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Buyers Guide  
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PO Box 1214, Folls Church VA 22041

September 15, 1987

Volume 11, Number 18

## VOA Orders Spark Protest

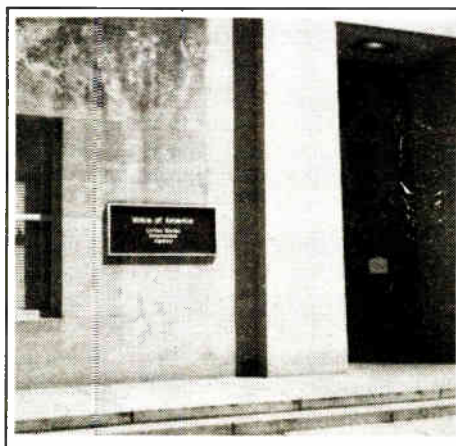
by David Hughes

Washington DC ... Purchase orders for broadcast equipment for the renovation of 19 studios at the VOA's Washington DC headquarters have been sent to some equipment manufacturers. However, one equipment firm that was not selected for the project—Wheatstone—has filed a protest.

Several firms contacted by RW in mid-August indicated that they had received purchase orders from Dynalectric, the Vienna, VA-based firm handling the acquisition of equipment for the VOA project. Rockville, MD-based Grunley-Walsh Construction is the primary contractor for the entire \$6.6 million project.

While there are indications that some equipment price breaks were made, it appears that many of the equipment firms sold gear without discounts.

There had been questions, raised by broadcast equipment manufacturers and distributors, as to how Dynalectric's sub-



Renovation of DC-based VOA studios is being done by Grunley-Walsh and its subcontractors.



contractor, Chantilly, VA-based Jullien Enterprises could acquire and install the gear for the major studio project for what Jullien says is only about \$2 million.

The remainder of Jullien's \$3.2 million share of the project would go toward equipment installation, storage and related tasks and still allow the company

to make a profit.

As of mid-August, purchase orders for some of the gear were sent, according to several equipment firms. Fidelipac and Studer had received purchase orders, while Harrison and RTS were expecting them shortly.

However, officials at Dynalectric and

Jullien refused to return RW's calls to confirm this. The equipment manufacturers indicated that the contracts actually were handled by Dynalectric.

One equipment manufacturer's representative who did not want to be identified confirmed that his firm had received a contract, not from Jullien, but from Dynalectric. Jullien VP Mike Hoover had told RW that his firm would be sending out the contracts.

According to sources from firms that had received contracts, Jullien handled the equipment recommendations for Dynalectric, while the latter actually sent out the contracts for the gear.

In July, Jullien indicated that contracts for the gear were to go to Studer for tape decks and hybrids, and Tascam for cassette decks. Audio distribution amplifier/IFB/mix minus systems will be provided by RTS (with Jullien custom work); the firm will also provide phono preamps.

In addition, cart decks will come from Fidelipac, speakers will be provided by JBL and ADS, TV monitors will be supplied by Proton, turntables by Technics, and CD players from Sony. As for the most expensive equipment item, Harrison was reportedly selected to supply consoles.

The equipment choices adhered closely to equipment specs previously drawn up for the VOA by National Teleconsultants.

### Firms talk

While some manufacturers contacted by RW did not want to be quoted on the record, several publicly confirmed they had received purchase orders.

"The VOA has done a complete, thorough and professional evaluation," said Fidelipac's Ari Constantine, who admitted that his firm did receive a contract. However, he would not reveal details about the document. "When they get good equipment and use it in a professional manner, it works great."

Likewise, Studer also indicated that it has received a purchase order. The company's VP/GM Tom Minter confirmed it to RW. He would not comment on any financial aspects regarding the contract.

However, some firms, at press time, were still waiting for their purchase orders. Brad Harrison of Harrison Systems said that his firm was "real close to finalizing" the deal as of mid-August. "There are a few sticky points, but I would say the deal is a *fait accompli*."

RTS VP/Marketing Doug Leighton, also as of mid-August, said his firm still had not received a contract, which he said would come from Jullien. "We expect to receive it any day. They have assured me it is coming."

Most of the firms contacted indicated  
**(continued on page 7)**

## AM Stereo Awaits FCC Action

by Alex Zavistovich

Washington DC ... The National Telecommunications and Information Administration's (NTIA) recent conclusion that multisystem technology is not a solution for AM stereo refocuses attention on two petitions before the FCC.

On 12 August, the NTIA presented a report which concluded a six-month investigation into whether multisystem receivers might be the answer to spreading the technology of AM stereo.

The agency found that, although such receivers could decode two incompatible AM stereo systems without degrading the performance of either, multisystem technology was not economically practical.

Reluctance by manufacturers to convert to a multisystem environment, implementation delays and international leanings toward a single standard were cited by the NTIA for rejecting multiple system decoder receivers.

A full year ago, in September 1986, processor manufacturer Texar filed with the FCC a request that a single standard be selected for AM stereo.

Two months later, in November, New Jersey-based Press Broadcasting urged the Commission to require that multi-mode circuits be included in AM stereo decoding receivers.

The Commission said it would await the NTIA report before acting on the petitions.

Acting Mass Media Bureau Chief Bill Johnson acknowledged that the decision for or against a single AM standard "probably should have been in (the

FCC's) court all along." He maintained, however, that the FCC decision would serve only as a catalyst in speeding a marketplace decision.

He added that "the AM stereo issue has to be addressed with all due haste."

"What we'd been hoping, and what the NTIA decision has probably helped,

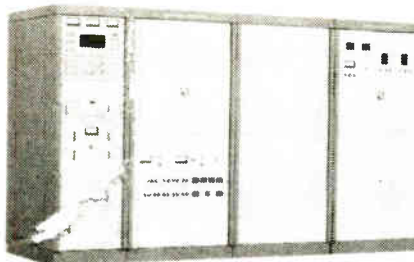
is to have this issue resolved, one way or the other, so people don't have to keep waiting for a governmental answer (to the AM stereo question)," Johnson explained.

Among the first things the FCC's Johnson expects to undertake in AM stereo  
**(continued on page 3)**

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Continental: For a Sound Investment

Circle Reader Service 38 on Page 28

REGULATORY NEWS

# Comments Favor FCC Ruling

by Alex Zavistovich

Washington DC ... Comments filed by broadcasters and radio reading services indicated, in general, a desire to have the FCC rule on charges incurred by radio reading services for use of non-commercial educational FM station subcarriers.

However, most comments from broadcasters suggested that the FCC should not impose rigid price structuring formulas; rather, they called for clarification of what may justifiably be charged for the use of the subcarrier.

According to the Commission's rules regarding use of subcarrier capacity, the licensee of a noncommercial educational FM station choosing to use its SCA must ensure that such use "shall not be detrimental to the provision of existing or potential radio reading services for the blind or otherwise inconsistent with its public broadcasting responsibilities."

In May 1986, the Association of Radio Reading Services (ARRS) filed a petition for rulemaking with the FCC, noting there was a disparity in fees charged by noncommercial radio stations for providing subcarrier service. In some cases, ARRS said, the fees bear "little resemblance" to incremental costs actually incurred by the stations.

The FCC then issued a notice of inquiry to gather further information as to whether particular methods should be required of non-commercial FMs for their charges.

### FCC should limit charges

The ARRS filed comments which were typical of many submitted by reading services in general. ARRS stated that the FCC should limit charges for use of subcarriers to actual incremental charges.

"While ARRS does not believe that every conceivable cost should be addressed by the Commission, there is a need for delineation of which items may never be charged to reading services, and a restatement of the basic requirement that only incremental costs may be charged," ARRS maintained.

Further, the association said, "the Commission should separate out charges directly related to SCA transmission and the cost of other ancillary services such as equipment and space rental which are properly the subject of separate contracts between the station and the reading service."

ARRS urged the Commission "to adopt specific guidelines prohibiting noncommercial radio stations from

charging radio reading services more than the actual incremental cost of providing access to their FM frequencies and including in these guidelines clear and precise definitions of incremental cost."

### No pricing formulas

In its filing, the NAB requested more clear-cut guidelines, but urged the FCC not to establish a "pricing formula for noncommercial stations' rates for radio reading services."

The current FCC rule on subcarrier use "successfully balances the interest of

*"Establish more definitive ... pricing and accounting guidelines ..."*

public broadcasters and radio reading services," the NAB held.

Modification of the rule to require mandatory carriage of services, NAB said, "could adversely affect many public broadcasting facilities which are already financially strapped and ultimately could jeopardize the carriage of many radio reading services."

The NAB also said that imposing strict guidelines on broadcasters for pricing and accounting may be "inappropriate," because of the differences in equipment and personnel costs from one market to the next.

The association urged the agency to "establish more definitive, but not rate-specific, pricing and accounting guidelines which allow noncommercial FM licensees to continue to use their discretion in assessing charges (based on incremental costs) for radio reading services."

National Public Radio (NPR), in its comments, stated there is "confusion and uncertainty" over the Commission's present rule regarding charges which can be assessed to reading services.

However, NPR added, despite the confusion, there was no evidence that a mandatory cost formula should be implemented.

The "ability of some licensees to provide substantial (and in some instances total) subsidies to the reading services" accounts for "variability" in charges to services NPR stated. However, NPR

noted that not all public stations can "afford to give away SCA usage."

NPR held there is a "national trend toward declining government revenues for public stations." Public radio stations "must be allowed to support their operations through all available revenue sources."

NPR recommended a public notice from the FCC to indicate appropriate incremental and overhead costs.

The Corporation for Public Broadcasting (CPB), like other commenters, said the Commission needs to clarify its requirement that stations should not charge radio reading services "for more than their incremental costs associated with providing a subchannel."

Disputes between services and stations were attributed by CPB to "misunderstanding and confusion on both sides." Without clarification of the FCC rule, disputes would continue, requiring "ad hoc adjudication" by the Commission, CPB said.

The corporation pointed out that some question exists in the industry as to whether use of microwave facilities or telephone lines are "incremental costs" which could be charged to the reading services.

To ensure effective protection for such services against inflated costs, the FCC needs to make more clear methods for calculating costs to be passed on to the reading services, CPB maintained.

FCC docket is 87-9. Contact Barbara Kreisman at the FCC, 202-632-7792.

## FCC Clips

### Rulemaking reopened

A rulemaking on establishment of new fulltime AM stations on foreign Class I-A AM clear channels has been reopened.

A Second Circuit Court of Appeals judge ruled that the FCC failed to provide an opportunity for comment on its studies of possible uses for the foreign clear channels, thus violating provisions of the Administrative Procedure Act.

New international agreements have made possible more extensive use of the 14 Canadian, Mexican and Bahamian Class I-A clears, which had been precluded from night-time use in the US in the past.

The FCC had decided to use the spectrum for night-time operations for all existing stations on the frequencies. In areas which were not precluded, the Commission also decided to allow filing of applications for new full-time stations.

According to the FCC, the decision was appealed by the National Black Media Coalition, which questioned the Commission's "refusal to adopt special minority and noncommercial provisions."

The docket is MM 84-281. At press time, comment deadlines had not been set. Contact Rosemary Kimball at 202-632-5050.

### Auxiliary Broadcast Rules

The FCC temporarily suspended Section 74.24 of its rules in several cities from 3 September to 20 September, to allow for advance coordination of auxiliary broadcast frequency usage for broadcasters covering the visit of Pope John Paul II to the US.

The cities affected by the action are Miami, FL; Columbia, SC; New Orleans, LA; San Antonio TX; Phoenix, AZ; and Detroit, MI. All Part 74 users, as well as all Part 21 and 78 licensees sharing Part 74 spectrum are covered.

All short-term auxiliary broadcast use in the cities should be coordinated in advance with the local coordinators, the FCC said.

In the past, the Commission suspended Section 74.24 in Los Angeles during 1984 Summer Olympic Game coverage. A similar suspension was enacted in New York during the re-dedication of the Statue of Liberty.

Contact James Durst or Alan Schneider at the FCC, 202-632-6307.

### RAC subgroups meet

The Technical and Allocations Subgroups of the Advisory Committee on Radio Broadcasting were scheduled at press time to meet 27 August at NAB headquarters.

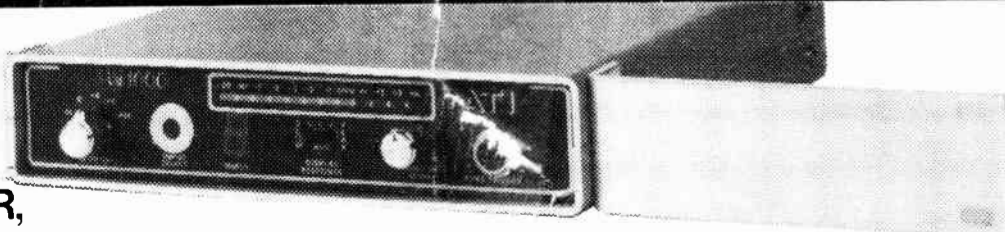
The subgroups were scheduled to discuss division of work between them on revisions to the AM rules and preparations for the 1988 conference to expand the AM band.

For more information, contact Louis Stephens at the FCC, 202-254-3394.

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# FCC to Look at Stereo Petitions

(continued from page 1)

is the resolution of the petitions for rulemaking filed by Texar and Press Broadcasting. Johnson said the filings are scheduled to be finished on a staff level by the end of the third quarter, or the end of September.

Although Johnson would not speculate on how the FCC would respond to the rulemaking requests, both Texar and Press officials said the report should facilitate a Commission decision.

Texar President Glen Clark said he hoped the NTIA findings would help speed the FCC to a statement about AM stereo.

Clark said he believed the FCC may have been prepared to make some official statement about AM stereo as early as the March NAB convention, but stopped out of a "professional obligation to another federal agency (the NTIA) investigating the same issue."

That did not prevent then-Mass Media Bureau Chief Jim McKinney from ex-

“ ”  
*The report should facilitate a Commission decision.*  
 ” ”

horting broadcasters at the spring NAB convention to adopt both AM stereo and the preemphasis standard recommended by the National Radio Systems Committee. McKinney also said broadcasters should not wait for any more tests of the systems.

Clark did not speculate on how the NTIA decision might affect the outcome of Texar's petition with the FCC. He suggested, however, that it may have effectively defeated the Press Broadcasting petition for multisystem.

Press Broadcasting VP Robert McAllan

said he was "disappointed" that the NTIA did not recommend a multisystem compromise. However, he said, the FCC now has what it said it needed to make a statement about AM stereo.

McAllan noted that AM stereo is an "important component in the resurrection" of AM radio in general. Press, he stressed, did not want to become a "spoiler" in the issue or delay the implementation of a system.

With its petition, Press had been "trying to promote the entire concept of AM stereo," McAllan said.

Another aspect of the NTIA report was a recommendation that the FCC protect AM stereo pilot tones. NTIA suggested that the C-QUAM tone be protected in particular, at least in part because of the large number of receivers capable of decoding the C-QUAM system.

The Kahn/Hazeltine ISB system pilot tone was not as vocally supported by the NTIA for protection. However, the agency held that Kahn, or any other system proponent, ought to be given the opportunity to explain to the FCC why their system should also be protected.

Protecting stereo pilot tones of AM stereo systems "is something we're going to have to take a look at," Johnson responded. However, he noted, "there's an issue here as to what we'd be protecting the pilot tones against."

"I'm not sure that it's clear that there's anything at this point that's likely to get in the way of the pilot tone," he said.

In the wake of the NTIA's August report, some industry watchers are still asking why the agency did not name a single standard.

With its denial of the feasibility of multisystem receivers and its recommendation for protection of the C-QUAM pilot tone, as well as its recognition of a tendency internationally toward C-QUAM as a single standard, some believe the NTIA has done everything but name a standard.

One source close to the proceedings



Alfred Sikes explains NTIA's findings on multimode.

said the NTIA may have been trying to "find a way to graciously back out the door" in the debate over AM stereo. The source said the agency irritated many in the industry in its original February report requesting multisystem testing.

That report received a lukewarm reaction from the industry, with manufacturers showing little support or desire for multisystem decoders (see RW, 15 March 1987).

However, the source speculated that if the NTIA had spoken in favor of one sys-

tem, the other would have attempted to bog down its implementation through lengthy litigation.

Another source, affiliated with a major radio network, concurred, suggesting the NTIA may be recommending "what they feel may be the only strategy which would be even a quasi-win" in the AM stereo arena.

The marketplace has made a choice, the source maintained, but it's the wrong marketplace that has made it—the receiver manufacturers, not the broadcasters.

Motorola has the marketing and the radios, the source commented. Whether they have the technically superior system is a completely different matter and, at this point, may have become irrelevant.

Whatever action the FCC takes regarding AM stereo from this point on, it seems unlikely that it would make any definitive statement supporting one system over the other.

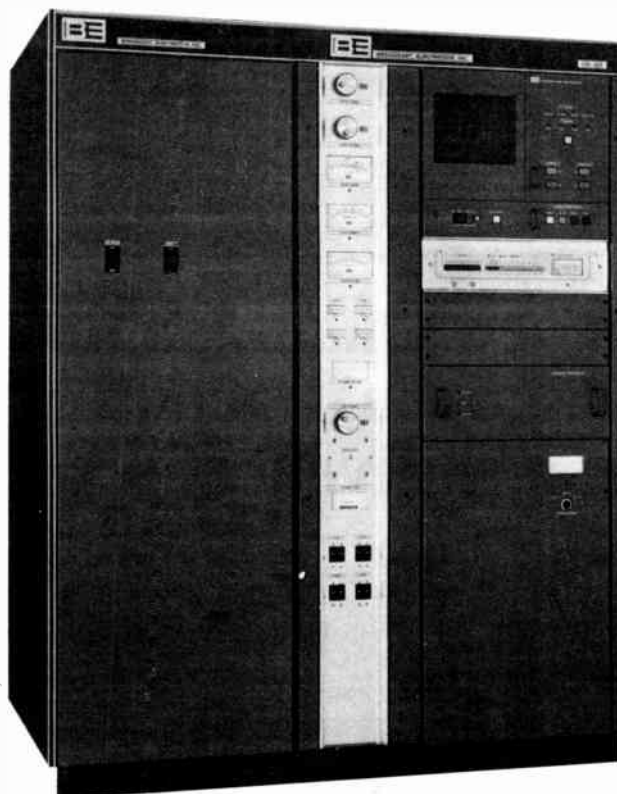
Johnson's comment: "I don't think there's anything in the (NTIA) report that would cause the Commission to reverse its fundamental decision (not to select a standard)."

For additional information, contact Bill Johnson at 202-632-6460. Contact Glen Clark at 412-856-4276 or Robert McAllan at 201-774-7700.

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# AM Stereo Bell Tolls For Thee

by Judith Gross

Falls Church VA ... The long-awaited results of the NTIA Multimode Study proved to be **sweet vindication** in as much as they confirmed what RW's news team had discovered when the agency's first report surfaced in February. Namely, receiver manufacturers just aren't interested in making multisystem AM stereo radios, period. They don't want to spend the money or the time, even if it can be done without technical tradeoffs. End of discussion.

There was a lot of gnashing of teeth when we first reported this. Maybe the companies weren't telling us the truth. Maybe they would change their minds if the Boulder study found it could be done.

But what you first read here in March proved to be the last word six months down the road. And just where does that leave AM stereo?

Well the FCC can protect the pilot tone



of the C-QUAM system as the NTIA suggested. Or make some definitive "McKinney-esque" statement on AM stereo.

But it really comes back to the AM stations that are still wringing their hands and straddling the fence for someone else to make the decision for them.

To those stations the handwriting is clearly on the wall. No one is going to decide for you. A standard will be in place **when you go ahead and create one**—by going stereo.

And time is running out.

Just how long do you think manufacturers will continue making AM stereo radios if only 10% of all AMers adopt stereo

and there is no consumer demand for them? But if you show them there's a market ...

☆☆☆

Yes, we've all heard the arguments about technical superiority of one AM stereo standard over another, etc. ad nauseum.

Maybe the standard winning the market isn't the most technically superior, and maybe it is.

And maybe the FM stereo standard adopted wasn't the best it could have been, nor the color TV standard, nor the stereo TV standard.

But at least with a standard in place, there's a chance for future improvement. With no AM stereo standard, even one adopted voluntarily, there is **no chance for improvement of AM**, no hope for AM's future.

It won't be easy for the Kahn/Hazeltine ISB system supporters to switch their allegiance to the system they've perceived as "the enemy." But this isn't Rocky or Rambo, where the underdog wins and we all go home happy and filled with popcorn.

If the standards war continues much longer, nobody wins and AM loses.

If the die-hard Kahn system supporters really care about AM's future, they will swallow hard, grit their teeth, and do the only thing left that will save AM radio.

I'm not being unsympathetic here. I've ridden through the streets of Manhattan with Leonard Kahn listening to WQXR on his car radio, and marvelled at the fidelity.

And I rode through the streets of Chicago with the late Dick Harasek of Motorola, listening to WLS on a GM car radio. *The Who* never sounded better.

I followed the ups and downs of the crusade Kahn has fought to get an AM stereo standard in place through the last few years, and cheered him on because I thought he had AM's best interests at heart.

I still believe he does, and if I'm right, then he, too, will make the final sacri-

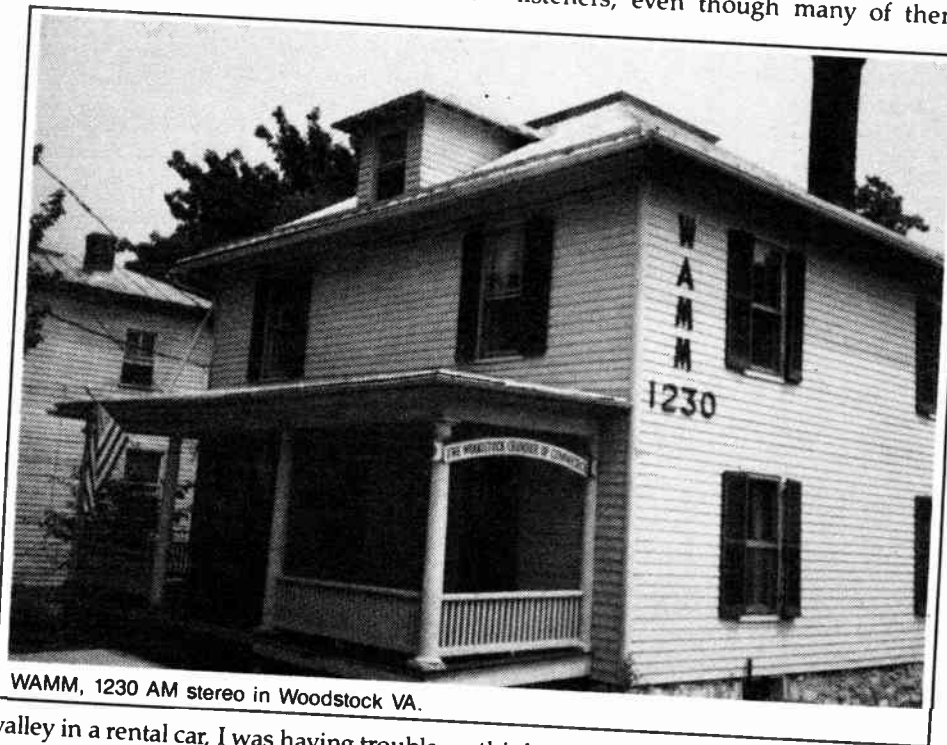
fice, and do what's right for AM's future.

If he does he'll be remembered as the **father of AM stereo** and not as the last remaining obstacle to AM's resurgence as a respected, listened-to service.

☆☆☆

And if you still need an incentive to go stereo, let me tell you about WAMM, in Woodstock VA.

On a recent trip to the Shenandoah



WAMM, 1230 AM stereo in Woodstock VA.

valley in a rental car, I was having trouble tuning in the available FMs on the car's digitally tuned radio. Static, mountains and all that.

I whizzed by a billboard announcing "WAMM, 1230 AM stereo" on Route 11, and flicked the AM switch.

The station is a light rock format playing '60s, '70s and '80s music in C-QUAM stereo. Lo and behold, the car radio picked it up **in stereo!**

I have never heard AM sound so good. Pristine, full fidelity, crisp highs, resonant bass—WAMM was doing everything right. They have a brand new Nautel solid state 1000 W transmitter. Their

think now they are getting the station in stereo on older radios.

Now WAMM isn't on the NRSC standard yet, but with a station as savvy as that, it's probably just a matter of time ...

☆☆☆

As we go to press with this issue, our "ears" are getting ready to head out to Anaheim for Radio '87.

Two interesting digital developments are slated to be shown.

Dick Wagoner from **Concept Productions** called to tell us about a system using **Sony consumer R-DAT machines**. Initially there will be eight machines and two analog cassette decks also, for voice tracks.

Concept will be offering radio formats on R-DAT cassettes for the system.

And **Paul Schafer** the "Father of automation" has come up with a system which uses a **Sony PCM processor and Beta machines** to store 80 hours of random access digital audio.

**Schafer Digital**, Paul's company, intends for stations (automated, live assist, or not) to be able to record their entire music libraries for random accessibility. We'll be telling you more ...

Finally, we were amused by a suggestion—in jest—from Emil Torick, the co-developer of the FMX stereo extension system, that RW drop references in its stories to last year's problematic multipath tests done on FMX.

The tests sparked some concern about FMX's future.

Tell you what, Emil ... if you don't tell us how to write our stories, we promise not to tell you how to design new technology for FM radio. Deal?

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 RW mug.

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Circle Reader Service 31 on Page 28

## OPINION

# Readers' Forum

Got something to say about *Radio World*? Any comments on articles? Call us at 800-336-3045 or send a letter to Readers' Forum (*Radio World*, Box 1214, Falls Church VA 22041 or MCI Mailbox #302-7776).

## Old Timer will be missed

Dear RW:

I was saddened to read of the passing of Floyd Hall on July 24th. To say he will be missed, particularly as he appears in your pages, is to state the obvious.

Men like Floyd have made the contributions to our industry which have made it what it is today.

They were special individuals who were unafraid to step beyond the boundaries of the science as it was understood and become pioneers.

They were willing to devote the time and resources to make American broadcasting the innovative, progressive business that we enjoy . . . always with the best interests of the public at heart.

I corresponded with Floyd and have had an opportunity to share in his knowledge, insights, and wit on a more personal level than some of your readers, and feel strongly that the "The Old Timer" will be a much missed feature of the American broadcasting scene.

I know that we can depend upon Floyd to now keep things "peaked up" in that big radio station in the sky.

James L. Sorensen, CE  
WJQY-FM  
Ft. Lauderdale, FL

## At war with CEs

Dear RW:

John "Q" Shepler's article in the 1 July issue had to be fictional!

Wouldn't it be great to see a PD and CE working together that way? Too often it seems the PD is "out to get" the poor CE.

How many out there have seen this kind of situation: the CE has meticulously gone through the equipment to make certain all cart and reel

machines are properly aligned.

Tone arms are mounted and adjusted precisely and the preamps are tuned to the phono cartridges.

The consoles and STLs are operating at the correct level with headroom. Noise and distortion are very low and the processing is right so the station sounds loud and clean.

Yet the PD, who is telling the CE that the station sounds good, is at the same time convincing the GM the station needs an "audio consultant."

The PD also informs the CE he believes in playing as much as possible direct from CD, then tells the consultant he wants everything on cart.

I've heard of other situations like the one where the PD orders new processing gear and the CE doesn't know it until the boxes are handed to him.

In his article John mentions how a station in another city across the country sounds louder and better than anything in this market.

The CE tries to adjust his station to make it sound that way and the only thing accomplished is to make the station sound like garbage because the PD still isn't happy.

I think it's going to take major market PDs who have enough guts to back way off that 1 dB of dynamic range to be the *cleanest* not the loudest.

I'd like to read comments about other situations or hear about any stations out there, particularly CHR, who push quality instead of loud.

(Name withheld by request)

## New radio signal

Dear RW:

I'd like to address this to all consultants, engineers, technicians, hams, hobbyists and others concerned that the standard broadcast (AM) band is sick, perhaps terminally.

You are familiar with the remedies already considered—various methods of transmitting stereo audio, more transmitter power, wider receiver bandwidth, limit transmitter high frequency response, pre-emphasis/de-emphasis, audio compression, antennas to reduce sky-waves, etc.

Ogden Prestholdt, a veteran radio engineer for over 50 years summed it up this way.

"We started as a transparent medium. Have we gone wrong? How do you pile corrections on corrections to get where we started? It's like trying to unpeel a bad apple. Putting on another Band-Aid doesn't really get out of the problem." Amen!

My suggestion is that we do go back to the beginning and start over—on the right foot this time.

I propose that we adopt NFR—a transmission system that will provide numerous advantages.

First, it is not susceptible to noise from natural and man-made sources.

It effectively reduces interference between co-channel and adjacent channel

Digital has become a catchword in the industry.

If a manufacturer wants to sell a new product, the word digital is guaranteed to draw interest.

CDs, reel-to-reels, even cart machines and transmitters have become caught up in "digital-mania"—and the emerging R-DAT promises to fan the digital fires even more.

It's important for stations to explore new technologies, and plan now so their plants don't become obsolete when changes take place.

But engineers and manufacturers needn't worry that the new interest in digital means that it's time to throw out the analog machines.

The fact is manufacturing professional digital equipment still carries high costs.

## Digital Sense

And some of the newer technologies, such as optical disk, still have to prove themselves before a station will turn over its day-to-day operations to them.

For this reason, digital and analog equipment will probably co-exist

at most stations for a long time to come.

As one digitally-savvy writer said recently "stations will be digital-analog hybrids."

Engineers and others entrusted with planning their stations' technical future should proceed slowly and plan far into the future to be able to incorporate digital technologies as they become available.

They should not be too quick to jump on the digital bandwagon, but neither should they take the "ostrich" approach and bury their heads in the sand, wishing digital fever would go away.

If digital equipment such as CD players make sense, cost-wise and technically, they can exist right next to the turntable and cart machine.

Where digital is cost prohibitive, such as in multitrack reels, the station should be patient and perhaps consider an interim technology like Dolby SR.

The important thing is to keep on doing what makes the most sense for the station, digital, analog or hybrid.

—RW

stations.

It permits the addition of thousands of new stations in the same spectrum space as now occupied.

It improves the audio frequency response range as compared to present AM service.

It reduces audio distortion to less than 1%.

Existing transmitters can be modified at modest cost, probably less than \$2,000.

A new type NFR receiver will be required to accomplish the objectives listed above.

However signals transmitted by NFR transmitters can be received by AM radios, subject to the usual noise, interference and limited audio response characteristic of AM.

Finally, receiver manufacturers will rush to market NFR receivers because all existing radios will quickly become obsolete.

Design of NFR receivers will be based on simple well-known techniques and utilize currently available components. Manufacturing costs may be even less than current AM models.

If there is any doubt in your mind on that point, just ask the policemen, firemen, taxi drivers, ham radio operators, airplane pilots, boaters, cellular telephone owners and others who have benefitted from the use of NBFM (narrow band FM).

But broadcasting is a sophisticated, highly professional service. We will never stoop to the use of anything "narrow."

Therefore, even though it works and sounds like NBFM we will be much happier and stand taller calling it NFR—"noise free radio."

I could go on for hours about the optimum frequency swing of a 550 kHz car-

rier, IF bandwidth, the relative merits of various limiters, demodulators, etc.

I have some thoughts on how to accomplish the transition from AM to NFR with minimum anguish and expense, but those details deserve the attention of all of you.

Are you interested?

George W. Yazell, P.E.  
Lakeland, FL

## More kudos for NRSC

Dear RW:

I would like to encourage all AM broadcasters to adopt the new NRSC standard for the AM band: 75  $\mu$ sec pre-emphasis and 10 kHz bandwidth.

The new standard pre-emphasis should result in moderate improvement for existing narrowband radios, with improved fidelity on wideband radios.

The 10 kHz bandwidth will virtually eliminate interference to second and higher adjacencies and will allow receiver manufacturers to produce wideband receivers. (Most receivers are now typically only 3 kHz.)

This is an opportunity to bring AM fidelity close to that of FM on many radios and a chance to significantly reduce interference and noise on the AM band.

Our station is now using the new standard, not so much as a benefit to us, but to other AM stations. Implementing the new standard is relatively inexpensive.

All of us need to quickly adopt this new standard before receiver manufacturers will start producing wideband radios.

By reducing adjacent channel interference this is a great opportunity to bring new life to the AM band.

Gary Leonard, OR/CE  
KXEO  
Mexico, MO

## Radio World

Vol 11 September 15, 1987 No 18



Radio World (ISSN: 0274-8541) is published twice a month by Industrial Marketing Advisory Services, Inc., 5827 Columbia Pike, Suite 310, Falls Church, VA 22041. Phone (703) 998-7600. Copyright 1987 by Industrial Marketing Advisory Services, Inc. All rights reserved.

**Publisher, Ad Sales Manager:** Stevan B. Dana; East Coast, Ernie Robitel (516-671-2502); West Coast, Pat Macsata (415-786-2198); Simone Leeser/Ad Co-ordinator; **Editor:** Judith Gross; **News Dept:** David Hughes/Manager, Alex Zavistovich; **Buyer's Guide:** Marlene Petska Lane/Editor; **Circulation Manager:** Marion Alsup; **Production Department:** Jean Barnes/Manager; Gina R. Rosario/Asst. Manager, Kelly Quill/Graphic Artist.

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# Protest Over Purchase Orders

(continued from page 1)

that they did not give substantial price breaks on their equipment. In fact, one firm maintained that its contract calls for "full retail price. Someone else must have dropped their shorts. It wasn't us."

One manufacturer indicated that his firm has worked with the VOA for the past six years and has proven that its equipment is reliable. He said, in his firm's case, there was no need to discount the price of the gear to get the contract.

"We did not make major cost concessions, we're not a cheap outfit. We don't skimp," said a spokesperson from another manufacturer. However, he admitted that the firm did not receive the size of a contract that it would have liked to from the VOA.

Yet, it appears that some price breaks took place. One source indicated that Harrison made a major price cut in its total package of 19 consoles. But, at press time, Harrison's Brad Harrison said he would not discuss financial details of the pending contract.

## Wheatstone protest

While Harrison was the console manufacturer cited in the VOA equipment specs, it appeared until recently

intentions to obtain four more consoles for an additional four studios.

Wheatstone President Gary Snow alleges that the specs for the four additional consoles, which are identical to the 19 previous ones, seem to favor the Harrison design.

According to the complaint which was sent in early August to Bill Gallagher, the USIA's contracting officer for the project, as well as to the General Accounting Office (GAO), "The grounds for our protest is the restrictive nature of the specifications: they favor one manufacturer to the exclusion of others."

While he did not mention it in the letter, Snow said that the manufacturer in question is Harrison. "The panel description drawings are written to Harrison consoles," he said.

