production room levels is no longer a hassle with this DA.

While eight outputs are ample for most applications, sometimes more are needed. Wheatstone has provided an auxiliary input port that is in parallel with the normal input port. This allows you to daisy-chain the input signal to additional DAs if needed.

It is also an elegant way to split a signal without splicing or doubling up on connector pins. The feature can be jumpered in or out.

Electrical aspects

The electrical characteristics of the SDA-82B are impressive and innovative. The input signal passes through state-of-the-art 5532 amplifiers, yielding a high slew rate and harmonic distortion of only .002%. All inputs and outputs are actively balanced and transformerless, with an input impedance of 10 K.

The common mode rejection is 85 dB at 1 kHz and 70 dB at 20 K with a +4 dB reference. All inputs have a CMMR trim pot for field adjustments should they become necessary. There is plenty of headroom. Clipping occurs at +28 dB and this DA boasts a 110 dB dynamic

range. CD anyone?

The frequency response will surprise you. It is rated at ± 0.5 dB from 20 Hz to 50 kHz. Why the extended range? Wheatstone believes that to have an audio chain in the station that is flat to 20 kHz each piece of equipment in the chain should be flat to beyond 20 kHz to prevent a cumulative roll-off effect, which can occur when each unit in the chain contributes a deficient response curve.

RF filtering

Extended frequency response could be a problem if proper RF filtering were not employed. But Wheatstone uses individual RF isolator networks and common mode RF rejection coils are on every input and output port of the DA.

The bipolar power supply is rugged and straightforward featuring plenty of filtering, trimpots to balance the supplies and a toroidal transformer for hum-field free operation.

Should the SDA-82B ever need servicing, the mother board is easily accessible by removing the top and bottom covers of the box. This exposes both sides of the board and internal parts without having to remove or disconnect anything. There are no stand-offs to wrestle with and no circuit boards to extricate.

The Wheatstone SDA-82B is a DA worth having in the audio chain. Its thoughtful engineering and high quality construction make it a must.

Dave Edwards may be reached at: 315-446-9090.

For more information on the Wheatstone SDA-82B, contact Pattye Bagshaw at: 315-455-7740, or circle Reader Service 90.

Marti Add-On Cuts Noise

(continued from page 52)

ing between the encode and decode chips. This specifies a maximum noise floor of about -40 dB. Any less SNR causes mistracking and in some cases can actually increase noise by fooling the decoding chip into increasing gain, thereby increasing noise.

Adaptive filter circuits

Marti has added what it calls adaptive filtering circuits to help as the signal decreases and the noise comes up. At about three microvolts receiver signal, the bandwidth is decreased to help the decoder track.

Below .5 microvolts, noise is still less than without companding, but mistracking becomes more annoying than the noise. (Keep in mind that SNR is not changed when audio is present but rather the audio masks the noise, subjectively giving a quieter broadcast.) Music does a better job of masking than does the more common voice-only.

Impulse noise is also a problem. If the pulse is fast, the effect is less noticeable than when it is slower. But either causes mistracking.

Companding must also have a fast "attack time" to handle the highest transmission frequency, with a slow release time to reduce distortion associated with low frequency audio.

High and low end limited

Marti limits the high end to accommodate the channel bandwidth and limits the low end because of its use of a 27 kHz tone to turn on repeater transmitters. Both help the decoder track more easily.

The transmitter still has the standard compressor before the encoder board but it is no longer necessary to hit it as hard. Only occasional and slight deflections of the compression meter are necessary.

I have also found fewer sibilance problems with the upgrade, probably be-

cause of the reduced preemphasis curve. With the reduced receiver signal for a quality broadcast, life is easier doing remotes.

I have not had the occasion to realign the system yet, but I can assume the procedure is as simple as the design philosophy behind all Marti equipment. All of the circuitry is straightforward. And while not all of the components are readily available, Marti seems well stocked and able to ship quickly.

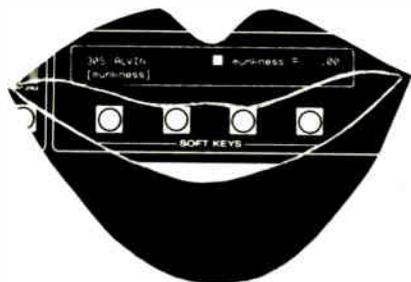
Modification of used Marti equipment is \$500 per pair, which includes a complete checkout of system performance and alignment but does not include repair if the unit is not functioning correctly. Factory installation with new equipment is \$400 per pair.

