

NAB Slates European Show

by Alan Carter

Boston MA US equipment manufacturers are generally pleased with NAB's move to organize a radio-only exhibition and symposium in Europe beginning in 1992.

NAB announced during Radio 1990 here in September that the first of what will be biennial shows held in Montreux, Switzerland, is scheduled for early June

of 1992. The show will be the NAB/Montreux International Radio Symposium and Exhibition and will be jointly operated with the city of Montreux.

The show will feature exhibits by suppliers of equipment and services, and sessions on station management, sales, marketing, programming and engineering.

NAB has been assessing the possibility of a radio show for some time, spurred on by the rise of commercial ra-

FCC Plans for WARC

by Benn Kobb

Washington DC The FCC is moving ahead with proposals for allocation of satellite and terrestrial spectrum to digital audio broadcasting (DAB) as it prepares US positions for the 1992 World Administrative Radio Conference (WARC).

In its Second Notice of Inquiry for WARC adopted in September, the Commission suggested several scenarios, which are tentative and subject to modification. Comment deadlines had not been set.

Recommendation by the FCC of spec-

trum positions does not mean that the Commission will move immediately to implement new allocations or services within the US. Such major actions usually are contingent on the decisions of conferences such as WARC, as well as domestic technical and political factors.

One option for DAB would provide for a broadcasting satellite sound (BSS) service on a shared basis in UHF television spectrum at 728-788 MHz (UHF TV channels 57-66).

Another option would be to allocate the 1493-1525 MHz band to BBS, to incorporate a complementary ground-

(continued on page 9)



More than 7000 attendees and 185 exhibitors gathered at Boston's Hynes Convention Center for Radio 1990. Complete coverage begins on page 15.

dio in Europe and the fall of the Communist governments in Eastern Europe.

Seeking help stateside

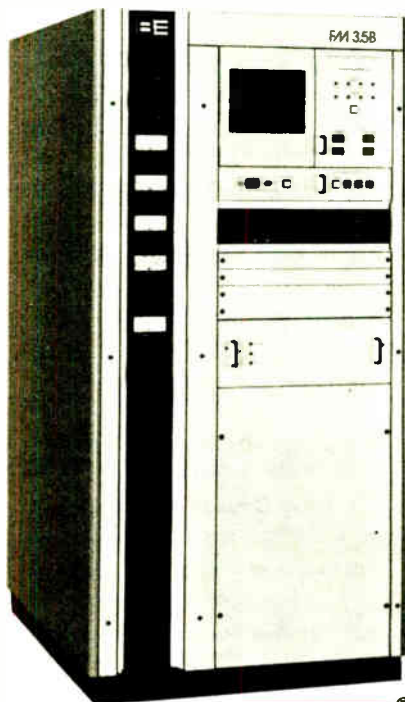
NAB reports that European broadcasters have been seeking advice from the NAB and noted that no radio-only convention currently exists for European countries. Another plus is the economic deregulation slated for Europe in 1992.

The potential European market is an area US equipment manufacturers have set their sites on and view the planned show as a prime attraction for radio broadcasters they target.

"We will definitely participate," said Fidelipac Sales Director Jack Ducart. "What's going to be the big draw are programs on how to do commercial radio."

(continued on page 15)

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Circle 7 On Reader Service Card

DAB Study Groups Hope to Cooperate

by Alan Carter

Boston MA The chairmen of two separate engineering groups formed to study digital audio broadcasting (DAB) said they believe a working relationship is only natural.

The NAB has named 12 engineers to a technical advisory group to work with the Digital Audio and Satellite Sound Broadcasting Task Force assigned to study DAB.

A majority of the engineers, named in an announcement at Radio 1990, also are members of the industry-developed Committee for Digital Radio Broadcasting that says it wishes to remain independent of NAB and industry politics.

Don Wilkinson, chairman of the NAB group and VP/engineering director for Fisher Broadcasting, called DAB one of

the two most important issues facing broadcasters, along with high definition television.

Appointed to the NAB engineering group in addition to Wilkinson are: Paul Donahue, engineering VP for Gannett Radio; Bud Aiello, director of engineering, EZ Communications; Bob Donnelly, general manager, Satellite System, Capital Cities/ABC Radio, and Terry Grieger, VP and engineering director, Emmis Broadcasting.

Also named were Don Lockett, engineering director, National Public Radio; Tony Masiello, technical operations director, CBS Radio; Charlie Morgan, VP, engineering director, Susquehanna Radio; Tom Montgomery, engineering director, Federated Media; Milford Smith, engineering VP, Greater Media;

(continued on page 7)

NEWS BRIEFS

Teleplex Acquires Alford

Indianapolis IN Teleplex Inc., announced its recent acquisition of The Alford Manufacturing Co. of Woburn, MA.

Dr. Andrew Alford, former president of Alford Industries and Alford Manufacturing Co. and designer of the Empire State Building FM radio broadcast antenna system, has allocated his product line and production facilities to Teleplex Inc., Alford Division.

Teleplex, which currently supplies an adaptive FM broadcast antenna array to Broadcast Services Inc., said it will continue production and distribution of Alford's telecommunications products from the Boston facility.

Teleplex said Dr. Alford will remain as a consultant to the company.

NAB Takes on Media Fund

Washington DC The NAB announced its acceptance of a

leadership role as the broadcast industry coordinator for the International Media Fund.

The idea was originally suggested in a speech given by Secretary of State James Baker III at Charles University, Prague Czechoslovakia, to support independent broadcasting and free press in Central Europe.

NAB President and CEO Edward Fritts will act as treasurer of the Media Fund as well as chairman of the fund's Radio Advisory Committee.

"We view the International Media Fund as an excellent opportunity to channel the wealth of leadership and support from this country into the

emerging democracies in Central and Eastern Europe," Fritts said.

Cutting Edge Antenna Planned Dallas TX The DFW Tower Group Inc. has introduced a "state-of-the-art" communications tower that will stand 1530' high in the Cedar Hill tower area of Dallas County. The tower should be completed in June 1991.

The company is jointly directed by Bill Cordell of Spectrum Engineering and Chet Wilke of Ameristar Group. Cordell, a registered professional engineer, is the firm's project engineer. Wilke serves as GM of

the project.

DFW said the tower will be equipped with a master FM antenna mounted at the top, which can handle 10 full-power FM stations simultaneously.

The tower will accommodate two television antennas below the master FM antenna.

BEXT Receives Type Acceptance Approval

San Diego CA BEXT Inc., has received FCC type acceptance approval for its PTX-80, an 80 W transmitter.

Dennis Pieri, VP of marketing, said that the acceptance may give BEXT an edge in the market for a while, but questioned the Commission's recent rule requiring type acceptance of all translators over 10 W under Part 74 of the rules.

"Even though we will undoubtedly gain sales as the only 80 W equipment with proper FCC approval, we do not know of any reason to support the FCC's new policy," Pieri said. "It is our position that all equipment should be just notified under Part 74 and not have to undergo the time-consuming process of type acceptance."

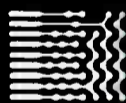
FCC Warns Bilateral Offenders

Washington DC Officials of the Mexican General Directorate of Communications Policy and Regulation have expressed concern with the FCC over the unlawful operation of auxiliary broadcast facilities in Mexico by US broadcast stations from the California border cities.

Violators face prosecution under Mexican law and possible seizure of equipment involved, the FCC stated.

"Unlawful operation by US stations in Mexico is an impediment to bilateral discussion and spectrum planning issues as well as the resolution of cases of harmful radio interference," the Commission said.

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INDEX

Nashville AM Feels Cuba's Bite by Harry Cole	25
Finer Points of the DSE 7000 by Ty Ford	26
Inside Christian Science Monitor by Tom Vernon	27
Please to Read Fully by Al Peterson	28
AM Plan Risks Reduced Service by Steve Crowley	32
Keeping Computers in Top Form by Barry Mishkind	33
The Early Days of FM Translators by Howard L. Enstrom	34
Facts about Amplifier Feedback by Ed Montgomery	36
KRVN: The Farmers' Favorite by Dee McVicker	38
Setting Your Sights On Better Planning by John M. Cummuta	41
Buyers Guide	43

Terrorists' Tactics Fail To Topple VOA Tower

by John Gatski

Concepcion Tarlac PHILIPPINES An estimated 50 pounds of explosives failed to topple a 150' Voice of America (VOA) antenna tower 17 September despite the destruction of the concrete base.



This VOA antenna was driven into the ground from the force of a terrorist bombing, but was not destroyed.

The tower was apparently the target of a terrorist bombing, VOA officials said. Nearly 900' of what was assumed to be detonator wire was found near the tower.

The Rhombic-style antenna is part of a four-tower array that transmits VOA broadcasts in the Philippines about four hours daily. The antenna frequency range is 6 to 26 MHz. The bombing did not hamper broadcasts.

VOA engineers at the Washington, DC, headquarters were in disbelief after looking at photos of the tower, which sank 3' from the base into the ground without collapsing.

"I've never seen anything quite like it," VOA Engineer Dean Bartelt said. "The whole thing just dropped down. It doesn't happen very often."

Bartelt is uncertain how the tower withstood the blast. "The guy wires just pulled it down. With the slack in the guys, you would think it would lean, but the pictures show it standing straight," he said.

Although the tower withstood the blast, the bottom was somewhat damaged and the structure will have to be taken down to repair, Bartelt added.

The VOA believes the bombing is the result of increased anti-American sentiment as the US and Philippine governments negotiate new terms for keeping American military bases in the Pacific islands.

Pirate On Air Again

by Charles Taylor

Nashville TN Radio New York International (RNI), the controversial pirate radio station that in 1988 argued that the FCC's allocation practices violate first amendment rights, has set its sites on new waters.

The station, which gained infamy in July 1987 when it illegally broadcast a talk and alternative music format for four days from the freighter *Sarah* off the coast of Long Island, NY, returned to the air 16 September.

This time, RNI is broadcasting—legally—on international shortwave 7520 kHz Sundays from 9 PM to 1 AM from the facilities of WWCR World Wide Christian Radio in Nashville, TN. The 100,000 W station can be heard over most of the US and Canada, as well as Europe, Russia, the Middle East and North Africa, according to RNI's Randi Steele.

The return to the air marks a victory of sorts for the operation, which was ordered promptly off the air by the FCC following its 1987 broadcasts. Three men connected with the station were arrested for violating international communications treaties.

But RNI took the issue to court, arguing that the Constitution's first amendment prevents the FCC from controlling unoccupied spectrum.

"I view unoccupied spots on the radio spectrum as unoccupied street corners. If I want to make a speech there, I can do it," said Jeremiah Gutman, who represented the station's proponents through the New York Civil Liberties Union.

The US District Court, however, ruled that the right of free speech does not include the right to broadcast without a license and told the pirate station to ship out. Charges against the three were dropped.

The station's new life came about when WWCR offered Steele and company the Sunday night slot on its far-reaching station. Station officials, who had a tough time getting FCC approval for their own venture, empathized with RNI's struggle to get its free-form programming on the air, Steele said.

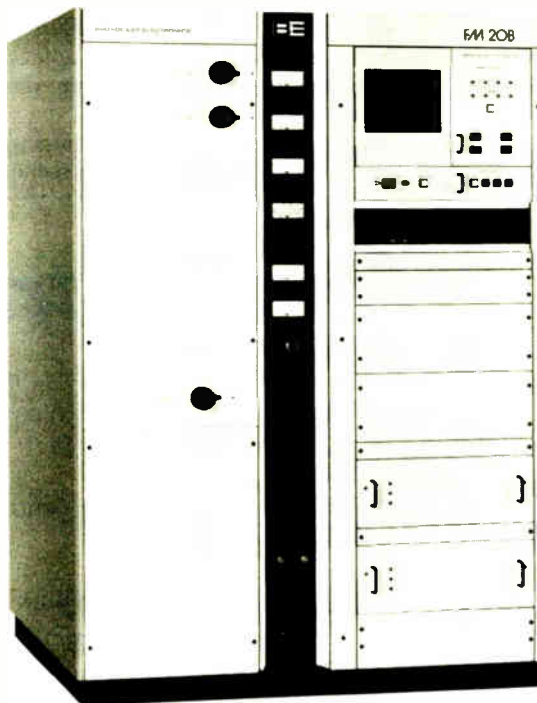
RNI's format is a "free-form talk/music format featuring eclectic popular tunes, new music and current issue earth-sensitive talk and discussion," he said. "Telephone lines are available to our New York studios to take calls from world wide listeners."

Steele said response has been exceptional since the first airing: "They tell me the phone lines were jammed up and we're getting about 37 letters a week. I'm really encouraged."

For information, contact RNI at 718-961-6463.

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Lost In a Cloud at 30,000 Feet

by Judith Gross

Somewhere Over the Midwest USA Looking down, I can't see a thing except the humongous rain-cloud that has Missouri in its grip.

No, I'm not up on top of another station's tower; I'm flying out to St. Louis for the SBE convention as I tap this out on the ole laptop.

Hey, faxes, voice-mail, modems: where would we be without technology? (Back home, snugly between the blankets, napping, but never mind that.)

One thing that happens: you go to these shows and you find out just how much is going on out there. Three weeks ago it was Boston and the NAB's fall radio show.

That's Radio 1990 to you. Yeah they changed the name, decided to add the century and drop the apostrophe (used to be Radio '90) and they didn't even bother to let us know.

I finally figured it out from the banners at the Hynes Convention Center, where we were joined by a prosthetics and a 7-Up convention.

Across the street was the controversial Robert Mapplethorpe exhibit (first a Dead concert, then blue art—what will those folks at NAB think of for Las Vegas?)

But then I knew it was going to be a fun kind of show on my way in from the airport when I spied a sign as we entered the tunnel warning motorists not to try for AM reception underground. I thought that was mighty considerate.

I don't have to tell you that DAB and things digital were the talk of the convention.

Another hot topic at the show was RDS. The session on it was enlightening, yes; it was also fun. The NAB's Stan Salek showed some videotapes on RDS. One was a cartoon from Germany. Instead of your usual deadly dull discussion of the technical merits, this was a story of a British couple, John and Suzy, on their honeymoon in Germany. They were able to hear an entire Mozart concert on one of NDR's (the German NPR)

stations while driving cross-country because an RDS receiver helped them find the appropriate stations.

Poor old Hans, meanwhile, all he got was static because he wasn't enlightened enough to have an RDS receiver in his car. But then, he only had a goose for a traveling companion, so what did he know?



What was particularly encouraging about the RDS session was hearing a representative from Delco get up and say the company is interested in making the receivers. He estimated about four years down the road for them to be in cars.

Now all we've got to do is agree on the format IDs. I think we'd hear quite a fuss if all the varied forms of rock and roll were lumped under one ID. Same for other stations. The NRSC is fielding the tough task of setting standards, so stay tuned.

But you had to love one question from an attendee posed to the Delco rep, namely: Why are radios still treated as an option in cars? No good answer for that one, except to let the car dealers make money.

Not surprisingly, advances in data compression seemed to be driving a sizable portion of the industry on the product side. Scientific Atlanta was ballyhooing its new SEDATS system as a replacement for its current digital satellite distribution system.

Along those lines, although not strictly related to that particular product, comes

word from two networks about some very forward thinking.

CBS and ABC can see the future coming and they know it's going to be digital. The two radio nets' top engineers, Tony Masiello from CBS and Dick Martinez from ABC, got together and defined the technical requirements of a digital satellite distribution system that will support an age when DAB is a reality.

They set their sights on 20 kHz bandwidth (CD-quality), a 3:1 compression ratio and said the new system had to be compatible with the existing DATS system. Also looking ahead, they said the system has to be able to accommodate more than one compression algorithm: MUSICAM, or whatever gets the nod for DAB.

Well, they shopped it around and finally contracted with Scientific Atlanta to develop the hardware. When the system is developed, CBS will migrate to ABC's transponder and, voila, the two radio biggies will be very well positioned to welcome in the digital future.

'em away and usually makes his callers grovel for them. But he gave me a set of red ones. And I didn't even have to grovel.

It was interesting to see what an international show Radio 1990 was. There were 560 attendees from 25 countries outside the US. They all came to see how commercial radio is done.

My personal favorites were the representatives of Gostelradio from the Soviet Union. What a swell bunch. One of their directors, Alexander Akhtyrski, told reporters through a translator that now, when they think of Radio 1990, they'll think of it as "our show, too."

He referred to the changes in the USSR which is shifting from public to private radio ownership. "We were complacent," Akhtyrski said. "This affected our professionalism . . . we have to learn to be independent. Sometimes it is easier to be a dependent."

Gosh, when you start to think of the incredible changes our world has seen



Privet tovarishcham—a welcome to our Soviet friends.

As for Radio 1990 product-wise, you can check out the coverage in this issue, but I really got a kick out of the Broadcast Electronics radio van, with a lot of nifty BE equipment inside.

It's a working studio; Satellite Music Network's Pat Clark used it to do his 2-5 PM show live from the convention floor two afternoons.

Clark is the "fuzzy dice" DJ. He gives

in just a short year. Radio friends and even military allies with the Soviets. And now one Germany.

And radio was there to see it through. Heard something interesting? Spill your guts to Earwaves. We're probably out of coveted mugs for now. But a new supply is in the works. Maybe one can be yours. Write PO Box 1214, Falls Church, VA 22041 or FAX 703-998-2966.

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Dear RW:

In the 26 September issue you printed a letter from Mark H. Hunter. I wonder what his major is, as a graduate student at University of No. Colorado. Could it be high-altitude Stupidity? Then again it might be failure to elude the system.

I am not impressed by his suggestion that drug use—such as "pot"—is a minor crime. I am a DC native living in a very old fashioned town. However, we here in the rust-belt are at the forefront of technology. I absolutely disagree with the illogical ponderings of Mr. Hunter, who in his present environment must know that the world is changing to one where taboo things are once again being pushed out of the limelight in favor of good and healthy living. The number of people put in jail should go up and so should the fines.

I do not go out of my way to convince people of the hazards of drug use (including tobacco and alcohol). However, I have learned the hard way what smoking was doing to me. After 30 years I suffered a major heart attack. Since 23 May I haven't had any tobacco and am getting well. My doctor told me I had a limited amount of time if I continued—that was enough. I can't drink any more and actually do not miss it. That is me.

It is my desire to live a clean life that has helped me recover.

As to others, I have had the privilege of helping several "drug addicts" enter recovery. No user is ever cured by quitting. They enter remission. One must be diligent. Mr. Hunter fails to see the reality of drug use as a detriment to society. I am saying that where one could harm his fellow man—and has the option not to—but does so in some way, then let the punishment fit the crime.

If a person is unfit to work because of a self-induced impairment, then firing is proper. If we look at our work and understand that it is important to our fellow man then it is reasonable to set rules that are a valid guide.

The fact is that the Surgeon General has evidence that proves that smoking is dangerous to our health. Further, secondhand smoke has been shown to be harmful. Thus, many workplaces no longer allow smoking within and many companies are not hiring smokers—they even pay incentives to those who quit. Is there something discriminatory about this? I think not, as the majority have clearly chosen a path. As an ex-smoker I can assure you that it was hard for me to go places, but I respect that which is, mainly when the detrimental effects are considered. I do not believe that Mr. Hunter should cry foul.

As to illicit drug use, look no further than (DC mayor) Marion Barry. Politically, I have never liked him—except that he gave tax breaks to the elderly and created some summer jobs for kids in high school. Otherwise, he is a prime example of why punishment of a severe form is appropriate. For those out in the boonies, Mr. Barry—soon to be ex-mayor of Washington, DC—was convicted of (one count of) cocaine possession. It is a fact that he had been a long time user—no conviction. Has he been suitably punished? I do not think that a public official or a person who is held in high esteem by the public is adequately punished by a slap on the wrist sentence.

In Mr. Barry's case he is actually going to run for city council. He should be required to resign from any elected position and, from the date of the crime, refund all earnings from his post as mayor. Maybe that kind of punishment would deter others. This in addition to the fine. I have offered Senator Heinz and others a proposal that would choke the DC (and national) drug barons and their subordinates with fines they cannot afford.

Does radio have a reason to be part of the Drug War? You bet we do. The only way our children will ever understand the reality is by having the media pound into their heads the truth. Mr. Hunter is dead wrong about the media being manipulated with untruth or lack of accuracy.

Yul Brenner gave us a magnificent piece of videotape when he died of lung cancer. I suggest that Mr. Hunter view it and decide if a great thespian is a liar. How about John Wayne? Smoking eventually did him in. It is claimed by some that Jackie Gleason abused alcohol.

The success of Radio 1990 is in the eye of the beholder.

NAB can be proud of this year's event, which drew increased attendance and featured attention to emerging technologies.

Those engineers who went heard top-notch technical sessions focusing on radio's cutting edge and walked an exhibit floor that offered a comprehensive cross-section of equipment and services.

Digital technology was the center of attention during the sessions with breakthroughs seen in DAB, data compression and production equipment. Other important issues addressed included RDS, receiver improvements and AM reforms at the FCC.