Snow also told RW that his complaint focuses on the additional four studio console bidding process, which is still pending. However, his written complaint also protests the choice for the original 19 studio project—in which the supplying equipment firms have already been selected.

In the complaint, Snow indicated that the specifications issued for consoles to be used in both the original 19 studio portion of the project, as well as the additional four studios, are "heavily

A USIA spokesperson said that Wheatstone's complaints about the contract for the four consoles for the four additional VOA studios will delay the awarding of that contract until the GAO investigates the complaint, including the

... The specifications ... favor one manufacturer to the exclusion of others.

solicitation of additional comments.

"The ball is in the GAO's court," he said.

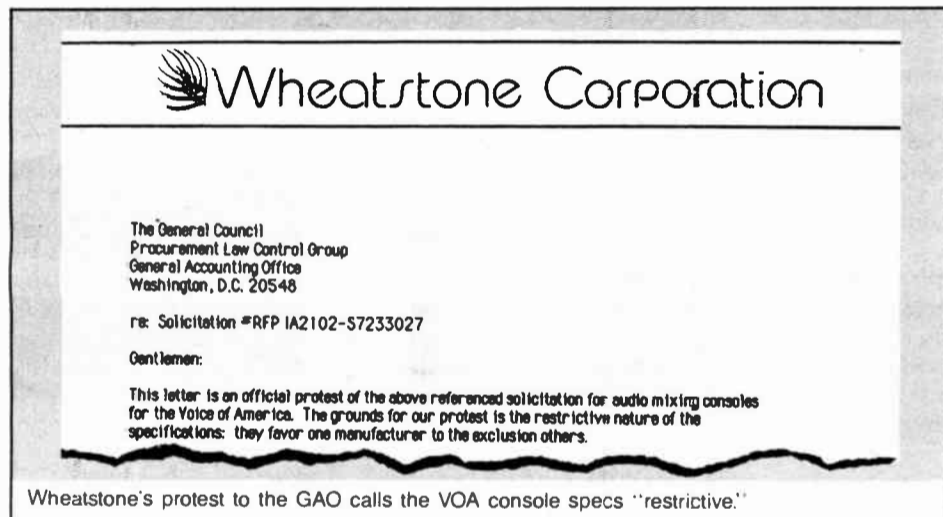
The spokesperson also said that he was unsure of the effect on the original 19 studio project since that contract was in a much more mature stage, with some purchase orders already released.

The USIA spokesperson called "untimely" the filing of the complaint on the 19 studio portion. He said it should have been filed when the specs were originally made public.

## Questions remain

The news that the contracts are being sent to equipment suppliers has not quelled the debate about how Jullien and Dynalectric will purchase broadcast equipment for the 19 studios for \$2 million. Some sources said that to obtain the gear that the VOA requested would cost upwards of \$4 million.

However, while there were questions, not all equipment manufacturers that received purchase orders doubted that it could be done for the \$2 million price.



Wheatstone's protest to the GAO calls the VOA console specs "restrictive."

that Jullien was prepared to choose Wheatstone to supply the studio's consoles.

Now, in a related development, Wheatstone, the console manufacturer that apparently lost to Harrison has filed a protest with the VOA's parent, the US Information Agency (USIA).

Sources indicate that Wheatstone had originally been the lowest priced bidder on the console portion of the contract until Harrison came in with an even lower bid.

In addition to the 19 studio deal for 19 consoles, in July the VOA announced its

weighted in favor of one manufacturer to the exclusion of others."

"We are requesting a ruling from the comptroller general regarding the above solicitations on the grounds that they are restrictive specifications and should be rescinded, rewritten and reissued to permit other experienced, qualified manufacturers to competitively bid on the project."

Harrison Systems' Brad Harrison refused to discuss the matter in any detail. However, he said he was confident that it would not affect his firm's bid to provide the consoles for the 19 studios.

For maximum audio console reliability, your air talent will enjoy such user-friendly features as color-coded switching and wide attenuator spacing, and you'll be able to choose linear or rotary faders.

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**HARRIS**

Circle Reader Service 28 on Page 28

"It will be difficult to come in at that price, but it won't be impossible," said one source. He added that cost cutting measures can be made on installation. "There is a big area for flexibility. The slack can be taken up on wiring and in furniture."

However, one manufacturer said he faulted the VOA for "picking such a low bid," in reference to the original Grunley-Walsh bid. "I feel bad for Jullien. I know they will have to watch every dime to avoid losing money."

For more information on the 19 studio VOA project, contact Mike Hoover at Jullien Enterprises, 703-631-0900, or the VOA at 202-485-6303.

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# Digital Audio on Tap for AES

by David Hughes

New York NY ... Digital audio, R-DAT, FMX, "Surround Sound," loudspeaker design and CD technology are just some of the topics on tap for the Audio Engineering Society's (AES) 83rd Technical Meeting and Exhibits in New York City.

The event, to be held 16 to 19 October at the New York Hilton and New York Sheraton Centre hotels, will feature equipment exhibits, paper presentations, workshops and AES technical group meetings.

More than 400 firms are expected to display equipment in the exhibition which will be spread out between the two hotels.

A wide array of papers will be presented during the show. Some of the highlights include R-DAT conversion techniques and measurement procedures, improvements in FMX technology, a progress update for digital audio, as well as the latest on the DASH and PD (ProDigi) digital recording formats.

The four day schedule begins Friday, 16 October, with morning papers (9 AM) scheduled on the "Advances In Digital Audio/Video Technology" in addition to "Acoustics and Psycho-Acoustics."

Afternoon (2 PM) sessions will focus on "Digital Audio/Video Technology" and "Sound Reinforcement," while evening (7 PM) topics include "Transmission" and "Acoustics and Sound Reinforcement."

On Saturday, 17 October, "Recording, Mixing and Editing" will be discussed in the morning, with "Transducers" covered in the afternoon and evening. "Signal Processing" will also be discussed in an evening session.

AES Technical Council paper sessions (10 PM) will follow the evening sessions on Friday and Saturday.

The schedule for Sunday, 18 October, includes "Signal Processing" in the morning and "Broadcast Audio" and "Microchips For Music Recording, Synthesis and Processing" in the afternoon.

A session covering "Audio Measurement and Evaluation" is scheduled for Monday morning, 19 October.

"We have made an extra effort to focus on invited papers, and to insure that the technical papers and the works of their presenters represent research and thinking of the individuals who are on the forefront of technology," said Convention Chairman Randy Hoffner of NBC.

Several workshops are also planned throughout the convention. Friday's feature tape recorder maintenance, pre- and de-emphasis of digital recording, and disc-based audio editing.

On Saturday, workshops will cover techniques for subjective listening and user interfaces for electronic music.

Sunday's workshop topics include motion picture sound and sound reinforcement, while Monday's will cover sound in the theatre and education.

Hoffner said that the AES has developed workshops that will "enhance the participation of attendees."

Lots of new equipment will be shown in the exhibit area.

Sony, while not releasing any details about new R-DAT developments, is sure to have information about its prototype R-DAT products at the show.

Sony will be showing several new products at AES including the MXP 3036 VF recording/mixing console, the MXBK-2009E stereo module without EQ, and the DAL 1000 digital limiter.

Studer Revox will feature its A727 CD player, previously shown at the NAB show. The unit, with autocue, features a new 16 bit chip set.

The firm will also show the first in a series of remote control units to go with its CD players, as well as the A820-8 1" multichannel mastering recorder.

Eventide is planning a "major unveiling" at the AES show, but the company would release no details. The firm is also planning its first public showing of the PD 860 2-channel digital delay, which is adjustable in 1  $\mu$ sec delay increments and suited for synchronous AM transmitters.

Eventide will also show its line of Harmonizers and special effects units.

Howe Technology will feature a new Phase Chaser in its AES display.

Orban Associates plans to show several new products at the show including a programmable mic processor, a programmable parametric equalizer and a stereo spacial enhancer.

Shure Brothers will feature several new items including the SM 84 unidirectional



tional lavalier microphone, the FP 51 gated compressor/mixer and their line of broadcast phono cartridges. The firm will also feature a new professional CD player.

Several other firms, including Apex, said, at press time, they were not able to release details about new products in their AES exhibits.

Other broadcast related firms scheduled to have booths at the show include Dolby Labs, Dorrough Electronics, Mitsubishi Pro Audio, Otari, Tascam and Yamaha.

For more information, contact Randy Hoffner at NBC: 212-664-4733, or AES headquarters at 212-661-8528.

## SBE Elections Have Full Slate

Indianapolis IN ... The SBE will be holding elections for its top offices this fall, with current President Richard Rudman forced to give up his position.

According to the SBE bylaws, Rudman cannot run for more than the two consecutive terms he has already served.

Running for president this time around is Jack McKain, VP/engineering with the Kansas State Network, Wichita KS. McKain is currently SBE vice president.

McKain said he plans to build on current programs implemented under Rud-

man, including work with the Ennis Foundation, the certification programs and the SBE's advocacy of issues, including frequency coordination matters.

He added that he wants to improve communication among engineers, and to improve the overall "product" engineers are responsible for. "We will also look at areas of change—and be able to adapt to that change," he said.

Rudman, head of engineering at KFVB, Los Angeles, indicated that even though he will be giving up the title of president, he will remain on the SBE ex-

ecutive board in the capacity of immediate past president.

"I plan to be very much involved, and will stay active in frequency coordination issues," Rudman said. He added that he will continue his work to prepare SBE comment on FCC matters.

Candidates for the three other top offices—all two-year terms—include Robert Van Buhler for vice president, Richard Farquhar for secretary, and Bill Harris for treasurer. Harris is currently the SBE's treasurer.

As of RW's press time in mid-August, McKain, Van Buhler, Farquhar and Harris had no opposition.

However, the upcoming election will also determine the makeup of the SBE Board of Directors. Nine candidates, so far, are running for six positions.

The field includes Phil Aaland, Terrence Baun, Robert Goza, David Harry, Michael Hayden, Wayne Kube, Jesse Maxenchs, Tom Weems and Larry White.

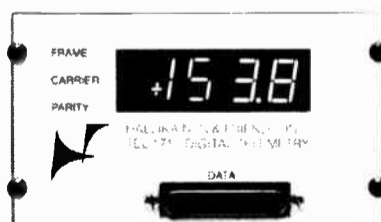
Ballots will be mailed to members in October, with the final results of the election announced at the SBE National Convention in St. Louis, 13-15 November.

For more information on the SBE's election process, contact the SBE's headquarters at 317-842-0836. Contact Jack McKain at 316-265-2815, or Richard Rudman at 213-462-5392.

## ANALOG METERING WENT OUT WITH SLIDE RULE HOLSTERS.

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# NAB Won't Oppose Auction Plan

by Alex Zavistovich

Washington DC ... The NAB has said it would not oppose FCC auctioning of licenses for "non-mass media spectrum uses" as a means to reduce the federal budget deficit.

The Senate Commerce Committee is currently investigating reduction of the deficit through several possible courses, including fee hikes for communications concerns under the FCC's "cost of regulation" fee schedule and a surcharge on license transfers.

In light of the other options being considered, the NAB, which had previously objected to auctioning of nonbroadcast spectrum, decided in a statement issued in July to come out in favor of the measure as the least objectionable of the choices.

“*Its support of auctioning extended only to non-mass media spectrum.*”

The association was quick to stress, however, that its support of auctioning extended only to non-mass media spectrum. If spectrum auctions were used to assign broadcast licenses, the NAB said, it would make it "even more difficult for minorities and women to bid for their licenses."

Auctioning nonbroadcast spectrum is not a new option for deficit reduction. The idea was presented to Congress last year by former FCC chairman Mark Fowler, and was supported in concept by Peter Pitsch, currently chief of Chairman Patrick's staff at the FCC.

The Commerce Committee is not slated to select a deficit reduction measure until after Labor Day, when Congress reconvenes from its August recess. At press time, there were no indications of how the committee will vote on the issue.

The NAB however, has made it clear that it opposes, to some degree, both of the other options under consideration.

In particular, the association objected to increased fees under the Commission's cost of regulation schedule. The schedule, established following legislation in 1986, requires communications concerns to reimburse the government for use of FCC services.

Increases or decreases in the fee schedule are keyed to changes in the Consumer Price Index.

The NAB maintained that, although its members "are willing to bear their fair share of the cost of FCC services," it would oppose the proposal if Congress "decides to eliminate the cost-based rationale for these fees, and to increase them simply to raise revenues."

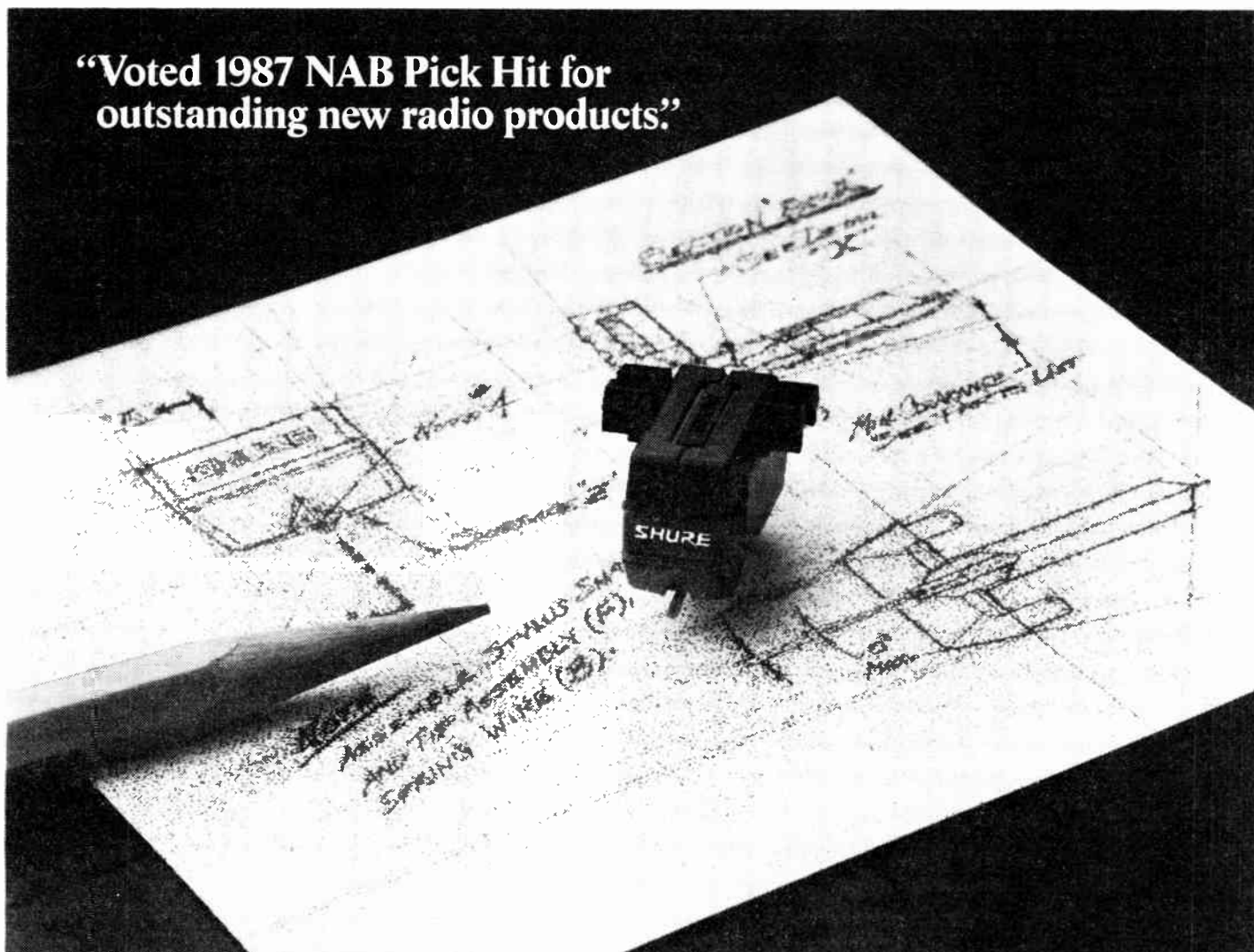
Also opposed by the NAB is the creation of a license transfer fee "that is designed solely to meet revenue targets." Transfer fees, the association said, could be increased virtually at will, and would make long-term planning by station owners difficult and uncertain."

The NAB said it "recognizes the serious problems caused by the federal deficit, and the Commerce Committee's obligation to consider ways to help reduce that deficit."

However, the NAB added that the Committee was considering proposals "in a context that does not allow for careful deliberation, public hearings, or other formal input from interested parties."

The association said it hoped the Commerce Committee would reject "quick, but temporary budget fixes that will have severe impacts upon the industries within its jurisdiction."

For additional information, contact Susan Kraus at the NAB: 202-429-5480.



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# Campaign Launched For FM2

by David Hughes

Washington DC ... Proponents of a second FM band, called FM2, for use by existing AMers, are continuing their campaign despite a rejection earlier this year from the FCC.

Larry Tighe, president of Radio New Jersey (RNJ), which operates a daytimer in Hackettstown, NJ, sent letters in early August to owners of other stations asking for their support for his plan, which would create a second FM band, between 225 and 230 MHz. The new band would be used by daytimers and interference plagued AM stations.

At the same time, Tighe has apparently dropped a plan to secure a section

of the band from 220-225 MHz for FM2.

In addition to filing a petition for reconsideration seeking a reversal of the FCC's March decision not to reallocate 225-230 MHz for FM2, Tighe has also taken out advertisements in two trade publications—*Radio World* and *Broadcasting*.

## Money requested

RNJ is asking broadcasters to contact the NAB and the FCC, particularly Chairman Dennis Patrick, to voice support for the plan. Tighe is also asking for financial contributions to help foot the bill for the costs of the campaign.

"We have had quite a few responses," said RNJ's Washington DC-based attor-

ney Larry Roberts. At *RW*'s press time in mid-August, he said the FCC had not acted on the petition for reconsideration.

## Almost a year old

The FM2 plan, which would create 25 new channels with a 20 kW ERP limit, was unveiled by RNJ in November 1986. Tighe indicated that it would allow some AM stations to move to the new FM band, thereby permitting them to add night operations and overcome interference problems.

Tighe also maintained that the plan calls for not replacing the AMs that vacate the band. This would allow remaining AM operations to face less clutter and even expand their operations.

However, in March the FCC rejected the FM2 plan saying that the 225-230 MHz band was allocated to the military and could not be transferred to broadcasting.

While the Commission did not say specifically what use the military made of the band, FCC Office of Engineering Technology Chief Engineer Thomas Stanley indicated that the uses were "vital to national security interests."

Tighe has said that he has monitored the band and has not heard any uses on it.

However, Roberts indicated that even though it may not use the band much, there are indications that the military may stand firm against giving up any of its spectrum allocations. Yet, he points to previous cases, such as the plan to expand the AM broadcast band to 1705 kHz, which involved what had been military bands.

## New campaign

In his new campaign to keep the FM2 issue alive, Tighe in August sent information packets to stations. He dubbed FM2 as "the simple answer to the AM problem."

"The proposed FM2 band has always been considered untouchable military property. In fact, FM2 would operate on a small 5 MHz piece of a vast military band that now runs from 225-400 MHz," Tighe indicated in the mailing.

"The sole purpose for the 225-230 MHz band known to date is casual air-to-air and air-to-ground communications," he added.

"In turning down our request, the FCC gave a pat response that the national security required continued military use of the frequencies," Tighe wrote. "We are now challenging that response through questioning by Congressman Jim Courter (NJ)."

Courter, a senior member of the House Armed Services Committee, sent a letter 9 July to FCC Office of Science and Technology Chief Engineer Thomas Stanley, asking him provide him with information about the classified use of the band that cannot be made available to the general public.

## FCC intrigued?

Roberts added that "so far" the FCC has not produced information "to refute our contention that the FM2 band is a lightly used band of no military significance."

While Tighe, in the letter, indicated that a "highly placed FCC official" found the FM2 plan "intriguing," the official maintained that the FCC cannot reassign military spectrum without "widespread and vocal support."

Roberts pointed out that while the FCC may not be against the plan, it does act upon the advice of the National Telecommunications and Information Administration (NTIA), which coordinates policy for the Executive Branch. And the NTIA has maintained that the 225-230 MHz chunk of military spectrum cannot be reallocated.

Roberts added that if the FCC rejects the pending petition for reconsideration, RNJ will take its plan a step further and request review by the commissioners. He said that Tighe has no plans to resurrect his request for the 220-225 MHz band which has been allocated to other non-military uses.

For more information about FM2, contact Larry Tighe at 201-850-1000, or Larry Roberts at 202-659-4700. Tighe has set up an "FM2 hotline" at 201-850-4444.

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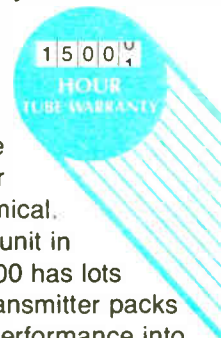
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# Tell Starts RF Consulting Firm

by Alex Zavistovich

Las Vegas NV ... Richard Tell, formerly chief of the Electromagnetics Branch of the Environmental Protection Agency (EPA) Office of Radiation Programs, has resigned to launch a private RF radiation consulting practice.

Tell, who spent 20 years in government service, was scheduled to leave the EPA on 31 August. At press time, he was expected to begin his new enterprise, Richard Tell Associates, Inc., on 1 September.

According to Tell, his consultancy will focus on the issue of RF radiation. Tell will assist or provide advice to users of RF sources—broadcasters, radar operators, and industrial users, for example—to assure compliance with FCC and other agency RF guidelines.

Services available through Richard Tell and Associates will include analytical and theoretical studies, field studies and seminars addressing RF regulation compliance, Tell said. The seminars will also include "hands-on familiarization" with RF measuring devices.

An employee of the EPA since the agency was formed in December 1970, Tell had served as chief of the electromagnetics branch for approximately five years. He came to the EPA from the Department of Health and Human Services' Bureau of Radiological Health.

As the EPA's expert in radiation measurement, Tell participated in joint EPA-FCC surveys of RF emission levels at broadcast towers in Honolulu, HI, Seattle, WA, Denver, CO, and Portland, OR.

Most recently, Tell took part in EPA/FCC radiation meas-

urements of AM antennas in Spokane, WA. A report based on the latest survey is expected to be completed by October, Tell stated.

FCC Physical Scientist Robert Cleveland said, "In many ways (Tell) will be irreplaceable" in the government. Cleveland worked closely with Tell on the joint RF radiation measurement studies.

"Rick Tell has made innumerable valuable contributions to the field of bioelectromagnetics over the last 20 years,"

Cleveland said. He added that Tell was "certainly the top expert in the federal government in the area of measurements and analysis of electromagnetic fields in the environment."

Tell will be succeeded in the EPA by Paul Wagner, also an employee of the Office of Radiation Programs.

The address for Richard Tell Associates, Inc., is 6141 W. Racel St., Las Vegas NV 89131. For additional information, contact Richard Tell at 702-645-3338.



Richard Tell leaves EPA to start his own firm.

## FCC to Look at Dial-Up

by David Hughes

Washington DC ... The FCC is planning to issue a public notice in the near future in order to clarify some of the confusion about its transmitter remote control rules.

Some of the confusion from broadcasters was illustrated in a series of articles RW ran on the subject earlier this year.

FCC Mass Media Bureau Asst. Chief Engineer William Hassinger said in mid-August that the Commission is planning a notice that will more clearly specify its remote control rules.

"Remote control equipment (today) is so much more (continued on page 12)

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# Sale Spurs New NABET Talks

by Alex Zavistovich

Washington DC . . . At RW's press time a meeting was in progress in Washington DC between negotiating committees of the National Association of Broadcast Employees and Technicians (NABET) and NBC, to resolve the ongoing strike of NABET members at the network.

The meeting, held 25 August, was presided over by a representative of the Federal Mediation and Conciliation Service (FMCS) and reportedly touched on the sale of NBC's radio networks to Westwood One.

The sale was completed 25 August for \$50 million and warrants to purchase one million shares of Westwood stock at \$36.40 per share.

According to network spokesperson McClain Ramsey, the talk in Washington was an "informal session" regarding how the sale would affect NABET members, on strike since 29 June over a contract disagreement.

## The Church steps in

The discussion between NABET and NBC on 25 August may have been precipitated by an informal meeting of key officials from both sides with John Cardinal O'Connor, of the Roman Catholic Archdiocese of New York.

Cardinal O'Connor said he was con-

cerned about "his good friends and neighbors at NBC," as well as preserving the "dignity and worth" of the two parties.

At his home on 20 August, the church leader conferred with NBC CEO Robert Wright and Thomas Donahue, Secretary-Treasurer of the American Federation of Labor and Congress of Industrial Organizations (AFL-CIO).

O'Connor called the meeting "gratifying."

O'Connor speculated the union and NBC would begin talks again in Washington, "under the auspices of the Federal Mediation and Conciliation Service (FMCS) at the earliest possible time."

Shortly thereafter, spokespersons for NABET said a meeting would be held in Washington, DC on 25 August, under the eye of an FMCS representative. The meeting preempted what would have been a discussion in New York between the two sides, pertaining strictly to radio issues.

NABET officials involved in the meeting could not be reached by RW on the day of the talks. NABET International Representative John Krieger left word that the media would be notified only if the situation changed.

NABET has been on strike since 29 June, following the implementation of a

final contract offer by NBC which the union had found unacceptable. The two sides have been at odds over a new master contract to replace a previous agreement which expired 31 March.

Among the complaints NABET has with NBC's current contract proposal is language in the preamble to the contract which would abrogate the agreement if the network sells its properties. The union is concerned that a sale at NBC would leave NABET members without any contract.

That concern has become even more crucial since the announced sale of NBC's three radio networks to Westwood One.

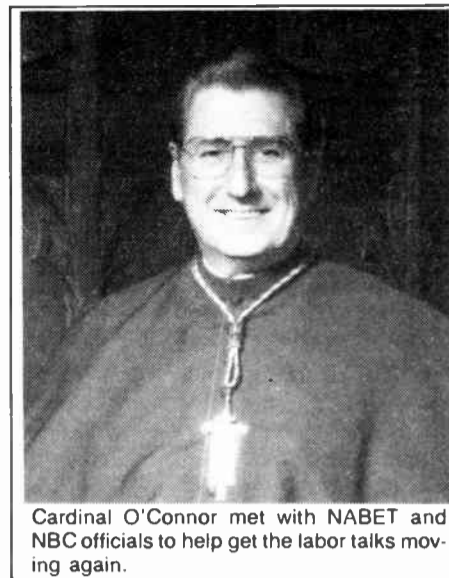
Under the previous contract, a "successor clause" was stipulated which allayed such concerns. The clause provided that the master agreement was between NABET and NBC or the network's successor.

Calvin Siemer, Secretary-Treasurer of NABET local 11 in New York explained that, with such a clause, the contract would be passed on to any group purchasing any of NBC's properties in which NABET members are employed.

NBC's new contract proposal does not include a successor clause, Siemer noted. The proposal also stipulates that the network must not only own but operate its properties for the new contract to be binding.

"If the network decided to lease out to another company, the contract would no longer apply," Siemer commented. The sale of NBC's radio networks to Westwood One, therefore, makes the future of NABET members employed by the networks unclear.

Other contract language proposed by NBC would have the contract apply only at those facilities in place at the time of the agreement, Siemer added. If a new facility was opened after the agreement, the terms again might not be binding.



Cardinal O'Connor met with NABET and NBC officials to help get the labor talks moving again.

Siemer noted that NBC's radio facilities have recently been relocated to 1700 Broadway. Had the preamble been in place at the time of the relocation, NABET members employed by NBC radio would have had a "lot less protection and breathing room," Siemer said.

Talks between the two disputing parties had been sidelined since 23 July, when NABET submitted a reduced list of points of arbitration to the NBC negotiating committee. NBC maintained that the reductions were primarily made in the network's bargaining points.

NBC also said it would consider only minor modifications to its original contract proposal, NABET's Krieger noted.

With the network remaining inflexible, the union's negotiating committee made a suggestion to NBC to rekindle the talks, replacing the current mediators. The suggestion was rejected by NBC.

## FMCS "unproductive"

The two sides had been presided over in past talks by FMCS mediators Tim Germany and Brian Flores, Krieger acknowledged. However, he added, using

(continued on page 27)

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## Dial-Up to be Clarified

(continued from page 11)

sophisticated than when the FCC wrote its original rules," Hassinger said.

In recent years, the use of telephone dial-up equipment has rapidly increased. Such gear allows an engineer to use any telephone to bypass the FCC required official control point to take not only transmitter readings, but also make changes in operations.

While FCC rules prohibit the bypass of a specified control point, engineers maintain that there is virtually no way the Commission can adequately detect and prohibit the use of telephone dial-up gear.

The remote gear is also being increasingly used in satellite operations, in which a network control center monitors and controls transmitter parameters for a number of stations located hundreds of miles away.

While manufacturers acknowledge that their equipment can be misused, they generally emphasize the legal uses to their clients. One firm, Hallikainen and Friends, includes a voluminous printed interpretation of FCC rules with each unit sold.

In the RW series, many broadcasters, consultants and manufacturers stressed

that the FCC rules regarding remote control points, EBS monitoring and failsafe devices were unclear.

Hassinger has recently indicated that while the Commission has "relaxed rules in some areas, they are still rigid in other areas. The licensee still has to meet the requirements."

However, because of a manpower shortage in his office, Hassinger said that while there is an immediate need for the public notice, it may not be completed until later this year or early 1988.

"It's on my list of things to do, and it will get done when we have people available to do it," he said.

John Reiser, of the FCC Engineering Policy Branch, added that there has been an ongoing debate at the FCC as to whether to issue a public notice to clarify the remote control regulations or to actually amend the rules to make them more compatible with the advanced equipment on the market.

"Rules are only good if they can be enforced," he said.

For more information, contact William Hassinger at 202-632-6460. The multi-part series on remote control ran in RW from May through July.

# Pacifica Won't Be Prosecuted

by David Hughes

Washington DC ... The Justice Department has told the FCC that it will not prosecute Pacifica Radio for allegedly violating the FCC's indecency standards.

The department said that since the Pacifica obscenity incident occurred in 1986, new indecency standards put into affect by the FCC in 1987 do not apply in this case.

It also said that the previous indecency standard, involving the use of the "seven dirty words" was not violated by Pacifica.

When the FCC in April unveiled its

difficult to prove that KPFK intended to violate the law.

H. Robert Showers, of the Justice Department's National Obscenity Enforcement Unit, said in a letter to FCC General Council Diane Killory that the KPFK broadcast did not technically violate the FCC's indecency standards that were in effect at the time.

The main reason for the dismissal, the Justice Department added, was that the KPFK incident occurred seven months before the FCC unveiled its new indecency policy. Before the new policy took effect, the FCC relied on its "seven dirty words" policy.

Yet, none of the "seven dirty words,"

which were determined to be indecent by the Supreme Court in 1978, were used in the KPFK play, thereby allowing the station to avoid prosecution, the department said.

The department added that the KPFK broadcast occurred after 10 PM. The FCC, at the time, broadened its standards to allow more adult oriented material to be broadcast after 10 PM.

However, Showers, in the letter to Killory, added the department agreed that the program featured "patently offensive material" that violated community standards. He also praised the FCC's April decision on indecent broadcasts.

Even though KPFK will not be prosecuted, a Pacifica spokesperson indicated that the whole incident had a chilling effect on free speech.

The FCC said its new policy, which has been widely criticized by broadcasters, would involve the issuance of warnings, and possibly even license revocations, if stations air material that refers to sexual and other "indecent" topics at times when children might be listening. The new policy is not limited to the so-called seven dirty words.

For more information on the indecency policy contact the FCC's public information office at 202-632-5050.

*The KPFK broadcast did not technically violate the FCC's indecency standards.*

new, tougher standards regarding potentially indecent and obscene broadcasts, it asked the Justice Department to bring formal obscenity charges against Pacifica's KPFK, Los Angeles for airing a play entitled "Jerker."

The August 1986 broadcast of the play, with a homosexual theme, contained explicit sexual references.

While the FCC also noted other allegedly indecent broadcasts, including Howard Stern's morning program on New York's WXRK and Philadelphia's WYSP, only the KPFK broadcast was recommended for Justice Department action.

In a July decision, even though the Justice Department admitted that the KPFK play featured offensive material, it told the FCC that it would have been

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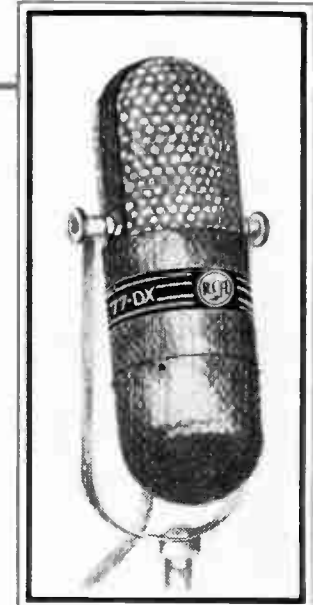
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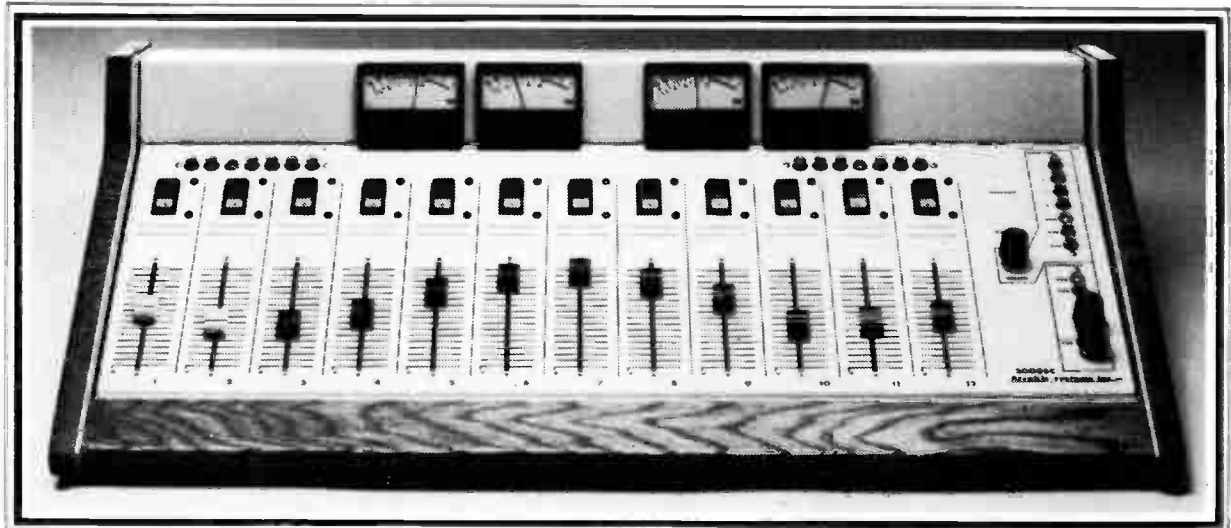


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# When The New Owner Arrives

by John M. Cummuta

**Downers Grove IL . . .** The way radio properties change hands these days it's becoming an increasing challenge to employees in all departments to learn how to open and sustain communication channels with new owners.