The non-companding system is not compatible with the companding Marti product, so at least one transmitter and one receiver must be converted. I had all five transmitters and four receivers companded. We can now reach out further, more quietly than ever before.

Editor's note: Phillip Klingler is a member of the SBE and is a flying enthusiast who has a private pilot's license with an instrument rating and has logged 1400 hours as pilot in command. He may be reached at: 414-545-5920.

For more information on Marti's audio companding system, contact M.E. McClanahan at Marti: 817-645-9163, or circle Reader Service 81.

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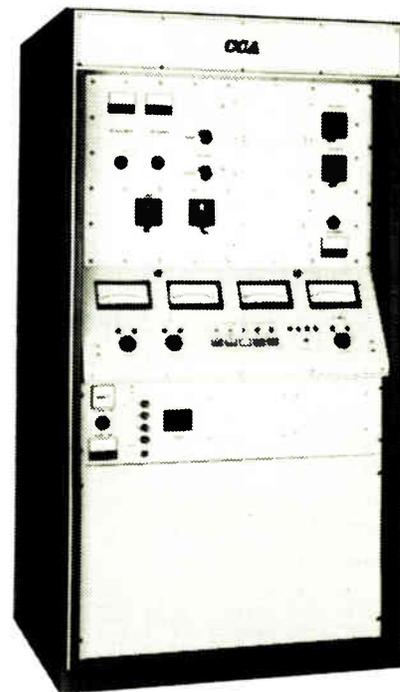
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Cassette Rivals Reel Deck

(continued from page 51)

numerous times, I could not discern audible variations between any of the eight channels with regard to fidelity, distortion or adjacent channel crosstalk.

Most recording enthusiasts reference the "feel" of any piece of equipment and attach a label to it. I maintain that all electronic circuitry imparts a "color" to the waveforms manipulated by it, and that, in theory, those circuits exhibiting the least amount of color to the material passed through them are often considered the top of the line.

Purists adamantly maintain that there is a noticeable difference in audio amplified by tubes and audio amplified by

solid-state devices. I believe electrically transferred sound is perceived in the end as is art: "Beauty lies in the 'ear' of the beholder."

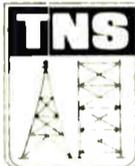
Naturally, the age old adage of "garbage in-garbage out" applies to any audio system, but given the parameters encompassing the Syncaset it more than meets the task of multitrack recording, at a cost significantly below any open reel decks.

Steve Keating may be reached at: 818-363-6064.

For more information on the Tascam 238, contact William Mohrhoff at Tascam: 213-726-0303, or circle Reader Service 86.

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Company forms . . . Former president of the now-defunct ADM Technology Robert A. Bloom has announced the beginning of operations of **Innotech Systems**. The new company will initially offer tech support and service, along with an in-depth inventory of spare parts, for all of ADM's products.

Innotech is located at 2328 Liver- nois Rd. Suite A, Troy, MI 48084. The company can be reached at: 313-689-7160.

People . . . With the new fiscal year just begun as of 1 July, **Gentner Electronics** is adding personnel in both its manufacturing and administration areas.

The company has named Hugh Heinsohn to the post of Director of Corporate Development. Heinsohn, former Director of Marketing Development, will research acquisition and joint venture candidates, procure patent rights and supervise Gentner's Management Information Systems.

Gentner CEO William Trowbridge will assume product management responsibilities from among Mr. Heinsohn's former duties, in addition to maintaining his present managerial responsibilities.

Gentner will also add one customer support technician, two marketing coordination employees and an information processing assistant. The company will also hire 12 new manufacturing employees to bolster its production capabilities.

Studer Revox America (SRA) has also done some shuffling, adding former Harrison and Neve pro audio sales staffer David Purple as the sales rep for Studer's newly-formed "Nashville-South" territory.

The territory Purple will cover includes the formerly designated Southeast and Southwest regions. Purple's arrival works hand in hand with the promotion of Studer South-eastern sales rep Joe Bean to Eastern Sales Manager for professional dealer products. Purple will be based in Studer's Nashville headquarters, as will Bean.