A first step also was taken this year regarding international attendance. The Soviet Union sent representatives for the first time and the announcement of NAB co-sponsoring a European radio show in Montreux, Switzerland in 1992 met with enthusiasm.

Exhibitors who showed products directed across the board toward managers, programmers and engineers had the best booth traffic.

The logistics of traffic flow, however, was a problem in certain areas of the exhibit floor even though the situation was ultimately addressed.

NAB's fall radio show continues to warrant the industry's support. But there is room for improvement if it is to grow.

The next move should be to build a bigger engineering conference at the show that would attract more engineering attendees.

Strong technical representation would help eliminate the stigma that the fall radio show is for managers and programmers only.

With better engineering attendance, equipment exhibitors who questioned the success of Radio 1990 will be satisfied. Plus, the entire radio industry would benefit.

Not only will radio have a strong, established showing at the annual spring exhibit, but an even stronger forum all its own in the fall.

—RW

Build on Success

What about John Belushi, Mama Cass Elliott, Janis Joplin, Elvis Presley. All of the latter died of drug abuse of one kind or another. They were all public figures. Mr. Hunter fails to see the reality of life in any lane.

Rather, Mr. Hunter wants to bury the reality; I guess from his letter that he is a victim of his own stupidity. He wants a second chance. There aren't any of those, chum, not in a high profile industry such as ours. Go out and find a new profession. Just remember that you best be on good behavior from now on as you will find the same abhorrence in other industries.

As for me, I'm getting well and haven't smoked since 23 May. During the last three years I have helped save two lives from self destruction. One is very precious to me and the other has gone a separate road. Each of them is fine now. They will make it because they have the desire and ability to succeed. Given purpose and direction anyone can make a new life for themselves.

Radio has an obligation to its audience and itself to be honest at all times. The FCC is only trying to get a message out. I think it is a valid one and we, from within the industry, should do whatever we can to set an example that has meaning.

We can win the War On Drugs—Just Say No—as an industry and nation if we believe in what we are doing!

Do you Mr. Hunter? Will you join the majority?

Ben Coplan, Jr.
Coplan Communications
Monroeville, PA

Editor's note: Mr. Coplan's comments about DC mayor Marion Barry do not necessarily reflect the views of Radio World or the facts of his court case as they became known through the local media. Barry was convicted on one count of cocaine possession but the majority of charges against him ended in a mistrial—generally considered a victory for Barry.

As to the conclusion of any drug use by Barry over time, no such fact has been established by a court of law and Radio World declines to speculate on such a possibility al-

though Mr. Coplan obviously sees fit to express his view on the matter. We have made his views available to our readers for their comment.

The other side of ethics

Dear RW:

I have to take exception to Barry Mishkind's "Ethics In Equipment Purchasing" article (12 September issue).

As a former radio equipment salesman, I agree with Barry's efforts to dissuade buyers from potential unethical kickbacks to customers. Like every industry, there are "bad apples" out there who discredit the rest of the honest equipment suppliers in the marketplace.

But every time I read one of these articles, it seems to me that the authors are always pointing a critical finger at the suppliers. How about all of those "unethical" engineers and group managers who expect free dinners, lunch and drinks and special favors before they will even take a look at a proposal or equipment specifications?

Every day, equipment dealers are taken for a ride by customers, who demand Federal Expressed proposals, instant service and personal favors—and then, almost without reason, go with the other quote. You find out later that the engineer always had a brand preference, but had to get an alternative proposal to satisfy his boss (with no intentions of even considering the second quote).

Now that I am out of the marketplace and just a radio industry fan, it's "safe" for me to say that there are just as many bad engineers as there are bad equipment salespeople.

Barry Mishkind has always been a balanced writer. Maybe his next article on ethics should be written from the other side so that your readers are aware of the kinds of activities and special requests made by so-called customers that equipment sales people must deal with every day.

Thanks, *Radio World*, for such a great job on covering radio!

William A. Wohl, Sr.
(formerly of Radio Systems)
West Grove, PA

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Next Issue
Radio World
November 7, 1990

Stations Discover Hidden Assets

Trade-in, Trade-out: Save Big Bucks with Equipment Exchange

by
John Grayson
Harris Allied Chicago



Our typical used equipment success story starts out with a scenario that may be easy for you to identify with.

Transmitter rooms so full of used radio gear it's difficult to find the transmitter. A workshop cluttered with discarded equipment stacked so high it's difficult to tell the test jig from the broom closet.

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In more than one situation, listeners have discovered that a station is doing its talk show without a profanity delay.

In another specific case a station's 12-year-old stereo generator has just degenerated and the old reliable standby is setting off the smoke detector.

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The Harris Allied Equipment Exchange is a resource that many stations use regularly to solve their new equipment purchase budget problems!

Just last year a major metro AM/FM combo cleaned out a transmitter building and more than six studios' worth of old gear. They sent THREE truck loads of abandoned radio hardware to Allied's used equipment department. All of this effort paid off in \$30,000 directly applicable to several new needs that had always been cut from budgeting considerations. They also reclaimed untold amounts of space in their transmitter building.

A Minnesota customer called to order a phone hybrid only to discover that the price had increased since the last time he checked. By trading in some old cart machines and a modulation monitor, he was not only able to cover the increase, but also upgrade it to a top-of-the-line DIGITAL hybrid!

Recently a medium market customer learned of a format change and came to us for new microphones. The customer had a budget placed somewhere between slim and none. However, by trading in some gear, he was able to buy the new mics which shipped the same day he called!

To find out just how fast a program director can move, let his listeners figure out that his station isn't doing their phone-in show with a profanity delay. One station didn't have a profanity delay because they thought they couldn't afford it. It turns out they couldn't afford to be WITHOUT one. A used equipment trade-in to the Harris Allied Equipment Exchange made the profanity delay possible!

Two years ago a small market station in Wisconsin lost its stereo generator. Then they lost their backup. Then they called Harris Allied. The new stereo generator arrived the next day, 100% paid for with used equipment they were able to dig up!

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the money until they've seen your used gear . . . you don't want to ship your used gear until you have their money.

Simple and Clean

Trading in your used gear with Allied is very simple. Give us a call for an appraisal. We'll do all the foot work, evaluating your trade-in equipment against the new gear you need and call or fax you back with a quotation which will save you many dollars or, possibly, trade out the new equipment you need for the used equipment you have!

We're easy to do business with. There's a good chance your station is already on account with us. Your used equipment acts as a credit toward the new equipment you need.

In a Nutshell

You can talk to us today about the used equipment you have and the new equipment you need. If you're serious about trading in your used equipment to save dollars, there's a good chance we'll make a deal. Or, you can have 68 tire-kickers call you about each of the items you have for sale. The choice is yours.

Check around. You may be sitting on a wealth of used equipment. Give us a call. Remember, we buy, sell and trade selected used equipment.



All this used equipment was turned into valuable dollars toward the new equipment several radio stations needed. Leasing may provide finances for the balance.

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Radio And Production Believes

Jerry Vigil, editor and publisher of RAP, the RAP sheet for radio's production personnel, writes in the August issue, "our hats are off to AKG Acoustics for the most serious approach to digital audio work stations designed for radio our industry has ever seen."

Jerry leaves no doubt about the direct aim taken by AKG on the radio production market. "AKG didn't contact major recording studios or engineers at radio stations across the country and ask what they thought their production directors could use



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in their studios. Instead, AKG spoke directly to the people who spend their days cranking out spot after spot, promo after promo, sweeper after sweeper."

Jerry summarized, "The machine is called the DSE 7000, and it belongs in every radio production room where speed, quality, and ease of use are the top priorities."

Jerry Vigil's comments are used by permission of Radio And Production, P.O. Box 150265, Irving, TX 75015-0265, (214) 254-1100.

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NRSC Fine Tunes Receiver Tests

Parameters of Study on Effects of Processing Are Modified Because of Differences of Opinion

by John Gatski

Washington DC Several changes have been made to NRSC proposed FM receiver tests that are supposed to assess whether processing degrades performance.

Although there was significant disagreement about the intent and methodology of the testing, some details were worked out at a 20 July meeting of the National Radio Systems Committee (NRSC) FM Composite Spectrum Studies Working Group.

The procedures were proposed last spring by Bob Orban of Orban Associates to assess the effect of aggressive audio processing on FM receivers. The differences of opinion over test methods

surfaced during a May meeting.

The tests are supposed to subject receivers to various levels of processed signals and determine the best protection ratios.

Agreements reached

Based on previous questions about how many receivers to test, members have agreed to evaluate three receivers, according to NAB Staff Engineer Stan Salek, who coordinates the NRSC.

The receivers will include a high quality tuner such as the NAB's NRSC-specification tuner that will be built by Denon, a mid-quality receiver and an auto receiver.

Also, members tentatively agreed to allow the companies whose processors are selected for the test to define what is meant by "light, medium and heavy" processing levels, Salek said.

European interest

The effects of processing on FM signals also has interested European officials, based on discussion by the US's CCIR Study Group 10 and 11 Chairman John Reiser.

Reiser, who was at the NRSC meeting as an observer, said European officials and broadcasters are interested in the NRSC processing effects study.

Currently, Europe's traditional method of measuring modulation does not "necessarily take into account processing," which has recently become a topic of much discussion there, Reiser noted.

The concern stems from European broadcasters' trend toward increased processing, Reiser said.

The NRSC's findings from its processing tests could be used to develop an international modulation measurement that takes into account processing, he added.

In other matters relating to the FM

processing effects test, Belar President Arno Meyer presented Digital Still Oscilloscope (DSO) readings of several unidentified stations to point out the accuracy of using such a scope.

Use of a DSO has been suggested to measure modulation during Orban's processing tests, according to Salek.

Use of a DSO has been suggested to measure modulation during Orban's processing tests . . .

Meyer said the NRSC should use a higher speed DSO rather than the recommended 50 MHz scope.

He said his modulation measurements of the unidentified stations were used with a 400 MHz DSO and he maintained they were very accurate.

"You need the speed to give an adequate number of samples of all the frequencies," Meyer said.

DAB Groups

(continued from page 1)

Dave Murray, CE, WWNZ/WSSP of Orlando, FL, and Dennis Snyder, CE, WJOY/WOKO, Burlington, VT.

Wilkinson said he expects to see a "merger" of work between the NAB engineering group and the industry digital committee because many of the engineers are on both.

Donahue, who also chairs the digital committee maintained that he doesn't foresee any conflict between the two groups, noting that DAB is a broad issue. He also said he and the NAB have openly shared information.

But Donahue noted one difference. "We don't want any political issues because the minute we bring that in," he said, "we won't get anywhere."

Working group members also briefly discussed a draft receiver RF protection paper submitted by Bonneville International Engineering VP Bill Loveless, who was not at the meeting.

Interference causes

In his analysis of RF signal protection ratios, based on FCC rules, the Loveless paper suggested that new Class A and C assignments "may be causing interference due to the wide variance of RF protection ratios built into the FCC allotment rules for different classes of stations."

Salek said the paper will be discussed in more detail at the working group's next meeting.

For information on the NRSC contact Stan Salek at 202-429-5391.

Continental Sale Inked

Palo Alto CA Varian Associates and Tech-Sym Corp. announced 28 September that the sale of Continental Electronics of Dallas has been finalized through a newly formed wholly owned subsidiary.

The subsidiary, named Continental Electronics Corp. paid \$12 million in cash, issued a promissory note in the amount of approximately \$1.7 million and assumed certain liabilities of the Continental Electronics division.

Houston-based Tech-Sym makes and markets a variety of advanced electronic systems and components. Continental, which manufactures high power radio frequency transmitters, will remain in Dallas.

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CITEL Reps Hear Eureka 147

by James Careless

Ottawa CANADA They came. They listened. They were impressed.

A poor rework of Caesar's great saying, perhaps. But, it is an accurate assessment of how delegates to the Inter-American Telecommunications Conference, held here 10-14 September, reacted to an impromptu demonstration of digital audio broadcasting (DAB).

The show was organized by the Canadian Department of Communications, which tested a van equipped with a DAB receiver across the country this summer. In fact, the European-made Eureka 147-

DAB really should have been home, but the Canadians managed to hang onto the equipment long enough to give the 25 delegates from the Americas a taste of digital broadcasting.

Preparing for WARC

The delegates are members of CITEL, the broadcasting arm of the Organization of American States. Meeting were the Permanent Technical Committees II (Radiobroadcasting) and III (Radiocommunications) to work out common Western hemisphere positions for the upcoming World Administrative Radio Conference (WARC) in 1992.

The Canadians chose this opportunity to expose countries like Brazil, Panama, and Jamaica to a demo of DAB.

Canada is pushing hard for digital frequency allocations at WARC '92 and each of the countries attending this conference has a vote at WARC. Canada is hoping for a unified spectrum allocation request from the western hemisphere to take to the WARC meeting.

Because the test was slotted at the last minute it was not quite like the original demonstrations held this summer.

"It was done with the same bus, but we had a different transmit location," said Royce Trenholm, head of DOC's Cable TV

Broadcast Systems, planning and development, who pulled the tests together.

Instead of a simulcast from a local FM station, which allowed passengers in the bus to hear the difference between analog and digital broadcasting, the DOC used prerecorded digital on an R-DAT, which fed the DAB transmitter directly, according to Trenholm. "We did do some tests of FM reception, as we did in the demo before," he said, "but we just selected a local FM broadcast station and demonstrated the multipath effects."

Same results

Those who have traveled the Ottawa demonstration route, which snakes through a number of FM dead zones, know how well DAB stands up in these tests. Its signal stays constant, while the FM fades and hisses. For some delegates, like Alfredo De Sousa Francheschi of Panama, it was this consistency, rather than the CD-quality audio, that caught his attention.

"What impressed me is the equipment used in reality, and the frequencies (68-89 UHF) they use, and the bandwidth

Canada is pushing hard for digital frequency allocations at WARC '92...

they're using for the transmission," he said. "That is what is more impressive than the difference between the sound."

Overall, Trenholm said, the CITEL delegates from ITU Region 2—the entire Western hemisphere—were quite taken with DAB. "I think everyone was extremely interested," he said. "I've been getting questions ever since."

De Sousa Francheschi said thought the demonstration had increased CITEL's support for DAB. "The problem is that sometimes the people who decide things just see on paper what it is," he said. "But when they hear what is, when you see it in practice, you understand what it is."

The DOC's Dr. Bruce Gracie, who chairs the Canadian Preparatory Committee for WARC '92, said that digital technology may prove especially important for broadcasters concerned about economy.

"This is a lot more than simply demonstrating a technology to countries that, for the most part, may not be able to use the technology," Gracie noted. "Because of the nature of the technology—being energy efficient (100s vs 1000s of watts), and being spectrum efficient (up to 16 stations on one signal), it is within the range of possibilities that countries in Latin America could, in fact, use it."

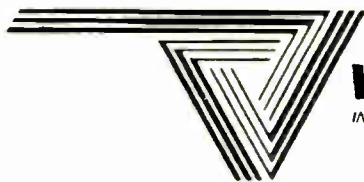
In the final analysis, the Canadian DAB demonstrations were primarily a consciousness-raising exercise, according to Ron Begley, director-general, Broadcast Regulations, of the DOC. "We don't expect people to roar home" trumpeting the virtues of DAB, he said, but now "they will be aware of the technology, know why people are excited about it, and be in a better position" to judge it at WARC '92.

For information contact Ron Begley, director-general, Broadcast Regulation, Canadian Department of Communications at 1-613-990-4820, FAX: 1-613-952-1231; or Dr. Bruce Gracie, International Relations, Department of Communications at 1-613-990-4248, FAX: 1-613-952-1231.

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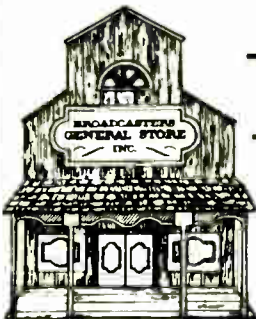
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Denon to Use Sprague Chips

by John Gatski

Washington DC The NAB will recommend that Denon use Sprague Semiconductor FMX decoder chips in the 2500 production models of the Denon "supertuner," according to the NAB's Science and Technology Department.

The yet-to-be-produced \$400-500 Denon home tuner, which also includes AM stereo and NRSC specification-AM performance, will be marketed by Denon and the NAB. The "supertuner" concept was designed by the NAB.

NAB Staff Engineer Stan Salek said the NAB will recommend the Sprague chip over the Sanyo chip, currently the only FMX chip being mass-produced, because of its predicted performance in home receivers.

"The Sprague chip is better suited for home use while the Sanyo chip is better suited for in the car," Salek said.

Sprague has indicated that it will supply Denon with FMX chips, but has not yet committed to any additional chip production because of uncertainty about FMX's market acceptance, according to the company.

Sprague, which jointly hosted a booth

with FMX Inc. at the two Consumer Electronics Shows (CES) this year, has not committed itself to full-scale FMX chip production because of market uncertainty, according to Sprague Analog Applications Manager Oliver Richards.

"At this point, we really haven't made a decision on how much support to give it," Richards said. "We have seen little interest in the receiver market place."

Both JVC and Alpine have a car radio models that receive FMX broadcasts and other companies have developed home units. But there has been no mass-production of FMX-equipped receivers.

Stations also have been slow to adopt FMX despite the claimed benefits. About 100 stations in the US are broadcasting with FMX, according to FMX Inc.

Many station engineers have been reluctant to use FMX because of possible noise resulting from incompatibility with other subcarriers, such as paging services.

Only one broadcasting equipment manufacturer, Inovonics, is producing an FMX generator. Several companies, however, are considering adding FMX as an option to their stereo generators.

Industry analysts believe FMX's acceptance has been slowed for several rea-

sons including last year's critical analysis of the technology by Bose Corp. President and Chairman Amar Bose.

The report concluded that FMX actually increased noise and distortion under multipath conditions, a condition FMX proponents denied.

Bose critics attributed the poor FMX performance tests to a faulty transmitter and the use of a pre-production FMX chip during the field tests, an assertion that Bose engineers denied.

For more information about the Denon tuner, contact Stan Salek at the NAB 202-429-5391.

WARC Plans in Progress

(continued from page 1)

based DAB service. This band is used for aeronautical telemetry including flight testing and command of missiles.

Under the second option, its current users would be relocated higher in the spectrum at 2390-2420 MHz.

Option three would allocate 2390-2420 MHz to BSS and complementary terrestrial DAB.

Advising the FCC on proposals for WARC is the Industry Advisory Committee (IAC). On 24 August, Ad-hoc Subgroup B within IAC Informal Working Group 2 released its report on spectrum requirements and possible frequency bands for BSS and terrestrial DAB in the range 500 MHz-3 GHz.

Subgroup B participants include NAB, National Public Radio, Strother Communications, NASA, Radio Satellite Corp. and Satellite CD Radio, among others. Its work contributes to the comprehensive IAC recommendation that is forwarded to the FCC.

The group examined three DAB scenarios: Integrated satellite and terrestrial; purely terrestrial and an international satellite system, possibly using the same satellites as the domestic systems.

Critical to success of any DAB proposal is how realistic its prospects are for sharing bands with existing services. The microwave bands proposed by the FCC for sharing with DAB are allegedly intensively used by government satellite, nuclear testing, flight testing and experimental projects.

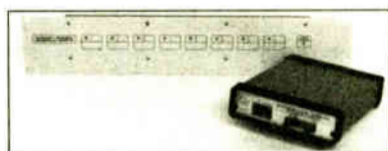
Satellite CD Radio contended that interference from a BSS system to such uses could be mitigated and controlled. The Aerospace and Flight Test Radio Coordinating Council disagreed, telling the subgroup that "given the vital safety-of-life implications associated with flight test telemetry—a matter which the Commission has repeatedly recognized over

the years—it is clear that such operations may not share spectrum with BSS proposals such as Satellite CD Radio's."

A unique proposal made during the IAC deliberations is known as AfriStar, an international BSS system designed to be controlled from the US but broadcasting to Africa and the Middle East. Designed to operate in a portion of the 1.5 GHz band shown to be little-used in the target areas, AfriStar would provide as many as 100 channels of non-CD quality digital sound.

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AM Antenna Results Are Mixed

by John Gatski

Boston MA NAB AM antenna projects were the subject of good and not-so-good news at Radio 1990.

Officially, the NAB put its \$100,000 anti-skywave project to rest after its unexpected and disappointing performance during tests from the antenna/transmitter site in Beltsville, MD.

Although the antenna structure is still in place, the NAB has no immediate plans to continue testing, according to NAB Staff Engineer Kelly Williams.

On the plus side, the NAB's low-profile antenna computer modeling, undertaken by AGL Inc. of Pacific Grove, CA, has produced theoretical antennas that "in some cases exceed" NAB performance criteria.

History of snags

The anti-skywave antenna project was plagued with bad luck (bureaucratic delays, equipment breakdowns and poor weather) since NAB commissioned the project in 1989. Its ineffective performance was the final disappointment.