Just like with a new personal relationship, there are pitfalls and pluses in a new employer/employee relationship. There are opportunities to strengthen the bond—or sever it.

Unfortunately, unlike when someone takes over an airplane factory or a hardware store, the new owner of a radio station doesn't always keep the current team on board.

In fact the engineering department is frequently the only group with any security whatsoever.

However, that security could be short-lived if you find that the new bosses look differently than you on what you may consider inviolable laws of good engineering practice.

## What you do when . . .

How do you respond when the new owner or GM wants you to crank modulation up to 278%?

You could get red in the face and begin a dissertation on the relative sound quality of transmitting square waves.

You could stomp your feet, threaten to quit or simply pull your head into your shell and crank up the modulation.

The fact of the matter is that none of the above will likely solve anything.

The situation is really a combination of problems, and that's where the average person gets into trouble in a new employer/employee relationship.

On the surface it looks like the question that needs addressing is the 278% modulation and so most folks make a

*John Cummuta is president of Marketline, a broadcast management and marketing consulting firm, and a regular RW columnist. He can be reached at 312-960-5999.*

campaign out of convincing the new boss that broadcasting a sound equivalent to an electric razor is not the way to build audience.

The real obstacle, however, is the lack of relationship and trust necessary for them to consider your opinion nearly as valuable as their own.

## Where to start

When new ownership takes over, or whenever you might move to work for a new station, a lot of bridges must be built and much common ground must be found before the real task of working together can begin.

## Engineering-Manager

This usually requires an openness on both sides, and a willingness to really communicate.

This is really a period of negotiations. You have what you consider to be important interests and so does the ownership.

In most negotiations the two parties are considered adversaries. This is stupid and usually fruitless.

When adversarial negotiations take place someone has to lose for anyone to win. Losers rarely feel good about the resulting "agreement."

## Win/win

There's an old saying that covers this point well: "A man convinced against his will is of the same opinion still."

The only constructive way to negotiate is with a "win/win" philosophy. How do we relate this to the employer/employee situation? Simple.

Instead of starting out using positional negotiations, where you have your "positions" and the ownership (or their management) has their "positions," you should establish that what you both have are "interests" in the situation.

This takes the pressure off for anyone to give up ground because you're no

longer trying to tear them from a given position, nor are they having to rip you from your position.

If each of you put your interests on the table, you can both sit on the same side and examine where there might be opportunities to satisfy both sets of interests.

Now it's no longer a matter of one party having to give up something for the other to get what's desired. It becomes a situation where both sides are working together to find ways to accommodate all the interests in question.

## First do your homework

However, before you can begin to effectively negotiate your interests with your new bosses you need to know where they're coming from.

What, historically, has been their style of business? What have they expected and gotten from their other properties or businesses?

In other words, you need to know as much ahead of time as possible about what makes these people tick.

You need to know what they really want out of your business situation before you can begin to show how you can accomplish any of their interests.

Presuming that you've decided to continue working for them after finding out more about them, the next step is convincing them that you really want to be a contributing member of their team—helping them reach *their* goals.

Remember the adage, "If you're not part of the solution, you're part of the problem?"

Well, if you're not perceived as a strong part of the solutions to the problems they'll face in your station you'll inexorably be considered part of their problems.

## Team effort

You don't have to act like a boot-licker, but you should request a meeting with the manager for the purpose of assuring him or her that you are there to help the whole team succeed.

Spend the time before the meeting developing a list of the areas in which you feel you can contribute, and for which you'd like to learn their priorities.

You may casually agree on the areas that need attention from engineering, but you may have dramatically different opinions of what's the most important, the next most important and so on.

This apparently minor communication gap could cause much frustration and headache down the road.

Ask the boss to prioritize the list for you. Let him have it for several days if necessary, but get it back before you start working on it in earnest.

Don't argue if you disagree on the relative importance of certain tasks. The important thing at this point is to better understand where the boss is coming from and to know where you can help.

Work on accomplishing the highest priority jobs with which you have little or no disagreement, and after you have some successes to report, schedule another meeting to begin negotiations on the unsettled issues.

## Tackling tough issues

By this point you've already proven that you're a team player and now you want to, for the good of the station, discuss certain issues of concern.

Here's where you begin the win/win negotiations. You put everyone's interests on the table and examine possible ways to accommodate both.

If management's interest is loudness and coverage, and yours is fidelity, there may be several compromise solutions you can propose which will consider both concerns.

First, as an example, try to discern whether loudness is really the manager's interest—or is it what he or she perceives to be the result of loudness: more coverage.

Explore whether there might not be other more creative ways to increase coverage without boosting loudness into the distortion range.

Remember, however, when you're in these negotiation situations you are selling your point of view, and there's a rule of sales which says, "You can win the sale or the argument—never both." So, don't argue—ever.

## Deferring to authority

Neither should you take your ball and bat and sulk, because once you've effectively cut yourself off from the relationship of trust with the boss you'll never again likely be able to positively affect any situation. It's not worth it.

Remember, it's their radio station, and in the final analysis, if you can't convince (not argue) them that your concerns are more important than theirs you have but one choice: grit your teeth and do the job their way—or quit.

I assure you, though, that if you swallow your pride now and then and remain a contributing member of the team you'll find more and more of the engineering decisions left to you.

Managers are not going to leave important decisions up to someone they don't know and/or trust.

But if you can, over a period of time, become a trusted ally and team player, you will find that you'll be given more and greater decisions to make on your own.

Take these steps, nice and easy, and you'll probably be able to enjoy many happy anniversaries with your new employers rather than suffering through a traumatic divorce. It's really up to you.

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# Maximizing Your FM Antenna

by W.C. Alexander

## Part I of IV

Dallas TX . . . There are as many ways to plan an FM antenna installation as there are engineers.

All the various choices in antenna gains, transmitter powers, and transmission line types provide a wide range of variables that can be used to either benefit or work against a station operator.

Most station owner/operators want to provide the maximum coverage with their transmitter/antenna system.

This can be done, but it may be that by designing a system for distance, the city or cities that the station primarily serves will be left with multipath, shadowing or a combination of signal problems.

FM antenna systems can be chosen that will overcome these problems to a large degree, and reach a compromise between distance to a contour and service to the intended city.

In this four-part series, we will examine the factors that must be considered when planning such a system and the technology that is available to help us achieve our goals.

### Role of terrain

Terrain plays perhaps the most important role in the performance of an FM antenna system. A number of questions must be answered before an antenna system can be properly designed.

What is the elevation of the intended transmitter site? What is the elevation of the city or cities to be served?

What is the terrain between transmitter site and the city? What is the terrain surrounding the city? Are there mountains behind the city?

All of these answers play a part in the selection of an antenna system. If the transmitter location is not a variable, then the effort must be put into designing the right antenna system for the job.

Terrain factors will enter into almost every part of the antenna planning, and a good working knowledge of the terrain and any significant features is a must.

### Brewster angle

When a circularly polarized VHF signal strikes the ground, the Vpol component will not be reflected to the degree that the Hpol component will. How much difference depends on the angle of incidence.

Angles of incidence greater than about 2° result in very little reflection of the Vpol component as compared to the Hpol component.

This phenomenon, discovered by an Englishman by the name of Brewster, produces radiation that tends to be more elliptical than circular in polarization.

For that reason, it is important that an antenna height above the area to be served is chosen that will result in grazing angles that are less than 2°.

As with medium-wave frequencies, soil conductivity (and permittivity) greatly affect the attenuation of VHF signals. Vegetation is also a factor.

As a rule of thumb, raising the receive-

ing antenna above the ground counteracts the immediate effects of the soil on the signal.

It is important to remember that most coverage predictions are based on a receiving antenna located at least 30' above the ground for this reason.

Many times, what engineers consider when planning their STL paths, they completely neglect when planning an FM antenna installation.

A 60% first Fresnel zone clearance is very important to FM reception.

When selecting a tower height or an antenna site, the engineer should ask if obstacles or terrain between the transmitter site and the intended area of

reception will allow this clearance.

The formula for finding the midpath first Fresnel zone radius was found by French scientist Auguste Jean Fresnel, who discovered the effect on radio waves of clearance above ground or obstacles while working with optics. The formula is:

$$R = 1140 \times \sqrt{df}$$

Where d is the path length in miles, f is the frequency in megahertz, and R is the radius of the zone in feet.

While there are other more exact formulas for calculating the first Fresnel zone for microwave or other applications, this formula generally gives good results

over the 4/3 curvature of the earth.

Once the radius of the first Fresnel zone is calculated, the engineer must insure that all obstacles and terrain are cleared by at least 60% of this value.

If there is any less clearance, signal strength is lost. Clearance is most critical around the middle of the path.

It is important to note that for coverage predictions based on the FCC's 73.333 F(50,50) graphs to be anywhere close to accurate, 60% first Fresnel zone clearance must exist.

In the next part, we will look at some of the electrical characteristics of antennas and how they can be used to our advantage.

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W.C. Alexander is Director of Engineering for Crawford Broadcasting Company, and a soon-to-be-published horror fiction novelist. He can be reached at 214-445-1713.

# Radio's New Secret Weapon

# StereoMaxx

**StereoMaxx™** is a hit with scores of Chief Engineers and Program Directors from coast to coast. Our spatial image enlarger is their new "SECRET WEAPON". And it's a secret they'd prefer to keep to themselves as long as possible.

A Southwest top 10 market CE explained to us:

**"After you asked me for a quote about StereoMaxx, I talked it over with management. We agreed on two things: First, StereoMaxx is making a difference at our station. It gives our sound a fullness and richness we didn't have before, and nobody else has now. And second, we don't want our competition to know what we're doing. So no names, OK?"**

We understand. StereoMaxx users love the box, but most don't want publicity. After all, it's no secret that audio processing can be a potent weapon in the "ratings wars." A West Coast Chief Engineer tells us how StereoMaxx is working out at his station:

**"It's terrific. The extra separation and depth we get from StereoMaxx makes us not only sound bigger, but better. It's amazing... The PD has been bugging me for months to give our station a sound that stands out from the other CHR's. With StereoMaxx, we're finally able to do it. I followed your instructions for connecting StereoMaxx with our Texar Audio Prisms. There were no problems putting StereoMaxx in, and it gives us no problems on the air."**

We're glad he said that. Enlarging the stereo image is one thing, but doing it without creating big hassles is quite another. A top 5 market CE put it this way:

**"I was a little skeptical because I'd played with several ambience gadgets in the past. But they were more trouble than they were worth. StereoMaxx is different. It really does make us 'more stereo'. And it really doesn't cause us any undue multipath hassles. Also, I don't like unknown 'black boxes', so I was impressed that you sent me complete specs, and a block diagram. The unit comes with full schematics... no mystery modules! Eric Small, you've done it again."**

To sum up, we like these comments from a West Coast Program Director:

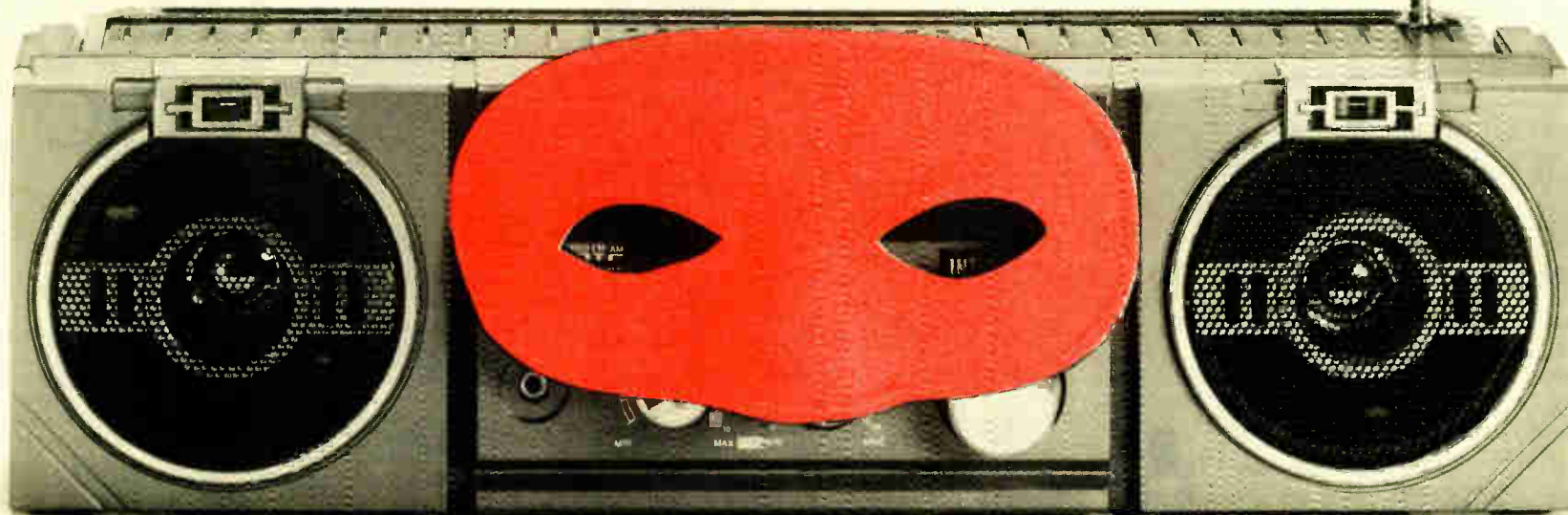
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# Tradeoffs in FM Revamp Plan

by John Kean

**Part I**

**Falls Church VA ...** In May of this year the FCC initiated one of the most significant proceedings for FM radio since its modification of the FM rules in Docket 80-90.

The Commission was quick to point out that the Notice of Inquiry was intended only to allow greater flexibility for existing commercial FM stations and allotments by allowing directional antenna systems.

But the plan as offered by the Commission could carry a future price of slightly greater interference between some stations.

Initiated by the Commission as Docket No. 87-121, the Notice suggests that an overhaul in the separation requirements for commercial FM transmitter sites is possible by using directional antennas and some form of signal contour protection.

The Commission noted that directional antennas are currently used to avoid interference in special cases and are routinely permitted for non-commercial FM service.

If eventually adopted, the changes would eliminate the strict distance separations which tend to increase the average spacing between commercial FM stations.

Since few FM stations operate at minimum separation under the present system, allowing reduced separation through contour protection may result in increased interference to the outer coverage area of some operations.

A number of issues must first be resolved before adoption of new separation rules for commercial FM stations.

These include specific methods for determining contour protection, directional antenna performance requirements and consideration of what constitutes a protected contour for existing stations.

They also include whether to alter the protection ratios for Class B and B1 stations (which differ from all other classes, including NCE-FM operations).

This two-part article reviews these matters and discusses some of the tradeoffs involved if new rules are adopted.

For the past 25 years the Commission has assigned commercial FM channels on the basis of distance separations rather than signal strength contour protection.

This system fixes minimum geographical separations according to the class of each FM station, which ranks facilities within the six brackets of power and height shown in Table 1.

The six classes are listed in Table 1, to provide different levels of service.

Each class has been assigned a particular range of operating characteristics, i.e., maximum to minimum allowed ERP, and a maximum to minimum allowed antenna height.

The distances to the F(50,50) 60 dBu contour are shown for maximum and minimum facilities within each class.

*John Kean is a senior engineer with Moffet, Larson & Johnson, Inc., a Washington, DC area-based consulting firm. Previously he was a senior engineer with Jules Cohen and a senior engineer for National Public Radio. He can be reached at 703-824-5660.*

**Table 1.**

Class	ERP (kW)	HAAT (meters)	F(50,50) 60 dBu		(Class B & B1 only) F(50,50) 54 or 57* dBu	
			km	(mi.)	km	(mi.)
A max.	3.0	100	24.3	(15.1)		
A min.	0.1	30	5.7	(3.5)		
B1 max.	25	100	39.1	(24.3)	44.7*	(27.8)*
B1 min.	3.1	30	13.5	(8.4)	16.1*	(10.0)*
B max.	50	100	52.3	(32.5)	65.0	(40.4)
B min.	25.5	30	23.0	(14.2)	31.2	(19.4)
C2 max.	50	150	52.3	(32.5)		
C2 min.	3.1	30	13.5	(8.4)		
C1 max.	100	299	72.2	(44.9)		
C1 min.	51	30	26.9	(16.7)		
C max.	100	600	91.7	(57.0)		
C min.	100	300	72.4	(45.0)		

**Table 3.**

EXAMPLES OF SIGNAL TO INTERFERENCE RATIOS ASSUMING MINIMUM SEPARATION DISTANCES

Facility Relation:	Cochannel Separation				Adjacent Channel Separation			
	Desired F(50,50) to Undesired F(50,10) Ratio (dB)		Desired F(50,50) to Undesired F(50,10) Ratio (dB)		Desired F(50,50) to Undesired F(50,10) Ratio (dB)		Desired F(50,50) to Undesired F(50,10) Ratio (dB)	
	max/max	max/min	min/max	min/min	max/max	max/min	min/max	min/min
A to A	21.3	40.0	26.3	43.8	7.4	31.3	14.5	35.8
B to B	20.8	28.3	26.8	34.1	7.3	14.7	14.0	21.2
C to C	20.1	24.8	23.5	28.1	9.3	16.0	13.2	19.4
<b>PRESENT CLASS B PROTECTION RATIO AT THE 60 dBu CONTOUR</b>								
B to B	32.0	36.6	34.2	41.7	16.0	23.2	21.6	28.7

**Table 2.**

Relation	REQUIRED SEPARATION	
	Cochannel (km)	Adjacent Channel (km)
A to A	105	64
A to B1	138	88
A to B	163	105
A to C2	163	105
A to C1	196	129
A to C	222	169
B1 to B1	175	114
B1 to B	211	145
B1 to C2	200	134
B1 to C1	233	161
B1 to C	259	193
B to B	241	169
B to C2	241	169
B to C1	270	195
B to C	274	217
C2 to C2	190	130
C2 to C1	224	158
C2 to C	249	188
C1 to C1	245	177
C1 to C	270	209
C to C	290	241

The present allotment system assumes each station operates with maximum facilities for its particular class (maximum ERP and antenna height).

The transmitting antenna is assumed to be omnidirectional, and its height above terrain is assumed uniform in all directions (based on the average height above eight standard radials).

The 60 dBu (1 mV/m) contour represents the protected contour for interference determination purposes for Class A and C stations.

The 54 dBu (0.5 mV/m) and 57 dBu (0.7 mV/m) contours are the protected contours of Class B and B1 stations, respectively, although their usable service may not extend to these predicted contours.

It is apparent that a wide difference in contour distances exists between maximum and minimum for facilities of the same class.

The FCC's FM allocations technical standards are based, to a large degree, on a minimum co-channel signal-to-interference (S/I) ratio of 20 dB and minimum adjacent channel S/I ratio of 6 dB.

Figure 1 illustrates how these ratios relate to the protected contours of each class of station.

Because there are many possible combinations of classes, the contour distances are not drawn to scale.

However, to depict the additional protection provided Class B and B1 stations, the contour distances for all the stations were "normalized" to the same power/height combination.

Table 2 is excerpted from Section 73.207(b)(1) of the FCC Rules to show the distance separations permitted between the various combinations of classes.

Table 3 shows the S/I field strength ratios for various combinations of stations, computed using the minimum required separation distances and distances to the protected and interfering contours for stations as described in Table 2.

Four sets of columns display the S/I ratios assuming the following combination of facilities for the existing station compared to the interfering station: maximum to maximum, maximum to minimum, minimum to maximum and minimum to minimum.

A study of the first (max/max) column shows that the co-channel S/I ratios are close to, but slightly greater than, 20 dB. (The slightly higher values are proba-

bly due to metric conversion and rounding from the original English unit calculations, which were also rounded values.)

Examination of the columns to the right show that the S/I ratios are substantially higher between stations which operate with minimum facilities. The higher ratios imply less interference between these services.

Examination of the adjacent channel S/I ratios reveals the same situation: the ratios approach the nominal 6 dB value

any change in separation requirements would still include the provision to contain the entire principal community of service within the 70 dBu (3.16 mV/m) field strength contour.

Stations on adjacent channels have much smaller separation requirements than co-channel operations.

Therefore the same displacement would result in proportionately larger reductions in separation for adjacent channel than for co-channel operations.

This matter should receive more careful analysis before rule changes affecting separation are proposed.

The Commission's Notice suggests that separations could be determined by either of two methods.

In one case, the ERP/HAAT combination on the azimuth between the affected stations would be used to classify each operation. The classifications would then determine the minimum separations between these operations.

As an alternative, the Commission suggests that protected and interfering contours be used to determine minimum separation, as is done presently with non-commercial FM stations.

The present approach to separating FM stations results in greater than minimum spacing for two reasons.

First, some FM stations operate with less than maximum power or height for their class, which reduces the range of potential interference to adjacent and co-channel FM stations.

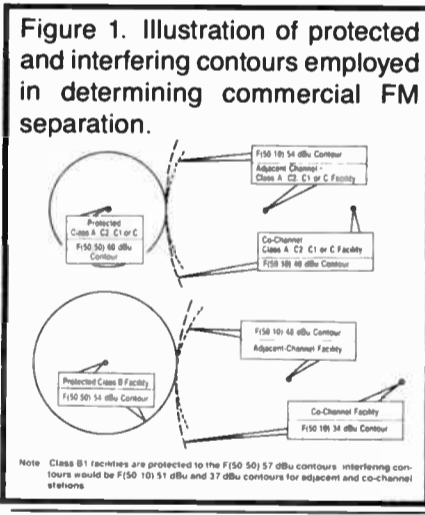
Second, the FCC's allocation process has assigned channels to communities that are randomly spaced and therefore are likely to be at greater than the minimum geographic separation.

In a study of approximately 3,700 FM stations conducted in June, 1982, by the Technical Subgroup of the NAB's Radio Advisory Committee, the median mileage separations for Class A, B, and C channels were 105, 190, and 230 miles, respectively, for the nearest three co-channel stations.

The FCC permits minimum separations of 65, 150, and 180 miles (105, 241 and 290 kilometers) for Class A, B, and C stations, respectively.

As a result, many FM stations were operating with less adjacent or co-channel interference than is permitted by the FCC Rules.

(continued on page 21)



for minimum-spaced maximum facilities, and increase substantially between the services involving minimum facilities.

In its Notice, the FCC notes that protected contour overlap criteria is complicated by the fact that Class B and B1 operations use different protection contour values.

Accordingly, the S/I ratios for these services shown in Table 3 are based on protection to the 54 dBu contour.

Since these contours extend farther than the 60 dBu contour, protection is increased.

It is evident that these operations enjoy significantly higher S/I ratios at the 60 dBu contour than Class A or Class C operations.

It is also probable that Class B or B1 stations would be most affected if the Commission adopted a uniform protection contour of 60 dBu.

Potential interference would be more likely in the case of adjacent channel spacings than co-channel spacings.

This is because the FCC proposes that

# Presenting Your Station's Best

by Tyree Ford

**Baltimore MD** ... This month's chapter of *Producer's File* takes a look at the station presentation.

An often overlooked commodity in the "I need it yesterday" world of radio, this kind of production requires more than the usual short term creative spurt.

Begin by getting a fix on to whom the presentation will be made, and what the central message will be.

A typical approach is to highlight the people, services, programming, community involvement and any other elements that set your station apart from the competition.

Even in the early concept stages it's a good idea to "think modular," both in writing and production.

When the inevitable changes occur that threaten to dedicate your production to the dumpster, you can update the afflicted module rather than start all over again.

## The big picture

Most presentations are done at the request of the sales manager.

Whether used on the local retail level or to better acquaint national sales reps about your station, this kind of presentation takes the pressure off of trying to smoothly cover all of the important facets which make up each station's "Big Picture."

Sharper sales managers and A/Es use the presentation to observe the potential client's reactions. This helps them to focus their efforts where they may be most effective.

If a prospective client "lights up" when a particular feature (say a sports/talk show) is mentioned, sponsorship may be more likely to occur than for another feature which yields a less positive response.

One pitfall to avoid in the writing of any presentation is being overly specific.

If you have a great book, and make those numbers the main selling point of your copy, the presentation will be ob-

*Ty Ford, a radio audio production consultant, helps stations optimize their use of production equipment and airstaff skills. He can be reached at 301-889-6201.*

solete as soon as the next book comes out ... even if the rating was up.

The sales department should use ratings info as an adjunct to the presentation.

## Great graphics needed

If you really feel the need to do demographic or other statistical presentations your audio must be accompanied by graphics or some sort of visual aids.

Hand drawn flip charts, unless done by a good graphic artist, don't cut it. Consider contacting an A/V firm that can supply computer generated graphics.

If you already have a computer at the station, consider getting the boss to spring for the software and hardware that will allow you to do the job yourself.

## Producer's File

Be aware that your current printer may not be capable of handling quality graphics.

If this is the case, and you want printed material, consider finding someone who has a compatible system and the right printer.

Compose the graphics on your system, store them on a floppy and run the program on their computer.

## Three minute warning

If your finished script is longer than three minutes, give serious thought to a slide show.

Few people have the attention span to stay with any audio presentation over three minutes, regardless of the copy, production values or crafty segues.

This is especially true when the presentation is played on your average cheap cassette machine placed on someone's cluttered desk.

Even though you're both sitting in that person's office with the door closed, they may be reliving the high points of their last vacation. It happens everyday.

Even if your script is less than three minutes, think about a slide show. Your chances of holding the attention of your prospective clients increase as you involve more of their senses.

Slide show production exists on many

levels. There are one projector shows that come in a self-contained rear screen/wall screen case.

For these all you need is a dark room and an electrical outlet. Focus the image, cue the cassette and slide tray and let it ride.

Although there may be one or two people on your sales staff who have the knack for operating these systems, it's best not to expect them to handle the multi-projector shows, especially if they have to take them on the road.

While a two or three projector show can increase the impact it also requires a lot more preparation.

Unless you're committed to this kind of show, consider farming out the job to a local A/V company which specializes in them. Crawling under someone's desk in search of an outlet does little to enhance your station's image.

Speaking of images, make sure all of your slides are of good quality. To get a feel for what "good" is, have an A/V house show you something they have produced.

Your morning man's cousin who shoots weddings on the weekend may be economical, but deadly. Again, ask for advice from a good A/V firm.

The more successful operations have screening rooms designed for great sound, visual impact and client comfort.

If you go this way, use the occasion to bring in several clients, serve lunch, open the bar. After all it's show business.

## Back to basics

The addition of any kind of video to your presentation will cause you to rethink your project. You might have to edit your copy based on what slides you have on hand.

While this may seem backwards, remember that the viewer will be expecting the words to explain the pictures.

If you have a budget for slides, shoot to your script. A quick call to Encore Productions here in Baltimore confirmed that fifteen to twenty dollars was the going rate for good graphics shot onto a slide.

Good graphic slides can transform your slide show from the "we walked around the station and took pictures of everybody and everything" level to a more polished presentation.

The reality is you'll probably end up paying for some shots, and using what your promotion director has on file.

He or she is an expert with a 35mm camera and does shoot slides at station events ... right?

As executive producer of this spectacle, you will absolutely have to get out of the production studio and do a lot of leg work.

Because this presentation involves

your entire station, you need to touch base with everyone from the GM on down. Ask their advice and make notes.

(Production Rats, this is your big chance to clean up your act and get to the next level. Don't screw it up by telling people their ideas are dumb, or by making faces and laughing. Practice your composure in the bathroom mirror if necessary.)

While you won't be able to incorporate all of everyone's ideas, later on people will recognize a phrase or word they came up with and feel good about it.

Before you start recording your script, get final approval from your GM and all department heads. Minor revisions at this stage create minimal hassle compared to the grief you could get by not following through.

## Meanwhile back in the studio

The best music I ever used for one of these presentations was the station's new jingle package, which came with instrumental outtakes.

The instrumentals made great underscoring for the copy. They segued perfectly with the feature jingles which I used to set up each relevant section. At the end I used the full sing image jingle to bring it all home.

If you don't have a package like this at your station, use needle-drop instrumentals and other non-familiar pieces.

Playing popular cuts is distracting to your audience, especially if they are biased against a particular song. And if they like the song, they may start singing along (in their minds) and not hear your message.

## Video cassettes

One final suggestion. If you go the slide show route, get it mastered on 3/4" or 1" video tape.

From that master you can make additional VHS copies. These you can send to clients and reps who can't meet with you.

If you're farming this job out, make the company show you some of their transfer work. There are some inexpensive ways to do transfers with less than spectacular results.

If you do plan to go the video tape route, remember that all of your slides should be shot horizontally.

Turning the camera 90° to get that shot of the tower will leave big ugly black spaces on both sides of the video screen.

Expect the entire station to see the completed job. Don't forget to include traffic people, part-timers, and other behind-the-scene folks.

Even a group shot which will be on the screen for two seconds means a lot to the people you work with.



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# Low-Cost, Simple Audio AGC

by Frederick Baumgartner

Englewood CO . . . I have always found it an irritation to listen to communications circuits where levels never remained the same.

It happens on repeaters and phone lines. It happens as operators move around intercom mics, and different operators in different locations come on and off line.

This device described runs about \$25

Frederick Baumgartner, assistant CE at KWGN-TV and former CE of WIBA, Madison, WI, is a frequent contributor to RW. He can be reached at 303-740-2883.

in parts and takes about an hour to assemble.

### Components

Figure 1 shows two 5534 opamps, the first with a light dependent resistor (LDR) and LED in the feedback loop.

This amp drives an NPN transistor which lights the LED and reduces the resistance of the LDR which reduces the gain of the stage.

R1 and R2 allow control of the transfer characteristic, which is to say adjust the amount of gain control and threshold.

The second amp is a buffer and allows  
*(continued on page 21)*

Figure 2.

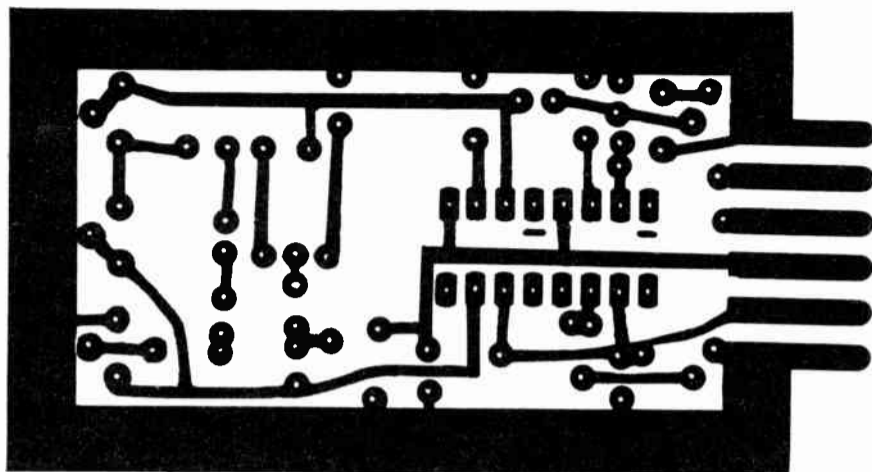


Figure 1. Auto Gain Control

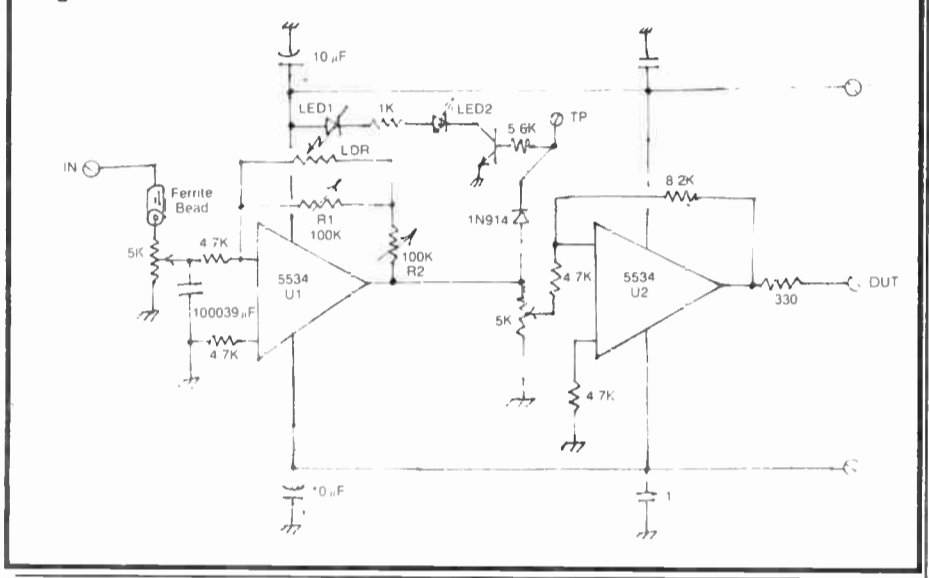
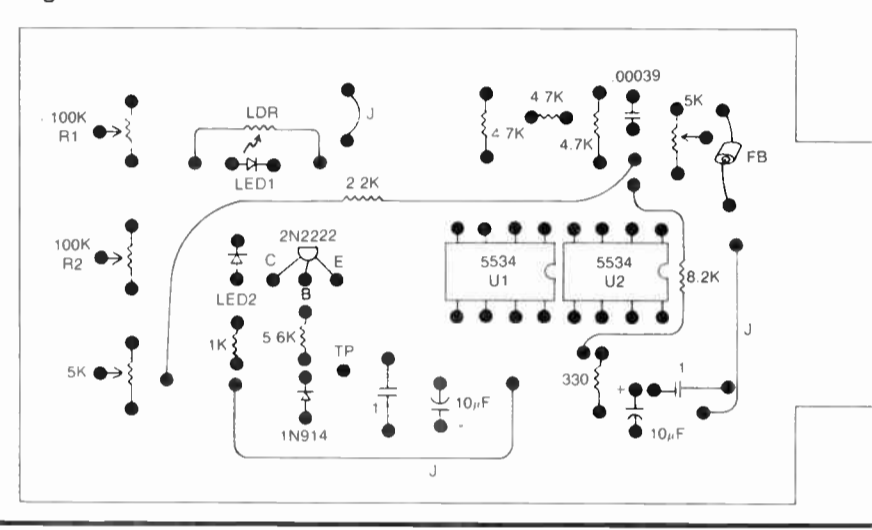


Figure 3.