Also at Studer Revox, Brian Tucker, a long-time independent sales rep for the company's Great lakes/Midwest region, has signed an agreement with SRA. Tucker will now be a full line dealer for Studer Revox products.

Elsewhere, at **Broadcasters General Store**, Barry Thomas has come aboard and joined the company's sales force. Thomas, a certified AM/FM engineer and former CE at



WNOK/WODE in Columbia, SC, will assist Kandy Clark in servicing the Southeast region. He will be headquartered in the Marietta, GA office.

The new deal . . . Two new radio equipment dealers have begun operations in the New England area. As of 5 June, the **E.U. Wurlitzer Company** opened its Pro Audio division at its Boston headquarters under the supervision of Peter Engel, who may be reached at: 617-437-1815.

Opening 15 June was the third office, located in Auburn, NH, of **Northeast Broadcast Lab (NEBL)**. The office will be managed by NEBL installations specialist Steve Vanni, who may be reached at: 603-483-2352.

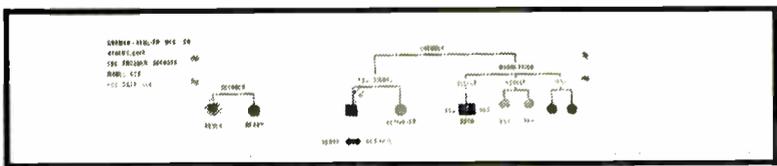
Richardson Electronics, Ltd. has opened its second sales office in Canada. The site, located in St-Laurent, Quebec, near Montreal, is managed by Yves Caron, who brings five years of experience in electron tube and component marketing.

The new office will serve several markets using electron tubes and power semiconductors, which include broadcast, marine, avionics, industrial, medical and other electronic fields.

For more information, contact Richardson Electronique Canada Ltd. at: 514-748-1770.

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Dear Gary;

I just wanted to drop you a line and let you know how much we appreciate all of the last minute help with the installation of our A-500 console back in July.

Thanks to you and your staff, we were on the air with the new facility on time and without a single glitch. The A-500 console is a winner!

Our staff enjoys the ease of use of the console, and I enjoyed the ease of installation. Everyone here enjoys our improved audio performance. We would recommend the console to anyone.

By the way, our SP-6 has been installed now for a few weeks and we are taking advantage of its great features and performance. The SP-6 is a wonderful piece of equipment. Again, the installation was easy, and the SP-6's straightforward layout and design make the functions easily accessible and understandable to operations personnel.

You stood by your promise that Wheatstone is a service-oriented company...and then some. Thanks again, Gary, for providing an outstanding product with service to match.

Sincerely,


Alan Lane
Chief Engineer

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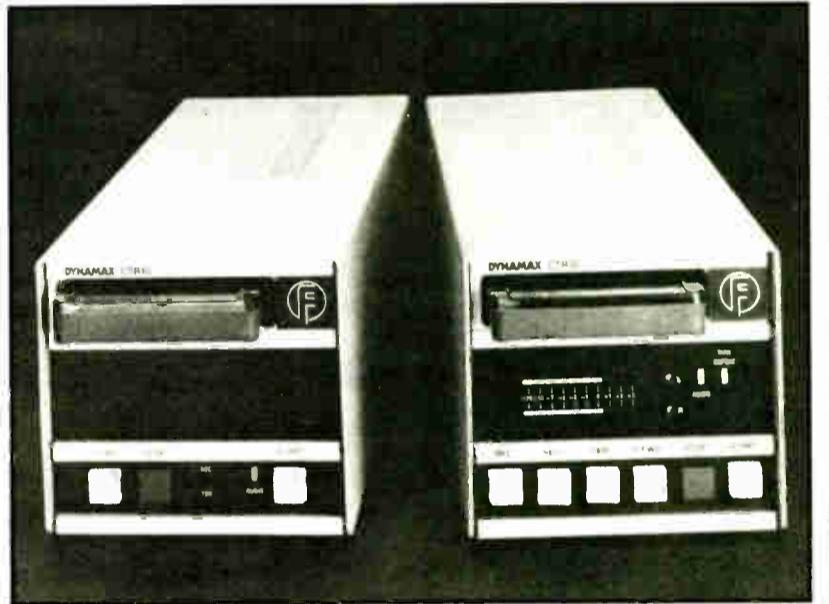
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