During the AM antenna session, Williams and antenna designer Ogden Prestholdt and consultant Ron Rackley of du Treil, Lundin & Rackley acknowledged that the antenna did not effectively reduce the skywave in the direction the antenna was tuned.

The anti-skywave antenna design is

essentially a horizontal radiator attached to a conventional vertical tower with a custom matching circuit.

In theory, according to the NAB anti-skywave report, "By adjusting the current and phase of the signal applied to the horizontal radiator, a null can be placed in the vertical radiation pattern of the antenna systems at that specific azimuth and angle of elevation without affecting the system's groundwave performance."

According to the report, the 21-24 June field tests were conducted by transmitting and monitoring at two listening sites: one in Raritan, NJ, and the other in Uniontown, PA.

On-site engineers who monitored the 1660 kHz test signal used field strength meters and strip charts to record the emissions from the vertical radiator only, the horizontal radiator only and a combination of the vertical and horizontal radiators in the suppression mode.

"Attempts were made to adjust the antenna systems to produce the (skywave) null, but without success," the report stated. "Prior calculations showed that we should have been able to achieve an average of 15 dB of suppression from the systems."

Temporary null

"A very pronounced null could be produced for a short period, but the null could not be sustained," the report noted.

Measurements in Uniontown were

similar, and antenna testing in the receive mode also did not significantly reduce the skywave signals of distant channels, the report continued.

In evaluating the antenna performance and why it did not work, the report concluded "there was not a constant relationship between the emissions produced by the two elements and it was obvious that each transmitted signal underwent a different mode ionospheric reflection. These differences caused the nulls to be unstable."

The NAB believes that the antenna produces a high angle null as predicted, but horizontal and vertical elements propagate differently, which does not allow the antenna to operate as a skywave suppression system.

In commenting on the project, designer Prestholdt said experiments sometimes reveal unexpected results and the anti-skywave project was indeed an "educational process."

Williams noted there were some positives that came out of the project including increased knowledge on how the skywave behaves—information that could be put to use in the future.

Low profile looks good

On a more upbeat note, the low-profile antenna computer modeling project has produced a design that fits into the NAB's design criteria, which includes a 50' height limit, simplified ground system, 2:1 or less VSWR for a ± 10 kHz bandwidth and effective performance over the entire AM band, including the expanded band (1700 kHz).

The NAB believes that a small "electrically short" antenna could allow stations to economically mount a roof-top antenna. Although not as efficient as a full-sized tower, a low-profile antenna could enable AM daytimers to economically move facilities closer to the service area.

The antenna also would benefit nighttime broadcasting because its closer-to-

the-community location would not require as deep of a nocturnal power decrease as a normal antenna requires since it would already be operating at a lower power.

Based on AGL's latest computer modeling results, the antenna with the best predicted performance is a triangular tower with a 2' face width and 2' diameter legs, according to the NAB report.

The design has 50' ground radials buried 6" into the ground and 8' ground rods. On top, the antenna has six radials sloped at 45°.

The effective heights varied from 50' at 1700 kHz to 175' at 540 kHz, which means the antenna will work best at higher frequencies, based on AGL calculations. Radiation efficiencies range from 21% to 46% in comparison to a standard AM antenna, the NAB report said.

"Because a tower of 65' or less can be used, this antenna system is most useful at frequencies over 1000 kHz," the report stated. "Fortunately, most daytime-only stations operate between 1000 and 1600 kHz where the shorter waves will suffice."

The NAB also concluded that the antenna will work best with 1000 W or less.

The report noted, however, that the antenna will not perform at the FCC's required radiation efficiencies and indicated it would "seek FCC acceptance" for any proposed low-profile design.

The low-profile project was initially commissioned in March 1989 and computer analysis indicated that a model, known as the Smith-Musselman antenna, had potential as a low-profile antenna.

Phase II began in November 1989 with further computer modeling that concluded the Smith-Musselman antenna would not meet the NAB's desired performance criteria.

In June 1990, more analysis was undertaken and the current working antenna model was the result of a modified configuration of Phase I design with some new parameters.

For information, contact Kelly Williams at 202-429-5337.

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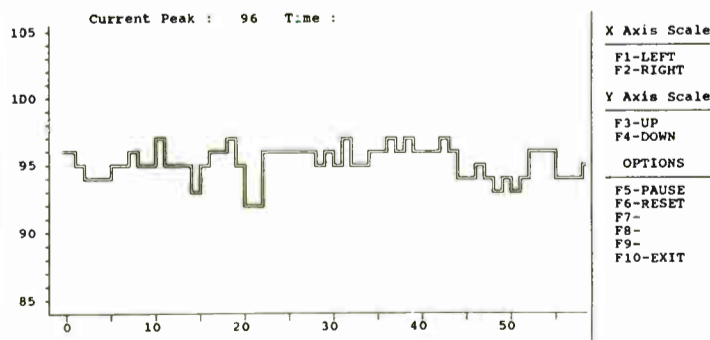
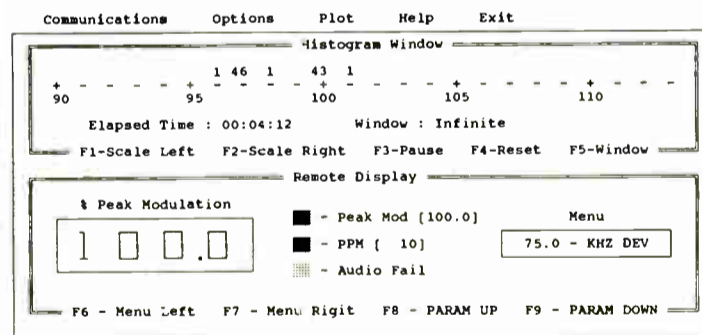
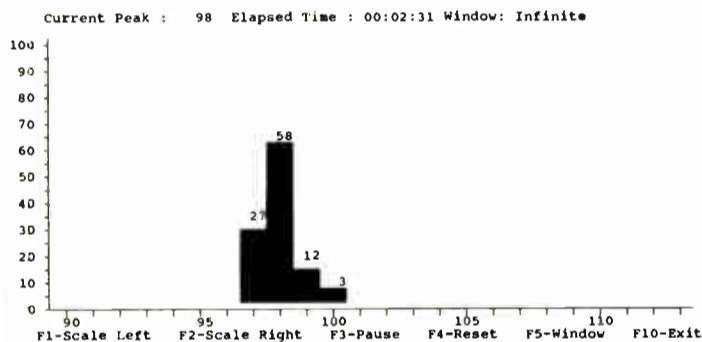
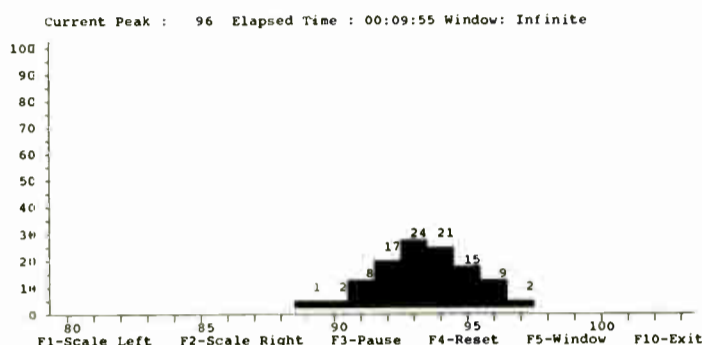
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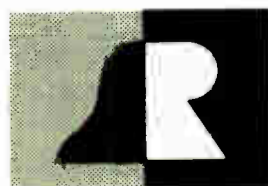
Sample PC Output



Sample Setup Menus

- ^ SELF CALIBRATION ^
- V MENU PARAMETER V
- ^ SAVE CONFIG ^
- V MENU PARAMETER V
- ^ BLANK - ON ^
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- ^ TIME MODE - REAL ^
- V MENU PARAMETER V
- ^ DEV 75.0 KHZ ^
- V MENU PARAMETER V
- ^ HOLD 1.0 SEC ^
- V MENU PARAMETER V
- ^ PEAK MOD 100.0 % ^
- V MENU PARAMETER V
- ^ REMOTE - OFF ^
- V MENU PARAMETER V
- ^ INFINITE - ON ^
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- ^ PILOT INJ 9.0 % ^
- V MENU PARAMETER V
- ^ SCA INJ 10.0 % ^
- V MENU PARAMETER V
- ^ PK WEIGHT - OFF ^
- V MENU PARAMETER V
- ^ RES- 1.0 PERCENT ^
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World Radio History

Where Accuracy Counts ... Count on Belar

Spectrum Fees Draw Fire at Radio Show

by Charles Taylor

Washington DC A 5% spectrum fee that would raise \$6 to \$9 billion for the federal government in the next five years was not included in Congress' initial budget package, however, broadcasters were not calling the issue dead.

The tax, which would apply to station owners with gross revenues of more than \$100,000, was among a list of items subject to tax increases in a massive effort to re-

duce the federal deficit, along with gasoline, beer and alcohol, cigarettes and luxury items. Approval was reached 30 September on the majority of the items, but the deal fell apart when Congress rejected the package.

NAB, which has strongly opposed the tax since its proposal, said it will continue an active grass roots lobbying effort as well as traditional lobbying to defeat the tax.

At Radio 1990, where the issue was a major point of contest, NAB President



Commerce Department representative Wayne Berman (center) explained the government's position regarding the spectrum fee.

and CEO Eddie Fritts said during an opening luncheon that the tax would be devastating for radio.

"NAB is employing every conceivable lobbying strategy to kill the spectrum tax proposal, including all legal avenues," he said. "But key to the success of these efforts is old fashioned grassroots lobbying."

Will proposal pass?

Discussions at a convention session by members of Congress, however, lent doubt to the tax's chances of getting passed. The House members said the tax didn't make sense.

"There doesn't seem to be among the members of the House and Senate anybody who favors a spectrum tax," said Rep. Clay Shaw (R-FL). "It would be irresponsible of Congress to get into an area of taxation without holding a substantial amount of hearings and examine the damage that would be done."

Echoed Rep. Brian Donnelly (D-MA), "I don't see it as an immediate threat."

Deficit is national priority

Broadcasters themselves also let a Commerce Department official know just how vehemently they oppose the measure in a session not on finances but on digital audio broadcasting.

Wayne Berman, assistant secretary-designate and counselor to the Department of Commerce secretary, told attendees, "I'm here to listen and take back any messages that you have. We do have an understanding of the seriousness of your business concerns. We're not taking them lightly. But the deficit is a national priority."

"The Administration has no other agenda in proposing this fee," Berman added. "We are not trying to single you out, your industry out or hurt or distress you in any way. We understand the value

of radio. It is one of the foundations of democracy. (The tax) is part of a series of several dozen specific fee-type proposals."

His comments, however, failed to appease station owners and managers attending the session. Said one emotional attendee, "I think this is going to change the chemistry of broadcasting in a way that will be very regrettable if this thing progresses. You are destroying a situation that has made America great. Radio is underestimated; it's just like Mother. People don't appreciate her till she's gone. Don't kill radio by doing this just because the congressmen can't control their spending."

Give us fair playing field

"I don't mind playing on a fair playing field, but what (Congress) is proposing is an unfair playing field," another appealed. "You are not taxing newspapers, you are not taxing billboards or magazines, and we are the people that provide localism. It's unfair. Forty percent of the radio stations in America are losing money now and we can't afford a 5% tax."

One attendee who said he had just purchased a small-market FM, said, "What this tax will do in my case is deprive me of one badly needed employee in my start-up years when I need him worse than I ever will. I wish you would consider the plight of all of the radio stations that are not great big broadcasting companies, which I think are the priority."

Berman listened patiently to the comments, responding that all views would be taken to higher authorities.

In its efforts to fight the proposed tax, the NAB established a booth at the show for station officials to send a pre-worded mailgram directly to members of Congress, which Fritts said was an obligation "to help determine the destiny of our industry."

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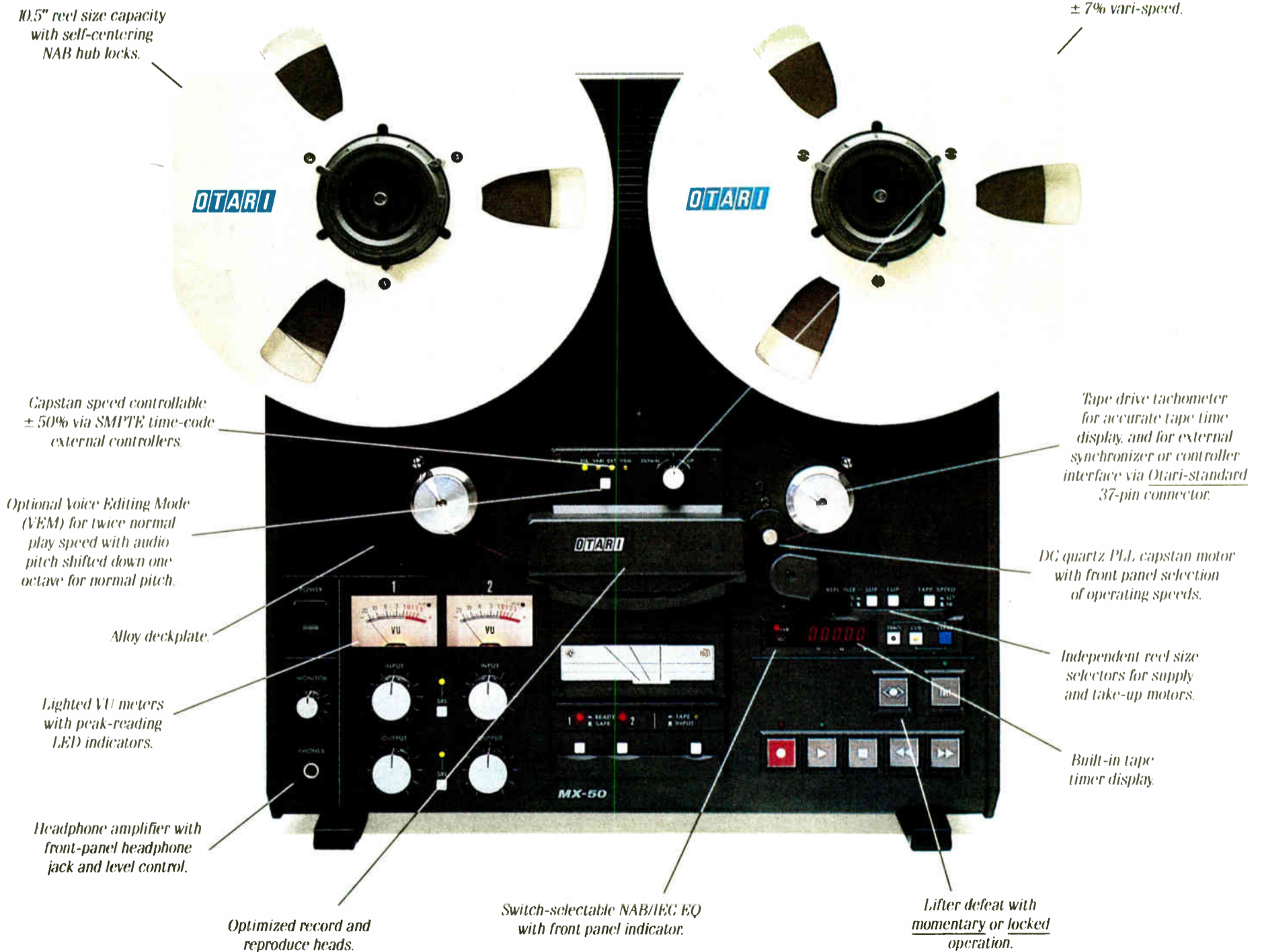
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World Radio History

DAB Takes Center Stage at Show

by Charles Taylor

Boston MA Digital audio broadcasting (DAB) wasn't just a buzzword at NAB's Radio 1990 convention and engineering conference. It was an obsession.

The topic, which has yet to be determined either a threat or an opportunity for broadcasters by the NAB, headed a list of topics at the show, 12 to 15 September, that reflected concern over regulation of emerging technologies and government involvement in broadcasting.

Inevitable tensions of DAB

Forums to discuss DAB included a general information session, "DAB: Friend or Foe," which was repeated during the show, and an all-day program addressing technical issues of digital broadcasting. Topping the list of concerns was how soon the advanced technology will enter the marketplace and how its allocation and coverage standards will affect the AM and FM bands.



Country artist Lionel Cartwright performed at the Crystal Awards luncheon.

FCC Chairman Al Sikes acknowledged the challenge of implementing DAB in a speech at the show: "Internationally and domestically we face some very difficult questions as we work through frequency allocation questions and the inevitable tensions that develop around the poten-

tial of new delivery media."

Also prominent at the convention was a call to action against the 5% spectrum tax proposed by Congress for all stations with gross revenues of more than \$100,000. The tax, NAB said, would be devastating for a number of broadcasters already struggling to survive.

In a luncheon speech, NAB President and CEO Eddie Fritts

stressed the importance of grassroots lobbying to defeat the tax proposal. "We can win this fight, we must win this fight and with your help, we will convince Congress that this proposal by the administration is out of touch with reality."

(As budget negotiations continued in early October, it appeared NAB was not calming its opposition. See separate story.)

By most other terms—save for a false fire alarm that snagged sessions and floor traffic Friday morning—the convention appeared a positive experience for most. Attendance rose by 350 over Radio '89 in New Orleans to 7241, while 185 exhibitors occupied 40,800 square feet of space.



International attendance was its highest ever—560 representatives from 25 nations. Included, for the first time ever, was a delegation from the Soviet Union.

Mixed reviews

Business for most was satisfying, though comments from the floor ran the gamut.

"I thought it was a great show, all the way through to the Marconi Awards," said Earl Goodman, marketing manager for satellite communications company

(continued on page 16)

NAB Montreux '92

(continued from page 1)

Ducart said he has found a "a great desire to learn more about American radio" in his travels to Europe. Fidelipac exhibits at the European Audio Engineering Society (AES) show, he said, and probably will alternate it with the new NAB show.

Auditronics' Murray Shields also was pleased with the idea. "It looks like a good venture for us. It looks very promising."

At Modulation Sciences, Engineering VP Eric Small said he hasn't decided if he will join the NAB show, noting his success with AES.

"I want to know the show will get to the emerging private broadcasters in Europe," he said. But he added that the first

The show will be the NAB/Montreux International Radio Symposium and Exhibition and will be jointly operated with the city of Montreux.

show should attract a large attendance because of curiosity. "So, who knows," he said, "I may go."

Giving it a try

There is a "very good chance" Circuit Research Labs (CRL) will exhibit, according to TV and Radio Products Manager Bill Ammons. He suggested that NAB hold seminars in which manufacturers can explain their equipment and broadcasters can "accurately learn the technology."

However, Ammons noted he was not pleased with the Montreux site, calling it an expensive venue and pointing to inadequate convention facilities for AES and the TV show.

Orban Sales Manager Howard Mullinack, who organizes show attendance for AKG companies, had reservations about Montreux and the idea of "another" trade show. He, however, said he

likes the US radio show and sees the potential for a similar show in Europe.

In response, NAB Exhibits and Associate Membership VP Rick Dobson said the Montreux facilities and hotels will accommodate the radio show because it will be "less than a quarter the size" of the TV show. That show "overtakes" the facilities, he said.

Not optimistic about plans for the radio show was Gary Snow of Wheatstone. "I think there are too many trade shows," he said.

He also questioned the timing, which would be two months after the US NAB spring show set for April, and problems conventioners report with the Montreux site.

It is "highly unlikely" Wheatstone will exhibit, Snow said. "This is the National Association of Broadcasters, and this is not their turf. It will be great if it works out, but we're not going to be the pioneers."


Broadcast Electronics (BE) Trade Show and Government Sales Manager Tim Bealor was another enthusiastic manufacturer. "I think it is a good idea, and we have a lot of confidence in the NAB's credentials to hold a trade show," he said.

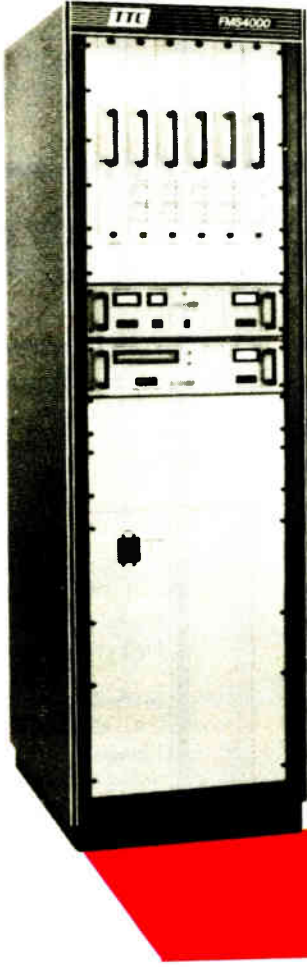
BE has tentatively said it will exhibit, Bealor noted. If the show is "accepted" by European broadcasters, BE would re-evaluate its participation in AES and two other European television/audio shows, Montreux and IBC.