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## Here's why Blane Webster bought Auditronics for WLAK-FM



Blane Webster,  
Chief Engineer, WLAK-FM



“**W**hen I prepared the budget for our new facilities on Chicago's Michigan Avenue, I could have included any console I wanted, be it Ward-Beck, Neve, you name it. So I looked at and listened to everything the industry had to offer, from the Harrison to the Harris Medalist, and I bought Auditronics.

I bought the Auditronics 200 primarily for its audio quality, by which I mean its waveform integrity, freedom from distortion and low noise floor. The quality of its sound is remarkably transparent. I think Auditronics' VCA technology is really good too, maybe the best on the market.

I also looked for reliability. The console's the most important link in the studio chain because it's on the air all the time. We just can't afford a failure, and I recalled that our old Auditronics console at Sears Tower never had an on-air failure.

Features were important too, like the modular concept that lets me pull a module out and pop another one in almost

as fast as making an Indianapolis pit stop. If I need another mike channel or cart machine channel, I've got it right here on the shelf for immediate use. The layout of the Auditronics 200 is almost self-explanatory so our on-air people can use it without making mistakes, and the 200 is rugged enough to withstand the jocks' abuse and coffee spills.

One of the things that sets WLAK apart is that we're the number 1 adult contemporary station in the Chicago market, and to us being number 1 means more than just winning in the ratings. It means being the best both on and off-the-air. This includes the kind of equipment we buy and the way we use it. We're a winner and we're proud of it.”

If you'd like to know more about why Viacom's Blane Webster specifies Auditronics consoles for *both* on-air and production, call 800-638-0977 toll free, for complete information and a demonstration near you.

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# Remote Systems



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VOL. 2 NO. 1

## Gentner Remote Systems Make Remotes Fast, Easy

By Elaine Jones

Imagine a remote broadcast where you take a single box to the site...where you're ready to go on air in less than five minutes...and where you hear return audio from the station in your headset.

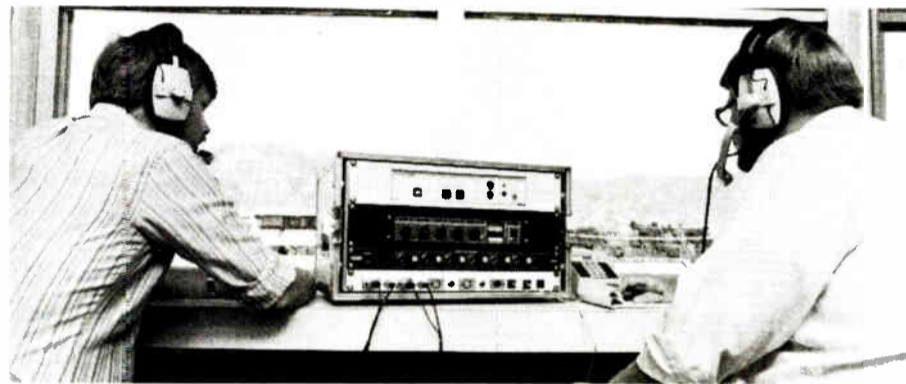
You've just visualized a Gentner Remote System...the one box solution for easier telephone remotes.

Gentner Remote Systems take away the hassle of setting up remote broadcasts. Everything is pre-wired in a single case. There's plenty of room for your mics, headsets, phone and other accessories. When you get to the site, you plug in your accessories, telephone line and power, call the station and go on air. **It's just that simple!** Studio equipment for your remotes is also provided in each package.

A Gentner Remote System uses a standard dial-up telephone line to deliver the broadcast to the studio.

Special processes are used to deliver good quality telephone audio - better than you'd expect from a phone line. Line noise is greatly reduced, and there's no "tinny" sound to the audio.

Gentner Remote Systems have been designed to maximize the benefits of the dial-up telephone network, which include low cost, ready availability and two-way



communication. With a Gentner Remote System, you can use a telephone line that's already installed in the facility...and you'll hear audio coming down the phone line in your headsets, so cues are easy.

When you buy a Gentner Remote System, you get ALL of the equipment you need for your remotes. Along with your fully wired and tested Remote System case, you'll

receive equipment for the studio that will interface your console to the telephone line.

With this ease of set-up and use, you'll find that doing remotes can be both enjoyable and profitable. You don't need to send a lot of people to the remote - one person can easily set up everything. And, since the Remote System case is always ready to go, a last-minute remote is no problem.

Gentner Remote Systems can give your station the competitive edge - whether it be in sports, news coverage, promotions or sales events!

The purpose of this Guide is to provide information on Gentner Remote Systems. For detailed set-up and technical information, call our Sales department at (801) 268-1117.

### Why Should You Buy A Gentner Remote System?

By Russell Gentner

**ANSWER:** Gentner Remote Systems provide the COMPLETE solution to your remote needs by delivering good quality audio, ease of set-up, and simple operation. From installation to implementation Gentner Remote Systems are designed to reduce the variables in remote broadcasting to a minimum. All Gentner Remote Systems share these common benefits:

**\*\* Good quality remote audio.** Gentner Remote Systems use frequency extension, noise reduction, Aphex® processing, and digital filtering to achieve the very best audio quality possible from a telephone line.

**\*\* Two-way Communication.** Talent at the remote site can continuously hear what's on the studio console through his headset. Talent can converse with studio end talent or even conduct a telephone talk show from the field.

**\*\* Fast Easy Set-up.** Because all equipment is pre-wired in a single case, your talent simply plugs in mics, headsets, power, and the phone line.

**\*\* Protection of Your Investment.** The equipment is housed in an American Travel Association (ATA) approved case that will protect it while in transit\*.

**\*\* Flexibility.** A Gentner Remote System can be used for sports, news, special events or sales remotes with easy set-up and good quality audio. The system can be reconfigured in a matter of minutes.

**\*\* Proven Dependability.** All of the components that make up a Gentner Remote System have years of proven dependability.

**\*\* All Equipment Provided.** You won't need to purchase a telephone coupler, a mic mixer, or even a power cord; it's all provided in a Gentner Remote System. We've taken the guess work out of remote broadcasts.

**\*\* Proven Customer Support.** Our customer support people are waiting right now to help you solve your remote broadcast problems.

Remote broadcasts generate a considerable amount of revenue for your station. A Gentner Remote System will allow you to do more broadcasts and you can rest assured they'll come off without a hitch.

\* The ATA approved case is designed to protect your equipment against impact. The case does not provide shock or vibration protection if the case were dropped. You may optionally purchase a Thermodyne case for this purpose.

### Highlights

Package Descriptions	pg. 2
Step by Step Set-up	pg. 4
Comparison Chart	pg. 7
Options	pg. 7
Prices & Distribution Information	pg. 8

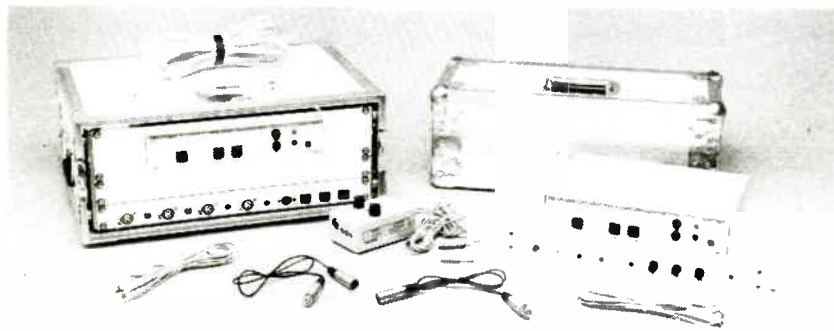
P.O. Box 27647  
Salt Lake City, Utah 84127-0647

**GENTNER**

Place  
Postage  
Here

# Gentner Remote Systems - Designed To

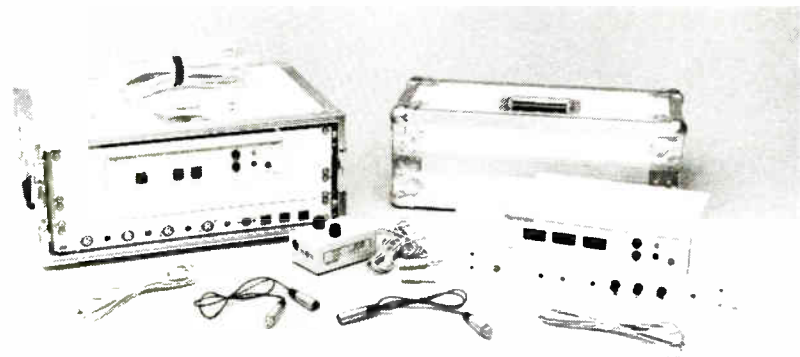
## SYSTEM #1



This package uses a 7" Star Case with an EFT-900, Microtel and interface panel; EFT-900 and Teleprocessor for studio end; standard accessories Kit. (See description on page 8.)

- single or dual talent capability (including headset)
- 1 tape input
- lower cost
- smaller case
- simple operation
- good quality audio
- manual answer and disconnect
- factory prewired and tested

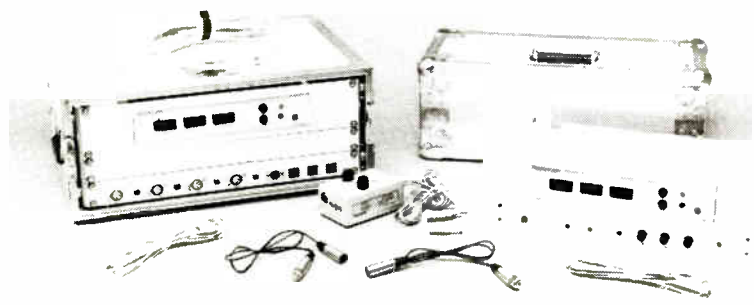
## SYSTEM #2



Similar to package #1 except that an EFT-1000 is provided for the studio end. This allows auto-answer at the studio end and automatic set-up. (See page 5.)

- single or dual talent capability (including headset)
- 1 tape input
- smaller case
- automatic studio operation
- good quality telephone audio
- factory prewired and tested

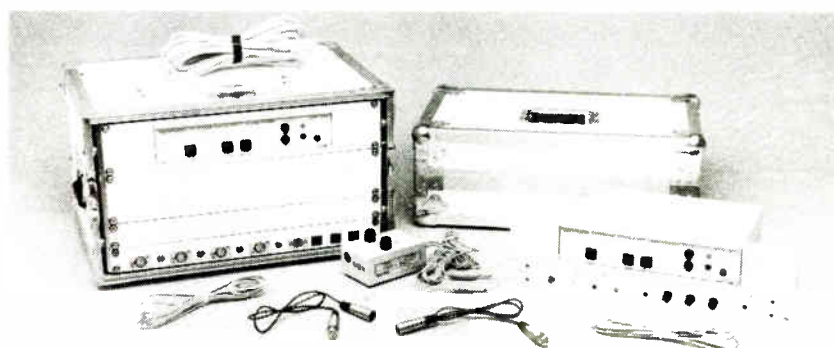
## SYSTEM #3



7" Star Case with EFT-1000, Microtel and interface panel; EFT-1000 and Teleprocessor at studio end; standard accessories kit. This package offers totally automatic studio operation and the capability of continuous return cues.

- single or dual talent capability (including headset)
- 1 tape input
- smaller case
- totally automatic studio operation
- second telephone line can be used for continuous return cue audio or for feeding two sites
- factory prewired and tested

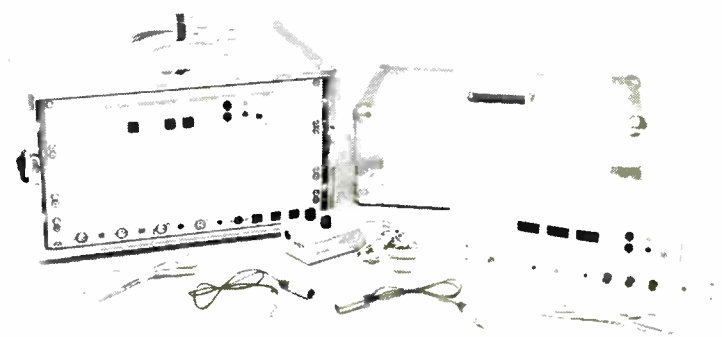
## SYSTEM #4



10" Star Case with EFT-900, Microtel, interface panel, EFT-900 and Teleprocessor at studio end, standard accessories kit. Similar to package #1, but with more room. Add your mic mixer and headset amp; we'll wire them in free.

- single or dual talent capability (including headset)
- input capability can be increased by adding mic mixer
- good quality telephone audio
- larger case provides room for mic mixer, headset amp to be added
- manual answer and disconnect
- low cost
- factory prewired and tested

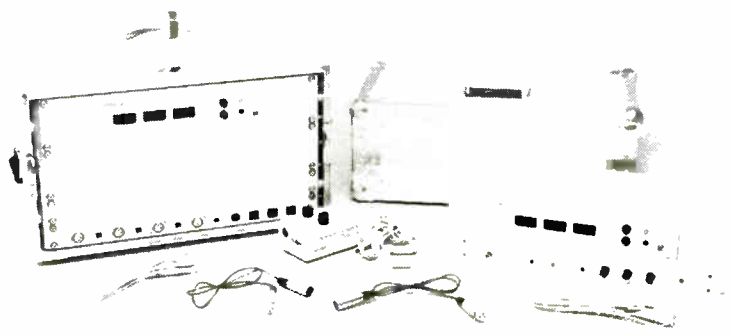
## SYSTEM #5



10" Star Case with EFT-900, Microtel, interface panel; EFT-1000 and Teleprocessor for studio end; standard accessories kit. This is similar to package #2 except for the larger case. Gentner will wire in your mic mixer and headset amp at no extra charge.

- single or dual talent capability (including headset)
- input capability can be increased by adding mic mixer
- automatic operation at studio end
- good quality telephone audio
- factory prewired and tested
- mic mixer, headset amp can be added to provide more inputs
- factory prewired and tested

## SYSTEM #6



This package is similar to #3 except that it uses a larger 10" Star Case. EFT-1000, Microtel and interface panel are provided with the case; an additional EFT-1000 and Teleprocessor are provided for the studio end. We will wire in your mic mixer and headset amp at no extra cost.

- single or dual talent capability (including headset)
- input capability can be increased by adding mic mixer
- automatic studio operation
- second telephone line may be used for continuous return cues or feed to another site
- factory prewired and tested

# Fit Your Requirements

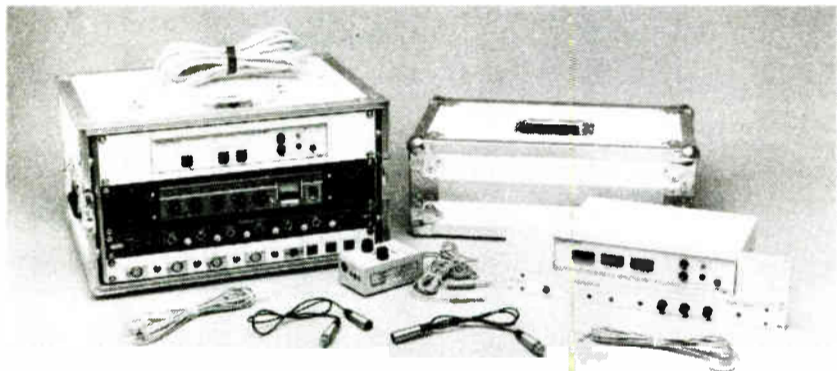
## SYSTEM #7



Same as package #4, but we provide the mic mixer and headset amp. Good for multiple talent remotes; EFT-900 units at each end provide good quality audio at lower cost.

- Shure mixer, Rane Headset amp provide 4 mic/tape inputs, 6 headset connections
- allows simple set-up for multi-talent remotes
- good quality telephone audio
- manual answer & disconnect
- factory prewired and tested

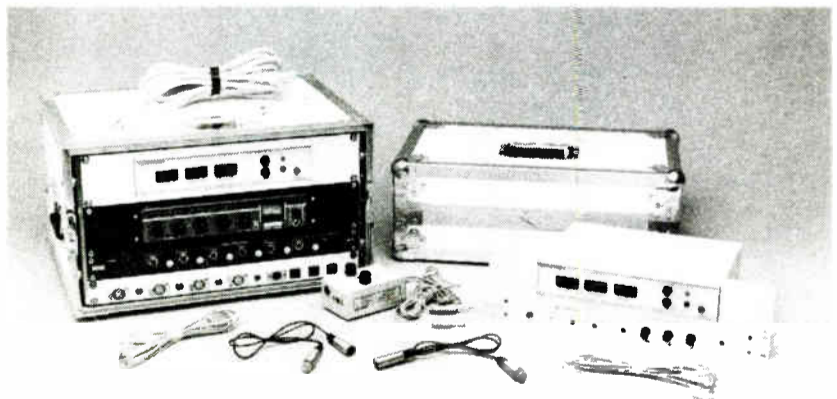
## SYSTEM #8



10" Star Case with EFT-900, Microtel, interface panel, mic mixer and headset amplifier; EFT-1000 and Teleprocessor for studio end; standard accessories kit. Similar to package #5, but we provide the mic mixer and headset amp.

- 4 mic/tape inputs, 6 headset connections
- automatic answer at studio end
- simple set-up and operation for multi-talent remotes
- factory prewired and tested

## SYSTEM #9



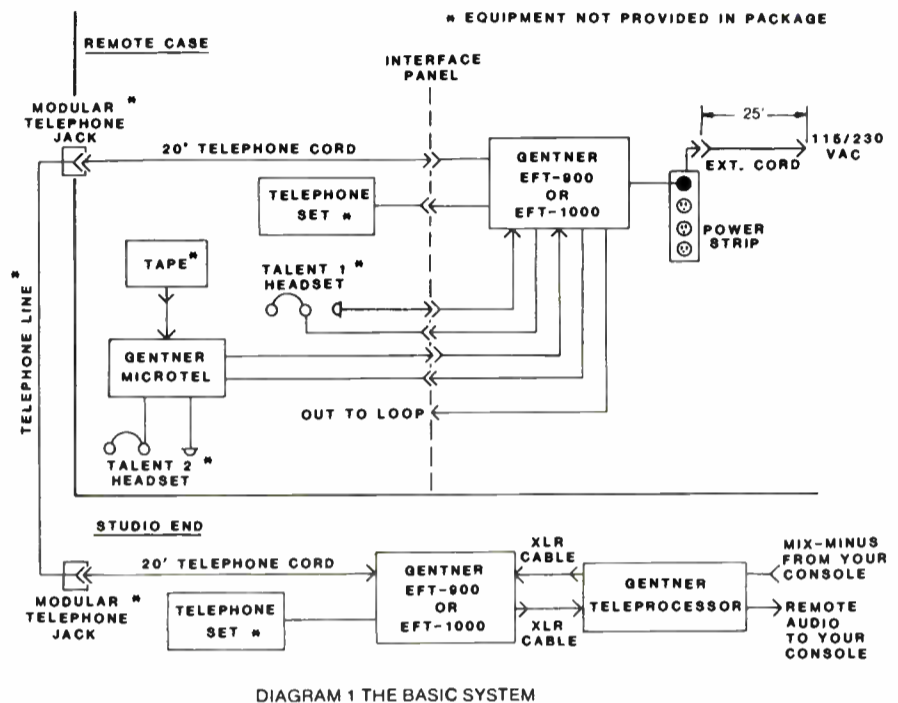
This package offers the greatest flexibility in operation. It uses a 10" Star Case with an EFT-1000, mic mixer, headset amp and Microtel; EFT-1000 and Teleprocessor at the studio; standard accessories kit. Similar to package #6 but we provide all of the equipment. Multiple talent, crowd mics, tape inputs, etc. are all handled out of ONE box.

- automatic studio operation
- 4 mic/tape inputs, 6 headset outputs
- second telephone line may be used for continuous return cues or feed to another site
- easy to set up and operate
- factory prewired and tested

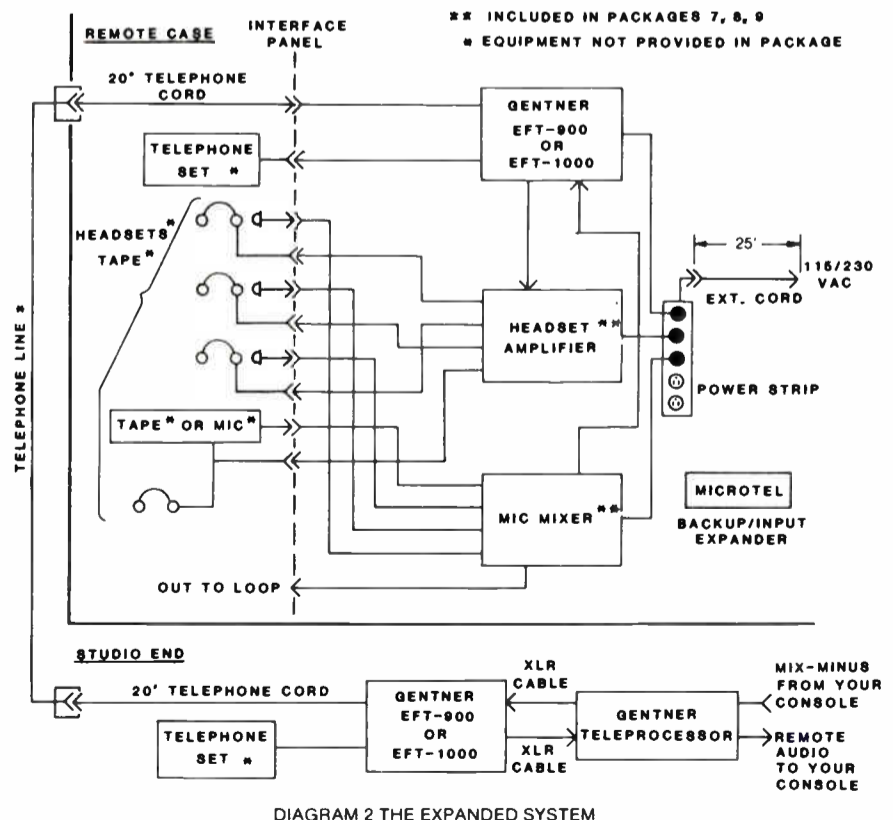
## Detailed Set-up Information

Although nine packages are available, they represent only two types of systems: basic and expanded. The basic system is designed for simple remotes involving only one or two people. Talent 1's headset is directly connected to the interface panel; level control is done with the EFT-900 or EFT-1000. Talent 2's headset (and a tape recorder, if desired) is connected to a Microtel, which provides level control for Talent 2. The Microtel then makes connection to the interface panel.

Diagram 1 shows the basic system. All nine packages offer this type of set-up.



The expanded system (Diagram 2) is used when the remote requires more than two people or one tape input. A mic mixer and headset amplifier are incorporated to provide the additional inputs. Packages 4 through 9 offer this capability. The mic mixer and headset amp are provided in packages 7, 8 and 9. Packages 4, 5 and 6 would utilize a microphone mixer and headset amplifier already owned by you; these would be sent to Gentner for wiring in your system.

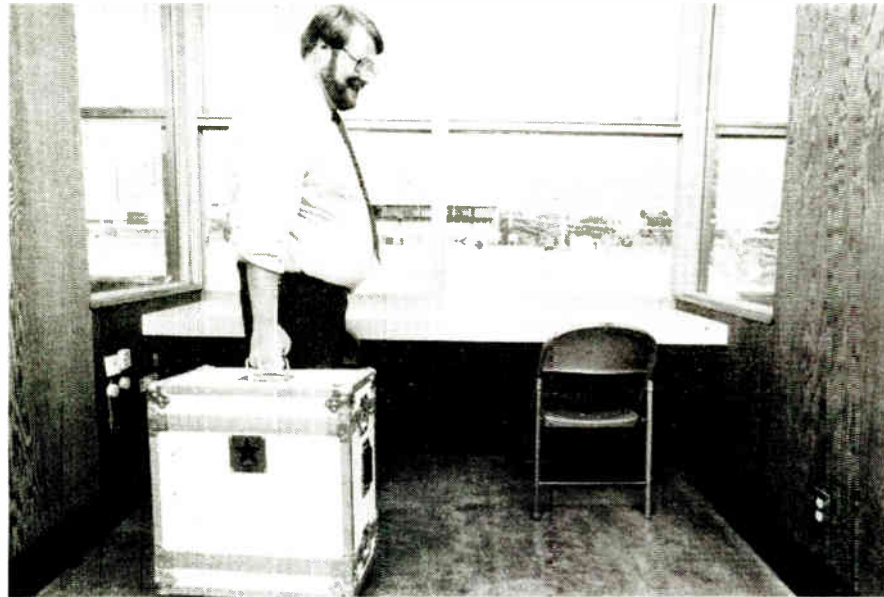


# Gentner Remote Systems - The Five Minute Remote Set-up

Do the words "remote broadcast" send you running for cover? They might, if doing a remote means finding all of the gear, untangling cables and going to the site hours ahead of time to iron out problems.

Gentner Remote Systems take the hassle out of setting up remotes. In fact, you can usually set up your remote in less than five minutes.

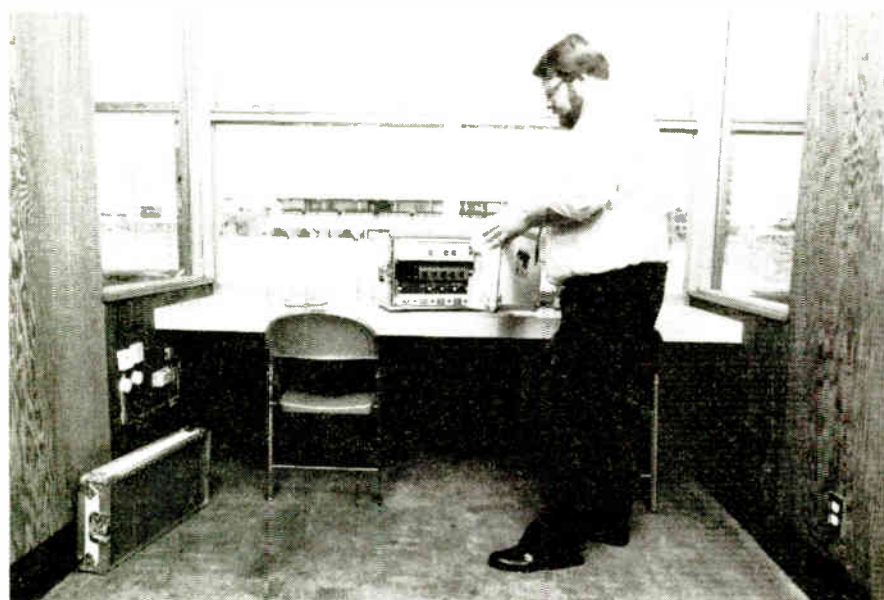
A typical remote set-up might go as follows:



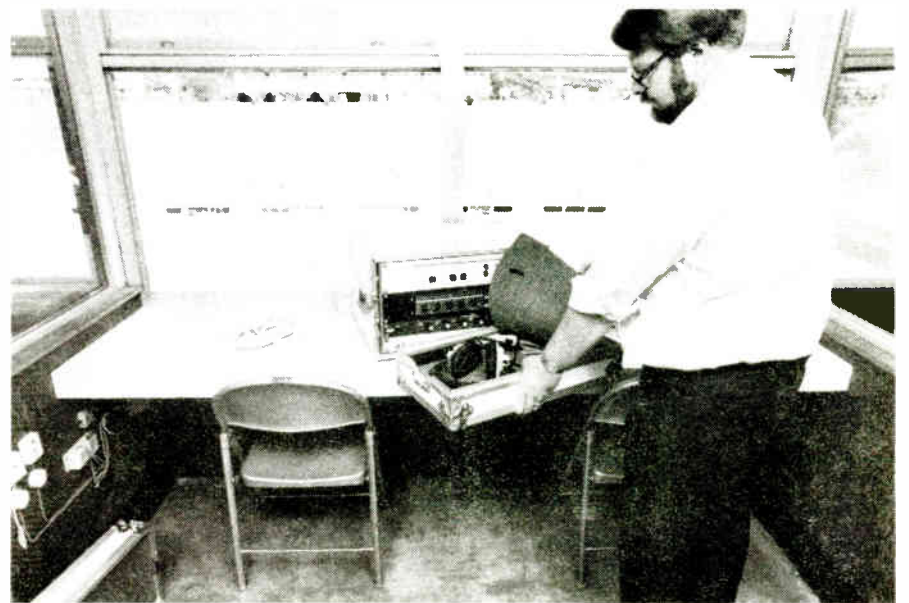
1. At 30 minutes before air time, you arrive at the remote site with the case. All equipment, accessories, and notes for broadcast are contained in the case, so there's no need to make several trips to the car.



2. Take the rear cover off the case and remove accessories stored behind equipment.



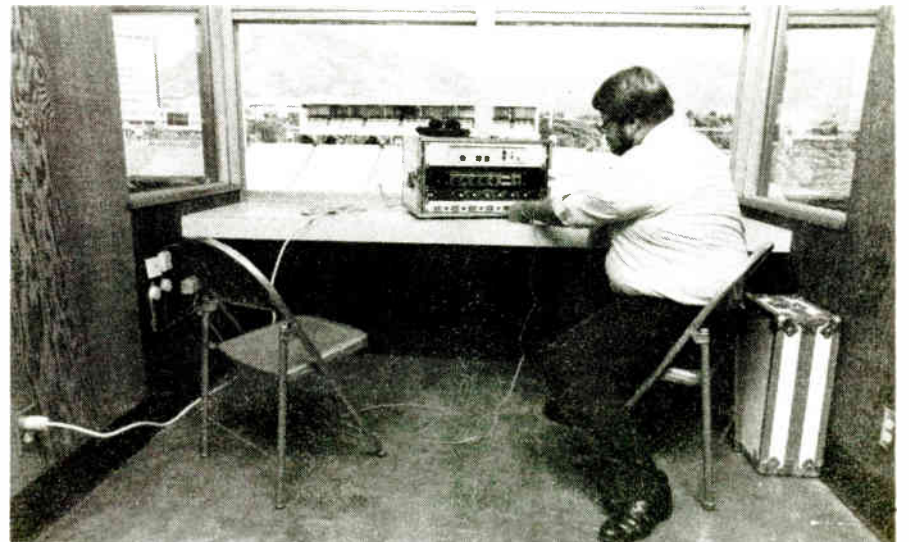
3. Remove the front cover.



4. Remove remaining accessories from front cover foam insert.



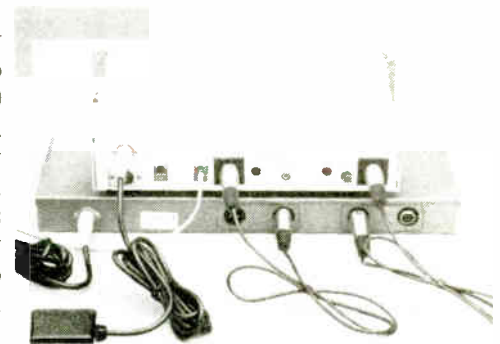
5. Plug in the single power cord. We've provided a 25' extension cord for your convenience.



6. The telephone line and your telephone set both plug into modular jacks on the interface panel. (Gentner remote systems will work with most cellular phones as well.) A 20' modular telephone cord is provided.

## Studio Set-up: Fast and Easy

The studio end of your Gentner Remote System can be set up quickly. The EFT-900 or EFT-1000 and Teleprocessor are connected by the provided XLR cables; power transformers plug into standard wall outlets. You simply run XLR cables between the Teleprocessor and your console, connect the phone line to the EFT and you're ready to go on air!







7. Connections to equipment are made via the interface panel.



8. Pick up the phone and call the station.



9. Once the call is established, press the "LINE" button on the EFT-900 or EFT-1000\* in the case. This disables the telephone set, placing telephone audio on the headsets and enabling you to speak via microphone.

The studio operator now brings up remote audio in "audition" and sends mix-minus audio from the console back down the phone line. Depression of a couple buttons on the studio and remote EFT units\* enables the circuitry that improves the audio quality of the broadcast.

A COMPLETE TWO-WAY COMMUNICATION PATH HAS NOW BEEN ESTABLISHED, with good quality audio at both ends.

\*EFT-1000 units can **automatically** answer the line and enable the "frequency extension" process. This is a good benefit for stations that have a limited staff or that want to have the remote audio available from another room. EFT-900 units require manual answer and the pressing of two buttons to enable frequency extension.



10. For the next 20 to 25 minutes, you monitor on-air audio and receive cues and other information from the station. Levels are set; the broadcast is ready to go on air.

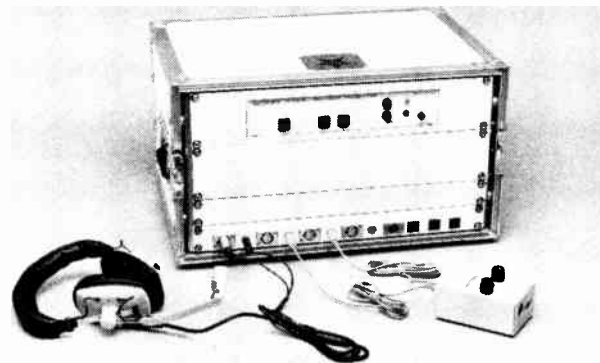
At air time, you will hear the final cue in your headsets:

"...and now, live from the regional playoffs, here's Sports Central."

From this verbal cue, the remote is on air. Since you're monitoring the telephone line, any cues or problems will be immediately noted.

When the remote is completed, you can be out of the facility in a minimum amount of time. Simply unplug the few cables, replace the accessories in the ends and rear of the case, close the case and leave.

With a Gentner Remote System, you save valuable set-up and tear-down time, no matter how complex the remote. The equipment you need is always on hand so even last minute remotes will be easy!



The Microtel provided in your Gentner Remote System can be used to provide a second mic/headset input, if desired. As shown above, simply connect the Microtel to the interface panel with the provided cables, then connect your mic and headset directly to the Microtel. Mic and headset levels are controlled directly from the Microtel.

## Gentner EFT's - The Heart of Gentner Remote Systems

Although Gentner Remote Systems are packaged to give you the convenience of a single case and FAST set-up, a single piece of equipment does virtually all of the work. That equipment is the Gentner EFT-900 or EFT-1000 in your case.

The EFT contains all of the components critical to your remote broadcast - the telephone coupler(s), connection for the telephone set, mic or mic mixer inputs and headset outputs. In addition, it's responsible for the quality improvement of the telephone audio (see page 7).

### Two-Way Communication Capability

Both the EFT-900 and EFT-1000 allow the remote site to communicate with the studio, using the built-in two-way capability of the telephone line. Audio quality is improved in both directions, reducing "listener

fatigue" for the remote talent as well as your listeners.