Bealor, however, noted he is concerned about the NAB radio show being on alternate years. "The best answer would be to have the proper venue every year," he said.

At this time, Dobson said NAB doesn't plan to increase the Montreux radio symposium to an annual show. But he said that if the first one is successful, NAB has the option to establish a long-term contract with Montreux.

Dobson said NAB wants to give manufacturers the opportunity to exhibit but acknowledged there is a high number of trade shows. He said he expects the number of trade shows to decline as some become less successful.





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Crystal Award Winners Shine

Ten Stations Cited for Local Accomplishments

Boston MA Ten radio stations were awarded NAB Crystal Radio Awards for excellence in local achievement at Radio 1990, chosen from 45 finalists nationwide.

The majority of the winning stations were based in small markets, and were

judged on public service campaigns, community leadership and involvement by station staff, consistent local programming and coverage and evidence of interaction with listeners, community groups and businesses and recognition of them.

Picking up the free-form crystal sculptures, named after early radio receivers, were KTTX-AM/KWHI-FM, Brenham, TX; WHBC-AM and FM, Canton, OH;

WAKR-AM, Akron, OH; WHIZ-AM, Zanesville, OH; WDLB-AM, Marshfield, WI; WILM-AM, Wilmington, DE; WPXC-FM, Hyannis, MA; WTSN-AM, Dover, NH; WSJM-AM, St. Joseph, MI; and WYAY/WYAI-FM, Atlanta.

Among the markets nominated that did not win were Los Angeles, New York, Boston, Washington, DC, and Chicago.

A Crystal award also was presented to New Jersey Congressman Matthew Rinaldo for his leadership in Congress on radio issues. Rinaldo, who is the

ranking Republican member of the House Telecommunications and Finance Subcommittee, authored two bills in the current Congress to improve radio.

The first, HR 1136, would reform the license renewal process, while HR 2714, would make improvements in the technical aspects of radio.

The presentation was co-emceed by country recording artist Lionel Cartwright, who performed at the lunch, and Dave Lubeski with Associated Press Broadcast Services in Washington, DC.

DAB at Radio 1990

(continued from page 15)

Spacecom Systems, whose primary customers are the networks that also are vendors at the show.

"Most of our customers are exhibiting, so we try to provide a program for our customers to relax and rest their feet for a while and see some of their comrades," he said.

"We thought it was an excellent show, better than last year. We did quite well at the show and as a result of the show," said Broadcast Electronics trade show manager Tim Bealor. "While we heard a lot of discussion about the weak economic situation, I don't know that it had any influence on the show itself."

But according to Jack Ducart, director of sales for Fidelipac, it was just an average show, nothing outstanding.

One reason for the slow traffic, he theorized, was the number of quality sessions Radio 1990 offered. "I think a lot of people were attending programs in the conference center and ignored the exhibits," he said. "NAB needs to take a lesson from SBE and schedule some free time to visit the exhibit hall."

Dan Braverman, president of Radio

Systems, said that his company's location in the exhibit hall made for a disappointing show. Despite NAB efforts to open the area up for access, he said traffic was poor.

"Attendance was abysmal in those areas of the hall. When people did come, the show seemed more than ever to be programmer-oriented rather than equipment purchasers. We were disappointed."

Star-studded list

Among the guests participating in the show were national radio commentator Paul Harvey, popular talk show host Larry King and billionaire entrepreneur H. Ross Perot.

Award shows included the Crystal Awards, which went to 10 stations for community service; and the swanky second annual Marconi Awards for 23 stations judged best by market size and formats.

Robert Hyland Jr., senior VP with CBS and GM of KMOX/KLOU in St. Louis, was named winner of the National Radio Award, recognizing significant contributions and a lifetime of service to the radio industry.

Marconis Bring Out Radio's "Glitterati"

Boston MA Twenty-three winners were announced at Radio 1990's classic event, the second annual Marconi Awards.

Broadcasters came out in their finest, while radio celebrities and personalities entertained a full-house crowd on the show's final evening. Mutual talk show host Larry King and Gary Owens were hosts for the gala, while entertainment included musicians Lyle Lovett and Harry Connick Jr., and comedy duo Mack and Jamie.

Named network/syndicated personality of the year was King, while Don Imus with WFAN-AM, New York, was named major market personality. Other winners were Gary Burbank, WLW-AM, Cincinnati, large market personality; Luther Massengill, WDEF-AM/FM, Chattanooga, medium market personality, and Bobby Owen, KEAN-AM/FM, Abilene, TX, small market personality.

Stations of the year were: KMOX-AM, St. Louis, major market; WTIC-AM, Hartford, CT, large market; KSSN-FM, Little Rock, AR, medium market, and WAXX-FM, Eau Claire, WI, small market.

Thirteen also were named stations of the year by format: KOST-FM, Los Angeles; WLUP-FM, Chicago; KFRC-AM, San Francisco; WVEE-FM, Atlanta; KIIS-FM, Los Angeles; KING-FM, Seattle; KILT-FM, Houston; WJZZ-FM, Detroit; WGN-AM, Chicago; KABC-AM, Los Angeles; WCBS-FM, New York; WAOK-AM, Atlanta, and WAQI-AM, Miami.

Awarded legendary station of the year was Chicago's WGN-AM.

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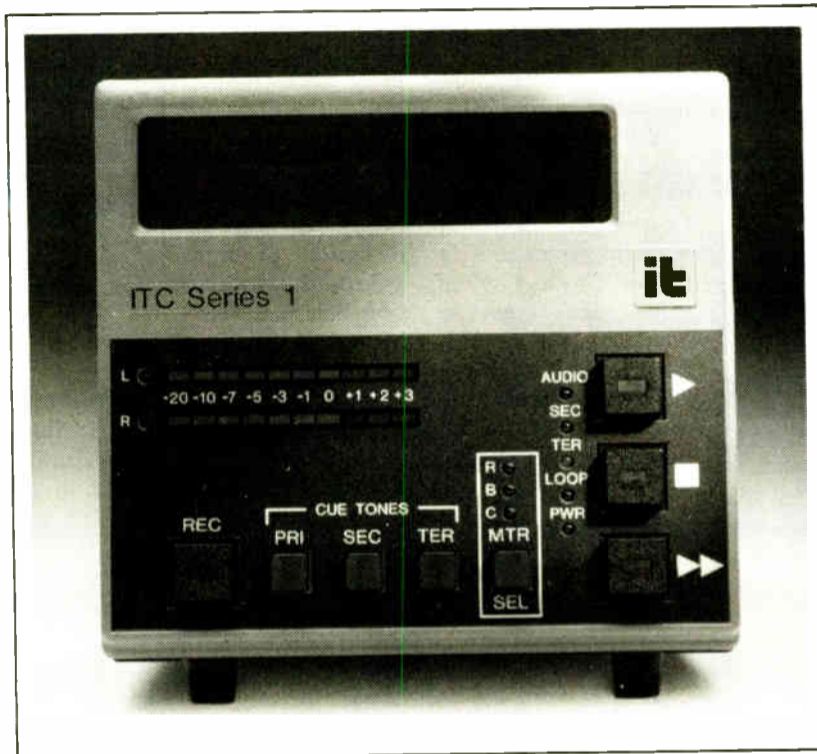
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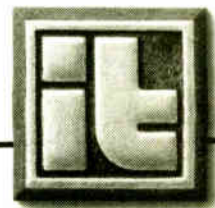
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Digital, Analog on Exhibit Floor

Boston MA The latest in digital and high quality analog products competed for visitors' attention at Radio 1990 for three days in September.

Digital became more than a code-word as concepts introduced in previous gatherings emerged as real-world products.

Recent advances in data compression technology brought forth offerings in satellite distribution with systems such as Scientific Atlanta's SEDATS replacement for its DATS digital distribution system.

Across the hall, in the Bradley Broadcast booth was a sat system for remotes: ComStream. Both S-A's and the ComStream product use proprietary compression algorithms to squeeze higher

player-controller while 360 Systems continued to generate interest in its Bernoulli-disk-based DigiCart, not yet a product.

Newer products along this line came from smaller companies, such as the Digital Audio System from Kingdom Technologies. Meanwhile, established offerings in workstations, such as AKG's DSE-7000 and Studer's Dyaxis drew more attention than ever.

As recent controversy over modulation monitoring simmers in the background, Belar introduced The Wizard, an FM Digital Modulation analyzer shown hooked up to a PC.

It takes in the baseband signal, gives peak modulation and will be upgraded with a demod card in the future. The price tag is \$3300, and it's designed to compete with Modulation Sciences Mod-Minder, which was also displayed with computer control.

On the analog side, new cart machine products were featured by Fidelipac and Radio Systems. In consoles, Auditorics introduced the 210 in 6, 12, 18 and 24 module configurations. It's an upgrade

to the model 200 console with some new options but the same quality, such as P&G faders.

Wheatstone showed the A-500 cost-effective console and Arrakis showed its 12,000 series. Audio Broadcast Group



The TeleSwitch, from Gentner helps stations field calls.



Belar introduced the computer controlled Wizard modulation monitor.

quality audio into narrower bandwidths.

Along this line, ISDN products were featured by three companies. Corporate Computer Systems offers 7.5 kHz in one product while a 15 kHz prototype waits in the wings. Comrex is readying a 7.5 kHz ISDN offering as well, while Intraplex has both a 7.5 and 15 kHz product.

For the studio, Computer Concepts featured its hard-disk computerized spot



The Broadcast Electronics radio van (above) featured a live broadcast from the exhibit floor. Inside (top), the van is equipped with BE equipment.

featured the latest in furniture with its Design Five in the Pro Studio series.

Programmers who are always interested in processing gear got a chance to see CRL's

Audio Signature with microprocessor control and computerized set-ups and



Fidelipac showed the new CTR 90 Dynamax series.

memory.

On the RF side of things, QEI showed its CAT/Link STL for T-1 technology and Harris introduced a motorized switch for its transmitters.



Bradley Broadcast showed the ComStream satellite system for remotes.

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Open-Minded Policy Is Stressed for DAB

by Charles Taylor

Boston MA A chief Commerce Department official stressed at Radio 1990 that the department's role is not to select standards guiding development of digital audio broadcasting (DAB) in the US, but to remain an open-minded forum for the technology.

The position, quoted by Wayne Berman, assistant secretary designate and counselor to Commerce Secretary Robert Mosbacher, comes amid questions and concerns by some broadcasters who

merits of terrestrial delivery and the localism concerns of broadcasters," Rau said. "A satellite focus has been very clear.

"If satellite radio broadcasting comes to be, then we'll compete with it fairly," Rau added. "But what's really troublesome is that if it does come to be, it might be our own government that caused it or helped subsidize it and helped bring it to be."

Berman firmly responded that the meetings are not set up to formulate policy, but to impart information and ex-

"They have not focused on the merits of terrestrial delivery and the localism concerns of broadcasting. A satellite focus has been very clear."

question the department's research into satellite DAB for Voice of America and potential commercial use.

"It is clearly (not) the role of the government to pick technologies as winners and designate others as losers," he said. "It is our role to insure that the policy and the environment are such that new technologies can mesh with current technology. We will not single out a particular technology for special treatment by the government."

Sorry if they're better

"I hope you can compete with your new competitors," he added. "If they have a better technology and deliver better service to the public that's more interesting, that's too bad. I'm sorry. It's the government's role, we shouldn't help them, we shouldn't hinder them. We shouldn't help you, we shouldn't hinder you. We ought to have a level playing field."

Berman acknowledged the NAB's strong preference for terrestrial DAB delivery over satellite delivery, and its defense of localism but made no promises that Commerce would take a similar viewpoint.

"We're not going to push satellite radio or pick it or try to make sure it succeeds or it fails over the current terrestrial system we have. It's not up to the government to do that," Berman said. "On the other hand, it is clearly not up to the government to prevent the entry of new technologies of any kind in any industry for any application unless they threaten health."

Commerce not impartial

Michael Rau, senior VP for NAB Science and Technology, took issue with the Commerce Department's alleged impartiality, claiming that in meetings he has attended arranged by the Office of Space Commerce, the focus has been squarely on satellite delivery.

The meeting are closed to the press, a move questioned by some members of Congress.

"They have not focused on the

change views. It is the beginning of a long, detailed and complex process, he said.

"I think there's been a naive overreaction to meetings taken place at a working level in the government," Berman added. "It may be your life on the line, but you can't react to any stimuli of individuals in the government trying to learn things. All they are is meetings and discussions.

"I make a pledge to you. We'll have a session on the things that you think are important," he said.

"The important thing is we will listen to everything you have to say. We'll study it, we'll consider it, we'll recognize that we have a stake in your business as well as a stake in the growth of new technologies."

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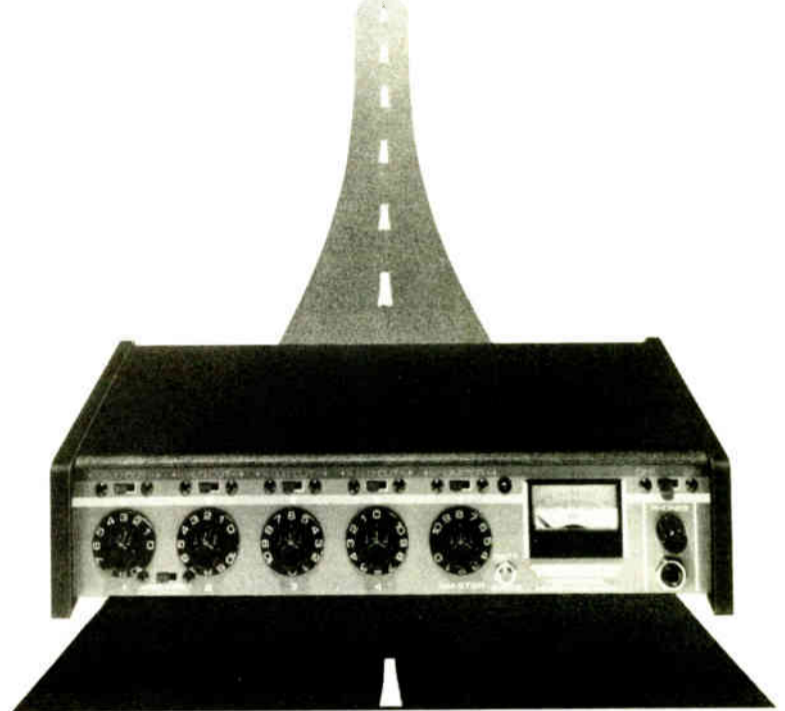
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Digital Seminar Offers Answers

by Mel Lambert

Boston MA With bits and bytes becoming an integral part of every radio broadcaster's vocabulary, the NAB is to be congratulated for its regular series of digital radio station seminars.

The third seminar of the series was held on the first day of Radio 1990 in Boston. Digital recording and processing technologies are impacting the radio industry in quite profound ways; the well-attended seminar in Boston will attest to the fact that many of us are ready and willing to learn from the experts.

Headway in standards

The first session of the day, entitled "Digital Audio Interfacing: Standards Progress," was presented by Richard Cabot, vice president and principal engineer of Audio Precision, Inc. Cabot quickly ran through the pros and cons of various I/O formats, including AES/EBU, S/P DIF, SDIF-2, MAD1, Yamaha Cascade and ProDigi.

Cabot focused on SDIF-2, the serial format first introduced on Sony's PCM-Series digital audio processors, but also now featured on a variety of workstations. He warned that there's no guarantee of the timing relation between the dedicated Word Clock channel (normally used to lock the send and receive microprocessor clocks) and the actual MSB transitions within the two channels

of digital audio.

Turning to what is now pretty much accepted as the standard digital I/O format for interconnecting professional hardware, Cabot ran through the 64-bit per frame format, in particular the 192-bit sequence of Channel Status information. In terms of ensuring reliable, error-free transmission of digital data, he encouraged users to measure the Eye Pattern of the transmitted information, and use high-quality, balanced conductors.

Revised specifications

Responding to valuable feedback from users, Cabot explained that the Audio Engineering Society has decided to revise its original AES3-1985 specification, which is now in draft format for industry discussion. Among the various parameters being evaluated, the following are of particular interest.

The impedance will probably be changed to 120 ohms for input and output, to encourage correctly terminated, single transmitter-to-single receiver configurations.

Transformers will be recommended on all I/Os, to further improve data transmissions over longer distances.

Various bits within Channel Status will signify that the data is being carried as 20- or 24-bit data.

The currently defined four bits of Auxiliary Data will be made available for use as an additional, voice-quality channel

for coordination or talkback applications. These signals would be sampled at 16 kHz, coded at 12 bits/sample, and sent four bits at a time via the Aux Data sections.

The original "Sample Address Codes" of AES3 will be refined to specify a time code that can be locked to traditional SMPTE/EBU-format time codes used in production facilities.

Three defined levels of interface completeness, from Basic to Enhanced will allow receiving equipment to fully accept data in certain sections of the bitstream, or simply ignore them.

Cart player for a digital age

The second paper of the morning session, entitled "A Digital Audio Cart Recorder," was given by Don Bird, marketing director of 360 System's Broadcast Products Group.

Bird began by defining the primary features of a digital cartridge system—that it sounds good, is lower in cost than conventional systems, and that it be optimized for broadcast automation.

Utilizing a removable, 5.25" magnetic disk cartridge, the new DigiCart player/recorder offers full 16-bit sampling, but adds a couple of features not available on analog equivalents, including head and tail trim, fade in/out, and automatic level alignments. Secondary and Tertiary tones are also available within the encoded data stream and can easily be erased and/or re-recorded as necessary.

Up to 300 individual cues can be stored on each DigiCart, which holds up to a total of 10 minutes of stereo data-compressed audio (at a 32 kHz sampling frequency for 15 kHz bandwidth).

A dedicated EIA 485 port allows bidirectional control of DigiCart, so that a station automation system can interrogate the players and extract program titles for each cut. (360 Systems plans to publish the controlling protocol in the very near future, to allow direct interface with existing systems.) Future enhancements, Bird concluded, will include timecode, S/P DIF- and AES/EBU-format digital I/O, plus other functions.

The final paper of the morning ses-

sion, entitled, "An All-Digital Commercial Insertion System," by Greg Dean, president of Computer Concepts Corporation, provided a valuable overview of the firm's PC-based system for replacing conventional NAB cart players and controller systems.

Only in broadcasting

Dean offered that the broadcast industry was perhaps unique in its need for random access to virtually hours of recorded music, promos, IDs, commercials, liners, PSAs, etc., within fractions of a second.

Any system designed for radio applications, he offered, should also be fully integrated, so that every stage in the process—from order entry to replay to air—can be handled from the same platform. The system should also interface directly with existing (and future) satellite automation systems, so that the final broadcast sounds as if it were originated locally, rather than comprising a hybrid of locally inserted commercials within a networked delivery.

The Digital Commercial System combines a hard disk recorder and switcher, both under full PC control. The solid-state switcher features 100 dB of cross-point isolation and comprises a matrix of eight stereo inputs and four stereo outputs, plus a rear-panel digital control interface for comprehensive satellite control.

Various software segments provide live-assist control of all system parameters, and will also check the stated length of each cut against its actual recorded length, and correct timings if so directed.

A unique feature of the DCS is its ability to simultaneously record audio into the unit while replaying two stereo events, thereby enabling crossfades between segments while recording, for example, commercials from a network feed. For extended record times, the DCS can be supplied with optional APT four-bit/4:1 digital audio data compression.

■ ■ ■

Mel Lambert has been intimately involved with the production and broadcast industries on both sides of the Atlantic for more than a dozen years. Now principal of Media & Marketing, a consulting service for the professional audio industry, he can be reached at 818-753-9510.

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GLF10-940	26.5	30	A
GLF12-940	28.1	30	A

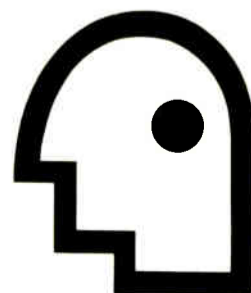
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DAB: When Will It Get Here?

by Tom McGinley

Boston MA Digital Audio Broadcasting is coming to the United States. But how soon?

Estimates range from five years to "not in our lifetime," depending on whether you are talking to an audio salesman or a transmitter manufacturer.

At NAB's Radio 1990 DAB session, "DAB: Friend or Foe?", John Abel, executive VP for NAB outlined a timetable of expectations with qualifying assumptions.

If the 1992 WARC produces worldwide agreement on where the new DAB radio

band will fit in the spectrum, Europe and Canada will probably have the Eureka 147 system on the air by 1993-94.

It will take the US longer to deal with the politics of satellite delivery versus localism and of who gets what. Sifting through the maze of concerns regarding class of license, power and coverage in assigning new DAB channels will likely delay the adoption of new FCC rules governing DAB until 1995-96.

From this discussion, we could assume 1996-97 for the first licensed DAB US stations to begin transmitting.