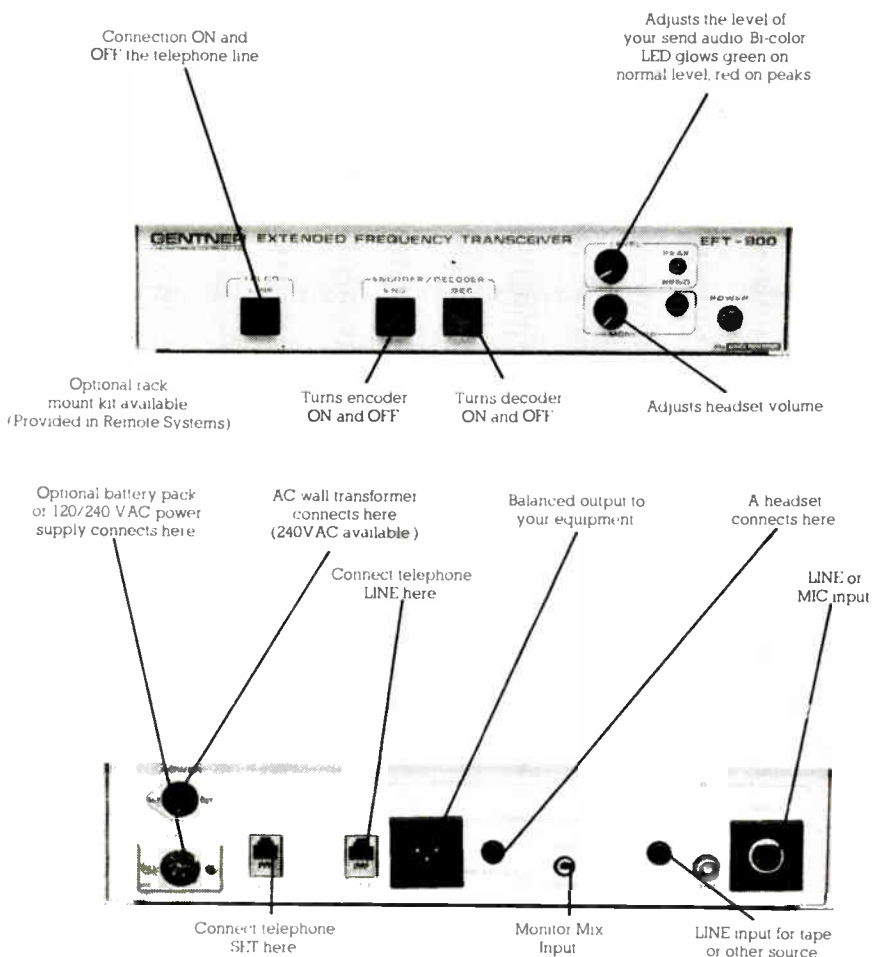
### Need Continuous Return Cues?

Although the EFT allows two-way communication, a single line can't provide CONTINUOUS return cue audio from the station - anything sent down the line will be heard on air unless the receive audio is muted during the cue. Many remotes don't require continuous return audio, information can be exchanged during breaks.

If your application requires continuous return audio from the station, you'll need a Remote System with EFT-1000 units at each end (Cases #3, #6 and #9). The EFT-1000 has two telephone couplers, allowing independent "send" and "receive" paths for the broadcast.

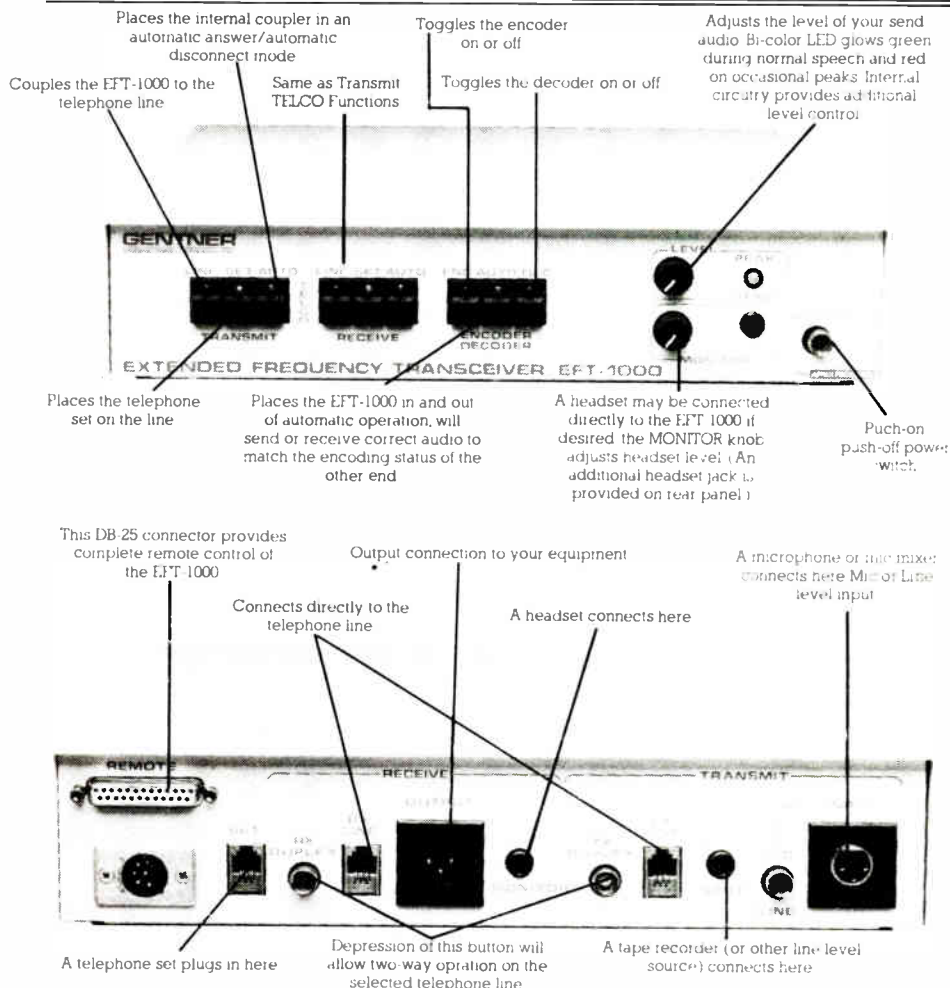
# Component Specifications

## EFT-900™ Extended Frequency Transceiver



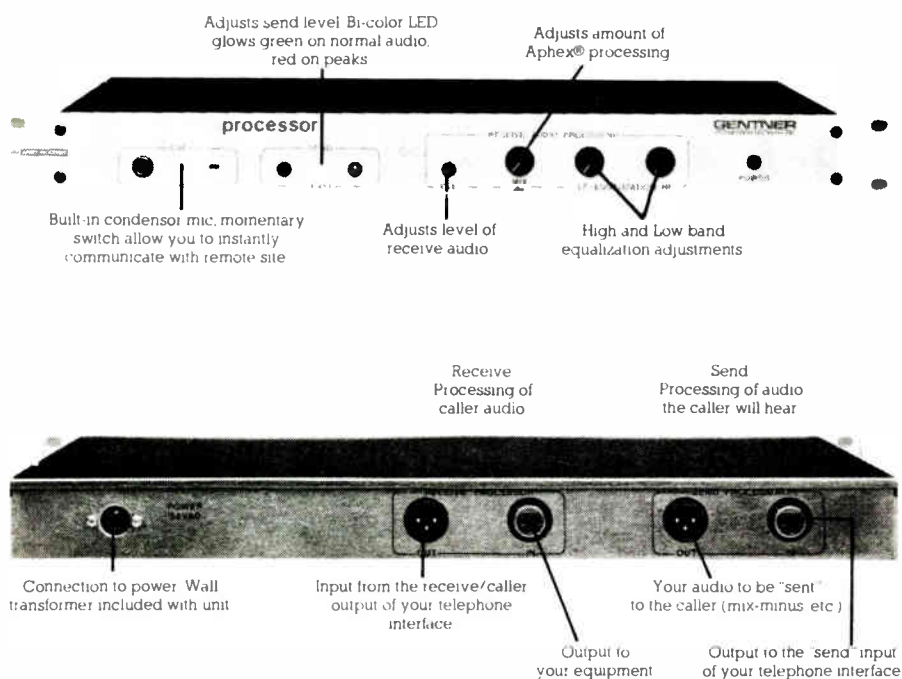
- Built-in telephone coupler
- Two-way communication capability
- Inputs for mic or mic mixer with front panel level control
- Aux input for tape or other source to be sent down the phone line
- Monitor mix input places another source on headset output but not on phone line
- Built-in headset amplifier with front panel level control
- "Frequency Extension," noise reduction, sharp filtering improve telephone audio
- Compatible with EFT-900, EFT-1000, other single line frequency extenders

## EFT-1000™ Extended Frequency Transceiver



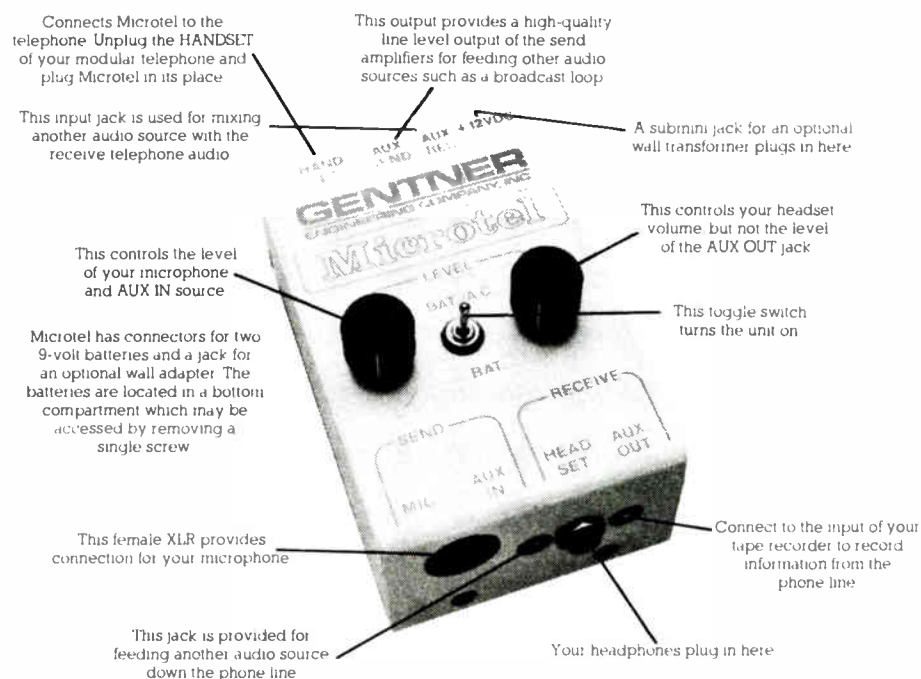
- Two internal telephone couplers allow independent send/receive paths or feeding two locations
- Two-way communication capability on either coupler
- "Frequency Extension," noise reduction, sharp filtering improve telephone audio
- Auto-answer, auto-disconnect capability
- Automatic "Frequency Extension" encode/decode capability
- Inputs for mic or mic mixer with front panel level control
- Auxiliary line level input for tape or other source
- Built-in headset amplifier with front panel level control

## Teleprocessor™



- Use with "receive" or studio telephone equipment
- Connects between console and EFT equipment
- High/low band EQ, Aphex® enhancing add further improvement to telephone audio quality
- BUILT-IN CUE MIC, momentary switch allow instantaneous cueing of remote site, interrupt receive audio
- Maintains consistent send/receive audio levels

## Microtel™ Portable Telephone Interface



- Use for additional mic/headset input or as Remote System backup
- Allows easy feeding of reports with taped actualities
- Replaces HANDSET of modular telephone
- Inputs for Mic, line, aux sources
- Outputs for headset, tape recorder
- Runs on standard 9 Volt battery

### Star Cases

Available in 7" and 10.5" rack sizes. These cases provide good travel protection for your equipment and allow you to keep all equipment you need in one case. Gentner will provide a pre-wired interface panel with your case.

### Thermodyne "Rack Pack" Cases

Also available in 7" and 10.5" rack sizes, these cases provide an added measure of protection for your equipment. Unique "shock mount" case absorbs all vibration on impact, keeping equipment safe even if case is dropped or hit. Pre-wired interface panel is provided with case when purchased from Gentner.

## Cellular, Battery Interfaces Add Freedom to Remotes

From time to time you'll want to do a remote from a location that doesn't have standard power and telephone services...for example, a parking lot - the middle of a lake or the gorilla cage at the zoo. It's easy to do that remote if you have cellular telephone service and a Gentner Remote System.

Cellular telephone service, now available in most metropolitan areas, takes away the need for "installed" telephone lines when doing a telephone remote. A cellular system operates through a network of short range radio links from the field to "cells", which route the signal to a central processing site, and then onto the regular telephone system.

Gentner Remote Systems work well with most cellular phones for single and multiple talent remotes. However, since our systems are designed to connect directly to the telephone **line**, an interface is required between the Remote System and the cellular telephone. One such interface is the Morrison & Dempsey ABIX, which connects between the cellular phone and its handset. The ABIX is available from Gentner or your broadcast distributor and lists for \$395. Call our Sales department at (801) 268-1117 for detailed information on the ABIX and a list of compatible telephones.

Using the Gentner Remote System over a cellular phone link is no different from a standard telephone line; just pick up the handset of the cellular phone and call the station. When they answer, put the EFT-900 (or EFT-1000) on line and put the handset back on its cradle. You could also connect a standard telephone to the SET connector on the EFT, making operation identical for both regular phone lines and cellular lines.

Operation away from AC power sources can be accomplished with Gentner's optional battery interface. This unit powers the EFT-900 or EFT-1000 in the remote case for up to four hours. It lists for \$495 and may be ordered from Gentner or your distributor.

## HELP! I Can't Get to the Phone Line!

What do you do if you get to the remote site and the phone system you need to tie into is more complicated than the Space Shuttle? There are three possible solutions:

- 1. Use a single line PBX extension.** Most modern digital phone systems have single line telephone extensions. These extensions can be directly connected to a Gentner Remote System.
- 2. Use a Gentner Handset Interface.** A Gentner Handset Interface (optional) allows you to interface to most telephones that are equipped with a modular handset cord. To do this, you simply unplug the handset,

## Gentner Remote Systems Package Comparison Chart

REMOTE CASE:									
Package #	#1	#2	#3	#4	#5	#6	#7	#8	#9
7" Case	•	•	•						
10" Case				•	•	•	•	•	•
EFT-900	•	•		•	•		•	•	
EFT-1000			•			•			•
Microtel	•	•	•	•	•	•	•	•	•
Microtel Cables	•	•	•	•	•	•	•	•	•
Interface Panel	•	•	•	•	•	•	•	•	•
Mic Mixer							•	•	•
Headset Amp							•	•	•
20' Phone Cable	•	•	•	•	•	•	•	•	•
Power Strip	•	•	•	•	•	•	•	•	•
25' Ext. Cord	•	•	•	•	•	•	•	•	•
STUDIO END:									
	#1	#2	#3	#4	#5	#6	#7	#8	#9
EFT-900	•			•			•		
EFT-1000		•	•		•	•		•	•
Teleprocessor	•	•	•	•	•	•	•	•	•
XLR Cables	•	•	•	•	•	•	•	•	•
20' Phone Cable	•	•	•	•	•	•	•	•	•

plug it into the interface, then connect the Remote System to the interface. The Handset Interface simply converts the four wires of the telephone handset into a simulated two wire telephone line. The Remote System won't know the difference, and will operate normally.

**3. Use a cellular telephone.** If you simply can't access the phone line, you might try using a cellular phone for the remote (see article, this page). The quality of most cellular broadcasts are as good as with standard phone lines. An interface is available that will make your Gentner Remote System work with the cellular phone.

## What is Frequency Extension??

In reading this guide, you'll see many references to the term "frequency extension" and its use in improving telephone audio quality.

A standard dial-up telephone line has a limited bandwidth of approximately 300Hz to 3300Hz. While this bandwidth is adequate for voice communications, it cuts off about 2½ octaves of low frequencies crucial to the "natural" sound of the voice. The result is tinny or hollow sounding audio, especially with a male voice. For this reason many broadcasters tend to shy away from using dial-up lines for remotes.

Frequency extension, or audio bandwidth extension, recovers these low frequencies to make telephone audio sound more natural. Audio frequencies are encoded, or shifted up, by 250Hz before being sent down the telephone line. This places

(Continued on page 8)

## Improve Visibility, Make Money with Gentner Remote Systems

— by Gary Crowder —

As a former General Manager and station owner, I'm excited about what a Gentner Remote System can do for your station. These systems can be the perfect way for your station to be more visible in the community and increase sales at the same time.

Because Gentner Remote Systems are so fast and easy to set up, you can now do remotes from virtually any place with a telephone line. With cellular telephone capabilities, even more sites are available.

Make your station visible...easily. Do a remote broadcast from Election Central...report directly from the county fair. Be at that shopping mall's grand opening. Gentner Remote Systems allow you to be several places in one day, so you can make all of the store owners happy.

One station we know of had a promotion that had a "DJ Hunt" several times a day on selected weekends. The talent went to a location and then did "break-ins" giving clues to where they were. The first five people to find the DJ received a prize from the sponsoring business.

Local sports coverage presents another opportunity to be involved in the community, and increase your sales at the same time. All you need for a remote is your Gentner Remote System and the talent. Set up can be done in less than five minutes and there's no need to order a special "broadcast line"...just use a standard

line in the facility. Sell the remote to local sponsors and increase your station's revenue!

News reporters will like the neatness of a Gentner Remote System. Set it up quickly in that crowded press room without tangled cables to trip people. Do those special interviews. Our system's unique two-way ability allows your anchor to be involved in the interview as well as the reporter on the scene.

Your promotion and on-air staff will have a great time thinking of ways to use a Gentner Remote System. I'd like to hear your ideas... give me a call!

## Uses for Gentner Remote Systems

- Sports remotes (either the whole game or "break ins")
- Election Returns
- Grand Openings
- Special "in-store" sales and promotions (make your best clients happy)
- News reporting or special event coverage
- Multiple store remotes within a shopping mall
- Out-of-town remotes using low cost telephone lines
- Fairs and carnivals
- Church events
- Talent showcase or special appearances

(Continued from page 7)

critical low audio frequencies within the bandwidth of the telephone line. At the other end, the audio is decoded, or shifted back down.

By using "frequency extension" equipment, it is possible to do a good sounding telephone remote without having to order special "broadcast quality" telephone lines.

Gentner's EFT-900 and EFT-1000 Extended Frequency Transceivers utilize this "frequency extension" process along with sharp filtering, noise reduction and Aphex® enhancing to obtain the maximum possible quality from the telephone line.

### Standard Accessories Kit

All packages contain the following accessory items:

- (1) Power strip (mounted in the case)
- (1) 25' Extension cord
- (2) 20' modular telephone cords
- XLR cables for Teleprocessor connection
- Microtel connection cables
- Foam inserts for ends and rear of Star Case to protect equipment and your accessories

The following equipment is NOT included in our packages:

- Microphones/mic stands
- Microphone cords

### Headsets Telephone

Several options are available

### Want to "Roll Your Own?"

All equipment described in this Guide is available individually from Gentner or your distributor. We will

### Gentner - Broadcast Telephone Specialists

Gentner has the broadcast industry's largest line of telephone interface equipment. Telephone products include:

Microtel - a portable telephone interface that replaces the handset of the telephone for news or sports reporting, hands-free telephone use.

TC-100 - a versatile, inexpensive telephone hybrid for on air use, "listen" lines, request lines, automatic news feeding or recording.

SPH-3A - a telephone hybrid designed for easy installation and operation. Use for on-air calls, news interviews, talk shows.

SPH-4 - Good for on-air telephone calls. Features quiet connection to the telephone line, studio monitor dimming to help reduce feedback, "caller control" circuitry that automatically reduces level of caller audio when talent speaks.

Digital Hybrid™ - Gentner's newest and the industry's best hybrid. This telephone system uses Digital Signal

for your Remote System package. See descriptions on page 7 of this Guide.

be glad to prewire your equipment in a case for a small fee. Please note, however, that our package prices offer a good discount compared to purchasing all of the components individually.

Processing technology to achieve the maximum separation between caller and "send" audio; it maintains consistent send and caller levels; sharp filtering cleans up the sound of the phone line. This product gives you dependable telephone audio, call after call.

Telemix X - A multi-line, on-air telephone system that handles up to 18 lines for talk shows, contests, etc. This system's modular design allows you to configure your on-air phone system to your exact needs.

Other telephone related products made by Gentner include the Remote Systems, EFT-900, EFT-1000 and Teleprocessor (described in this flier) and the VRC-1000 Remote Control Unit, which allows transmitter remote control via the dial telephone network.

For more information on these products, call your broadcast distributor or call Gentner at (801) 268-1117.

### Gentner Remote Systems

### Suggested List Prices August 20, 1987

Product	List Price
PACKAGE #1	\$2,995.00
PACKAGE #2	\$3,495.00
PACKAGE #3	\$3,995.00
PACKAGE #4	\$3,095.00
PACKAGE #5	\$3,595.00
PACKAGE #6	\$4,095.00
PACKAGE #7	\$3,875.00
PACKAGE #8	\$4,395.00
PACKAGE #9	\$4,895.00
Custom Remote Packages	
Prices start at \$4,995.00	
Handset Interface	
Option	\$195.00
Cellular Interface	
Option	\$395.00
Battery Pack	\$495.00
EFT-900	\$939.00
EFT-1000	\$1,599.00
TELEPROCESSOR	\$499.00
MICROTEL	\$219.00
7" STARCASE	
With interface panel	\$435.00
10" STARCASE	
With interface panel	\$470.00
8" Thermodyne case	
With interface panel	\$715.00
10" Thermodyne case	
With interface panel	\$775.00

All prices and specifications are subject to change without notice

### Gentner Remote Systems Are Available Through These Broadcast Distributors:

- Allied Broadcast Equipment
  - Richmond, IN (317) 962-8596
  - Atlanta, GA (404) 964-1464
  - Chicago, IL (312) 470-0303
  - Dallas, TX (214) 423-8667
  - Los Angeles, CA (818) 843-5052
  - Seattle, WA (206) 838-2705
  - Northeast Rep: (609) 299-0448
  - Toronto, ON, Canada (416) 731-3697

- The Audio Broadcast Group
  - Grand Rapids, MI (616) 452-1596
- Bradley Broadcast Sales
  - Gaithersburg, MD (301) 948-0650
- Broadcasters General Store
  - Ocala, FL (904) 622-9058
  - Carol Stream, IL (312) 231-7120
  - Marietta, GA (404) 425-0630
- Broadcast Supply West
  - Tacoma, WA (206) 565-2301
- Crouse-Kimzey Co.
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# Audio Gain Control Easy To Assemble

(continued from page 19)

adjustment of the output level (the 5K pot on its input).

The power supply can be  $\pm 5$  VDC to 15. At 15 V this can deliver +10 dB into 600 ohms. It will drive much lower resistances.

The input includes a ferrite bead and small capacitor to reduce RFI. The input pot controls at what point on the gain curve the device operates.

## The circuit board

The device using the printed circuit board in Figure 2 fits neatly in many cases. The IC socket is a single 16 pin, and most parts are mounted upright. Figure 3 shows the parts layout.

The LDR is a Radio Shack 276-1657 cadmium sulfide photo resistor (five cost \$2). In darkness it runs about 28K.

In full light it can reach 250 ohms. I ground a stock red LED flat down to just above the LED junction, and "super glued" it to the LDR.

Paint it black, and if you must use it in ambient light, cover it in some way. Outside light causes the gain to be reduced without reason.

LED 2 is left in the open so that you can see when gain is being reduced. Significant gain reduction is indicated when the LED is just visible.

You can change the input pot, R1 and R2 to alter the transfer characteristic.

## Maximum gain control

With R1 at maximum and R2 at minimum we have maximum gain control. Here any signal in the 50 dB range comes out within  $\pm 3$  dB, as in the graph in Figure 4.

The LDR is fairly slow to react so while gain control is fast, it does not compress a great deal or pump slowly.

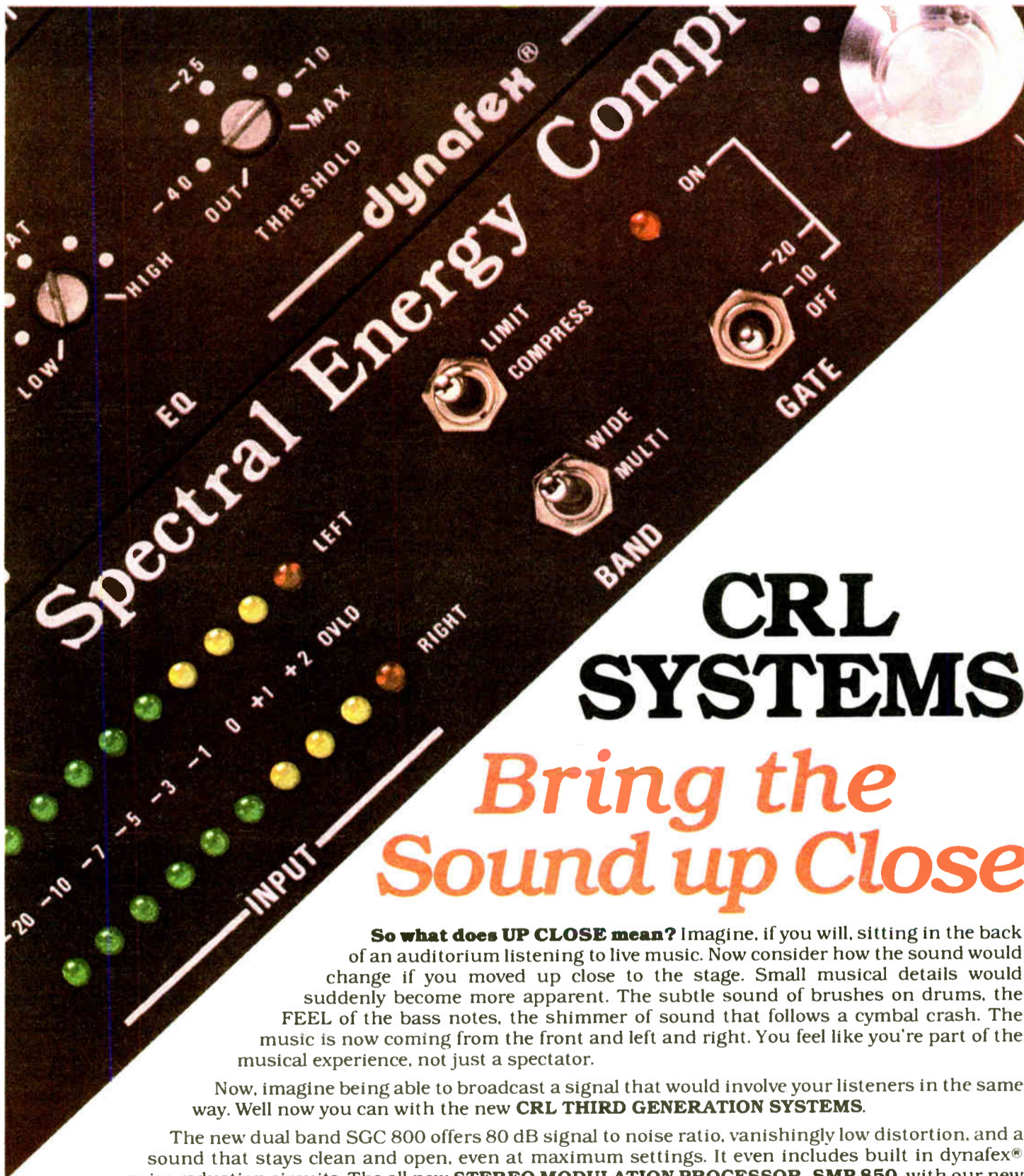
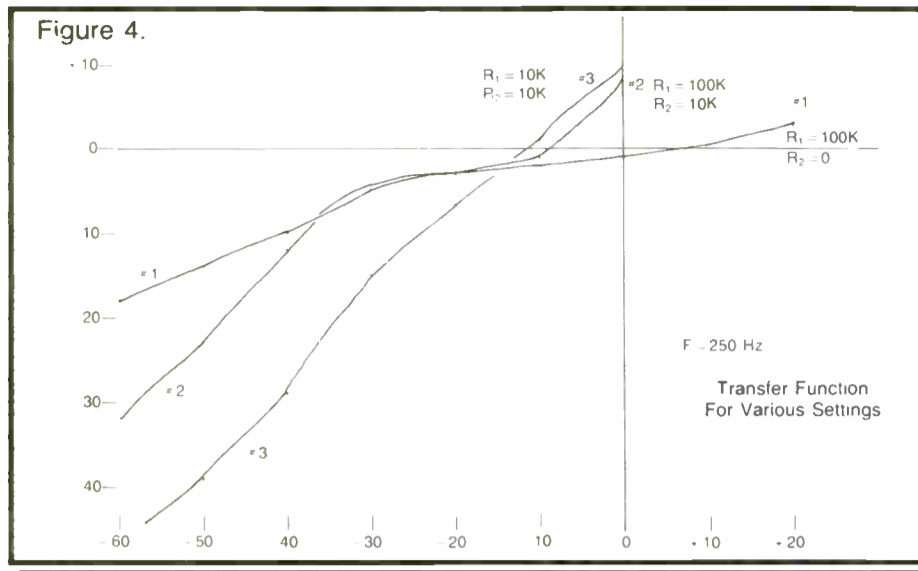
The test point, TP, can connect to a small capacitor to slow down the gain

control. It can also be used to gate the device as a positive signal here will cause minimum gain.

The design emphasizes easy to obtain components, low cost, small size and ease of construction at the expense of some control (gate, compression, limiting) and quality (distortion runs 3%).

While not designed to be an on-air device, in a pinch anything can be. Tie the TP's together on two units for stereo.

If your experience with active audio is a limited, this is a good learning project.



# FM Revamp

(continued from page 17)

Of course, that study was conducted prior to Docket 80-90, which created allotments for nearly 700 new FM stations.

As those allotments are authorized, the average spacings between all adjacent and co-channel stations will decrease.

For now, by employing a directional transmitting antenna, FM stations could reduce their radiation in the direction of a critical service to that equivalent to a minimally-spaced non-directional FM service.

This approach would allow stations greater freedom to locate their transmitter sites, supposedly without causing more interference than would be technically possible between two stations at minimum separation with maximum facilities.

The second article on MM Docket 87-141 will discuss the audio SNR that results from S/I ratios of 20 dB (co-channel) and 6 dB (adjacent channel).

We'll also address the question of how much interference is statistically possible from minimally-spaced FM stations, directional antenna performance, and related matters.

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# CHAM Puts R-DAT On the Air

by Rob Meuser

**Hamilton ONT . . .** CHAM radio has become one of the first, if not the first station in North America, to put R-DAT—digital audio tape—technology into regular usage.

At present R-DAT technology is being used for some music, some program segments, and any other task deemed appropriate at the station.

The primary purpose at this point is to put as much wear as possible on the machine and tapes so that wear patterns may be determined.

A fully digital live performance recorded directly onto the R-DAT format is being planned with the co-operation of Rainbow Sound, Niagra Falls, Canada.

## Instant access

Where does R-DAT technology fit into the radio station of the future? This question does not have any direct or easy answer.

R-DAT has tremendous capabilities, the most important for commercial radio being that of instant access of program segments.

*Rob Meuser runs International Broadcast Support Services, an international broadcast consulting firm. He can be reached via MCI Mail #325-3672 or by calling 416-692-3330.*

R-DAT subcodes allow the machine to access any one of 99 program codes, at up to 200 times normal speed.

In practice, this means that you can give the machine a cut number, and it will go to that cut in less than 20 seconds from anywhere on the tape.

The ability to rapidly locate cuts makes R-DAT the awaited replacement for the cart, or so it might seem.

There is no question as to the audio performance of R-DAT, since it uses a 16 bit linear coding, similar to CDs. The sampling rate is 48 kHz, rather than 44.1 as on the CDs.

## Home players

R-DAT equipment currently available is of the home variety, as were the early CD players.

It is necessary in most stations to provide a proper unbalanced to balanced line converter for such equipment.

Many R-DAT features planned for the future, and imbedded as standard in the R-DAT coding, are not presently available.

Most missed is the access to the vast amount of subcode information allocated in the R-DAT code. Subcodes would allow for plain text encoding of program titles or commercial names along with the audio.

Remote control is presently limited to the infrared remote unit supplied with

the player.

Sony Canada has announced the release of a professional version of the R-DAT machine for this month.

While the unit offers balanced outputs and playback of subcode information, it cannot record subcodes and it only offers a hardware style remote control.

Actually the "professional" unit is comprised of an add-on chassis to the existing home unit. In many ways, it is a disappointment, especially at almost three times the price of the consumer

“ “ —————  
*The digital future for radio is here.*  
 ————— ” ”

unit (\$6500 Cdn).

For now, I am sticking to the home units.

## Good for radio?

Unfortunately for broadcasters, Sony does not seem to have a clue about the real value of this machine. The company seems to be concentrating on the recording end, with plans to introduce the portable unit shown at the NAB and various other shows.

In the film and TV industries portable R-DAT might be more popular, but the sales volume probably wouldn't equal that which would be generated by a good radio machine.

The problems of R-DAT for now (and in Sony's schedule for the next three years) include the lack of a fully interchangeable remote control—one that indicates when the machine is in various modes—as well as no remote ability to select cut numbers.

Another shortcoming is the machine must be placed in "pause" before you have it seek out a new cut, otherwise it cues and goes directly into play. Also, there is no RS232 control or tally.

Incredible editing capability is possible with this system, but the hardware for that, too, is way off in the future.

At CHAM, the remote control problem will be solved by the use of a microcomputer board that translates RS232 into the Sony Circs code, used on all the company's consumer products.

Unfortunately, without major hardware modifications, reading the machine will not be possible.

Where does R-DAT stand at this moment? Other than supply problems for Americans (the rest of the world is now getting equipment), R-DAT could be used right now for delivery of both music and commercials.

All that is necessary is to select cuts as is now done on CDs.

The real future of R-DAT will be in its ability to fit into the computer control systems now coming on the market.

The shortcomings previously listed must be solved first, however. Interfacing and using R-DAT in digital control systems will require a new way of thinking about commercial control and spot production.

Another open question at this point is that of head wear and rotary head maintenance. R-DAT is more mechanical than CD.

Where CDs are read by a laser that never touches the disc, R-DAT has spinning heads that contact the tape and create wear. The same maintenance procedures as those of VTRs are required. The maintenance interval is not yet known.

## DAT vs. carts

What advantage does this machine offer over conventional carts at the moment?

Other than smaller storage space and lower tape costs, R-DAT provides better certainty against uncued program material than carts.

The drastically reduced noise level relative to tape is an immense help to audio processing, in the same manner as CDs.

The improvement is especially noticeable on AM where there is generally much greater compression than FM. In wideband AM stereo, drastic improvement is noticed with any digital source.