Predicting the future

As the panel discussion continued, the 500 eager listeners who packed the session heard a status report about DAB. Recent developments became the basis for a general prediction of trends for the coming decade.

The feeling was that most if not all of the existing AM and FM stations will likely wind up with a spot in the new band.

Realizing that it will take 10 to 20 years for new DAB receivers to sufficiently penetrate the marketplace, broadcasters were told that a lengthy period of simulcasting existing AM and FM with DAB will be necessary until at least the year 2010.

This scenario is probably as clear a gaze at the future of DAB as the crystal ball presently allows.

Only one system ready

As far as the system for delivering digital quality radio, while some pie-in-the-sky speculation about various systems in development have permeated previous meetings, at this session it became clear that one system has the edge.

The EBU sponsored Eureka 147 project is the only digital transmission system proven in real-world field testing thus far.

Affordable receivers have yet to be developed, but thanks to LSI technology,

most receiver manufacturers apparently believe this is not going to be a problem.

Eureka-based receivers will consist of three LSI chips: an RF/IF chip and two DSP chips which will handle the COFDM demodulation, forward error correction decoding, filtering, final D to A conversion, and of course, audio amplification.

There is talk of a DAB concept which

can co-exist with our present analog FM system. One such scheme, called power-multiplexing, uses digital modulation on a "shadow" carrier which is 180° out of phase and about 20 dB down from the main FM carrier.

The key to its compatibility is the capture effect of FM demodulation and advanced phase locked loop design. This technology is still being developed, but if it or something like it can be perfected, DAB can be done on the existing FM band and additional spectrum would not be needed.

Receivers Discussed

by Charles Taylor

Boston MA As broadcasting technology continues to evolve and change, the design and function of radio receivers must also be upgraded.

The ways the broadcasting industry and manufacturers should upgrade their receivers predominated discussion in a Radio 1990 session on the progress of radio receiver technology.

Ted Snider, president of Snider Corp. and chairman of the NAB AM Receiver Manufacturer Liaison Task Force, outlined the history of the task force and its progress with formulating elements of a high-quality, industry-standard receiver.

Six characteristics were determined for the improved receiver in mid-August. The list covers AM/FM, AM stereo, AM noise blanking, an external antenna and the expanded AM band. Hopeful adoption of them is on the agenda of the Electronics Industries Association (EIA) for a meeting scheduled in October.

With luck, he said, a receiver meeting the group's qualifications will be on the market by the beginning of 1991.

Meanwhile, it still must decide on a

name for the certification mark, Snider said. So far, all suggestions the group has tried to adopt have been copyrighted by other groups.

Victor DeGutis with Philips Consumer Electronics, which designs and manufactures receivers, stressed that for electronics companies to upgrade receivers, they must see progress from broadcasters.



A panel of experts discuss the upgrading of receivers to keep pace with broadcast technology's changes.

"You give us good programs and we'll continue to work on quality," he said.

Sprague Semiconductor's Oliver Richards played a tape demonstrating two devils of the AM and FM bands—adjacent channel interference and multipath.

Noise blanking, one method recently developed to help defeat the AM interference, was explained. Already designed in several receivers, the feature is expected to reach the shelf in the 1991 model year, Richards said.



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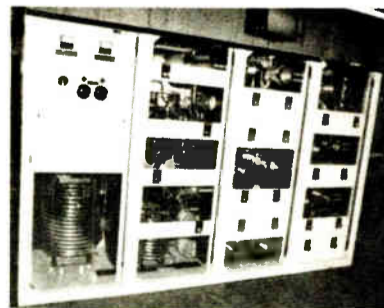
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Stations Seek Satellite Service

by Charles Taylor

Boston MA Radio Satellite Corp. Chairman and CEO Gary Noreen said response has been "very strong" to a trade publication ad soliciting 10 radio stations to become part of a satellite superstation network.

This despite the fact that the ad was accepted in a publication sponsored by an opponent of such services.

Noreen's proposal, which he has filed with the FCC, would form the RadioSat network by utilizing 10 channels leased from a satellite to be launched by American Mobile Satellite Corp. in 1993, enabling digital audio programming to reach vehicles equipped with special receivers.

The receivers would make use of a 3 1/2"-wide, 1/2"-thick saucer-like antenna that can be flush mounted on a car roof. Noreen carried the antenna around the floor of NAB's Radio 1990 here as a dramatic statement of the convenience of the system.

Mixed observations

"Some are extremely excited about the possibilities," said Noreen at the show. "Others view us as the biggest possible threat."

While he would elaborate no more than to say that "dozens" of stations have expressed interest in the venture, it seems likely that among them is Minneapolis clear channel WCCO-AM.

The station, in comments filed regarding an FCC proposal for digital audio broadcasting (DAB) by Satellite CD Radio, said it hopes to be given a first opportunity or grandfathered priority on the use of newly proposed digital technologies.

Over the years, explained CE Jerry Miller, WCCO has lost portions of its once-broad audience due to changes in broadcast rules, increases in RF interference and a more populous urban environment.

"The newly proposed systems would allow WCCO to regain a delivery system capable of delivering those services to listeners who traditionally have sought after those program sources from WCCO radio," Miller wrote.

Satellite superstations

The station supports the idea of satellite-delivered national programming, because of dramatic changes in US demographics since the early days of radio, the comments said. "In today's America with travel, job transfers and retirement, listeners are seeking news, information and sports from all parts of the country; this service is needed by the populace." Miller also pointed out that

the AM band has inherent disadvantages over HDTV and CD-quality recordings. "The point is that the public has come to expect not only good programming, but a high quality of technical service."

The newly proposed digital service will provide radio broadcasters with a means of competing on a level playing field and delivering quality audio, he said.

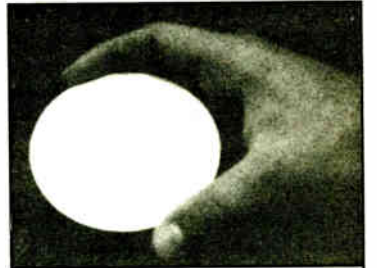
Noreen's ad, ironically, ran in the NAB newsletter *RadioWeek* despite the NAB Board's stated opposition to satellite delivery of radio and the superstation concept. Each, the NAB has said, strikes against NAB's fundamental platform of localism in broadcasting.

Walt Wurfel, senior VP of NAB public affairs and communications, said the association does not attempt to censor any

advertising, regardless of viewpoint.

"The newsletter expresses NAB's views, but this is an open and free market. As an advertising vehicle, anyone can advertise," he said. "We have an editorial column on the back page, 'My View' that doesn't necessarily reflect NAB's views."

For information on Gary Noreen's Radio Satellite Corp., call 213-983-8145.



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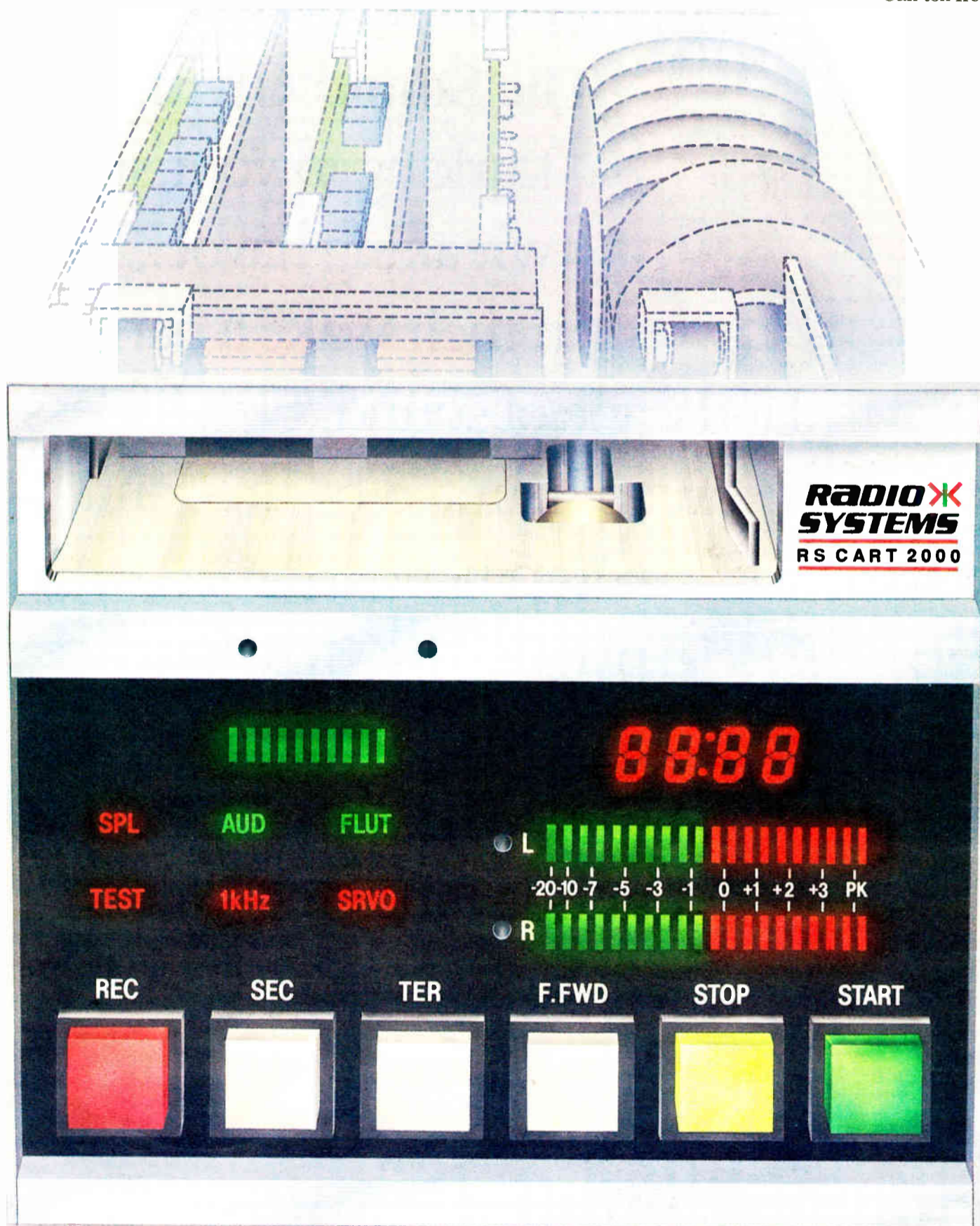
Next, build it to last. That means long life heads, 1/2" thick deck plate, direct drive Nidec motor, massive toroidal power supply, newly designed positive cart hold-down and guidance systems, and precision head-block assembly.

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But features aren't important if the engineering isn't top-notch. The RS-2000 was created by industry-renowned design engineer Mike Sirkis. So this "new" machine carries more than a decade of cart machine experience.

One last note: since the RS-2000 is built, sold and supported exclusively by Radio Systems, it carries one more trademark—**VALUE**. Every RS-2000 model is very affordable.

Call toll-free today for details.



Nashville AM Feels Cuba's Bite

by Harry Cole

Washington DC We'll look to Chuck Berry for our teaching today: "Memphis" (we'll be talking about a Tennessee station), the more obscure "Havana Moon" (we'll also be talking about nighttime interference from Cuba), and "No Particular Place to Go." Unfortunately, Mr. Berry did not write any songs about weird special temporary authorizations that create a new kind of FM service.

This latest piece of ingenuity comes to us from a Tennessee AM station. That station shares its channel with a station down in sunny Cuba, which has been causing unwelcome interference since the mid-1980s. Since June 1988, the interference has effectively destroyed the US station's local nighttime service, a claim which was backed up by measurements.

What to do? The US licensee determined that no modifications to its existing facilities would do the trick. What about a change in frequency? No good either—protection requirements for other stations eliminated the use of any other AM channel (except for one, which would have required the "extensive modification" of the station's nighttime directional antenna system, including construction of additional towers).

A unique approach

Our Tennessee licensee then came up with a radical idea. Why not get a special temporary authorization (STA) to operate on an FM channel?

Forget that there was no vacant FM channel allotted to the community. Forget that the normal processing time to have a channel allotted, and then to apply for a construction permit, and then to prosecute that application through to a grant, would be years. Basically, forget reality and start to dream a little dream about getting an STA and just cranking up a neat little low power FM station to take the place of the lost AM signal.

Sure enough, that's what the US licensee did, and lo and behold, the Commission granted the STA!

The STA came with a couple of

strings, to be sure. First, the FM station can operate with no more than 75 W—the power that will most closely duplicate the AM station's protected nighttime coverage. Second, the FM authorization is for nighttime operation only, in effect to restore the nighttime service being lost because of the Cuban interference.

COLE'S LAW

Third, the FM station will have to correct by whatever means necessary (including powering down or ceasing operation) any interference it causes. And fourth, the FM authorization is a "temporary" interim measure "taken until a solution can be reached between the United States and Cuba over interference problems in the AM band."

These conditions ensure that the new station's facilities will be less than optimal. (We do note, however, with all due respect to the diplomats of the world, that the supposedly "temporary" aspect of the STA is not likely to be a real limitation—after all, what with TV Marti and all, a thaw in US-Cuban relationships does not appear to be imminent.)

Nevertheless, the STA will provide the AMer with an ability it does not now have: to serve its community of license at night.

What's behind all this?

The Commission's willingness to create an entirely new class of FM stations—something more than a translator but less than a full-powered station—is surprising, especially in view of the FCC's reluctance over the years to convert the FM translator service to a kind of "low power FM" service.

Probably the Commission intends to limit this type of extraordinary relief to situations involving Cuban interference. After all, in 1983 Congress passed the Radio Broadcasting to Cuba Act which mandates that the FCC should take steps to minimize domestic disruption from Cuban interference. On that basis, the

Commission could argue that claims of Cuban interference are entitled to special consideration.

Over and above that rationale, the Commission also justified the recent STA on the basis of Section 303(g) of the Communications Act, which requires that the Commission "provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest?"

But that provision could be used to justify a wide variety of STAs along these lines, whether or not Cuban interference is involved at all. For example, why shouldn't just about every AM daytimer be given a similar STA for low-power nighttime-only operation? Wouldn't that be the same type of "experimental use" of the frequencies, and wouldn't that constitute a "larger and more effective use of radio in the public interest?"

By hanging its hat on Section 303(g), instead of just the Cuban problem, the Commission may be signaling a greater willingness to consider such innovative—and heretofore unthinkable—approaches to common problems.

A cautionary note

Before you rush to call your communications lawyer to ask that she or he put together an STA request pronto, though, you should bear in mind that the FCC's apparent reliance on Section 303(g) may have been only window-dressing, and may not signal anything at all. As a prac-

tical matter, probably the last thing the Commission wants is a boatload of new FM applications dressed up as STA requests.

The FM Branch has had a hard enough time processing the routine flow of applications; a flood (or even a modest trickle) of STA requests, each proposing unique facilities requiring separate analysis, could mess things up even more. Also, the more the Commission seems to embrace such low-power operations, the more it would seem to be moving toward the "low power FM" service which has already been rejected.

And to throw further cold water on this whole idea, you should recognize that the STA request filed by the Tennessee AM licensee, the request granted on 24 September 1990, was filed in August, 1988. In other words, it took more than two years to get this thing through. This is not an approach likely to be useful to anyone needing immediate help.

But even if this particular STA is a one-time-only action, it demonstrates a willingness on the part of the current FCC to bend its rules and assumptions in order to help out where it can. This should be encouraging to anyone who has a serious problem and who is ingenious enough to come up with a novel solution.

The Commission may not agree with your solution, but it would appear that you are still likely to be greeted with an open mind and at least some measure of assistance, rather than resistance. Good luck.

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

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Finer Points of the DSE 7000

by Ty Ford

Baltimore MD Last month's edition of *Producer's File* covered AKG's DSE 7000 Digital Sound Editor from a manager's and engineer's perspective. If that issue is already in the birdcage, the following were the major points of interest:

Entry-level system price is \$37,500 for 4.4 minutes at a sample rate of 32 kHz which provides a 15 kHz bandwidth. Sample rates of 44.1 kHz and 48 kHz, as well as more recording time are options.

With only one hour of training, our non-production rat volunteer was able to carry out the kinds of perfunctory production required by the average airperson.

Screen simplicity

There are only three screens: a job control, a mixer and an editor. The job control screen lets you choose from temporary or permanent (saveable) new productions, or allows you to edit, copy, rename or erase old productions.

After you select either a new production or an old one, the mixer screen appears. If you've selected an old production, the DSE 7000 automatically loads it from the hard drive into RAM.

Loading in a stereo 60 second jingle from the library (120 seconds) takes a minute. Loading time varies due to the amount of time recorded and the number of edits performed. Still, after some very edit-intensive production, loading took less than the total recorded real time.

The mixer screen lets you set pan, level, and both effect-send levels for each of the eight channels, and level and pan for the remaining two. Each effect send can be set to either pre or post fader. Typically you would use them to send to reverb or delay devices, headphone feeds or for a separate mix. Mixer levels and settings can be stored

in memory.

The editor screen gives you a close-up and overview of the individual tracks, all meters, remaining memory, timers and menus. Although the DSE 7000's attributes exceed the space I have to describe them, my personal top four features are: the manual, the "undo" button, the scrub wheel and the added visual perspective that being able to see all eight tracks at the same time provides.

PRODUCER'S FILE

In his writing of the 135 page manual, Jay Rose remains heavily practical. His graphic and humorous explanations (often with analogies to tape-based recording) are obviously written from the perspective of someone who has seen a lot of tape slide across the heads of a lot of machines. Absorb what's in the manual and you will blow the doors off what you have come to know as functional editing flexibility.

Techno-phobes expecting a hard time will be really disappointed when they find out how easy the DSE 7000 is to use. If you're visually oriented, check out the DSE 7000 video.

The great undoing

One of the main problems with editing is the hassle of having to put the tape back together after you've tried an edit that doesn't quite work, especially if you're only 1/16" off. The DSE 7000's "undo" button allows you to try edits you'd never have the guts to try with tape.

With that kind of "safety net," I went for (and made) edits I thought had no way of really working out. It will also let you "un-record," so if you screw up and record over good tracks, you're still safe. Switching between "do" and "undo" is

accomplished in less than a second.

Being able to cut music to sub-beats or between beats (and looping parts of a bed while listening to a voice track so that the incoming hit lands in just the right place to accent the copy) really impressed me. I gained control of a very fine degree of timing. The DSE 7000 lets you make very subtle moves, which make a dramatic difference in the impact of your work.

With practice, you can edit on the fly. For more difficult to find edit points you use the scrub wheel to find the beginning and end points of your edit. There are three different "gears" of scrubbing. Mid gear, the default setting, makes the audio sound as though its moving about a quarter second per turn. Low gear moves at half that speed and high gear moves at twice the speed.

There are four different splice angles: the standard 45°, an almost vertical 3°, as well as the more exotic 1 1/2" and 3" splices. Although you can't see actual sample waveforms on the screen, the graphics give you enough of an idea of

Absorb what's in the manual and you will blow the doors off what you have come to know as functional editing flexibility.

where you are. With edits as small as one millisecond (1/128" at 7.5 ips), I was easily able to successfully edit scratches out of a well worn vinyl copy of The Beatles' *Abbey Road*.

Thanks for the memory

If you have an element that repeats itself within a production (e.g., SFX or voice drop) it only uses the amount of memory it takes to record it the first time (even echoes and loops). Although some memory is used for edits, the amount is so small you'd have to have a major obsessive/compulsive disorder before edit memory usage became a problem.

After using the DSE 7000 for less than a week, I became aware that it had changed my approach to production. Even though I work fairly regularly with 2" 24-track tape, which requires that you "see" different elements of a production in your mind, being able to see actual track placement on a screen in front of me worked even better.

Because it was staring me in the face,

and because I was able to move elements so freely in time and space, new structural and compositional possibilities occurred to me.

The DSE 7000 also made me aware of how much I depend on analog tape compression as an effect. At first my mixes were . . . well, too clean. Adjusting my gain reduction for quicker release times put the aggressive edge back on my spot work.

Computer . . . what computer?

Some systems I have worked on require that you give up your accustomed way of operating, or require that you learn to use a computer. The DSE 7000 doesn't. Because its operating controls so closely resemble that of standard reel-to-reel operation, those little right-hand techniques you have developed for shuttling the tape transport still apply. Not only that, their placement on the controller is just where you would expect them to be.

Other admirable traits of the DSE 7000 include:

- Seven auto-locator points including head, tail, last record, 1, 1+, 2 and 2+.

With these, you are never more than a second away from any point in your production. Forget rewinding and fast-

forwarding tape. Forget tape spills.

- The real-time random access design of the DSE 7000 makes tape sync switching obsolete. You're always in real time.

- Internal mixdown. When you've loaded all eight tracks up and it's time to mix down, you can bounce-mix back to any two channels. If you don't like the mix, the "undo" feature lets you do it until you get it right. You can bounce-mix any track, even back onto itself so you can make level changes.