The digital future for radio is here and R-DAT is just one of the many emerging technologies.

It is refreshing that once again Canada has managed to avoid the legal snares facing the US (as was done with the AM stereo question) and will have this technology openly available for all to try.

For those wishing to get into R-DAT, Digital Audio Technology Ltd, Box 303, Binbrook, Ont L0R 1C0, Canada, will provide interim assistance as far as possible to help American stations obtain the equipment.

At the moment there are no "deals" on this equipment and you are advised that if you can find it elsewhere, especially if that "elsewhere" is in the US or Japan, then do it.

We'll have more info on the uses of R-DAT and other digital systems in future issues of *RW*.



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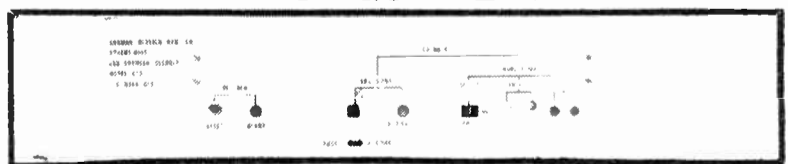
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# Noise Can Be Put to Good Use

by Tom Vernon

**Harrisburg PA** ... Whether you're designing circuits or tweaking amplifiers for ultimate performance, noise and distortion are usually viewed as the darker side of electronics.

With diligence they can be reduced, but never quite eliminated.

Surprisingly noise isn't always bad. This month "Station Sketches" finds some good things to say about noise, offers some circuits to build so you can make lots of noise on your own, and suggests ways to put noise to good use.

Noise is usually defined as any unwanted signal.

More specifically it is a randomly occurring signal characterized by its frequency spectrum and amplitude distribution.

Noise generators are available for audio and RF testing. Figure 1 shows a simplified schematic of a General Radio 1390-B random noise source.

Basically random noise is generated by V2, amplified by V3, and filtered for the desired bandwidth.

In the 20 kHz position the noise spectrum is rolled off above 30 kHz by a low pass filter.

Similarly, in the 500 kHz and 5 MHz positions other filters limit the noise bandwidth. Figure 2 illustrates these frequency response curves.

After leaving V4 the noise is metered and passed through a calibrated attenuator.

## Station Sketches

The maximum output is about 3V in the 20 kHz band, 2V in the 500 kHz band, and 1V in the 5 MHz band.

Impedance of the generator is 900 ohms, and these output amplitudes represent a noise level of 122 dB above resistive noise at the same impedance level.

Audio applications for noise generators include speaker and microphone analysis, acoustical room analysis (usually in conjunction with a spectrum analyzer), filter tests and tape recorder maintenance.

Figure 3 shows a white noise generator derived from a Walt Jung publication.

It does not have all the bells and whistles of the one just described, but should prove useful around the station.

Output is 1V p-p into a 600 ohm load. Construction and component values are not critical.

Audio noise generators often have a selector switch for white or pink noise. White noise has equal power per hertz, while pink noise has equal power per octave. Thus its power density drops at 3 dB per octave.

This curve approximates the power in music, with less energy per hertz with increasing frequency. This is what makes pink noise an excellent vehicle for testing sound systems and audio devices.

Noise also has practical applications in RF. One of the most useful tests is in receiver alignment.

Alignment adjustments or component

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

Figure 1.

Simplified schematic diagram of General Radio 1390-B noise generator. The magnets around V2 reduce oscillations and increase noise output at higher frequencies.

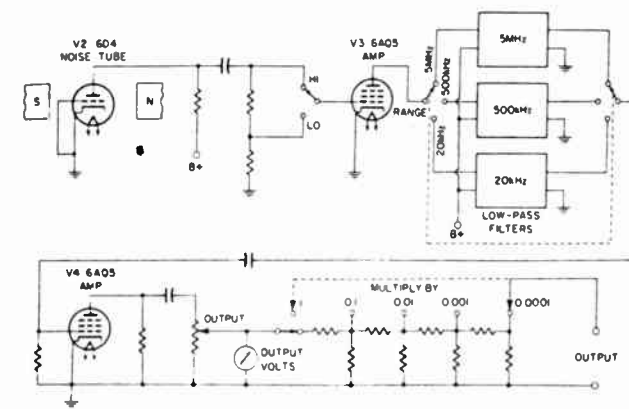
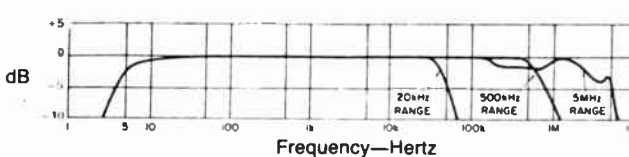


Figure 2.

Frequency response of the 1390-B illustrating effect of each of the three low pass filters.



changes in the RF stages can have a profound effect on the SNR

With conventional alignment procedures it's hard to tell if circuit adjustments have improved the SNR, or just increased the gain (and noise) of the receiver.

The RF noise generator is useful in solving this dilemma. The generator is connected to the receiver's antenna terminals.

The receiver is operated with AVC off and the RF gain control at maximum. The output from the speaker terminals at this time is the receiver noise.

The generator is turned on and the gain adjusted until the output measured across the speaker terminals doubles.

The output from the noise generator is then measured and subsequent alignment adjustments are made for this 2:1 noise ratio with minimum output from the noise generator.

Figure 4 illustrates a low cost RF noise generator.

Again, construction isn't critical, but the 1N21 diode is easily damaged by excessive heat, so take appropriate precautions.

A few words about measuring noise are in order. The most accurate way to do this is with a true RMS voltmeter.

You must be sure that the meter you're using has the response to handle the frequencies you are interested in.

Some meters have a response that rolls off around 20 kHz, others are flat out to 100 kHz.

Using a meter with too limited a bandwidth will give false low readings.

The crest factor of the meter is also important. This is the ratio of peak to RMS voltage that can be accurately measured.

A crest factor of 3:1 or better is required for measuring random noise.

Information on bandwidth and crest factor can usually be found in the meter's documentation.

For metering noise in the megahertz range, an oscilloscope may be your only option.

Here accuracy is compromised some-

what because you're eyeballing the scope.

The RMS value will be about 1/6 of the p-p voltage.

A broadband source of random noise can be very useful for testing both au-

dio and RF devices.

While laboratory devices are available with frequencies extending into the gigahertz range, the simple devices described here have many good applications around the radio station.

Figure 3.

A simple white noise generator for audio applications. Circuit puts out 1 V p-p noise into a 600 ohm load. All transistors are 2N2925.

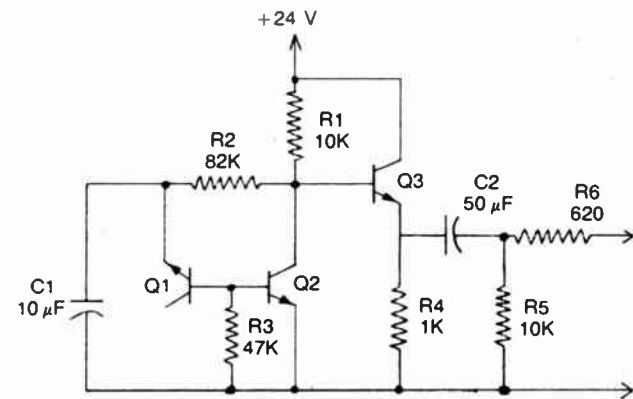
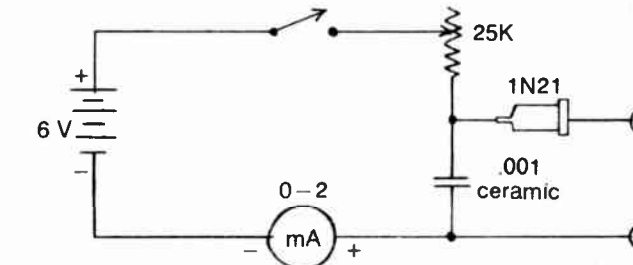


Figure 4.

Schematic of a simple RF noise generator. Be sure to build the circuit in a shielded enclosure. Source: Radio Amateur's Handbook.



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# Live, On-Air From Margaritaville

by Jeremy Burnham

## Part I

Los Angeles CA ... So ... Rick Dees was going to take his top-rated KIIS-FM morning show on the road again, this time to Puerto Vallarta, Mexico the second week of June.

A call to our friends at IDB Communications would easily provide us with high quality satellite program links in both directions.

All that was needed in addition was to work out the logistics of getting the equipment there and deciding on the exact location for the set-up.

### Scouting trip

A preliminary trip to the remote site is a must. I went with the travel agent who had set up a 650-person group to get down with the show.

The meeting with the general manager of Hotel Las Palmas provided all the information we needed along with introductions to others involved, such as security and electrical personnel.

After a nightmare of shipping equipment to ourselves in Mazatlan last year,

*Jeremy Burnham is Special Projects Engineer at KIIS AM/FM Los Angeles. His phone number is 213-466-8381.*

we agreed this time to ship everything directly to the hotel manager.

He was a Mexican national who would presumably have an easier time dealing with customs than we and who planned to hire a local customs broker.

After taking photos of possible broadcast sites we returned to Los Angeles.

### Packing up

Packing the Dees show for the road is a time-consuming task.

The equipment consists of a 24-input LPB Signature II console, six Fidelipac CTR-112 cart machines, two cases of carted drop-ins, a tool box and two cases of miscellaneous equipment including spare parts and wire.

Six custom Anvil cases house the broadcast gear.

Ryder International was engaged to act as our full-service domestic customs broker picking up the broadcast equipment at KIIS, the satellite equipment at IDB, completing all paperwork, and delivering everything to Mexicana Airlines.

The people at IDB got busy coordinating with the Mexican government, specifically the Secretary of Communications and Transportation and the Director of Telecommunications Systems to obtain permission and frequencies for using Morelos, Mexico's satellite.

The Ku-band uplink of 14.4705 GHz and downlink of 12.1705 were assigned along with IF frequency offsets for each of the three channels needed.

Don Gilmore from IDB and I arrived at Puerto Vallarta Wednesday afternoon.

All the equipment belonging to KIIS and IDB had arrived in perfect order. The hotel had arranged to pick it up and store it in a locked meeting room.

While I was waiting for a key, two coconuts fell from a 50' palm tree missing my head by inches. I made a note to myself to add a hard-hat to the remote gear.

Looking into the possibility of setting up the satellite dish on the roof of the hotel, we found the "perfect spot."

We ascended from the fourth floor through an access hole to the litter-strewn roof.

From there, the crumbly red clay tiles were parted exposing a bare concrete roof path across the main section of the hotel to a flat area next to an abandoned elevator motor house.

The area was the perfect size for setting up a satellite dish and associated equipment, and its location was almost directly above the broadcast site.

Physically getting the heavy and bulky equipment to the roof appeared to be an arduous task in that it would not fit through the roof access hole.

### Creative answers

I discovered that through room #405 the equipment could be passed across the balcony through an empty planter and lifted 9' directly onto the roof ... with the help of three bellboys.

The heavy cases of broadcast equipment were dollied down to room #1 to stay as my roommate.

Since the hotel's Mexican fiesta dinner did not start until 8 PM, I had plenty of time to set up all the equipment in the room.

The high temperature and humidity had caused the foam interiors of the equipment cases to get soft, allowing heavy items such as cart machines to sag to one side of the case.

Painted surfaces tended to stick together—I had to pry the legs of our console assembly apart with a screwdriver.

A malfunctioning logic board in a cart machine was the only problem I encountered. I slipped in a spare board and the KIIS remote studio was ready to go.

### Satellite set-up

I went to the roof to see how Don was progressing with the satellite equipment.

He had the Seavey 1-meter 37 dB gain flyaway dish on its framework and was adding the "petals" which increases the diameter to 1.8 meters and the gain eight times to 46 dB.

The hotel had agreed to provide us with a PA system. The one used for the fiesta stage show consisted of an Acoustic Model 215 amplifier and two Sunn 410S speakers. It was well-suited for our use.

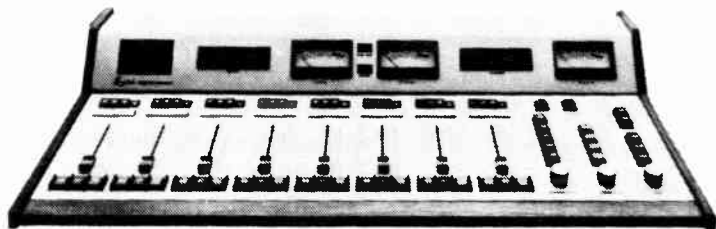
Thursday morning we conducted a bi-directional test via satellite to Hollywood. After a few minor problems were corrected, we broke for lunch.

Upon returning to room #1 to see if everything was still okay, I found the room smelling of phenolic smoke and the console dark.

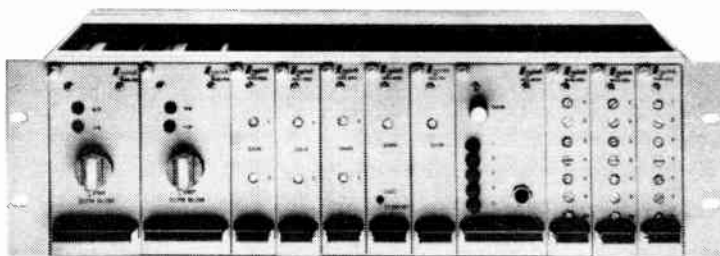
I opened it up to discover that the cue amplifier had folded its tent and taken out the main fuse in the process. I

*(continued on page 27)*

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# Methods For Array Adjustment

by Tom Osenkowsky

Brookfield CT ... In previous articles, I mentioned how an array can be mis-adjusted and still pass proof.

The only correct way to adjust an array calls for at least one variable to be identified and known. This variable is known as the sample system.

We must believe our antenna monitor before we can begin to theorize that our array is actually in adjustment.

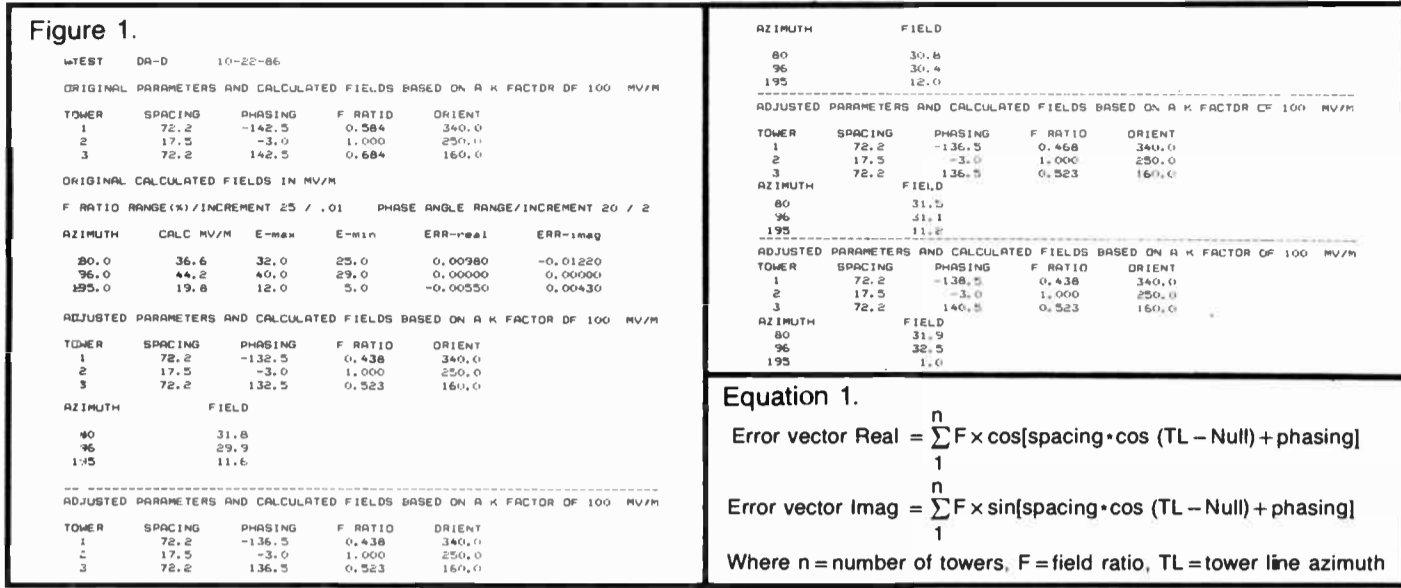
The previously discussed TALKIN computer program called for us to "talk down" our radials to zero field and then compute "error-vector" components based on the comparison of the theoretical zero field parameters and the actual antenna monitor readings.

I developed two computer programs, CRANK and SYMCRNK (Figures 1 and 2) to adjust an array with a minimum of phasor rocking.

### Theory vs. solutions

CRANK takes the theoretical parameters and error-vectors for each azimuth, and examines and extrapolates all phase and ratio combinations which

Tom Osenkowsky is a radio engineering consultant and president of MASTER Software, and a regular RW columnist. He can be reached at 203-775-3060.



Equation 1.

$$\text{Error vector Real} = \sum_{n=1}^n F \times \cos[\text{spacing} \cdot \cos(\text{TL} - \text{Null}) + \text{phasing}]$$

$$\text{Error vector Imag} = \sum_{n=1}^n F \times \sin[\text{spacing} \cdot \cos(\text{TL} - \text{Null}) + \text{phasing}]$$

Where n = number of towers, F = field ratio, TL = tower line azimuth

produce radiated fields falling within user-defined limits.

The permissible ratio and phase deviation windows are likewise user-defined. The search is centered about the theoretical parameters input to the program.

The TALKIN program is a problem-solver. That is, it solves for zero.

In developing CRANK, I considered using this approach, but the yield would have been only one solution, i.e. one set of operating parameters.

Both this method and the CRANK method may not actually be "right" for symmetrical arrays, though.

### A starting point

The two-tower pattern constitutes the building block for more complex, multi-tower symmetrical arrays.

By varying the phase angle of a two-tower array we can displace the null direction, but not alter its depth.

A phase adjustment may, however, produce the desired result on an FIM lo-

cated at the null. The null has been displaced, however.

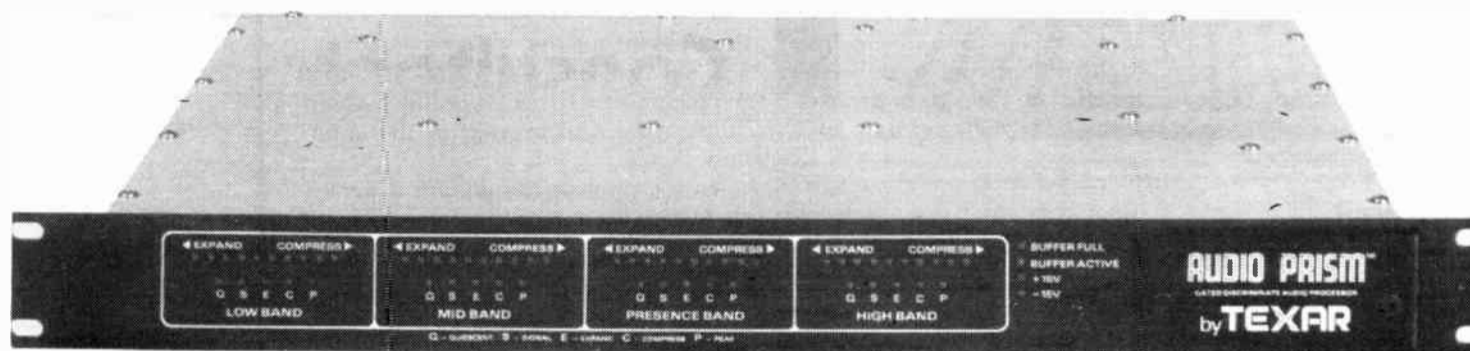
Once the null is centered about its azimuth, the only correct way to adjust the depth of the null is to adjust the field ratio.

SYMCRNK first breaks down the array into its original pairs and finds the minima associated with each pair.

The user may then specify how much change in field is desired. The new ratios are determined and then the ad-

(continued on page 26)

## ALL CD BY THE END OF THE YEAR!



That's the goal that many stations have set for themselves: to generate 100% of their music programming from CDs by the end of 1987. Using copyrighted station identifiers like "Lazer 104," broadcasters are able to position themselves in the listeners' minds as the high-quality music source. One promoted slogan is "Declare your independence from vinyl on July 4th 1987!" Surprisingly, it's not necessarily the big chain stations in major markets that are leading the charge. Medium and small market stations have shown themselves just as likely, if not more likely, to become leaders in their market.

Many of the early hurdles to on-air use of CDs have been removed. While early CD players were difficult to cue to music, making it impossible to run a tight air show, and were user-unfriendly, this has changed. Today's CD players (such as the Technics SLP-1200 and the Studer A725) feature instant start and incremental cueing, making it possible to cue exactly to any desired point in the music.

Many stations also questioned whether sufficient material, both oldies and current, existed on CD format to support all-CD operations. Oldies have come a very long way in the past few months. Several of the Beatles' albums have been released in CD format in just the past

few weeks, with more to follow shortly. And literally thousands of oldies titles are available on CD from Century 21 Programming in Dallas, Texas (214/934-2121). Each disc contains cuts from many different artists, so you don't pay for the album cuts that weren't hits. Each cut is a hit.

And more and more of the new release hits are being made available as a single-title CD. Under intense pressure from stations and also from influential program consulting firms like Burkhart/Abrahms/Douglas/Elliott, record firms are putting new emphasis on making hit releases immediately available on CD. Some record companies are getting the message slower than others, and are also finding themselves at a disadvantage when trying to get airplay for their new releases. Some stations simply won't add a title that is not on CD.

Why the big deal over CDs? Because today's listener has better equipment and is more quality-conscious than ever before. A higher-quality air product can translate into higher ratings and higher station revenues.

If you do or will originate a significant portion of your music from CDs, you should also consider the quality of your audio processing equipment. CDs deliver crisp, clear audio, but not all audio processors can preserve that quality. The digitally controlled TEXAR AUDIO

PRISM delivers the cleanest, powerful audio money can buy. All three networks have made multiple purchases of the AUDIO PRISM for their Owned and Operated radio stations. And the AUDIO PRISM has been the audio processor of choice for the top three rated FM stations in America's number one market, New York City, for seven Arbitrons in a row!

The secret? Digital control. Using digital technology allows the AUDIO PRISM to preserve the brilliance and quality of CD source material. On FM, the plug-in TEXAR Replacement Card Five (RCF-1) can add even MORE signal punch with no loss in quality.

For the complete story of how digital control can make you the quality leader in your market, contact your favorite distributor of high quality audio equipment, or call Barry Honel at (412) 85-MICRO.

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\*Summer and Fall '85, Winter, Spring, Summer and Fall '86, and Winter '87 ARBITRON Ratings. Total Persons 12+ Share, Mon-Sun, 6AM-12M. (Used with permission.)

# BROADCAST COMPUTING

## Analyzing Data With Your PC

by Peter Burk

**Harvard MA . . .** Most of the programs you find published for broadcast engineering involve calculations for various physical quantities based on well-behaved formulas.

Indeed, your computer is useful for calculating an STL path, transmitter ERP, or resistors for an audio pad.

Data analysis adds another dimension to your broadcast computing.

“ There is a wealth of information hidden in those logs.

Here, instead of using the computer to generate volumes of numerical results, we're asking it to help distill a mountain of data into a manageable set of answers that we can more easily comprehend.

### Transmitter parameters

Perhaps the most obvious set of data for a broadcast engineer to analyze is the operating parameters gathered from the transmitter on a periodic basis.

There is a wealth of information hidden in those logs, but most of it is too subtle to be seen directly.

The need for transmitter tuning, maintenance, or tube replacement can be

*Peter Burk is president of Advanced Micro-Dynamics and a long-time computer user. He can be reached at 617-433-8877, or via the bulletin board at 317-935-0531.*

seen with a high degree of confidence if the proper parameters are tracked and analyzed regularly.

The four steps to accomplish this (or any similar task) are:

1. Collect the observations
2. Compress and store the data
3. Analyze the data
4. Forecast

The first step, data acquisition, will be left for another discussion. For now, assume we have either manually or automatically acquired a computer full of observations.

Data compression is a necessary part of the process, since we would quickly run out of space if we attempted to store raw data for any long period of time.

A good way to deal with the storage problem is to allow the computer to progressively "forget" details as they get old, but remember the summary information.

An amazing amount of analysis can be performed on data that has been packed into three "summary" variables: the sum of the values, the sum of the squares of the values and the number of values.

We'll see why these are so useful when we analyze the data using statistical methods.

### Statistics

Statistics is a well-developed mathematics paradigm that allows us describe data easily and, through inference, draw conclusions from the observed data.

In its simplest form, descriptive statistics would allow us to say something like, "the average power out today was 12 kW." The inference we might make from that could be something like, "That's too high!"

Trend analysis would allow us to draw a more sophisticated conclusion; "The transmitter efficiency has been decreasing at the rate of 0.245% per day. Tube

replacement should be considered within the next five weeks."

We've already mentioned the most well-known characteristic, the average or mean of the data. As we all know, that's just the sum of the values divided by the number of values.

A measure of how much the data "bounces" around the mean is the variance or its square root, the standard deviation. This number tells us how likely it is that any particular observation is accurate.

In BASIC, the standard deviation can be calculated simply. First, assume we have the sum of the values in variable "B" and the sum of the squares of the values in "A".

## Additional Methods For Adjustment of Arrays

(continued from page 25)

justed pairs are remultiplied to produce the new final parameters.

In CRANK, we may enter the K factor (it defaults to 100) and, based on any error vectors, the present field is determined.

We then multiply that field by whatever percentage of adjustment we'd like to accomplish and let CRANK do its thing.

The end results are *all* parameters and radiation which fit into the user-defined limits.

The actual calculation of error-vectors is fairly straightforward. Equation 1 shows the method.

### Error vector results

A vector sum of 1/0 indicates that the parameters specified produce a zero null on the null bearing in the equation.

An error vector component is generated when the antenna monitor indicates anything other than the theoretical parameters.

This condition may result from unequal length sample lines, reradiators and other external factors.

One of the benefits of using TALKIN is that all of the above conditions are washed out in the adjustment process.

Next time we'll examine actual cases of moding an array. Until then . . .

If the number of values is N, then the variance is  $(A-B+N)/N$ . The square root of that is the standard deviation.

It is instructive to use your computer to experiment with these simple stats.

Write a BASIC program using a FOR-NEXT loop and DATA statements, or use the "what-if" capabilities of your computer using a database manager or a spread-sheet.

### Forecasting

Linear regression lets us forecast future performance based on a collection of data.

This is our ultimate goal, since the numbers would be pretty boring if we couldn't use them to improve future performance. This will be the subject of future *Broadcast Computing* columns.

As always, your comments and programs are welcome.

Figure 2.

TOWER INPUT DATA FOR WDEMO		
TWR #	F RATIO	PHASE deg
1	1.000	0.00
2	1.775	120.02
3	1.330	-116.28
4	0.404	0.71

INTER-ELEMENT SPACING (DEGREES) 100  
TOWER-LINE AZIMUTH (DEG TR) 310

ORIGINAL PAIRS		
PAIR #	FIELD RATIO	PHASE
1	0.780	171.25
2	0.721	86.13
3	0.718	103.32

NULL AZIMUTH DATA

PAIR # 1	MINIMA LOCATED AT 35 DEGREES
PAIR # 1	MINIMA LOCATED AT 225 DEGREES
PAIR # 2	MINIMA LOCATED AT 130 DEGREES
PAIR # 2	MINIMA LOCATED AT 290 DEGREES
PAIR # 2	MINIMA LOCATED AT 330 DEGREES
PAIR # 3	MINIMA LOCATED AT 270 DEGREES
PAIR # 3	MINIMA LOCATED AT 350 DEGREES

DESIRED FIELD CHANGES

PAIR #	XCHANGE IN FIELD
1	-12.5
2	2.5
3	-22

NEW PARAMETERS TO BE MULTIPLIED

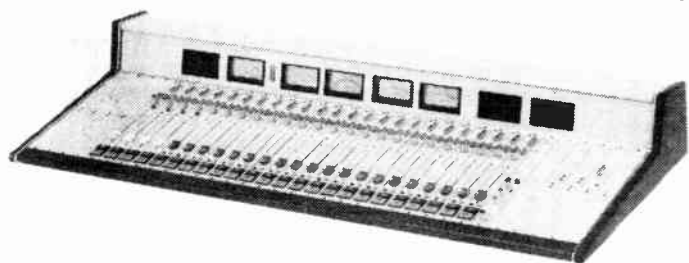
PAIR #	FIELD RATIO	PHASE ANGLE
1	0.878	171.25
2	0.703	86.13
3	0.877	103.32

NEW ARRAY PARAMETERS

TOWER	FIELD RATIO	PHASE ANGLE
1	1.000	0.00
2	1.973	121.20
3	1.620	-114.85
4	0.541	0.71



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RadioWorld

ALLIED

# Dees Remote Travels to Mexico

(continued from page 24)

replaced the shorted mylar capacitor with a spare.

Next came the matter of getting the emergency generator the hotel had promised to provide.

I went to the electric shop and found the unit lying on the floor in a million pieces, being overhauled by the hotel's electrician.

On the other side of the room was a massive diesel generator which looked big enough to power a small city.

"Is that for the hotel's emergency power?" I asked.

"Yes."

"Does it work?"

"No."

"Is it ever going to be fixed?"

"Who knows . . . maybe some time."

The following day the electrician brought our generator to the back door of room #1.

I don't know who originally made the unit, however it was powered by a Volkswagen bug engine which runs practically full throttle to produce a very solid 112 V (at some frequency).

The hotel electricians also made us a power-source switchover panel (using open knife switches) to our electrical specifications.

Our generator and U-grounds were connected to a brass rod driven into the wet ground next to a banana tree. None of the AC plugs in the hotel had grounds.

A final test of the whole system was

made the next day using the 129 V commercial power.

**Ready to roll**

I connected the PA system to the console using a Shure A95UF matching line transformer. This handy device accepts a male XLR plug and plugs into a standard phone jack.

The internal transformer eliminates any possible ground loops. Since the master gain control on the hotel's amplifier did not work, I padded down the console monitor feed to give a proper range on the input pot.

At this point both KIIS' equipment and IDB's satellite uplink/downlink were working perfectly and we were ready to go. Gee, it wasn't even the weekend yet!

Can it really be this easy? Stay tuned for Part II.

## NABET, NBC Meet in DC

(continued from page 12)

the FMCS "proved unproductive, and failed to budge the parties in their position to end the dispute."

In a 13 August telegram to NBC VP/Labor Relations Day Krolik, the NABET negotiating team recommended an "outside professional mediator" to preside over future negotiations.

Among the five names put forth by NABET as possible negotiators was former Watergate special prosecutor Archibald Cox, now a professor of labor law at Harvard University. William Usery, former US labor secretary, was also named.

Krieger said the NABET negotiating committee had felt it was time for a "bold move." He noted that recommendation of a new professional mediator could be a risk to NABET as well.

"In a situation like that, (the mediator) could write the whole deal for you," Krieger explained.

However, wire service reports claimed that NBC rejected the union's proposal. The network reportedly maintained that the role of mediator should properly be held by the Federal Mediation and Conciliation Service (FMCS).

Other NABET activity in the works at press time included a noontime rally showing union solidarity, planned for 27 August in Washington, DC.

Lane Kirkland, President of the AFL-CIO was slated to address the August rally, which was to take place in

Lafayette Park, across from the White House in the federal seat.

For additional information, contact John Krieger at 301-657-8420.

## Comtech's 3.8 Meter has the Extra Performance Margin Needed for Crystal-Clear Audio Reception. Why Settle for Less?

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face tolerance unequalled by mesh or other home-type antennas. The result is higher efficiency, optimum side-lobe performance and increased gain. This is the extra margin of performance that only a Comtech Antenna can provide. That's why literally hundreds of Comtech 3.8 Meter Antennas are operating today at radio stations throughout the U.S.

So why settle for marginal performance when you can have a performance margin today and in tomorrow's 2° spacing environment.

Allied Broadcast Equipment distributes Comtech Antenna systems to the radio industry nationwide. Call today for more information.

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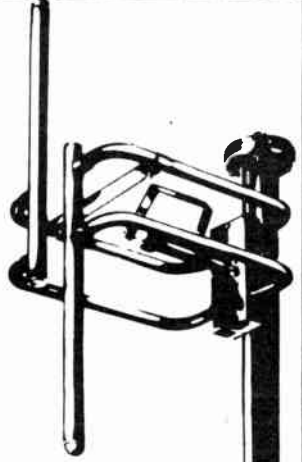
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Circle Reader Service 45 on Page 28

Circle Reader Service 43 on Page 28

# Radio World Marketplace

If your company has a new product you wish us to consider in *Radio World Marketplace*, please send a press release and black and white photograph to Radio World Marketplace, P.O. Box 1214, Falls Church, VA 22041



### Stereo console

Wheatstone's new SP-6 stereo production console features stereo line input channels with full machine control and remote module status ports. The mic channels include tally and remote on/off ports, as well as full control of multiple studio and control room mutes, interrupts, tally and talkback functions.

For more information, contact **Tim Guhl** at 315-455-7740, or circle Reader Service 70.



### Automation system

Absolute Broadcast Automation's new System 100 real-time automation system provides random access cassette music and commercials as well as random access CD music. Features include integrated music management and spot logging software.

For more information, call **Jack Mullen** at 301-359-3033, or circle Reader Service 73.

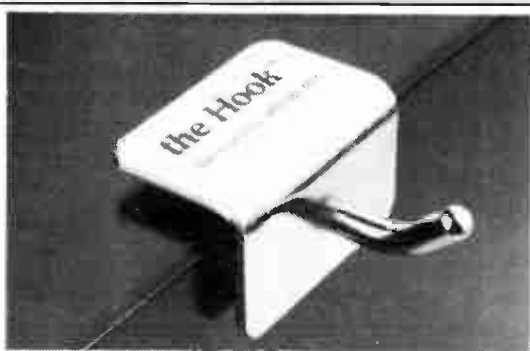
LOCAL		SWEEP TEST DEFINITIONS (press F9 to sweep)		SWEEP SETTLING		
MEASURE	A AMPLITUDE	DATA-1	LUF1	RDNG	TOLERANCE	RESOLUTION
READING	-0.82 dB	GRAPH TOP	+1.00 dB		AMPL 0.100 %	100.0 uV
LEVEL	-0.82 dB	BOTTOM	-1.00 dB		LUL 0.100 %	4.000 uV
FREQUENCY	1.99999 kHz	# TICS	0		TND 3.000 %	0.00007 %
PHASE	OFF	TYPE	LIM		IND 3.000 %	0.00003 %
BP/BR FREQ	AUTO	STANDARD	LUF1	RDNG	FREQ 0.500 %	0.00020 Hz
DETECTOR	0/sec	GRAPH TOP	+1.00 dB		W/F 5.000 %	0.00020 %
BANDWIDTH	<10Hz	BOTTOM	-1.00 dB		PHASE	0.50 DEG
FILTER	OFF	# TICS	0		SETTLING	EXP
		TYPE	LOG		DATA	3 SAMPLES
CHANNEL-A	INPUT	SOURCE-1	EXTERN FREQ		EXT SOURCE	3 SAMPLES
TERM	100kΩ	START	20.0000 Hz		MIN LUL	2 SAMPLES
RANGE	AUTO	STOP	20.0000 Hz		MIN LUL	40.00 uV
CHANNEL-B	INPUT	SPACING	5.0 %		RESPONSE	AUTO
TERM	100kΩ	STEP TYPE	LOG		TRIG DELAY	30.00 mSec
Freq REF	1.00000 kHz	STEP TABLE	OFF		TIMEOUT	4.00 Sec
dB REF	1.987 U	# TICS	0			
dBm/μV REF	600.0 0	DISPLAY	MONO-GRAPH			

### System One A tests

Audio Precision recently completed an applications note on CD player testing. Although specific test panel setups are useful only to owners of the System One, the general technique and results may be of interest to anyone involved in CDs.