During mixdown, you can bring any outboard effects returns back into the DSE 7000's analog inputs, which allows the left and right input faders to be used as pan-able stereo or separate pan-able mono returns.

Warts and all

There are a few things about the DSE 7000 that could have been done differently. Once you get below the half-way point with the faders, the level drops off a bit too quickly for me. David Angress said they researched this pretty well and my group lost.

I was also in the losing group when the decision whether or not to put the name of each production on the edit and mixer screens was made. I did find a bug in the software that jams the screen during certain erase procedures, but I was able to avoid it by using a different routine. Angress said that will be corrected in a future software release.

WARNING! The attributes of the DSE 7000 are formidable to the degree that you'll probably be seeing a lot more of the production director. Maybe you should consider a cot for the production studio.

■ ■ ■

By the time you read this, Ty Ford will have had over a month's experience on the DSE 7000. Call him with questions at 301-889-6201.

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Inside Christian Science Monitor

by Thomas L. Vernon

Boston MA Although most of us are familiar with the Christian Science Monitor newspaper, the church's more recent ventures into electronic media aren't as well known.

At the world headquarters of the First Church of Christ Scientist in Boston are located studios for the largest independent shortwave outlet in the world, as well as facilities for a domestic radio network, cable network and a local TV station.

STATION SKETCHES

The shortwave and domestic radio services share a complex of 12 studios, including talk studios, and several production rooms. Consoles and cart machines are from Pacific Recorders & Engineering, reel-to-reel recorders are Otari 5050s, and EV RE-20 microphones are used throughout the complex.

A staff of three full-time engineers maintain the facilities from a state-of-the-art service shop. In addition to a full complement of electronic test equipment, there are facilities for basic metal fabrication.

Among the staff's recent in-house

projects are interface circuitry to connect DAT machines to the automation system, multiplexers for digital audio equipment and software to run the program automation system.

Automated program distribution

Program audio distribution for both domestic and international services, as well as television, is controlled by an automation system. The complexity of handling five simultaneous shortwave programs in different languages, plus domestic programming, precludes the use of human operators.

Taped programs are dubbed from 1/4" reel to DAT and then loaded into one of the system's Sony DTC-300 ES machines. Switching is accomplished by a Utah Scientific AVS-1B audio router. All of this is controlled by Network Generation software running on an IBM PC clone.

The system runs on floppy disks, which handle about 1000 events per day. Although the system can run 48 hours standalone, disks are typically changed at 20 hour intervals. A second computer is available for backup, should the main computer fail.

From Boston, international programming is uplinked to Satcom II-R, and downlinked to each of the Monitor's three shortwave transmitter sites.

A site in Saipan takes a dual hop with Satcom II-R and Intelsat IV-A.

Stations of the cross

KHBI in Saipan was purchased by the Monitor in 1986 and has two Continental Electronics 418D-2 100 kW transmitters, and three slewable curtain antennas. From here, programming is beamed to Asia, Australia, New Zealand and India.

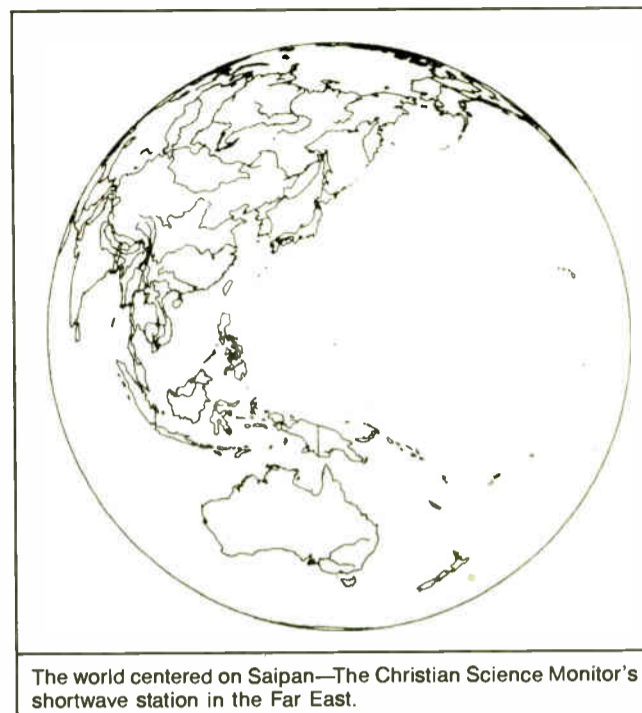
From Scotts Corners Maine, WCSN broadcasts to Europe and Africa with a 500 kW Brown Boveri transmitter and a TCI slewable curtain antenna. The array contains both high and low frequency curtains. The station went on the air in 1987.

In 1989, a third transmitter site was added in Cypress Creek, South Carolina. WWSB serves listeners in Canada, Central America, and South America with two Brown Boveri 500 kW transmitters and five antenna arrays. Although the current system provides good global coverage, all three sites

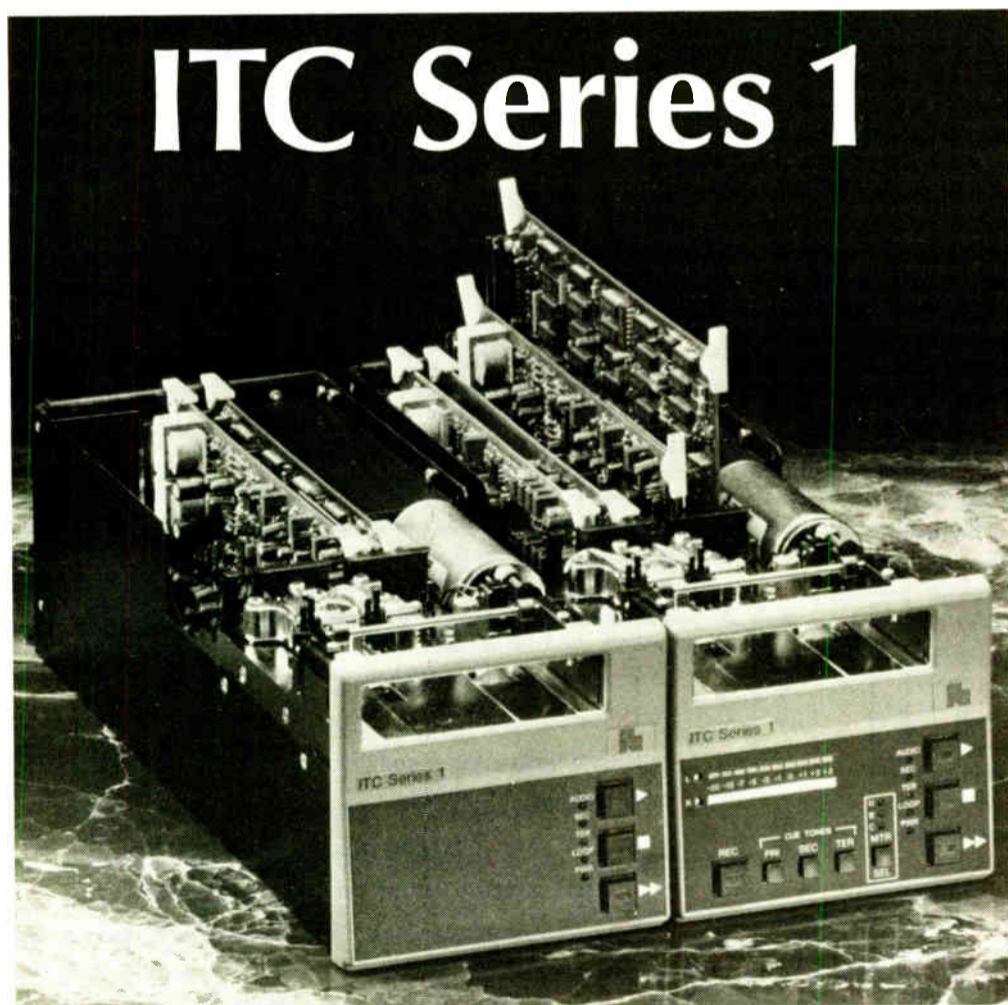
were designed to accommodate additional transmitters in the future.

The World Service of The Christian Science Monitor broadcasts 24 hours a day, with two hour segments per target area. Programs are aired in English, German, Spanish and French. News bulletins are updated on the hour and half hour daily. Regular inter-

(continued on page 31)



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by Alan Peterson

Please to Read Fully

Dear JG,

All set for Hallowe'en? We've got a dish filled with Raisinettes ready to go by the door and I've already picked out my costume for the WLAD/98Q party; I'm going to strap an old faucet and a pressure gauge to my head, wrap myself up in tin foil and go as a tank of nitrogen.

We had a CD machine keel over here recently, and the trouble was traced to a worn-out optical head. While CE Tom Osenowsky had it open to replace the laser, I found myself peering over his shoulder at the service manual. What I read charmed me right out of my socks: The entire manual was one of those that had been translated directly and literally from the original language to American English. The result was the definitive word on CD technology, just a little bit off-

center.

You've seen these manuals, haven't you? They make perfect sense, but it's a little like walking backwards around the block to get next door.

The first time I encountered writing like this was when I plunked down three hundred bucks to buy a Japanese-made electric jazz guitar and was treated to tips on, say, tuning: "String is insert through tuning peg while rotary is applied to sealed knob," or how to turn down a too-loud sound: "locate volume potentiometer on face of instrument. Twist to reduce volume through amplification goodly." Clear enough to understand, but hilarious when read aloud.

Fast-forward back to the shop... When it came time to install and align the new optical head in our comatose deck, I was treated to sparkling tech-

talk which began "please keep the following instructions carefully." So, as careful as I dare to be, live and direct from the pages of my new favorite literary work, let's fix a CD machine.

"Please take care for preventing from shock by falling down..." Not only is it open season on prepositions here, but it sounds as if the best way to protect the laser head is to hold it and fall on your keister as often as possible. Paging Laurel and Hardy-y-y!

"Protect your eyes... as the light beam spreads after focused through the objective lens, it does not affect you in the place as far as more than 30 cms." I wonder which can inflict more pain, looking into the laser or reading this phrase?

A diet tip for the health-conscious CE: "Since the laser diode contains As (Arsenic)... known as the poison... avoid... putting it into your mouth." Do you know anybody who wound up hospitalized for eating a laser? (This does prompt a sobering thought, Jude. How many of us still hold hanks of solder in our teeth while our hands are busy? Lead poisoning's a little more subtle, but still should be off the menu.)

"Be careful to handle pickup as it may be damaged in a moment by human electrostatic discharge." Now, I really like that. Human Electrostatic Discharge. It conjures up the image of someone capable of firing lightning bolts out of their navels and striking an expensive diode at 50 paces.

How important is the lens in this whole affair? "It may change the specifications by attaching dust or ash on the object lens." So I guess it's best to leave your ash-attacher home.

More static electricity tips: "And still it is further desirable to make use of mat on the platform and floor." The platform of course is the bench, but I am especially impressed with how polite these instructions are: "further desirable."

These guys could write a manual on CE etiquette! "I beg your pardon, fellow engineer, would you have any Grey Poupon?" "No, would some silicone heatsink grease suffice?" "Thank you terribly."

This part is the best. I know zip about metallurgy or industrial lubricants, so I should receive college credit for finding out about the rather fragile bearing

point: "The metal bearing of Cu-compound sintered alloy is impregnated with Sankoru FG-84."

Awriiight! And where can we get a tube of Sankoru FG-84 (which, of course, no shop should be without)? How about "The Daido Fatty Oil Company"? I've gotta call this place and talk to Mr. Daido Fatty.

Page after page revealed more of the uproarious wonders of direct literal translation, much too wordy to reproduce here. Tom got the player back together and right back on the air.

Does it seem as if I'm taking shots at a manufacturer by singling the company out here? Not in the least. The machine is beautiful and I love using it. Fact is, I'm sure a couple of the firm's American executives have taken a look into their own literature and gotten a giggle out of it.

Am I voicing a prejudicial slam against the great nations who write this manual or the hard-working experts whose job it is to help us understand it?

If that were the case, I'd have to single out American English first—in my basement is a 1954 General Electric Mine Detector I got as Army surplus. In my opinion, the goofiest writing I've encountered has got to be that peculiar "One each, Detector, Mine, Electronic, Field" style which is the hallmark of military classification and found all throughout the manual.

Truth be known, Satchmo said it best: "What A Wonderful Woild." It's the diversity, the sheer wonderment of another culture interfacing with ours for a common goal—broadcasting. Sure it can be amusing when these efforts are made, but the intentions are the best.

Somewhere in the world right now, someone might be reading this in *RW International*, busting a gut over whatever awkward wording my own efforts could have received. Jude, may they laugh long and loud. As an industry and a world we need more of it.

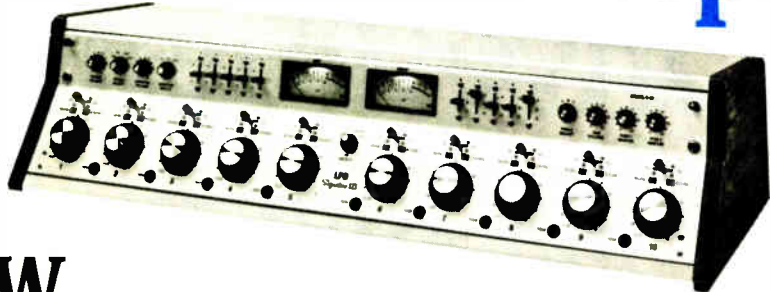
Now if only "Fahrvergnugen" could be adequately explained...

Happy Punkin' Nite,
—Al

■ ■ ■

Al Peterson writes through pages of *RW* to many goodly. Send from place you are other tidbits seen by you to Al. It is further desirable to send to address directly in the masthead listed.

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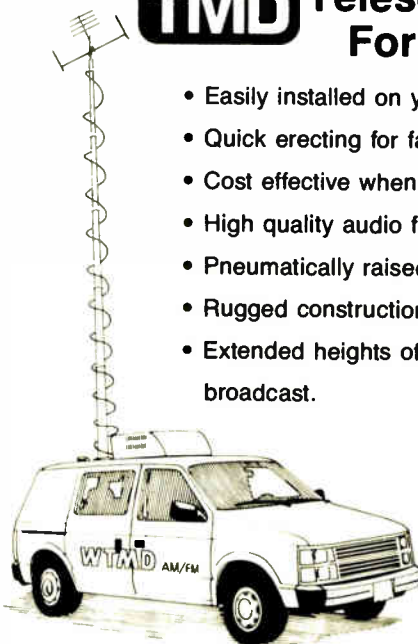
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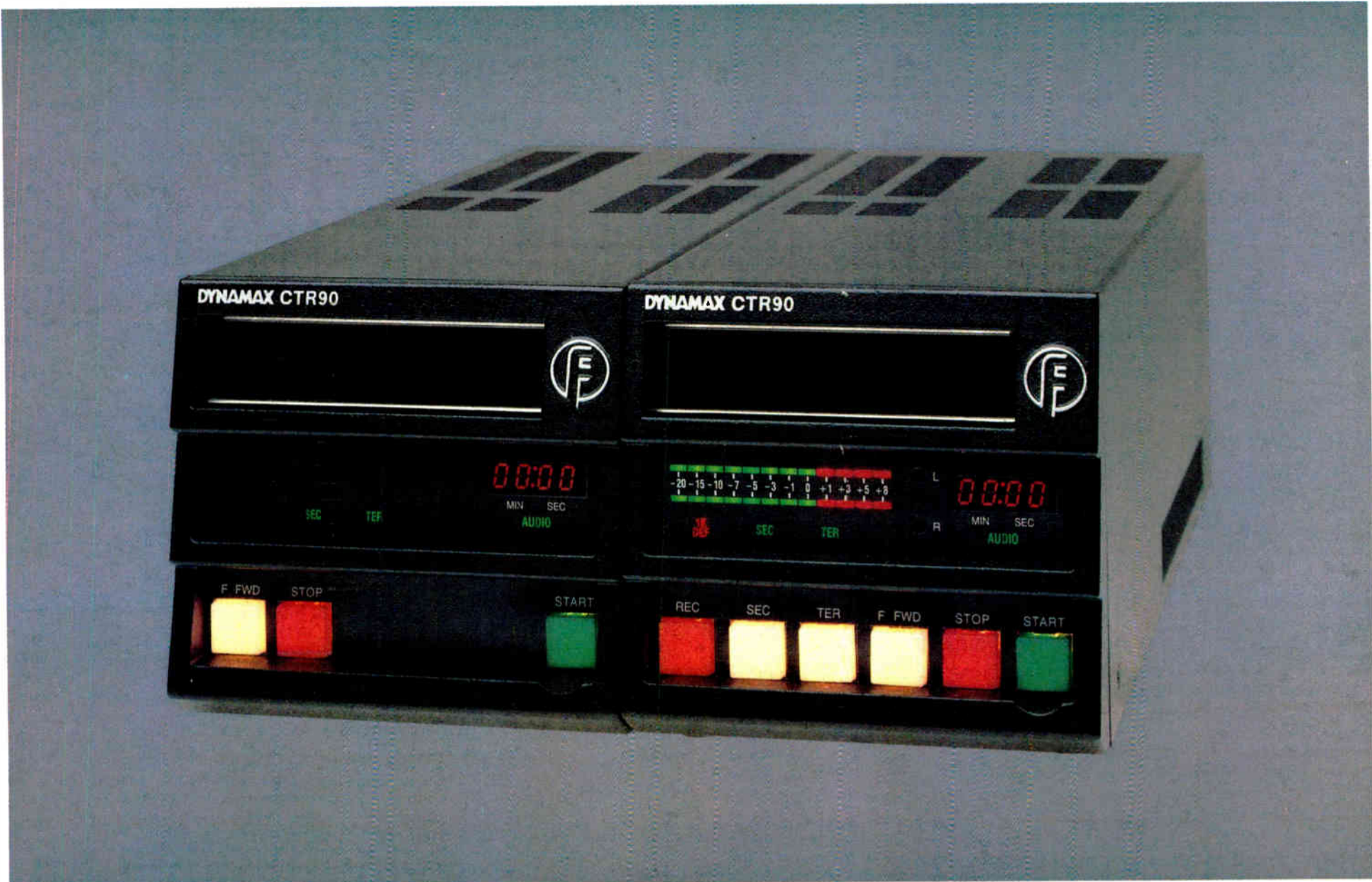
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World Radio History

Dynamax cartridge products are manufactured by Fidelipac Corporation, the world leader in cartridge systems and technology, and the standard against which others are judged.

No manufacturer is better qualified to develop an improved machine. Fidelipac invented the endless loop tape cartridge around which the original NAB Broadcast Audio Cartridge Standards were written. A major supplier of cartridges to the broadcast industry, the company received its first patent in 1956, and is the only manufacturer to maintain a complete tape manufacturing facility dedicated exclusively to the needs of the broadcast industry. Features originally introduced on Dynamax cartridge machines are now defacto industry standards, and Dynamax is the established market leader.

Fidelipac provides a full range of cartridge based products; Recorders, Reproducers, Eraser/Splice Finders, Cartridges, Magnetic Recording Tape, Splicing Tape, Bulk Erasers, Alignment Tapes and Gauges, and Cartridge Storage Systems.



Fidelipac Corporation P.O. Box 808 Moorestown, NJ 08057 USA Tel: 609-235-3900 Fax: 609-235-7779 Tlx: 710-897-0254



CTR90/990/50K PRINTED IN THE USA

Performance Specifications

RECORD/REPRODUCE ELECTRONICS

Inputs	Active Balanced & Differential Transformers Optional
Input Impedance	≥10 K Ω
Maximum Input Level	+20 dBm
	Adjustable off to +20 dBm
Outputs	Active Balanced & Differential Transformers Optional
Output Impedance	≤60 Ω
Bridging Output Impedance	≤600 Ω
Maximum Output Level (Ref. 600Ω Load)	+ 20 dBm
	Adjustable -20 dBm to +20 dBm
Equalization	NAB or IEC
Dolby HX Pro™ Headroom Extension	(Recorder Only)
DNR®	Internally Selectable
Frequency Response	40 Hz - 16 kHz ± 1.5 dB
Signal to Noise Ratio "A" Weighted	
With DNR®	≥81 dB
Without DNR®	≥70 dB
Depth of Mute	≥90 dB
System Distortion	
	(Total output distortion may be greater, and is dependent on the quality of the cartridge and tape utilized.)
Record/Reproduce	≤0.8% THD at 1 kHz
Reproduce	≤0.5% THD at 1 kHz
Crosstalk between audio tracks at 1kHz	≥50 dB
Crosstalk, Cue to audio tracks at 1 kHz	≥50 dB
Bias Frequency	144 kHz
Cue Tones	
Primary	1 kHz
Secondary	150 Hz
	200 Hz Optional
Tertiary	8 kHz
Input Provided for FSK and Cue Bias Enable	
Metering (Recorder Only)	
LED, 12 Segment,	
-20 to +8 dB Scale,	
VU or PPM Selectable	

Dolby HX Pro™ headroom extension originated by Bang & Olufsen and manufactured under license from Dolby Laboratories Licensing Corporation. "DOLBY", the double-D symbol, and "HX Pro" are trademarks of Dolby Laboratories Licensing Corporation.

DNR® is a registered trademark of National Semiconductor Corporation under U.S. Patents 3,678, 416 and 3,753,159.

TAPE TRANSPORT

Cartridge Type Accepted	NAB Type A or AA
Tape Speed	
Play or Record	7½ ips (19 cms)
	¾ & 15 ips (9.5 & 38 cms) Internally Selectable
Fast Forward	22½ ips (57 cms)
Tape Speed Accuracy	
Play or Record	≤0.2%
Head Configuration	NAB
	Optional MAXTRAX®
Start Time	≤100 msec.
Stop Time	≤80 msec.
Capstan Motor	
DC Phase Locked Loop (PLL) Drive	
Internally Selectable for Command	
Run or Continuous Run	
Wow & Flutter (Ref. DIN 45507 @ 7½ips)	0.12% max.

PHYSICAL

Power Requirements	
110/120/220/240 VAC ± 10%	50/60 Hz
	60 VA max.
Ambient Environment	10° to 50° C
	50° to 122° F
Mounting	Tabletop or Optional 19" Rack
Dimensions	
	5.50 H X 5.48 W X 16.34 L inches
	14.0 H X 13.9 W X 41.5 L cm.
Weight	
CTR91	21½ lb. (9.8 kg.)
CTR92	21½ lb. (9.8 kg.)
CTR92MX	21½ lb. (9.8 kg.)
CTR93	22¼ lb. (10.2 kg.)
CTR94	22¼ lb. (10.2 kg.)
CTR94MX	22¼ lb. (10.2 kg.)

DYNAMAX® is a registered trademark of Fidelipac Corporation.

Maxtrax® is a registered trademark of Pacific Recorders & Engineering Corp.

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTIFICATION

All specifications taken on typical Stereo units with NAB equalization and referenced to 250 nWB/m. Other models may vary slightly.

Rugged Construction

The CTR90 Series has been designed to provide years of reliable operation, and to withstand the abuse so often encountered in a fast paced broadcast environment. Premium quality components assure dependable and quality performance, backed by the Dynamax 2 year limited warranty. Each unit undergoes thorough and comprehensive factory testing and alignment, and is delivered with a complete test printout for performance verification.

PRECISION DRIVE SYSTEM

A high torque DC Capstan Motor, regulated by sophisticated Phase Locked Loop (PLL) control circuitry and a precision resolution tachometer, guarantees accurate speed. The large diameter constant current Solenoid provides cool operation, and stable pressure on the long life composition, self aligning, Pinch Roller.

ADVANCED PROGRAMMABLE LOGIC

A sophisticated and non-volatile Programmable Logic Array (PAL) is the heart of the CTR90 Series Logic System. Numerous logic options and configuration designations are internally user selectable via easily reset switches and jumpers.

INPUT and OUTPUT CONNECTIONS

Audio Inputs and Outputs are accessible via both XLR type and 9 pin "D" connectors to facilitate ease of installation in all environments. Remote commands and tallies, and Frequency Shift Keying (FSK) Data Interfacing are accessed via a 50 pin "D" connector at the rear of the machine.

SERVICEABILITY

Record, Reproduce, and Logic PC Boards are easily removable from the rear of the machine. Internal cleaning may be performed while the unit is rack mounted, as may Level and Equalization alignments, when utilizing the optional TE-90 Test Extender Board.

MECHANICAL INTEGRITY

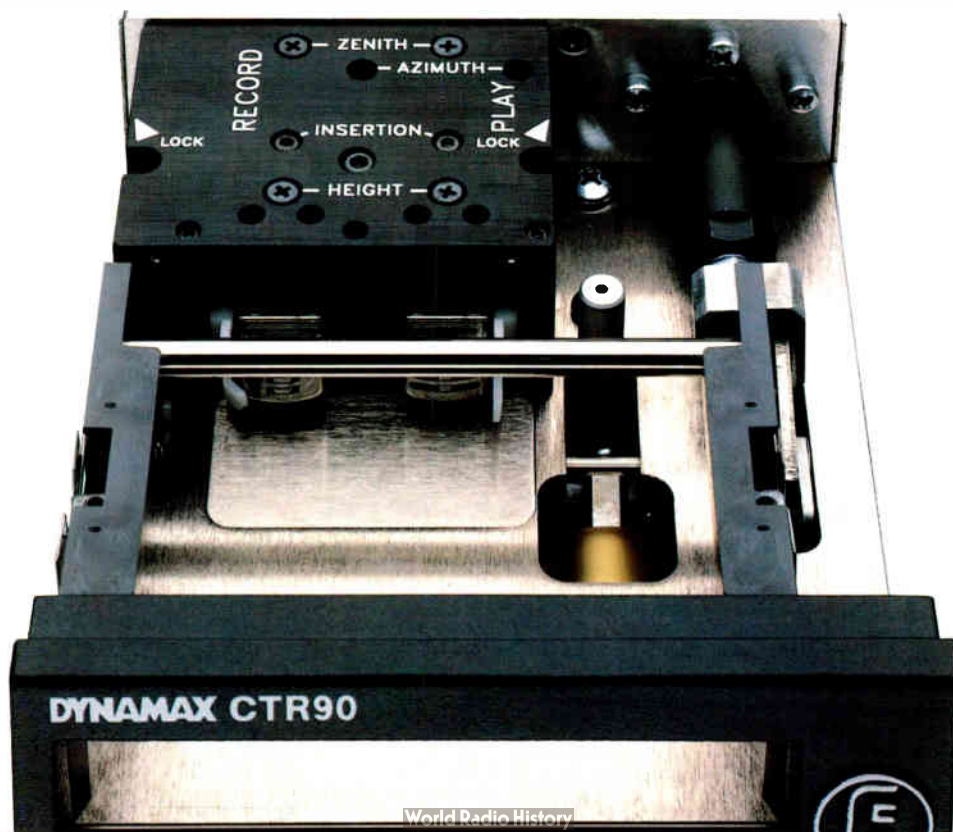
All cartridge and tape guidance elements are referenced to a thick and hardened nickel plated aluminum deck plate. Smooth self aligning lateral guides and heavy duty rails ensure that an inserted cartridge is forced into its optimum operational position firmly against precision reference surfaces. Tape guides and head mountings are extremely stable, with non-interactive adjustments for height, azimuth, zenith, and penetration into the cartridge.

ROBUST POWERING

The cool running and well filtered DC Power Supply is toroidal transformer based, providing clean and stable audio power. Maximum shielding of heads and low level circuitry prevents the spurious detection of stray RF signals. Mains voltage selection is easily accomplished via a rear mounted voltage selector/fuseholder with twin fusing. Earthing and high voltage wiring comply with applicable European and Asian standards.

INPUT/OUTPUT TRANSFORMER OPTION

To facilitate installation in adverse or remote environments, easily installed Input and Output Transformers are optionally available.



Functional Front Panel

EXTENDED SCALE VU/PPM METERING

12 Segment Extended Scale Metering is standard on all CTR90 Series Recorders. Bright LEDs permit easy meter viewing at a distance or angular offset, while the -20 to +8 dB range provides additional accuracy for monitoring all types of program material. Internal selections permit VU or PPM (Peak) ballistics, and metering sources of Input, Output, Bias, or Cue.



REAL TIME TIMER

The 4 Digit Real Time Minutes and Seconds Timer automatically resets upon cartridge insertion, and may be internally programmed to freeze on primary, secondary, or tertiary cue tone detection. The timer, standard on every CTR90 Recorder and Reproducer, is synchronized to the capstan tachometer and accurately tracks Starts, Stops, and Fast Forward excursions.



Large illuminated switches provide all Recorder and Reproducer operational controls. Bright Status Indicators announce the activation of important functions.

STOP Overrides all controls and stops the machine. Also illuminates as a Ready signal upon cartridge insertion, flashes slowly after any normal Play cycle, and quickly after a manually interrupted Play cycle.

START Initiates the Reproduce process, or Record if selected. The bezel reference detent permits easy control location by experienced operators in a fast paced environment. Internal programming may be selected for Re-Start Inhibit.

REC Preselects the Recording process, which is then initiated by the START switch, and causes insertion of a 1 KHz Primary Cue Tone.

1K DEF Defeats the Primary Cue Tone, and may be activated by a double-push of the REC switch.

SEC and **TER** Initiate the recording of Secondary and Tertiary Cue Tones, while **SEC** and **TER** indicate their detection.

F FWD Initiates Fast Forward mode, which may also be internally selected to activate upon secondary or tertiary cue tone detection.

AUDIO Indicates that the Audio Outputs are unmuted, verifying that the machine is running on speed, or has been commanded to unmute during wind by pushing the FAST FORWARD switch. Mute may be internally selected to occur upon secondary or tertiary cue tone detection.

Cleaning Mode is enabled by pushing momentarily with no cartridge inserted, and is disabled via the STOP switch.



Superior Audio Performance

The CTR90 Series attains new standards, and obsoletes previously acceptable specifications. Input and Output circuitry is balanced, and direct coupling is utilized through all possible internal stages. Dolby HX Pro™ and DNR® Dynamic Noise Reduction are incorporated as standard features on CTR90 Series Recorders, and DNR is incorporated as standard on all Reproducers.

DOLBY HX PRO™

Broadcasters now have access to program and production sources containing far more dynamic range and bandwidth than ever before. Dolby HX Pro permits high quality analog recording of such material.

THE SELF BIAS/SELF ERASURE EFFECT

During the audio magnetic recording process, high frequency program content can cause an effect called "self biasing", sometimes also referred to as self erasure. While this effect has been recognized for years, it was not previously an important factor when recording for broadcast use due to the nature of typical programs sourced from vinyl. Digital audio source material requires more refined techniques.

Magnetic recording tape requires bias to accept magnetization by an analog audio signal. Bias is an ultrasonic signal which is mixed with the audio and serves as a fluxivity source for the tape. This fluxivity initiates movement of the magnetic particles contained on the tape surface, permitting their alignment in accordance with a low level magnetic current generated by the applied audio signal via the recording head.

High frequency audio signals may cause an increased fluxivity effect. These signals can alter the effective bias, as seen by lower frequency audio signals, and cause self erasure of the high frequency signal applied. As music is a complex and constantly changing mixture of low, mid, and high frequency signals, it can be demonstrated that an increase in high frequency program content, such as encountered from a digital audio source, becomes an important factor in cartridge recording quality.

Dolby HX Pro continually analyzes the sum of pre-aligned bias and audio input signals. It then varies the applied fluxivity so that effective bias is always at optimum.

DNR® DYNAMIC NOISE REDUCTION

Existing cartridge libraries, including older selections originally recorded from worn and noisy sources, or those degraded with use, will be enhanced through the use of DNR. It is operator transparent, requires no alignment, is internally selectable, or may be deactivated when using external noise reduction systems.

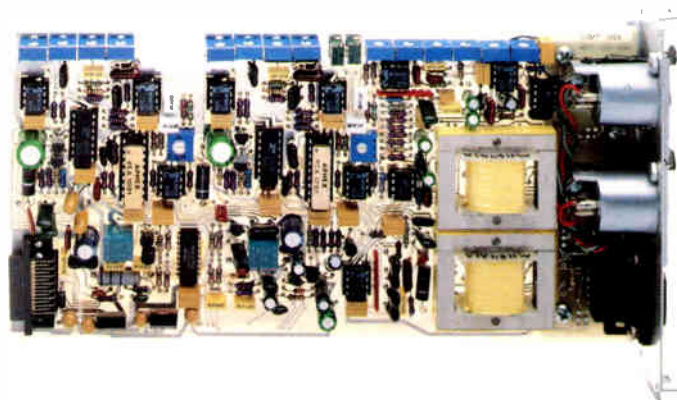
MINIMUM DISTORTION AND HEADROOM EXTENSION

Excessive bias applied to magnetic recording tape decreases its sensitivity. Sensitivity is the amount of signal current required to achieve nominal magnetization of the tape, and directly relates to distortion of the recorded audio signal. When effective bias is at optimum, distortion is at minimum.

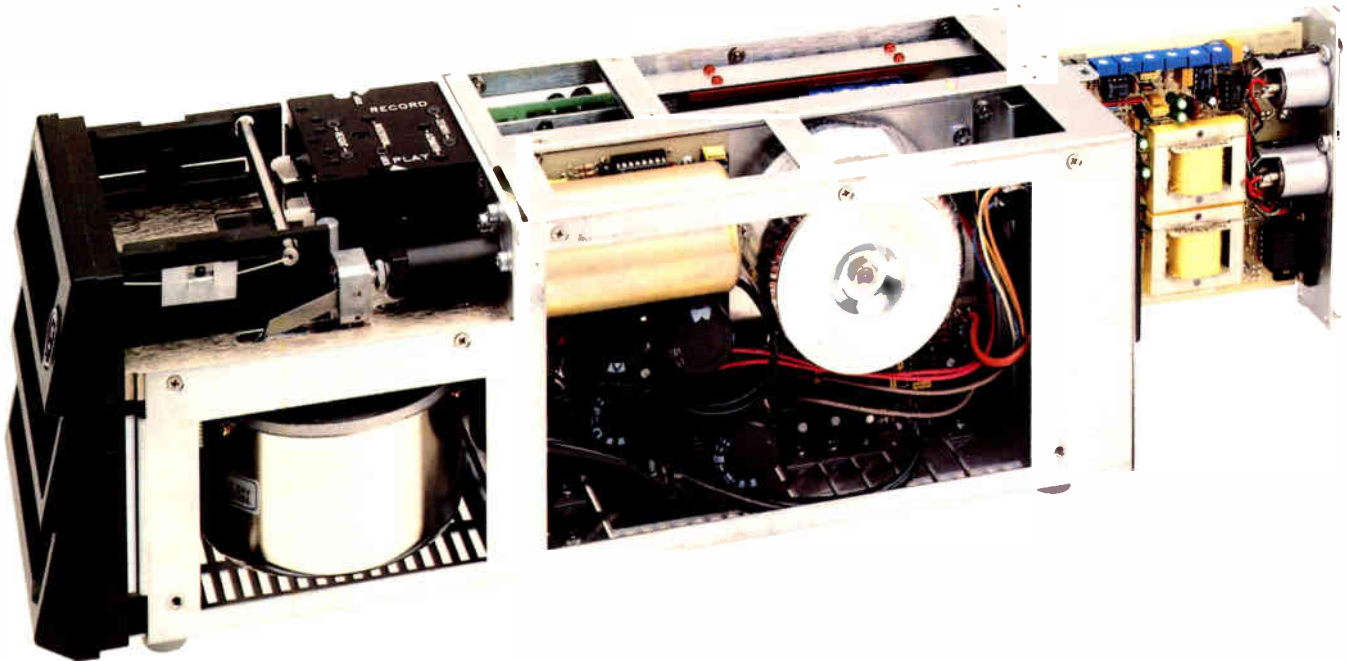
Headroom is the difference in levels between nominal signal and the maximum signal which may be recorded before reaching 3% total harmonic distortion (THD). As excessive bias decreases sensitivity, it decreases headroom.

By maintaining optimum effective bias, Dolby HX Pro ensures minimum distortion and maximum headroom. Cartridges have the ability to accurately record all source material, including digital audio and that with high level transient peaks.

As implemented in the CTR90, Dolby HX Pro is completely transparent to the operator. There are no In/Out switches, and no alignments required.



DNR is non-encoded, usable with all cartridges, and operational only during reproduce. Continuously analyzing audio content, it controls a variable frequency lowpass filter providing increasing amounts of bandwidth reduction during periods of lower signal content. DNR has a virtually instantaneous attack time, and natural decay time, so that there is no audible perception of its action.

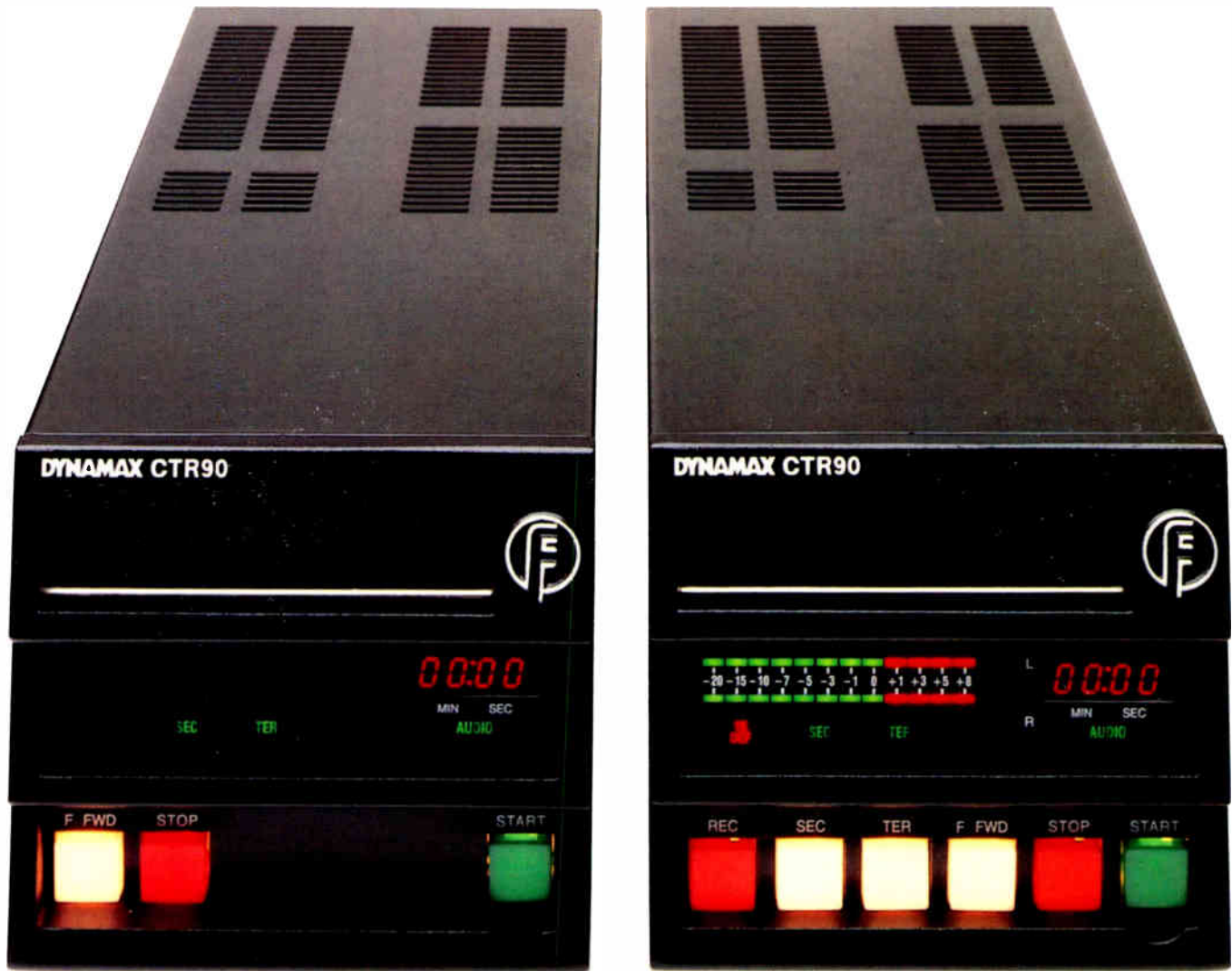


- SUPERIOR AUDIO QUALITY
- DOLBY HX PRO™ HEADROOM EXTENSION (Recorder Only)
- DNR® DYNAMIC NOISE REDUCTION
- 3 CUE TONES
- FSK COMPATIBILITY
- FAST FORWARD
- FAST FORWARD CUE DETECTION
- EXTENDED SCALE VU/PPM METERING (Recorder Only)
- ACTIVE BALANCED DIFFERENTIAL INPUTS AND OUTPUTS (Transformers Optionally Available)
- BALANCED XLR TYPE AND "D" INPUT/OUTPUT CONNECTORS
- NAB OR IEC EQUALIZATION
- BRIDGING SELECTABLE OUTPUTS FOR PARALLEL UNIT OPERATION
- 110/120/220/240 VAC 50/60 HZ MAINS
- COOL RUNNING - RUGGED CONSTRUCTION
- DC/PLL CAPSTAN SERVO DRIVE
- REAL TIME MINUTES & SECONDS TIMER WITH AUTO-FREEZE CAPABILITY
- HIGH STABILITY NON-INTERACTIVE HEAD BRIDGE
- CONSTANT CURRENT SOLENOID
- SELF-ALIGNING LONG LIFE PINCH ROLLER
- STATUS INDICATORS
- CLEANING MODE
- FULL FUNCTION REMOTE INTERCONNECTS
- ADVANCED PROGRAMMABLE INTERNAL LOGIC NETWORK
- PC CARDS REMOVABLE FROM REAR OF MACHINE
- 19" RACK MOUNTABLE - 3 ACROSS
- 2 YEAR LIMITED WARRANTY