For System One owners, a diskette is available with all the test setups.

For more information, call **Bob Metzler** at 503-627-0832, or circle Reader Service 71.



### Detachable spindle

Techworks' new product, The Hook, addresses the problem of where to put a reel of 1/4" leader tape while editing and assembling audio tape.

Made from solid steel, The Hook is nickel plated and comes supplied with adhesive-backed fabric fasteners that attach to tape machines, effects racks, audio consoles, or to the edge of any other smooth, clean surface.

For more information, contact **Pat Maloney** at 415-285-6071, or circle Reader Service 76.



### Precision clock

Allied Broadcast recently introduced the OEM-10, a combination precision clock and crystal controlled radio receiver. It decodes the WWV transmission by the US National Bureau of Standards on five frequencies.

The display uses bright red, 1 1/4" numbers. A system capable of accommodating multiple displays from one receiver will soon be available for master clock system configuration.

The system automatically compensates for leap year and daylight savings time.

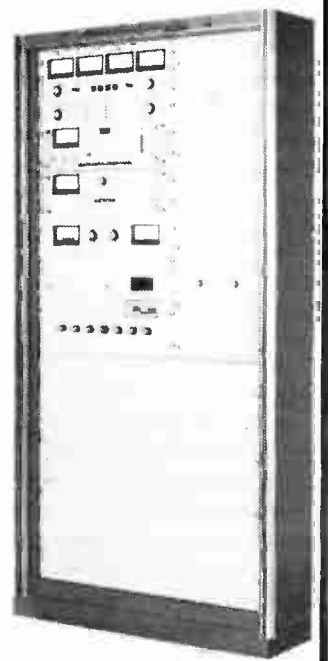
For more information, contact your regional **Allied Broadcast Equipment** representative, or circle Reader Service 79.

### 5 kW FM transmitter

Continental Electronics' new 5 kW FM transmitter, the Type 815A is solid state except for the single 4CX3500A tetrode tube in the final amplifier.

The 815A uses IC logic for all control functions and incorporates a computer-like memory to restart the transmitter after a power failure.

For more information, call **Vern Collins** at 214-381-7161, or circle Reader Service 72.



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008	028	048	068	088
009	029	049	069	089
010	030	050	070	090
011	031	051	071	091
012	032	052	072	092
013	033	053	073	093
014	034	054	074	094
015	035	055	075	095
016	036	056	076	096
017	037	057	077	097
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019	039	059	079	099
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# BUYERS GUIDE

Reel-to-Reel

## KNXR Acquires Sony DASH

by Tom H. Jones, Pres & GM  
KNXR-FM

Rochester MN ... Digital audio is making its way into on-air production control rooms across the country. Compact disc players are commonplace. Some stations are using digital processors such as the Sony PCM-F1 with a VCR for digital recording of long-form programming.

### User Report

Now, Sony's first-generation reel-to-reel DASH (digital audio stationary head) recorder, the PCM-3202, is available and finding its way into production rooms. It utilizes the PCM digital recording format.

The PCM-3202 looks like any other professional, analog reel-to-reel recorder. The tape transport is refined yet ruggedly built.

A sophisticated transport control panel offers plenty of options, including a 29-position auto locate feature and variable shuttle speed.

Interestingly, playback speed can be effectively varied by  $\pm 12.5\%$ .

The tape path is straightforward and simple to load. The head block contains a digital head and several analog heads.

An overhead bridge contains separate pairs of peak level indicators for both digital and analog record channels and various audio switching controls.

A built-in cue amplifier with stereo cue speakers is included in the bridge.



KNXR's Sony PCM-3202 DASH Recorder

The machine mounts in an optional roll-around stand which allows tilting of the transport to a convenient operating angle.

We found tape handling to be very smooth and gentle. A splicing block is built into the front of the transport complete with Teflon protector so you don't mar the transport surface with razor blade scratches.

The PCM-3202 is a two-channel recorder. In reality, it's a 12-channel recorder. Four tracks are required to record the digital data for the left audio, another four tracks for the right digital audio.

There are two additional tracks which record an analog version of left and right audio—these are used for cueing and editing purposes. Another two tracks

record time code and control track information.

Two digital sampling rates are switch selectable—either 48 kHz or 44.1 kHz. The machine is billed as a single speed recorder, but really it operates at two speeds: 15 ips when in the 48 kHz

mode; 13.78 ips when in the 44.1 kHz mode.

Out front, let me say that the PCM-3202 is not inexpensive! It carries a \$20,000 price tag (the 7.5 ips version is \$17,500). A 10 1/2" reel of digital tape is \$70.

Once you open the fold-down front door, you'll see an abundance of digital processing cards—evidence of plenty of engineering!

Subjectively, the sound from this recorder is flawless. The ultra-low distortion, combined with very flat frequency response and the lack of any tape hiss makes an announcer's voice stand out in stark realism.

The PCM-3202 will also reveal deficiencies, if any, in your audio console and or microphones.

We have two male announcers with very difficult-to-record voices. The high, non-symmetrical peak energy of their voices can saturate an analog tape—even when recording at 15 ips—if we're not careful.

Not so with the DASH recorder. Re-  
**(continued on page 35)**

## Analog Can Provide Near Digital Quality

by Marlene Petska Lane

Falls Church VA ... Tape machines—both digital and analog—are earning new respect from radio broadcasters, who have discovered the lucrative benefits of multitrack production.

For stations using the newer digital machines or additions such as Dolby SR there are also the "ratings rewards" a perceived increase in dynamic range can provide.

Broadcasters' growing interest in and demand for tape machines has been met by manufacturers who are eager to sell them products once marketed only to recording studios.

### Industry Roundup

Some stations are already making the leap into digital; Sony, Studer, Mitsubishi and Otari are all marketing their digital tape machines to broadcasters. Other stations are finding that analog alternatives may provide just the competitive edge they need.

#### Digital slow in coming

Broadcasters and manufacturers alike have discovered that digital is not the "perfect" medium it was once touted as being.

But, as Tom Mintner, vice president and general manager of Studer says, "The bottom line is that digital is better

than anything that's come before."

Although everyone agrees that digital tape machines will eventually replace their analog counterparts in radio stations, manufacturers say it will be a slow process.

"Digital is really out of the reach of most broadcasters right now," says Gus Skinas, product manager for the Sony  
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#### User Reports:

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Otari MTR-10 Recorder  
by Margaret Bryant,  
KQXT ... 32

Nakamichi MR-1 Cassette Deck  
by Frank Giardina, WAPI ... 36

Also, a special report from Michael Callaghan, KIIS, on the new Denon DN-950 CD player, and articles from Inovonics, ANT Telecommunications, AEG and Buff Stuff, Inc.



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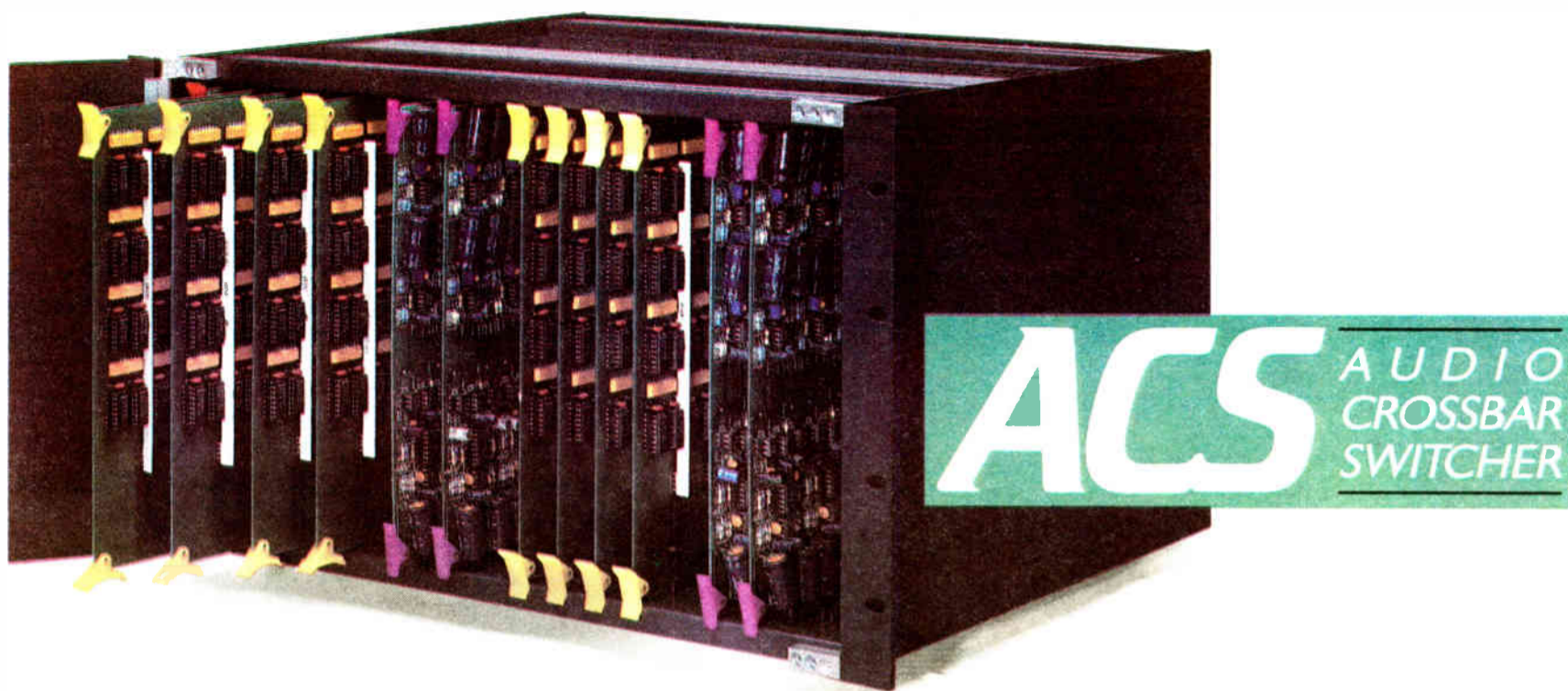
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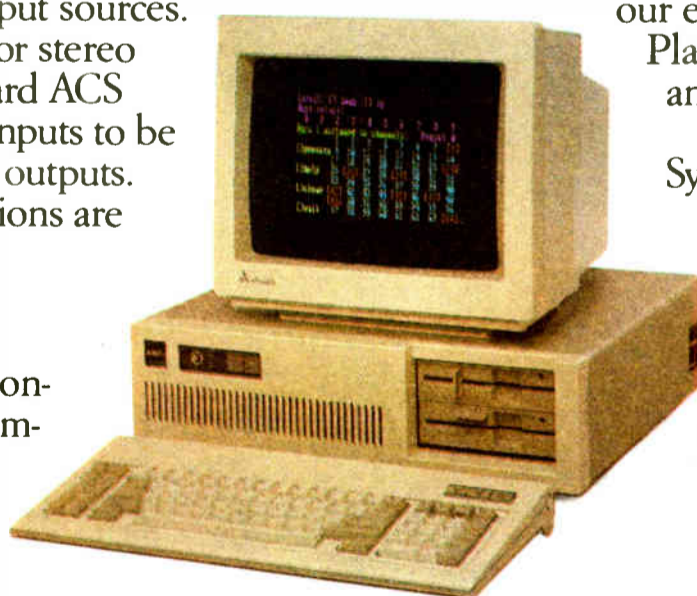
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World Radio History

## BUYERS GUIDE

# Tascam 122 MK II Rated High

by Kenneth J. Nurse, Tech  
KYW-AM

**Philadelphia PA ...** For any cassette machine to be easily adaptable in a broadcasting or recording studio, it must have balanced inputs. It must also be rugged, reliable and simple to use.

The Tascam 122 MK II Professional Cassette Deck recently purchased by KYW-AM fulfills these requirements. And it is a three-head machine.

The three heads provide the ability to monitor what is being recorded just as on a reel machine. This is an absolute must in those "one-take" situations.

Occasionally at KYW, we just roll the cassette machine as a back-up for reference when producing live material. We also plan to use it to record our AM stereo signal for comparison purposes when we make changes in our processing.

## Well designed

The most striking feature of this cassette machine is its overall appearance. The front panel has two large, illuminated (analog) VU meters that contain LED peak indicators.

## User Report

The most frequently used buttons are large and easy to find. The deck is brown, which makes the lettering easier to read than that found on "basic black" units.

The record level controls have large, metal vernier knobs with an unusual feature: they (left and right) are geared together. When changing levels simultaneously, only one knob need be rotated.

They have enough "play" so that unbalanced record levels are possible, too. This feature is quite an improvement over concentric knobs.

Many individual features are easily accessed from the front panel. The timer/counter uses a bright blue, fluorescent, four-digit display. The timer shows elapsed record or playback time; both timer and counter can be reset.

## Pitch control

There is a wide range pitch control with defeat button and a headphone output with a volume control. The deck has high speed cue and review (a feature found on many consumer grade decks), and a built-in 400 Hz, 10 kHz oscillator to be used for level set and bias adjustment.

There also is an FM multiplex filter, input selector (front or rear jacks) and an output selector (input or repro).

More "meaty" features include Dolby B, C, HX Pro, a return to zero logic function and a presettable memory location. Using the previous two logic functions simultaneously will produce an endless loop!

Full remote control is available—a plus for those who feel it is necessary.

Our machine at KYW does not really need to be remotely controlled because it is used primarily as a recorder for our sound morgue or playback for aircheck tapes.

We also use this machine for mastering programs produced at KYW to be sent to the public. More than 100 people will operate this machine, so ease of use is a must.

## No complaints lodged

Even our sales staff uses this machine to take copies of ideas for commercials to play for clients (on their own machines). So far I have heard no complaints about the Tascam 122 MK II.

There are a few intangibles that will reveal themselves with time. Since we have only had this machine for a short while, the machine's long-term reliability has yet to be proven.

It has not needed any repairs thus far. Five years from now perhaps head replacement will be in order; we also will probably have gone through a few pinch rollers. I hope compact cassettes are still around at that time.

I also do not know how this machine

will operate in a high RF field.

The Tascam MK II cassette deck is an excellent piece of broadcast equipment that will be easily installed and operated in many production studios. It has many useful features combined in an easy-to-use and well designed package that is well worth the asking price.

*Editor's note: Kenneth J. Nurse has an Associate in Electrical Engineering and a BA in communications from Penn State University.*

*For more information call David Oren at Tascam: 213-726-0303. The author may be reached at 215-238-4700.*

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World Radio History

## BUYERS GUIDE

# WKSZ Outfits Studios with A-807

by Douglas W. Fearn, CE  
WKSZ-FM

**Media PA** ... Studer reel-to-reel tape machines have long had an international reputation for being one of the best recorders money can buy. Unfortunately they are also very expensive, putting them out of reach of many radio stations.

The A-807 however, is a high quality machine in the Studer tradition but at a very reasonable price, which makes it practical for just about any station interested in serious production work.

### User Report

The two-track stereo machine, with remote control and in a roll-around stand is under \$6000.

WKSZ recently rebuilt its main production studio and constructed a new eight-track studio for more sophisticated work. After seeing the A-807 at the 1987 NAB Convention, I recommended that the station install an A-807 in each room.

#### Ahead of schedule

Delivery looked like it might be a problem since it was a brand new model, but both machines arrived a week ahead of our deadline.

One of the two remote controls was missing from the shipment, but Bradley Broadcast (the distributor) and Studer in Nashville promptly corrected the oversight.

I had been warned that the stands did not come with instructions, but we had the machine mounted within one half hour.

Although the instruction book is marked "preliminary," it is quite clear and complete. It is strong on alignment, maintenance, and technical drawings and schematics but weak in explaining features and operation.

Perhaps the final instruction manual will cover this in more detail. The fact that I've owned or used just about every machine Studer has built in the last ten years helped me to understand various functions, but I suspect that there are features available on the A-807 that we have not yet discovered.

Like the other A-800 series machines, the A-807 is totally microprocessor controlled. There are no trimpots for audio alignment. Adjustments are made by placing the machine in the setup mode via a tiny recessed switch on the front panel.

#### Push button adjustment

In this condition many of the transport buttons have new functions which are indicated on the front panel in smaller yellow lettering under the appropriate button.

To set the left channel playback level for instance, a series of buttons are pressed to permit adjustment and a set of raise and lower buttons are pressed to obtain the required level.

The tape timer display shows a code for the current setting, and small LEDs indicate which channel and parameter are being adjusted.

This alignment method may seem odd to those of us accustomed to turning little trimpots, but it really is better once you get used to it.

There are no more touchy adjustments or dirty pots. The resolution on all adjustments is fine enough to obtain very precise alignment. And it is very quick and simple once you have done it a couple of times.

#### Perfect alignment

The first thing I did after turning on the machine was to thread up a standard alignment tape. It really gives you a sense of confidence in a new piece of equipment when the 0 level tone on the tape sits perfectly on 0 VU on both meters.

Head alignment was also precise with our tape and phase meter. In fact at 15 ips and 7.5 ips no playback adjustments were necessary at all. I didn't have a 3.75 ips alignment tape but I suspect the machine was perfect at that speed also.

The machine was aligned at the factory for Ampex 406 tape. This is further evidence that the A-807 is aimed at the broadcast market; all the other Studer machines I've seen have come aligned for European tapes.

We use Agfa 468 at WKSZ, but it took only a few minutes to readjust bias and equalization for our tape. The 7.5 ips record/play frequency response was +0.6,

-0.1 dB from 31.5 Hz to 20 kHz.

At 15 ips, it measured +1, -0.5 dB from 31.5 Hz to 20 kHz. And at 3.75 ips it was  $\pm 4.2$  dB from 31.5 Hz to 20 kHz



WKSZ News Director Bill Gallagher with the Studer A-807

( $\pm 1$  dB up to 16 kHz).

Unweighted SNR, referenced to 0 VU (not to +6) was 58 dB at 15 ips, 57.6 dB at 7.5 ips, and 51.5 dB at 3.75 ips. Wow and flutter was 0.003% or below at all three speeds. Total harmonic distortion (THD) plus noise at 50 Hz was 0.37% at 0 VU, and 6.2% at +10 VU.

All adjustments can be made at all three tape speeds, and with both NAB or CCIR equalization standards. Alternatively (and probably more usefully at ra-

dio stations), the machine can be aligned for two different tape types.

Changing the function of the "NAB/CCIR" buttons to "Tape A/Tape B" requires shifting the position of a jumper inside the electronics.

#### Noteworthy features

The machine has many features, but I'll just mention a few.

It has a typical timer that reads in hours, minutes and seconds, but it also can be set to measure time from two different points.

There are several locate functions. A zero locate is easy to appreciate, but the one I think is most useful is a "locate last start" function.

A third locate point can be programmed in, either by simply shifting the time into memory at the appropriate point or by actually entering a time using various keys.

A "shift" key is provided which changes the function of some keys. For example, when pressed with "play" the machine runs backwards under capstan control.

When shift and fast forward or rewind are pressed, the spooling speed is reduced for better storage winding of important tapes.

Many of the safety shift requirements can be deleted or added by way of internal jumpers.

From the factory variable speed is selected without shift, but it can be reprogrammed to require a shift to pre-

*(continued on next page)*

# MTR-10 Earns Workhorse Status

by Margaret R. Bryant, Eng Mgr  
KQXT-FM

**San Antonio TX** ... Last year, when I was looking for reel-to-reel machines, I wanted a design that could serve for both production recording and on-air playback.

I wanted one model that could be used in both functions so I could cut down on spare parts needed, and the redundancy would ensure no major interruptions.

I chose the Otari MTR-10 for many reasons. It has all of the features I required for both on-air use and the production room.

But so did at least one other machine. What swayed me in the direction of Otari was previous experience with the company's reel-to-reel machines.

#### Easy to operate

If you are expecting to find a lot of specifications quoted in this review, you are out of luck. Equipment from most reputable companies meets published specifications. How the equipment holds up in real world use (and abuse) is much more interesting.

It is obvious looking at these machines that a lot of thought has gone into ergonomics. All of the machine operators praise the ease of operation.

Almost every possible way of shuttling the tape from reel to reel is incorporated in this machine. The only complaint I have heard is that timing is not accurate when the tape is run backwards because it is driven by the reel motors rather than the capstan.

The quality of the recordings is very

good. We have both two- and four-track versions of this machine, and all perform very well.

Otari designers have not only paid attention to those who use the machine, but also to those who must repair and maintain the machine. This is an area where I think the machine really shines.

All regularly adjusted controls and switches are brought out to the front panel of each electronics card. There are also numerous LEDs located throughout the unit to verify proper operation.

### User Report

All of the electronics are on plug-in cards or on small PC boards with jacks for wiring. Almost all the wiring harnesses have plugs on the ends to facilitate removal.

The wiring is well labelled and so are the jacks on the PC boards.

I have never before seen a machine that is so easy to work on. Many of the machines are rack mountable, which makes them a bit easier to work on than when they are console mounted.

#### Thorough documentation

The documentation that comes with the machine is very good. Most any adjustment you would want to make on the machine is described in detail in the operating manual.

There are numerous drawings of the PC boards (showing both the component and trace sides) as well as numerous exploded diagrams of the mechani-

cal sections.

The manual does not discuss head replacement. However, I'm sure most engineers know how to replace tape heads, but each machine has its little quirks.

The manual says you shouldn't have to ever replace brake bands, so don't. I have, however, and it was no problem (much easier than replacing them on an Ampex machine).

#### Industry workhorse

As I said at the beginning of this review, the reason I decided on Otari was because of my previous experience with their equipment. One specific reason is their service.

Whether you get service from Otari directly, or from one of their distributors, I have always found them to be very helpful. Let's face it, no machine will work forever, and isn't it nice to know you can get parts and advice if you need it!

As time goes on, there are fewer and fewer choices among larger tape machines. I think Otari has many good products, the MTR-10 being only one of them.

I can easily see the MTR-10 becoming the "workhorse" that the Ampex machines were 15 or 20 years ago.

*Editor's note: Margaret Bryant has spent eleven years in radio, nine of them as a CE. She has worked for KQXT for more than two years.*

*For more information contact Otari's sales and marketing department at 415-592-8311. The author may be reached at 512-220-3100.*



## BUYERS GUIDE

# Older Recorders Offer Simplicity

by Jim Wood, Pres  
Inovonics, Inc.

Santa Cruz CA ... Few things around a radio station can be considered truly permanent. It seems that broadcast equipment is replaced nearly as frequently as are program directors. There are exceptions, of course, and one of the most notable is the old reel-to-reel tape recorder.

The Ampex 350-series studio recorder was certainly one of the most successful tape machines ever manufactured for professional use. Production spanned more than a decade, and though the electronics evolved from octal tubes to transistors, the basic transport remained virtually unchanged.

By today's standards the old Ampex deck is quaint, if not downright crude. No microprocessors here; "logic" is courtesy of three beefy relays. Hardly TTL compatible, the control lines carry a lethal 150 V rectified directly from the AC line.

Only a couple of factors account for both the initial popularity of these transports and for the continuing tolerance of their limited features: simplicity and reliability.

There's not much to go wrong electrically. A tired selenium rectifier stack can be replaced by a 20-cent silicon diode, and the one filter capacitor is normally changed as a matter of course.

Bringing the deck mechanically up to snuff doesn't present much of a challenge either.

## Technology Update

As tape oxides improved over the years, performance of these machines became limited by the record/play electronics. Higher-coercivity tapes and the trend toward increased flux levels taxed the erase, bias and record headroom margins of the original amplifiers.

Inovonics introduced its first replacement electronics for older studio recorders more than 15 years ago. Current models represent a fourth generation with features and performance keeping pace with today's tape formulations.

In recent years, the changing trends in broadcast production and recording studio practices have precipitated a decline in the use of mono and two-track reel-to-reel recorders.

With respect to audio recording in general, the "all-digital" age is undeniably on our horizon.

But for the present, the reel-to-reel machine remains the most rugged and reliable, the easiest to use and to edit with, and the simplest to understand, troubleshoot and repair.

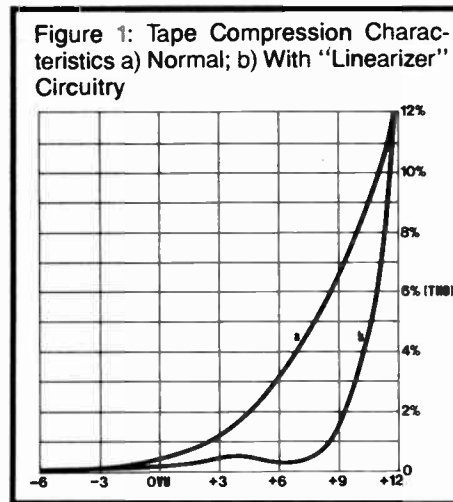
In addition to advancements in oxide formulations and recorder circuitry, there have been numerous other improvements to magnetic recording technology over the years.

Ray Dolby's name is synonymous with modern audio noise reduction techniques. From the "A" system of the late 1960s, through the "B" and "C" versions for consumer equipment, to his new

"Spectral Recording" process, Dolby Noise Reduction has dramatically extended the useful dynamic range of analog recorders.

With Dolby "SR" even a mediocre analog machine can rival the S/N performance of a 16-bit digital recorder.

Though certainly not contributing such a striking improvement as a 20 dB



to 30 dB increase in SNR, a couple of other refinements in the basic recording process are worth mentioning.

Unlike an amplifier stage which ultimately "hard clips" when overdriven, magnetic tape goes "gracefully" into saturation.

The broadcaster has often unwittingly used this property to his advantage. Even without a crash course in the physics of tape compression distortion, it's generally known that a spot or promo recorded "well into the red" will sound a good deal "gutsier" on-air.

Because magnetic oxide doesn't saturate abruptly, and because its properties are predictable, it is possible to at least partially compensate for certain magnetic non-linearities.

By "predistorting" the audio signal in a manner "complementary" to that of the magnetization characteristic, harmonic and intermodulation distortion can be held at a low level almost to the point of total saturation.

This can either yield a cleaner recording at normal levels, or permit recording at a somewhat higher level for an expected and tolerable amount of distortion.

In the 1960s, both Scully and 3M included "predistorter" circuits in their machines to "linearize" the recording process.

The feature was hardly used, however, since accurate adjustment required the use of a wave analyzer, and improper adjustment could actually "increase" distortion over the uncorrected, normal figure.

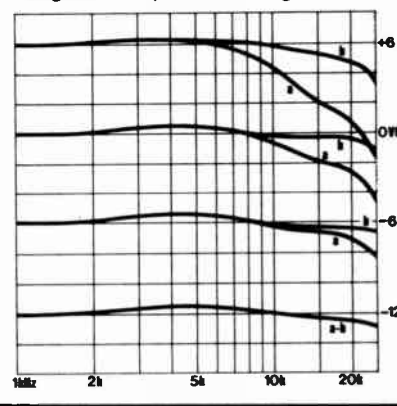
Another phenomenon of the recording process is "self-erasure" of short wavelength (high frequency) signals. This can manifest itself as a "spitting" sound which accompanies vocal sibilants and other high energy, high frequency peaks such as cymbals, breaking glass and the like.

The problem is particularly prevalent at lower tape speeds which call for more recording preemphasis. This is reflected in the practice of making 7½ ips frequency response measurements 10 dB or better below normal operating level.

Coping with high frequency self-erasure generally involves recording at lower levels or using some form of frequency-selective limiting. The former compromises noise performance, the latter sacrifices "brightness."

Back in the early 1950s, when oxide formulations were particularly susceptible to self-erasure, a system of "program-

Figure 2: Self-Erasure Effect on Response at 7½ ips a) Normal; b) With Program-adaptive Biasing



adaptive biasing" was developed which effectively eliminated the problem.

A special circuit monitored the input audio signal and reduced the normal bias in response to the magnitude of high frequency program energy.

Since bias current in the record head is typically 10 dB to 20 dB greater than

## WKSZ Studios Get Studers

(continued from previous page)  
vent accidental off-speed recording.

The variable speed is a standard feature. The range is about a half-octave in either direction, allowing any speed from about 3 ips (the machine is set so you can't go the full half octave down at the slowest speed) to about 22 ips to be obtained. The control is calibrated roughly in semi-tones, simplifying musical key changes.

The remote control has all the standard transport control functions, and several others. These may be reprogrammed as desired, and labels are provided to make the changed keys look like the other keys.

From the factory, the buttons are set up to zero the timer, locate the zero position, locate the last start position, backspace and enable "fader start."

### Backspacing

The "Backspace" function deserves mention. When pressed, the machine goes into rewind with tape lifters defeated and the machine output level reduced. When released, the machine goes into play. This is useful for finding a particular location on the tape.

Alternatively, the stop button can be pressed as the Backspace key is released, parking the tape at the beginning of a cut. Time will tell if this feature gets much use. Most operators prefer to go to the machine and manually cue the tape by rocking the reels.

For cueing, a "Shuttle" control is available on the front panel. This is a thumb-wheel which moves the tape forward or backward, with lifters defeated, at a

audio signal current, and as the bias could be controlled over its entire range, it was theoretically impossible to get into a self-erasure situation.

For an unusually high energy, high frequency program condition the input audio signal would actually be self-biasing.

Though the system worked well, by the time it was perfected tape was sufficiently improved to obviate its implementation in professional recorders of the day.

Dolby Labs has recently resurrected the system, but only for high speed duplication onto cassette tapes which exhibit a similar tendency toward self-erasure.

Nevertheless, in striving for optimum performance at 7½ ips, in either open-reel or NAB cartridge formats, the program-adaptive biasing technique has decided merits.

A composite of both basic and esoteric improvements to the direct-recording process could inspire yet another generation of analog recording electronics for reel-to-reel and cartridge machines.

In prototype form, alternative analog audio recording techniques utilizing FM and PDM have proved a challenge to available digital methods.

Although the future of professional audio recording clearly lies in the digital realm, analog recorders will continue to offer the fundamental advantage of simplicity—an advantage which may offset the small performance compromise for some while yet.

Editor's note: For more information, contact the author at 408-458-0552.

speed proportional to the distance left or right that the wheel is pushed.

It works well, although I think I would prefer that it moved a little more slowly near the center detent (stop) position. I believe this is adjustable within the transport, but I have not tried changing it yet.

Without exception operators have praise for the Studer A-807. They are impressed by its quick and precise tape handling, and the ease with which edits can be made.

Just about all the machine's features have been used. There are just two complaints: the console is a bit low for use in our stand-up height control room (although most operators do sit down to make edits), and starting time is relatively slow.

The capstan motor starts only when the play button is pressed, and although the motor gets up to speed in an amazingly short time, it isn't instantaneous.

The A-807 is built like you would expect a tape recorder made in Switzerland to be made: with great precision. But it also appears to be very rugged, and like its Studer ancestors, I expect it to continue to give us superlative performance for a long time.

Editor's note: Doug Fearn is a contributing author to The Sound Engineer's Handbook: The New Audio Encyclopedia, published by Howard Sams Co. Thirteen of his twenty years in audio were spent running a 24-track recording studio in California.

For more information contact Doug Beard at Studer: 615-254-5651. The author may be reached at 215-565-8900.

## BUYERS GUIDE

## Telcom c4 System Enriches Audio

by Robert van der Hilst, Audio Cons  
ANT Telecommunications

Gaithersburg MD ... Today's typical listener is far more discriminating about sound quality than his or her pre-1980 counterpart.

As listeners become more sophisticated, many radio stations are discovering that they can no longer afford to sacrifice dynamic range for greater compression and longer transmitter range.

A recent broadcasting event involving two New York City radio stations provided some interesting insights into the trade-offs of transmitter range on one hand and dynamic range on the other.

Both metropolitan stations broadcast the same live concert. Initially, the bulk of the listening audience tuned to the better-known, more powerful station.

Many were dissatisfied with the compromise in quality that accompanies greater compression for longer range. Consequently, many listeners switched to the less powerful, but clearer station.

The experience of the two NYC stations illustrates the broadcast industry's need for effective noise reduction, accompanied by minimal loss of range.

To meet this need of the broadcasting and recording industries, ANT Telecommunications, Inc. designed the Telcom

c4 Noise Reduction System.

This compander system reduces noise on audio and video tape recorders and line transmission systems employing cable, microwave and satellite links.

The system, placed ahead of the transmission line, or before the tape recorder, compresses (encodes) the audio signal. This compressed signal then is recorded onto the tape.

After the transmission line, the system expands (decodes) the dynamic range back to its original value. Virtually all undesirable noise is eliminated.

### Technology Update

Up to a 40 dB gain in dynamic range results, producing a clean, natural sound that can match, or even exceed, those from digital recordings.

The Telcom c4 system employs peak-detector-controlled VCAs, along with a dB-linear slope to produce dynamic behavior that is completely independent of level alignments.

The system operates by splitting the frequency range into four bands and using attack and release times adapted to each band with a soft 1:1.5 dB linear slope.

Each of the four frequency bands has its own compander and individual control circuitry. Crossover frequencies of 215, 1450 and 4800 Hz are adapted to the sensitivity of the human ear.

By concentrating on this mid-range, Telcom c4 systems practically eliminate side effects normally associated with companding systems.

A rapid attack, combined with a peak detector, prevents overmodulation of the recording system, while a slow release ensures minimal harmonic distortion. Regardless of the modulation level, the dynamic behavior of the control system remains constant.

The system's dB-linear slope of 1:1.5 is obtained by using a pair of VCAs (connected in series), controlled by a threshold rectifier (in parallel).

The second amplifier is controlled at twice the value of the first amplifier. This approach is used in each of the four bands to produce identical static characteristics for all four center frequencies. The 1:1.5 slope produces a 33 1/3% compression of the original signal.

The soft 1:1.5 dB linear slope also makes the system less susceptible to tape uniformity variations and frequency response errors.

Overall dynamic range can be determined by multiplying the dynamic range

of the transmission medium by the 1.5 slope characteristic. A tape recorder with 60 dB dynamic range will be expanded to 90 dB—a 30 dB improvement!

No level alignment is required due to the level-independent dynamic behavior and the static behavior of the dB-linear slope over the system's entire working range.

Correct dynamic tracking is assured, even if there is misalignment between the compressor and expander.

In fact, the system remains stable, even during level fluctuations. Mistracking due to phase response errors is nearly eliminated by the four-band-splitting.

By combining four-frequency band-splitting with optimized attack and release times, the Telcom c4 Noise Reduction System reduces tape distortion and crosstalk attenuation during expansion. Pre- and post-echoes and modulation noise also are greatly diminished.

The system also eliminates audible breathing sounds, which could negatively affect the original modulation.

During recording, the compressor amplifies low-level signals and reduces high-level signals. This increases headroom and also decreases distortion at peaks.

*Editor's note: ANT Telecommunications' German parent firm has been producing noise reduction systems in Europe for more than ten years. For more information, contact Richard Mattei at ANT Telecommunications: 301-670-9777.*

# On time. On budget. On air.



The Tascam 42B makes other 2-track recorders seem downright slow.

That's due in part to an ingeniously accurate tape handling system, and in part to Tascam's unique head technology. (Its heads provide sync response fully equal to repro, so you don't waste time rewinding to make audio decisions.)

And because the 42B probably offers more features per dollar than any equivalent machine, it makes everything else seem downright expensive, too. (+4 dBm balanced inputs and outputs, plus easy-access calibration are just a few of its standard features.)

For more information, call or write about the Tascam 42B today. It's a new and vastly improved way to keep meeting your deadlines.

And your budgets. **TASCAM**

## BUYERS GUIDE

**KNXR Acquires Sony PCM-3202***(continued from page 29)*

production of their voices was clean as could be with absolutely no trace of distortion.

I sensed a better feeling about the low end response—probably because of the lack of head bumps normally present on analog machines in that part of the spectrum.

After running some quick measurements, I found the response of the digital channels to be flat within +0.25 dB and -0.3 dB from 20 Hz to 20 kHz. There was a very slight ripple in the upper end response caused by the 20 kHz analog low-pass filters.

Phase tracking between channels was excellent with an ever-so-slight shift just perceivable between 15 kHz and 20 kHz—again caused by the low-pass filters. The analog cue channel response measured  $\pm 3$  dB from 45 Hz to 16 kHz.

There are some differences in operational techniques you must observe. Digital heads, like video heads, must be cleaned with a chamois, not cotton-tipped applicators. Tape must be handled more carefully to prevent dropouts.

Some recommend wearing white gloves to prevent skin oil from contaminating the oxide surface.

For start-up from a tight cue, you must give the machine a little more time than

with an analog player. It required 0.7 of a second for the processing circuitry to lock in.

The error correction circuitry worked quite well. I punched three small holes in the tape and they passed by without a glitch.

I then placed a deep, perpendicular crease in the tape and it too passed with no audible consequences. I handled a portion of the tape rather carelessly, attempting to place finger prints on the oxide but I was unable to cause any audible effect.

At one point, however, the tape slipped off the reel and got caught under the reel spindle. After untangling the tape, there were wrinkles in it for several inches.

The error correction in the PCM-3202 couldn't handle this much loss of data and the machine muted to silence for a second or two while the wrinkles passed by.

You can watch the CRC error LEDs on one of the circuit cards. I noticed that they were more active each time a splice passed by, indicating error correction was taking place.

Splicing is done almost the same as on an analog machine. Razor blade edits are always done perpendicularly to the tape, not diagonally.

The analog cue tracks on the machine are used for audibly locating editing positions. I found that the digital frame counter was also helpful in locating an exact position for a desired edit.

The PCM-3202 has only one digital head which serves a dual purpose. It acts as both a record and a play head.

Therefore, you cannot monitor off the tape immediately as it is being recorded, nor can you make A-B comparisons between input and tape signals. It further prevents you from doing punch-ins.

In addition, the machine will not allow you to individually record only one channel without erasing the other. Once the machine is placed in the record mode, both left and right tracks are erased and recording takes place on both channels.

It is only fair to mention that Sony has already introduced a second generation DASH recorder, the PCM-3402. This model allows you to monitor off the tape, to do punch-ins and to record one channel at a time.

Also, the PCM-3402 offers a second speed (7.5 ips) which yields a continuous three hour's recording time on a single 12½" reel of tape. It does, however, carry a higher price (\$28,000).

Another very important consideration for anyone contemplating the purchase of a digital reel-to-reel recorder is that

there are two professional digital formats fighting for the marketplace.

The PCM format is embraced by Sony and Studer. The other format, PD (professional digital), is supported by Mitsubishi and Otari. The two formats are not compatible.

In the recording industry, where digital reel-to-reel recorders have made great inroads, it is possible to visit one city and find PCM the dominant format. At the same time, another city's studios are dominated by the PD format!

Overall, I would rate the Sony PCM-3202 DASH recorder as an engineering marvel. One only needs to consider the computing power going on inside the unit and its ability to lay as much data as it does on a relatively slow moving piece of ¼" tape!

The sound is as close to perfection as you could want. The inability to monitor off the tape while recording, to do punch-ins and the inability to record one channel at a time are drawbacks.

One has to remember, however, that this is a first generation machine. I am sure it was a struggle to get it on the market at a price within reason.

*Editor's note: Tom Jones is founder and manager of KNXR. He has 29 years of experience in broadcasting and professional sound recording, and is a member of AES.*

*For more information, contact Gus Skinas at Sony Pro Audio: 201-833-5200. The author may be reached at 507-288-7700.*

Put the Tascam CD-501 next to any other broadcast compact disc player, and you'll find there's no comparison.

Nothing can compare to the purity, clarity, and accuracy of its sound, thanks to breakthroughs like Tascam's proprietary ZD Digital Circuit and double oversampling.

And in the split-second, high-speed, high-pressure world of the broadcast professional, it's the only machine you can depend on, 100% of the time.

Which figures, since the CD-501 is not an adapted consumer deck, but a highly-engineered system that's built for broadcast. Nothing else offers its combination of professional features, including 19" rack-mountability, balanced outputs, and a hard-wired remote that lets you completely control and program either of two decks in any mode.

Call or write for more information on the CD-501. Find out about a new, higher level of digital quality. And digital toughness.

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## BUYERS GUIDE

# Nakamichi MR-1 Used On Air

by Frank L. Giardina, CE  
WAPI-AM/FM

**Birmingham AL . . .** When thinking of ways to play music on the air, three methods come to mind almost immediately; direct disk, catted music and CDs.

At WAPI-AM we took another route. We installed a cassette music system using Nakamichi MR-1 cassette decks and a unique tone cue system.

Features that impressed us when we unpacked our first MR-1 was the fact that we did not have to worry about an interface to our equipment.

The MR-1 has both balanced and unbalanced inputs and outputs. It will accept a +4 dBm or -10 dBV input and has similar outputs which are active balanced.

Also standard is Dolby B and C noise reduction, three discrete heads and an extremely quiet transport.

Using the cassettes loaded with chrome tape, we ran response, noise, wow and flutter and phase tests on the MR-1 to see if it really would perform to specifications.

We were happy to see that the deck performed as well as—and most of the time better than—our top of the line cart equipment.

However phase response was not as consistently good as our cart equipment.

We attributed this to the cassettes themselves.

However, with careful cassette selection acceptable results can be achieved. We improved the noise figure considerably by using Dolby C during all recording.

Before recording our 2000+ song library and installing the playback decks, we had to come up with a cue system that would be acceptable to the air staff.

## User Report

We used a simple system of 25 Hz tones recorded on the cassette to cue and rewind the tapes. We use an automation tone generator to record a 25 Hz tone on the left channel followed by one second of silence before the record begins and a 25 Hz tone on the right channel after the song is finished.

We incorporated a single channel automation decoder connected to the left channel output of the MR-1.

This decoder is connected to the remote pause of the cassette deck and is set to trigger one second after the trailing edge of the tone. To record, all one has to do is place a cassette in the MR-1 and start in the record mode.

The tone and delay period are added with the push of a button and after the

delay, the machine goes into the pause mode.

The recording is done just as one would record on a cart machine. After the recording is finished, the right channel 25 Hz tone is added. The placement of this tone is not critical.

On playback, we use a dual channel automation tone decoder on each of our two playback decks to detect the tones. The left channel of the tone decoder is set up to trigger the remote pause on the MR-1 approximately 0.8 seconds after the end of the 25 Hz tone.

The right channel is connected to the other channel of the tone decoder and is adjusted to trigger on the leading edge of the 25 Hz tone, which places the MR-1 in the rewind mode.

The only difference between our cassette system and a normal cart setup is that the air staff has to remember to place the MR-1 in play after loading the cassette so that it will cue before playing.

The reliability of the Nakamichi MR-1 decks has been exceptional. When we purchased ours, we ordered four units: two for the playback decks in the studio, one for a record station and one for a spare.

After a year in service, we have placed the spare in our auxiliary production room so that it will get some use.

The only problem experienced in our

year of use has been after a power brown-out. One of the capstan motor drive transistors shorted on one of the decks.

Obtaining parts is quick and easy by calling Nakamichi service in California via an 800 number. I was surprised to learn how inexpensive the parts are.

WAPI's sister station in Mobile, WABB, has been using the Nakamichi MR-1 decks in a similar music system for almost two years.

The decks at WABB receive a lot more abuse than at WAPI since WABB is running a live CHR format 24 hours a day with music on cassette. In Birmingham, WAPI runs an easy listening format with some satellite programming.

From a purely economic standpoint, the cassette music system wins hands down over a cart system. The Nakamichi MR-1 cost much less than a cart playback deck. Excellent quality cassettes can be purchased in quantity for less than \$1 each.

After a combined total of more than three years daily on-air use, the Nakamichi MR-1 music system has proven to be reliable, stable and very cost effective.

*Editor's note: Frank Giardina has worked as an announcer/engineer, PD and CE, and served as Chairman of SBE Chapter 68, Birmingham. He is frequency coordinator for Alabama.*

*For more information, contact Nakamichi at 213-538-8150. The author may be reached at 205-933-9274.*

# Raise your standards.



To understand the superiority of the Tascam ATR-60/2N, begin with the heads: no other 2-track production recorder has heads that can provide sync response fully equal to repro response—an advantage that allows you to save time by making critical audio decisions without rewinding.

Next, look at its direct-drive reel motors, its PLL servo capstan, and its 3-motor servo controlled tape handling system—all factors that lead to the ultimate in fast, accurate, and stress-free tape handling.

Finally, consider that the ATR-60/2N gives you all this and more, hour after hour, year after year.

Then call or write today about the Tascam ATR-60/2N. And take your broadcasting to a higher level.

# TASCAM

## BUYERS GUIDE

# Analog Open Reel Near to Digital

(continued from page 29)  
DASH recorder.

But in the future, Skinas believes that broadcasters will turn to R-DAT rather than the costlier open reel digital machines. "The key thing for broadcasters is good quality at a low price," says Skinas.

Otari marketing manager John Carey says that for now, "Digital machines really are too darn expensive to build and, even given all the new circuitry innovations, they're still a complex monster."

While broadcasters save their money for future digital purchases, manufacturers will be working out the remaining kinks in digital technology.

## Attractive alternatives

There are some attractive analog alternatives to digital.

The most exciting development that is breathing new life into analog is the introduction of Dolby SR.

This system can produce significant gains in the dynamic range of analog material, and is specifically adapted to the sensitivity of the human ear.

"All the people I've talked with are impressed with Dolby SR," says Dave Oren, director of product planning for TEAC/Tascam.

Oren's comment is typical of other manufacturers. They agree that Dolby SR, along with the more recently marketed Telcom c4 system from ANT Telecommunications, may well provide broadcasters with just the edge they need to remain competitive.

Studer, according to Mintner, is "very interested" in both Dolby SR and Telcom c4.

Although he concedes that neither system can provide the full benefit of digital, Mintner says the advantage for broadcasters is obvious.

"For about \$1400 to \$3000, you can get performance essentially equivalent to digital," says Mintner. "And broadcasters don't need digital per se; they need that perceived quality."

In fact, the only readily identifiable disadvantage of using Dolby SR or Telcom c4 is tape wear. The eventual degradation of the frequency response may have some adverse effect on noise reduction systems.

These systems couldn't have come at a better time. Just as interest in noise reduction seemed to wane, Dolby SR regenerated it—and this time from broadcasters as well as recording studios.

The fact that many broadcasters started using companding noise reduc-

tion for satellite and land links may account for their receptiveness to the idea of using Dolby SR and Telcom c4 in other parts of the broadcasting chain.

## Analog improvements

There are other reasons for broadcasters to stay with analog tape machines, at least for the immediate future.

*"The most exciting development that is breathing new life into analog is the introduction of Dolby SR."*

Open reel analog tape machines have undergone significant refinement in recent years.

Microprocessor-based tape transport and control mechanisms have helped produce more reliable, less complicated machines—without the usual attendant higher price.

"A few years ago we would have had to have spent a lot more money and used

more electronic components to provide the same kind of functional sophistication we're now providing," says Carey.

Control and maintenance of setups in tape machines have been improved to an art. Studer machines provide almost total programmability of keys.

"We took all of the typical operational features and put those in software," explains Mintner. "The user is then free to choose which functions he wants and put them on soft keys."

And, nearly all tape machine manufacturers now provide machines with the ability to search to a cue point, much like a professional CD player.

Cassette machines have also gained sophisticated capabilities, as evidenced by TEAC/Tascam's new 122 Mk II.

The recorder features adjustable reel tension for both supply and takeup, much like an open reel. It also has independently adjustable azimuths on the record and playback heads.

"We can offer the broadcaster what he would expect in a reel-to-reel recorder," says Oren.

The many refinements made to analog recorders, along with the enhancement capabilities made possible by noise reduction systems are providing broadcasters with the option of near-digital quality without the digital expense.

## 10 years from now, it'll still be the standard.

The undisputed standard for broadcast cassette decks has always been the Tascam 122B.

But that standard has just been surpassed.

Presenting the 3-head Tascam 122MKII. Its leadership is founded upon features such as Tascam's Cobalt Amorphous tape head technology. Plus a choice of built-in Dolby systems: not just B and C, but also HX-Pro, for virtually perfect high-end frequency response.

More than any comparable deck, it maintains constant tape speed and tension, thanks to a tape handling system that includes Tascam's Hysteresis Tension Servo Control.

And when it comes to handling, the 122MKII is the complete professional tool, with cue and review functions (manual cue), balanced XLR +4dBm inputs and outputs, and rack-mountability.

Call or write for more information about the 122MKII. Get it now, and use it for decades.

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# TASCAM



Circle Reader Service 29 on Page 28

## BUYERS GUIDE

## KIIS CE Tests New Denon DN-950

by Michael Callaghan, CE  
KIIS-AM/FM

Los Angeles CA ... Two years ago Tower Records, the largest record store in Hollywood, devoted one small aisle to compact discs.

Today compact discs fill half the store. Considering their cost, it shows that a discerning audience is willing to pay premium prices for premium sound.

Yet, for all their popularity, most radio stations are still using carts and LPs as

about an easily noticeable improvement in the way a station sounds.

For those not willing to endure them, help is on the way!

Denon, a division of Nippon-Columbia in Japan, has built a player that precisely addresses the broadcast shortcomings of previous CD players.

The primary design goal of the Denon DN-950 was ease of use. The company has not only accomplished that, but has built a deck that's as "jock-proof" as any CD player can be.

it is the one that actually tracks the disc during play.

This combination provides a reasonably fast cue-up time, and less than a one second recue back to the beginning of a cut. This fast recue has a lot of contest possibilities—you can play the first four seconds of a song and then immediately skip back to the beginning.

Fast cue buttons on the front of the machine allow the cue point to be moved anywhere in the song. The same fast recue means you can ask listeners to

be identified or verbalized—it just sounds great!

Each CD has a data track that's supposed to provide information to the player about the number of cuts, how long they are, and where to find them.

Using this track to cue many of the early CDs was a real gamble; you never knew what to expect after pushing the Play button.

#### Actual time display

Denon addressed this inaccuracy by having its machine use the cue track just to find the approximate location of the cut; the transport then locates the actual start and end of audio, and calculates the time between them.

This time is what gets displayed on the front panel, and seems much more accurate than the information imbedded in the CD data track.

In terms of performance, it's been said that you can use a standard test CD with a player to take the place of your test oscillator. I believe it!

Connecting the Denon CD player to the Audio Precision System One and running the Denon Audio Technical CD produced readings almost as good as using the test system to calibrate itself.

Harmonic distortion was better than 0.007% through most of the band, reaching a high of 0.008% at 20 kHz.

Phase was within 2° throughout the spectrum, and frequency response was within  $\pm 0.1$  dB between 50 Hz and 15 kHz. SNR was -92 dB below the 1 kHz reference.

Measurements were virtually identical between the channels; the graphs show the left channel results.

The DN-950 worked out as well in the studio as it did on the bench.

We played various "current" CHR songs using the Century 21 "HitDisk" service, a special series of CDs digitally produced for radio stations. The cuts are digitally edited down to lengths acceptable to radio stations.

As more and more CDs become available, it's easy to see how the advantages of the DN-950 over the conventional player will increase in importance.

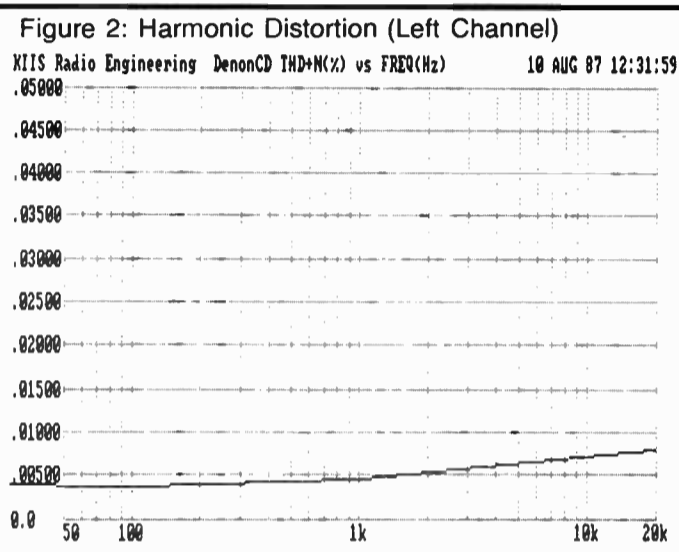
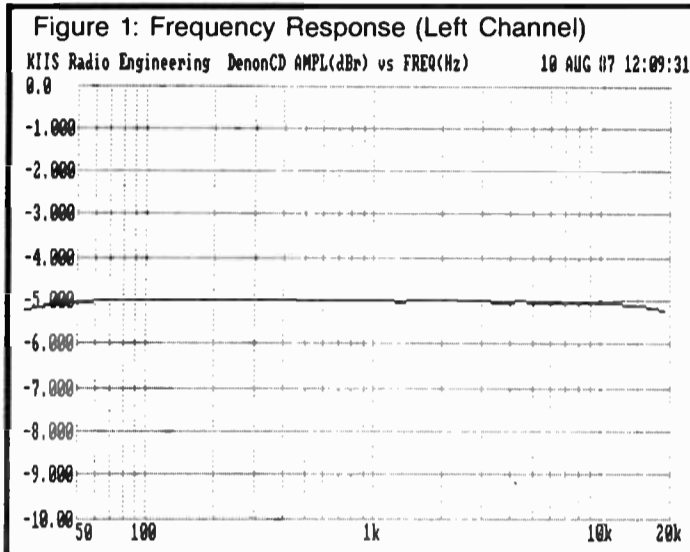
Consumer-based players require too many steps to load and select the CD, and to get it playing. The new Denon by comparison demands only one step more than playing a cart—dialing up the cut number.

Denon sought out and used input from broadcasters before starting this project. The final result is a CD player costing about half as much as a cart machine, and which offers performance, dependability and simplicity of operation.

One of the most important factors of success is being in the right place at the right time, or at least bringing out the right product. In the case of the DN-950, the product and the time are both right.

*Editor's note: Mike Callaghan was one of the engineers involved in the design of the Denon DN-950. He also teaches broadcast engineering/telecommunications at California Community College.*

For more information on the Denon DN-950, contact your regional Allied Broadcast Equipment representative. The author may be reached at 213-466-8381.



sources for air material. There are a couple of reasons for this.

First, most CDs are mixed using album length cuts rather than the shorter 45 versions. Stations can't afford that much time for just one song.

The other reason is that CDs are hard to use. We keep them in unwieldy plastic boxes, and they have to be opened, taken out, carefully dropped in a tray or under a cover, closed and then cued.

After they've been played, we reverse the whole process. These time-consuming steps are clearly out of place in a fast-moving studio environment.

Those of us who rushed to air CDs as soon as they came out learned some important lessons, too. CDs are not as invulnerable as we've been led to believe.

#### An easier way

For those willing to endure these trials, the result is worth the effort. Even with aggressive processing, the superior sound quality and the greatly diminished noise level of CDs brings

To be played in the DN-950, CDs are each inserted into individual plastic boxes almost exactly the same size as the "jewel boxes" the CDs are sold in.

But these boxes have a sliding shutter on the bottom that opens only when the disc is pushed into the player. Then the shutter moves aside, and the disc and the plastic carrier drop down to be accessed by the laser mechanism.

Once the discs are in these carriers, they're protected from dirt and smearing. They need never be removed until the disc is taken off the air and the "shuck" is needed for another one.

#### Faster cueing

The playback mechanism itself is exceptionally rugged and accurate. It was built for use with CD ROM discs as an input device to a computer.

Two different motors move the pickup head. One is geared to move it at high speed, which serves the rapid access and cueing requirements.

The other is geared to move it slowly;

identify the song from just little snips taken out of it.

The track number is selected with a rotary knob on the front panel; the cut you want can be dialed up either before or

## Special Report

after the CD is inserted. If you change the knob while it's being played, the machine will cue to the start of the new cut after finishing the current one.

Large LED numerals indicate the cut number being played; if you turn to another during the song, the display flashes to warn that it no longer indicates the current cut.

Smaller digits to the right show a countdown timer of minutes, seconds and frames left in the selection. The production version will inhibit the "frame" display unless the player is being manually cued. This cures the distraction of "dancing digits," which change so rapidly that they are unreadable.

#### End-of-music warning

A set of internal dry contacts close to indicate the song is ending. This warning interval is set with DIP switches on the rear, and can range from 5 to 30 seconds in 5 second steps.

Also on the back are switches to set the audio cue sensitivity and the remote control enable/disable. The remote control interface on the prototype we have is overly complex to hook up to our consoles, so we've been running the player from the front panel until the simpler production units arrive.

Denon uses a separate D-to-A converter for each channel, and the circuitry has been optimized so that the sound the player produces just seems a lot better than other players. The reason can't

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## BUYERS GUIDE

# Restoring Your Damaged CDs

by Gordon Sell  
Buff Stuff, Inc.

New York NY . . . When compact discs were first introduced in 1983, one of their supposed benefits was that they were nearly indestructible: you could spill coffee on them, stomp on them, play Frisbee with them and they would still play perfectly.

Unfortunately, we all learned that CDs were not the warhorses we thought them to be.

Although they are generally more tolerant of damage than LPs, misuse of a CD will lead to the same sorts of pops, ticks and skipping that can make abused LPs so annoying to listen to.

Slowly but surely people have come to realize that CDs need to be treated with care. Those who are meticulous about careful LP handling treat their CDs with the same respect. But, others are not so careful and accidents do happen.

The error correction and error concealment circuits in a CD player will usually enable discs with grease, dirt or modest scratches to be played without an audible defect.

Whether a dirt deposit or scratch will cause an audible problem depends on how much consecutive data is blocked.

If a scratch lies across the path of the

digital pits, the data loss will be brief and easily corrected or concealed. If it runs along the same path as the data pits, the loss can be quite severe and possibly audible.

## Handling CDs

CD problems can easily be avoided by careful handling of the discs. Remember to hold a disc by the edge of the rim or the center hole, and never place a disc on a hard flat surface.

If you drop a disc, try to pick it up vertically without sliding it, even on an apparently soft surface.

Many CDs get scuffed and scratched on the corners of CD player loading drawers. Many more CDs get scratched when they are returned to their jewel boxes—the corners of which seem to have a magnetic attraction for the playing side of favorite CDs.

When you open a CD jewel box be sure to use two hands. Keep the disc storage side of the box horizontal so the disc won't fall out if the previous user didn't push the disc tightly onto the hub lock.

Grab the exposed edges of the CD between your thumb and two middle fingers, apply pressure on the center hub lock with your forefinger and gently lift the disc.

When you replace a CD in the box, hold the edges of the disc between your thumb and the two middle fingers, and carefully lower the disc over the central hub.

When the disc is in place, put your thumb over the hub and gently press the disc down until it locks.

Although these handling tips may seem obvious, most damage occurs when people try to one-hand it or take shortcuts. It certainly can't hurt to review CD handling with staff members.

## Cleaning and restoring

The first, and by far the most important rule for cleaning a CD is always rub radially—from the center toward the rim—across the data path.

Never rub a CD with a rotary motion (around the center hole) as you would an LP. Doing so will cause any dust or dirt in the cloth to leave scratches that will block a lot of data. A radial scratch, however will not be very harmful to the sound.

Mild soap with a clear water rinse or diluted, denatured alcohol will work okay for most disc cleaning needs.

There are several commercially available CD cleaners that are very effective at removing dirt and grease. Those from Discwasher, Recoton and others are widely available in hi-fi and rec-

ord stores.

There are also several mechanical CD cleaners on the market. We suggest you test them out before you buy. If a unit is awkward to use, you may find it easier to clean your discs by hand. However, if you find frequent cleaning beneficial, a mechanical cleaner may prove worthwhile.

Cleaners, however, will not restore scratched and scuffed CDs. To accomplish this, many people have experimented with various polishing and rubbing compounds with varying degrees of success.

Buff Stuff is offering a new product called CD Saver to help restore scratched CDs. While it won't work miracles on severe scratches, it may restore a previously unplayable disc, and can cure many of the pops and dropouts.

If you have a problem disc, first try cleaning it several times. If that doesn't work and the disc has visible scratches, try CD Saver or some similar polishing compound before you trash the disc.

With proper handling and care, those CDs will sound as good ten years from now as they do today.

*Editor's note: Gordon Sell is a NY-based publicist for Blaupunkt, Ortofon, Tandberg, Dual, Ohm Acoustics and Buff Stuff, Inc. He may be reached at 212-704-9880.*

## AEG Intros Recorders

by Larry Lamoray, Sales Mgr  
AEG Corporation

Somerville NJ . . . The name AEG (formerly AEG-Telefunken) may not be familiar to many American broadcasters, although it was one of the pioneers in broadcast equipment.

AEG invented the magnetic tape recording process, and first manufactured reel-to-reel audio recorders in 1935. It has been manufacturing them and other equipment continuously since then.

### Technology Update

Now, AEG has introduced the micro-processor-controlled M-20 and M-21 Series of two-track recorders.

#### Two-track recorders

The M-20 is a full-function recorder suitable for production use. It features four-speed selection,  $\pm 25\%$  Varispeed with speed readout in percentage of deviation from center speed, and digitally accessed audio alignments for three tape formulations at each speed.

A six position locator is included, with automatic "Take" logging of the last entry into play or record, looping and manual entry functions.

Remote and synchronizer/editor interface ports are standard, and RS-232 or RS-422 interfaces are optionally available.

The M-21 is a downscaled version of the M-20, and is suitable for mastering or reproduction. It shares the same transport and configuration as the M-20,

but is a two-speed unit and includes conventional analog audio alignments via potentiometers.

For ease and speed of editing, these recorders include both edit and dump edit modes.

#### Lever-operated scissors

Both recorders are available with the option of various tape-cutting accessories, including AEG's patented, lever-operated scissors.

The scissors cut directly over the reproduce head gap, eliminating the need for grease pencils or other tape markers. The operator needs only to manually cue the tape to the edit point and activate the lever to make a precise edit cut. When not activated, the scissors store over the head.

Both the M-20 and M-21 accept 12½" reels and include amorphous metal core heads. The heads are constructed on a heavy grade cast aluminum alloy chassis and utilize sapphire and synthetic ruby tape guiding elements.

Because of the internal PC board and interconnect configuration, no extender boards or other service aids are required for troubleshooting. Internal diagnostics are built-in, with various error codes displayed on the tape timer to indicate major failures.

Several mounting configurations are available, including table mount, either of two roll-around stands or 19" rack mounting with front-of-rack service access.

The M-20 and M-21 carry a one year warranty.

*Editor's note: For more information, contact AEG Corporation—Audio Systems Division: 516-467-1200.*

# Play Only Is Hard Work

**Radio automation can be tough on a tape transport. That's why you should equip your system with the hard-working Revox PR99 Playback Only.**

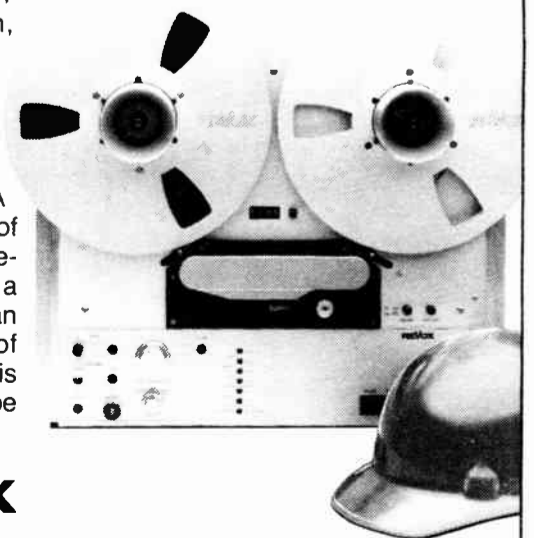
The PR99 is Swiss-engineered and German-built to perform smoothly and reliably. Hour after hour. Day after day. Year in and year out.

Revox reliability is no accident. It is based on a solid die-cast chassis, heavy-duty reel motors, a servo capstan motor, and contactless switching. In the Studer Revox tradition, every part is assembled and checked with meticulous precision.

The PR99 Playback Only also offers front panel controls for repro level, EOM stop delay time, and treble EQ for low and high speeds. A front panel light indicates presence of EOM signal. Audio, status, and remote signals are carried through a single multipin connector, so you can replace playback units in a matter of minutes. The PR99 Playback Only is available in 3.75/7.5 or 7.5/15 ips tape speed combinations.

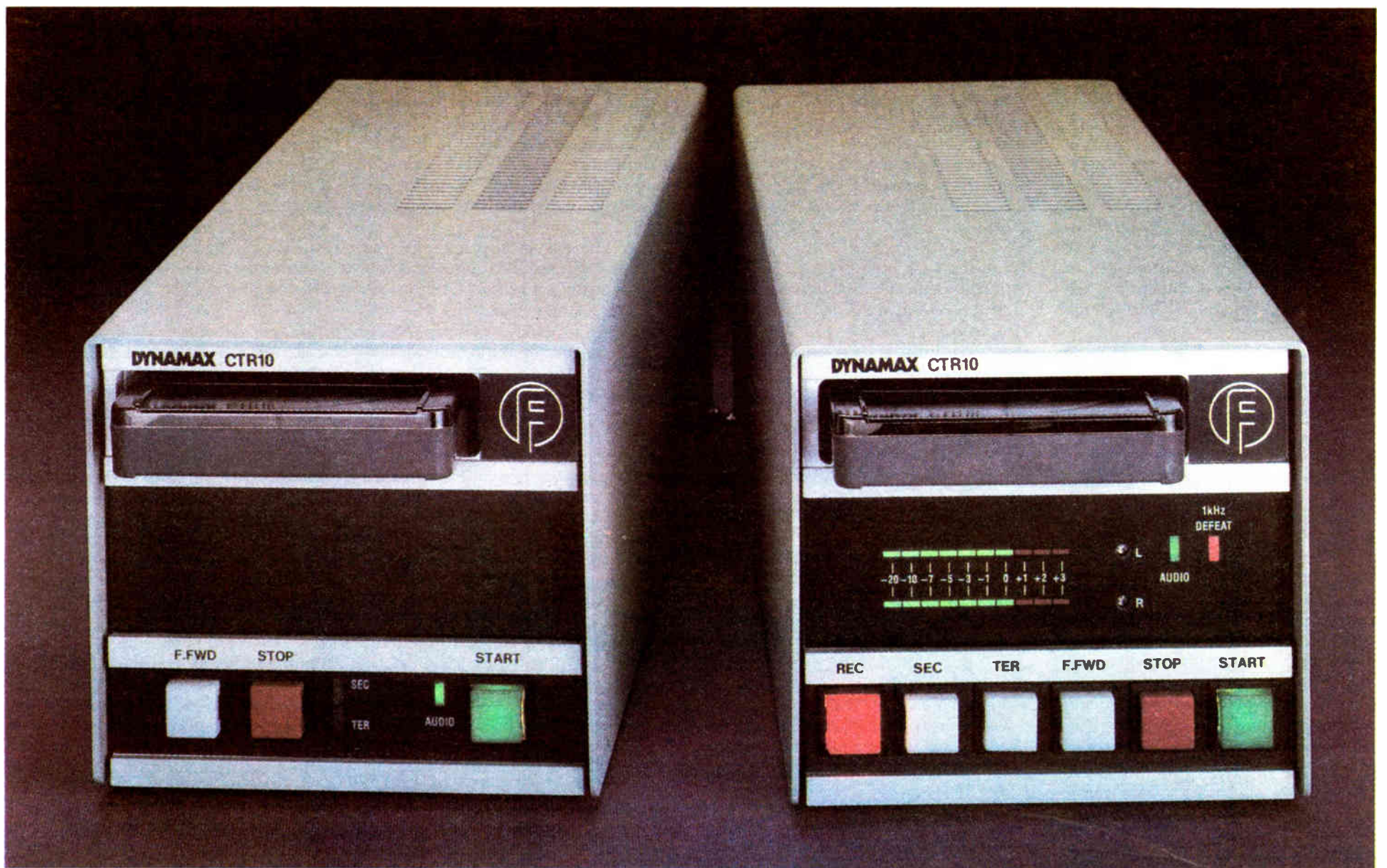
One more thing: this rugged machine also goes to work for less money. It has a suggested list price lower than the primary competition.

If you're looking for a playback unit that thrives on hard work, look closely at the Revox PR99 Playback Only. Call or write today for more information and the location of your nearest Revox Professional Products Dealer.



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DYNAMAX CTR12 and CTR14 shown

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