The CTR90 Series

A NEW STANDARD IN CARTRIDGE BASED AUDIO SYSTEMS

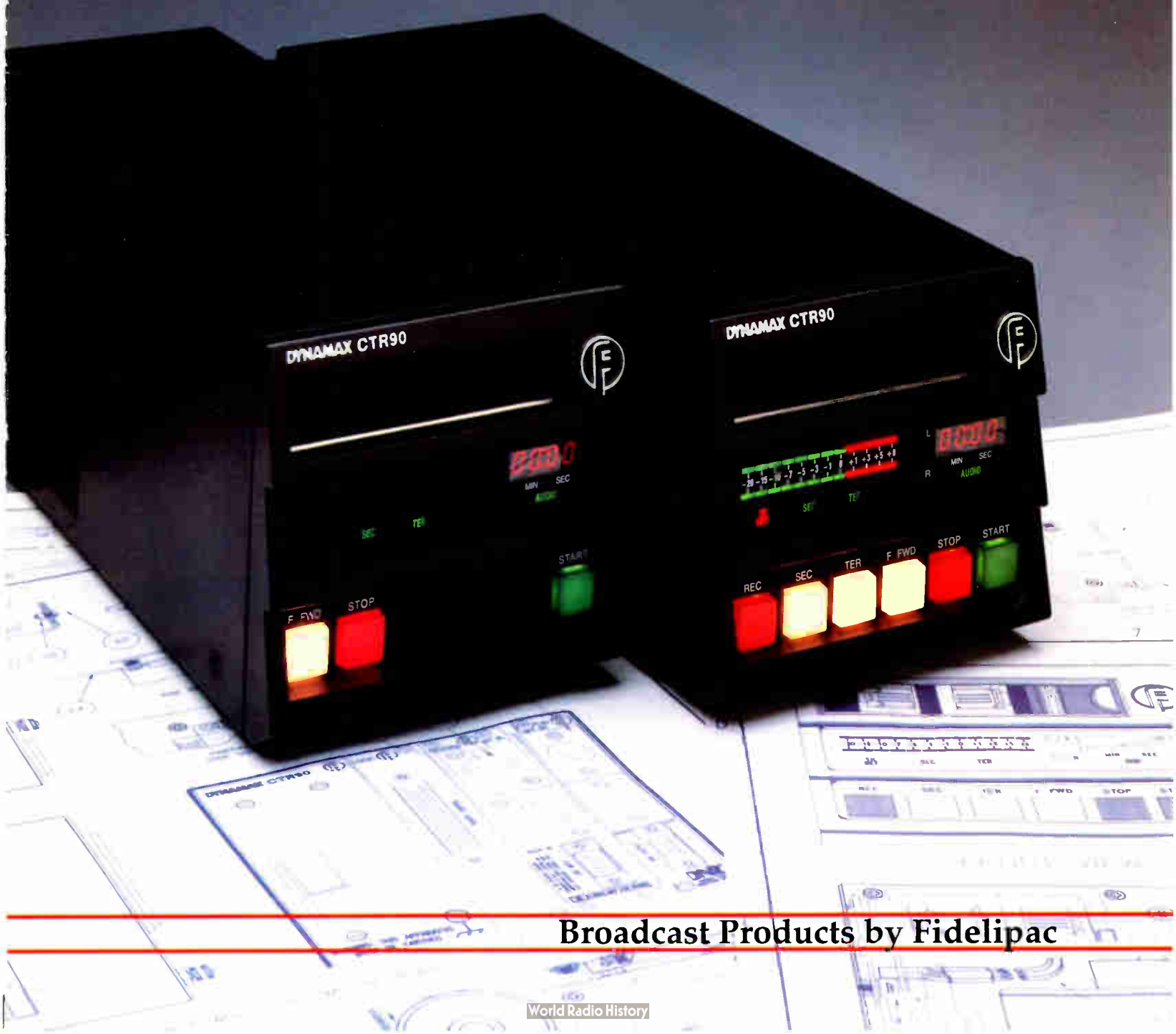
The DYNAMAX® CTR90 Series has been designed specifically to compliment the audiophile quality of todays sophisticated digital audio systems. Now, both compact disc based program material and local productions can be reproduced with equal quality, and aired in a traditional, convenient, and inexpensive format.



The CTR90 Series is a totally new design from Dynamax, the world leader in cartridge technology. It outperforms all other Broadcast Audio Cartridge Machines. Audio specifications exceed those of typical broadcast transmission chains as well as the finest commonly available receivers. Incorporating the best of current technology, while retaining proven mechanical and logic configurations, the CTR90 Series surpasses previously accepted audio specifications, and establishes a new standard by which to judge broadcast audio cartridge performance.

CTR90 Series Recorders & Reproducers

DYNAMAX[®]



Broadcast Products by Fidelipac

Monitor Takes to the Airwaves

(continued from page 27)

national programming includes news analysis, features on education, religion, the arts, and family life, as well as discussions with the Monitor's reporters, editors, and guests.

Part of what gives the World Service its unique perspective is the search for a spiritual dimension to the news. Reporters are actively involved in looking for solutions, not just reporting the world's problems.

The staff is heavily involved in features production and prides itself on the extensive research that goes into stories. Because the international service is relatively new,

... they follow the mandate: "To injure no man, but to bless all mankind."

current plans call for fine tuning the existing programming, rather than expansion.

It is interesting to note that writers must make a special effort in preparing English language broadcasts to avoid American idioms. Our cultural jargon would not be understood by English speaking listeners overseas and could become a source of irritation to them.

Programming practice

MonitoRadio, the domestic radio service, began operations in 1984, is heard on about 200 public radio stations and is distributed by American Public Radio. Programming includes "Early Edition," an hour long feature airing on weekday mornings; "Daily Edition," broadcast weekday afternoons; and "MonitoRadio," heard on the weekends.

Daily programs focus on breaking news stories, while the Saturday edition provides a more in-depth analysis of the week's events. Current plans include adding more affiliates on the public radio network and adding a new service for AM stations.

The volume of information coming into the Monitor from wire services around the world make any kind of paper-based system impossible to manage.

News Pro, a special information retrieval system for news organizations, is used throughout the Monitor. The program runs on a VAX computer and allows wire stories to be accessed by author, topic or deadline. An electronic mail system also runs on the VAX, and interconnects all

branches of the Monitor's operation.

With new programs being added to both the radio and television schedules, and older programs being upgraded, the Monitor has a composer on staff full time. Working in a studio with MIDI and other electronic instruments, he creates intro/outro themes, jingles and bumpers for all of the Monitor's programs.

Unique to the Monitor's op-

eration is the cooperation between radio and television in the coverage of news events. Every morning, radio and television producers meet to discuss stories.

Events that radio and television both cover are handled in a special way. Television crews filming these events record stereo sound with ambient noise on one track and vocals on the other. In this manner, radio can take

the television audio and use it as it sees fit. The Monitor's television crews are trained in the production of top quality sound, and are, in effect, both radio and television producers and reporters.

Within the confines of One Norway Street is a staff of professionals devoted to creating intelligent radio and TV, using state of the art facilities. True to the beliefs of Mary Baker Eddy, the church's foun-

der, they follow the mandate: "To injure no man, but to bless all mankind."

Special thanks to the following Monitor staff members for sharing their time and thoughts with me: Bill Spurlin, Radio Operations Manager; Kim Shippey, Executive Producer; World Service of The Christian Science Monitor; and Kate Dearborn, Executive Producer, MonitoRadio.

■ ■ ■

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



When you need extra hands mixing audio, Shure's AMS can help.

Until recently, you needed outstanding hand-eye coordination to mix audio in multiple-microphone broadcast situations.

Now there's a system that gives you broadcast-quality audio when you can't cover all the faders at once. It's the Shure Automatic Microphone System (AMS), featuring patented direction-sensitive gating.

The Shure AMS continuously compares audio signal levels from two matched unidirectional condenser microphone cartridges located back-to-back in each AMS microphone. The rear-facing cartridge monitors ambient sound, while the front-facing cartridge handles sound from the desired source. When the front cartridge output exceeds the rear cartridge output by 9 dB, the AMS mic channel gates on automatically in .004 seconds.

Because of this unique gating concept, an AMS microphone channel will *only* gate on

when addressed from within a 120-degree "window of acceptance" centered at the front of the microphone. AMS mics *not* addressed from within this angle remain off. So the number of open microphones is kept to a minimum automatically, with no need for manual control.

Since the Shure AMS automatically keeps track of the number of open microphones and adjusts the overall gain to compensate, your broadcast level stays constant as mics open and close, without troublesome gain-riding.

Direction-sensitive gating makes the

Shure AMS the best system to use in multiple-mic situations, from panel talk shows to game shows to hearings on Capitol Hill. More and more broadcast engineers are discovering the advantages of having broadcast-quality multiple-microphone



audio without the headaches of manual mixing or the time-consuming setup of so-called automatic mixers.

With AMS you not only get all the advantages of a truly automatic microphone system, you also get the broadcast-quality audio and reliability of Shure microphones.

For a comprehensive AMS literature packet, call us at 1-800-257-4873. For AMS technical support, call Michael Pettersen at 1-708-866-2512.



SHURE®

The Sound of the Professionals...Worldwide.

AM Plan Risks Reduced Service

by Steve Crowley

Washington DC Static on your radio? If you live south of Boston, call the power company. Eastern Utilities will send an information sheet describing how to locate noise sources using the most sensitive detector known to man—an AM radio.

You're supposed to take the radio and go sniffing around the house. They even give some hints: aquarium heaters, fluorescent lights, motors and (new to me) bug killers. (Zzzzzssapp! "Hmm, sounds like lightning—or a gypsy moth.")

It's tough for AM. There are some powerful signals here in downtown Washington—in the street. But they're

CONSULTANTS CORNER

just a whisper by the time they get through our office building. And when I switch on the computer, forget it. With all the noise out there, I don't stand a chance of hearing interference from other stations, which only affects the weaker stations I can't pick up.

Everyone has anecdotes. Let's look at the AM Radio Interference Study performed by B. Angell & Associates for the NAB. In that study, several hundred persons were tested to determine if AM interference ratios should be changed. Among the questions posed to the study's respondents:

"What do you feel are the major problems with the sound quality of the AM radio signal?"

The response:

- Weather interference: 69%
- Hiss/background noise: 37%
- Weak signal: 20%
- Static: 19%

- Frequency response: 13%
- Fading: 9%
- Unspecified interference: 8%
- Station crowding: 7%

Sounds like they have the same problem I do. The results from the Angell study must be used with caution because, as its authors state, its results cannot be projected statistically.

But if one considers "unspecified interference" and "station crowding" as interference from other stations, only 15% of the sample group considered interference between stations to be a major problem.

Sacrificing service?

We turn now to the FCC's proposed technical standards for AM. The thrust is clear—force a reduction in interference between AM stations. Sounds good, but not at the price of decreased service. Under the proposed rules, for instance, if you need to modify your nighttime antenna system, you'll be required to reduce your signal 10% toward those stations receiving more than a 1 mV/m signal from yours.

There is hope for AM—even in a digital world. The band has some desirable propagation characteristics that can't be matched by DAB . . .

Yes, interference is reduced, but so is close-in service from your station. And providing service is the biggest problem in AM.

The Commission is killing its original proposal to allow AM stations to receive interference in newly expanded coverage areas. Generally, between co-channel stations, the 0.5 mV/m and 0.025 mV/m contours are not allowed to overlap. But you might be able to increase your coverage, accepting some overlap of your newly expanded 0.5 mV/m contour and the 0.025 mV/m contour of the other station.

Yes, that means you get some new interference, but it's in areas you're not now serving. And all the while, you still protect the other station; your 0.025 mV/m can't overlap his 0.5 mV/m, so no interference is caused.

The Commission has said it won't allow this because it would foster "distorted service areas." Well, all AM service areas are distorted. The AM band is a sea of interference with islands of coverage. We need to focus on increasing the size of the islands, not lowering the water level.

First-adjacent gridlock

WGUL, Dunedin, FL, has an application on file to modify its pattern. By accepting some interference in its newly expanded coverage areas, the proposed operation will increase the population within its 0.5 mV/m contour by about 350,000 persons.

Close to the station, listeners will benefit from increased signal strength. No interference will be caused to any other station. But this won't be possible under the proposed rules.

As I discussed last month, the FCC (continued on page 40)

CHAIRMEN of the BOARDS

"It's amazing that you can offer a console of that quality for the low price tag that was on it."

"I would recommend the XL SERIES audio consoles to anyone with a small budget who is looking for 'big quality'."

"Congratulations! We believe you've built the most perfect audio console available to broadcast stations."

"We have found that noise and distortion are lower—much lower, in fact—than audio consoles selling at three to four times the price of the RAMKO XL Series!"

JUST PART OF THE STORY:

- STEREO, SINGLE & DUAL CHANNEL
- HUGE, INDIVIDUAL, MULTI-COLOR "VU" METERS
- LONG LIFE SWITCHES. Silent, illuminated, 5 million operation input/output switches
- DISTORTIONLESS, SOLID STATE SWITCHING & VCA audio control.
- EASE OF INSTALLATION. 2 screw drivers & a wire stripper. All other functions switch & jumper programmable.
- TOTAL RF PROOFING. Of the hundreds installed absolutely no RF reported.
- FREE 2 WEEK TRIAL & 2 year parts & labor warranty.
- SUPER 20TH ANNIVERSARY BONUS! For a limited time, take 10% off all published prices.
- ROTARY & OPTIONAL NOISELESS, LONG LIFE LINEAR FADERS (exclusive, non-moving contact design!).
- EXTRAORDINARILY LOW PRICES. Check the competition!
- 4, 6, 8, & 12 MIXER, 15 to 31 inputs.
- 9 INPUT MIX/MINUS BUSS & programmable start/stop controls
- AND A WHOLE LOT MORE.

EXAMPLE WITH ANNIVERSARY DISCOUNT:
8 mixer, single channel.....\$2,606 !!!
12 mixer, dual channel.....\$3,735 !!!

Q92
KAMP-FM
P.O. BOX 70
MADISON, MINNESOTA 56206

January 5, 1990

Dear Sirs:

Just a note to let you know how much we like the Ramko xl625 stereo console we installed in our FM broadcast operation a few months ago.

The audio quality is excellent and our announcers like the ease of operation. It's amazing that you can offer a console of that quality for the low price tag that was on it.

I had one occasion to call your service department for an answer to a question I had on a minor problem and I received some friendly and accurate advice. Incidentally, the minor problem resulted from a severe lightning strike at our studios, the Ramko board survived it nicely!

I would recommend the XL SERIES audio consoles to anyone with a small budget who is looking for "big" quality.

Very Truly Yours,
Maynard R. Meyer
General Mgr./Chief Engineer

WBZM
94.3 FM
Peoria
Central Illinois Pure Gold Station

April 24, 1990

RAMKO Research
3501 #4 Sunrise Blvd.
Rancho Cordova, CA 95670

Gentlemen:

Congratulations! We believe you've built the most perfect audio console available to broadcast stations.

We've been using an XL Series stereo console for four months with outstanding results. Indeed, your specifications for this console are quite conservative. We have found that noise and distortion are lower-- much lower, in fact-- than audio consoles selling at three to four times the price of the RAMKO XL Series!

Dollar-for-dollar and feature-for-feature, RAMKO consoles are the finest available in broadcast applications.

What sets RAMKO apart, however, is not simply the quality of the product. When problems develop (and with today's complex circuits, it's inevitable), your technicians have provided invaluable assistance over the telephone which has enabled us to make fast repairs.

It appears to us that your competitors spend a lot of money on slick four-color ads, while RAMKO puts its resources to good use quietly developing rugged, dependable consoles. So good, in fact, that our technicians refer to the RAMKO console as the "noise-free" board.

Yours truly,
Bill Bro
Bill Bro
President

FOR THE REST OF THE STORY CALL:
TOLL FREE (800) 678-1357 or FAX: (916) 635-0907

3501-4 SUNRISE BLVD.
RANCHO CORDOVA, CA 95742 **RAMKO RESEARCH**

Keeping Computers in Top Form

Backups, Defragmentation and a More Careful Attitude Mean Fewer Problems Down the Line

by Barry Mishkind

Tucson AZ No matter what you do with your computer, from bookkeeping to word processing to engineering, like any piece of equipment, your computer needs maintenance.

Most stations that use computers wouldn't go back to a manual office on a bet. The days before those word processor and traffic and billing programs seem like the dark ages!

KEYBOARD CONNECTION

Whether it is scheduling and billing for time sales, sales leads, music rotation, all manner of correspondence, engineering, or desktop publishing, computer technology has made great changes in how we do things.

If you've been in broadcasting for over 10 years or so, you now meet people who can't imagine how a station could operate without a computer. Doing a log by hand? No way!

In fact, stations can now buy packages such as those shown at the NAB this

past spring, where the entire radio station is contained in a computer!

What an amazing thought. No turntables, no cart machines, no tape decks. Just a computer humming along softly as the hits just roll on and on ...

Protecting the valuables

With its value unquestioned, and the computer taking over more and more functions formerly done by hand, most stations have taken precautions to protect the valuable data hidden inside the CPU.

For example, it usually only takes a couple of times walking past the computer and having a static electrical charge cause the computer to reboot for many people to buy anti-static carpets and other static fighters.

It's just a whole lot easier and better than periodically reentering a lot of lost data.

Areas where lightning is frequent provide another challenge. Both induced surges and power losses are common during storms.

As the hard disk spins at 3600 RPM or so, with the head suspended off the magnetic media merely by a cushion of air flow, brief interruptions of power can cause the head to "crash" down on the

(continued on page 39)

Figure 1.

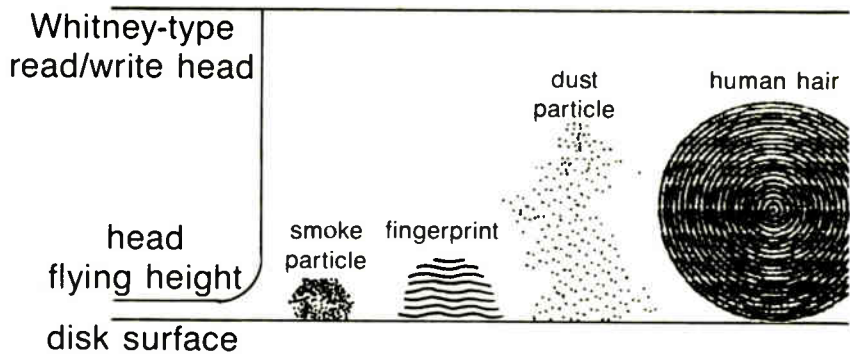


Figure 2A.



Newly loaded files

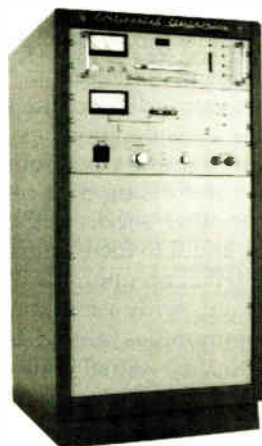


File "B" deleted and replaced by "F" then File "E" deleted. (Notice separated "F"s)

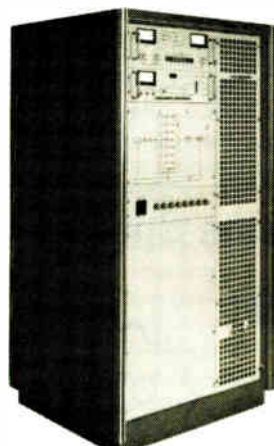


After disk compression

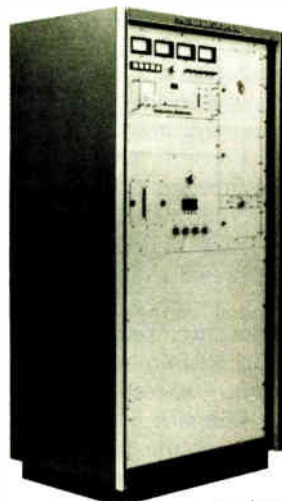
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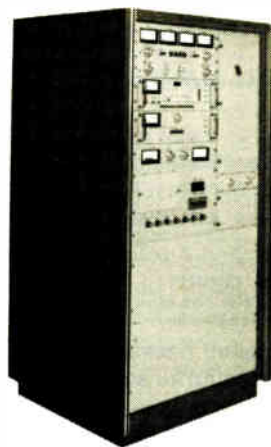
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The Early Days of FM Translators

A Look at the Colorful History of the Technology And the People Who Helped Bring It This Far

by Howard L. Enstrom

Mount Dora FL In this installment of *Low Power Lowdown*, I'll look at the origins of low power translators and discuss the general theory behind the technology. Then we'll have a look at a couple of the firms manufacturing the devices.

LOW POWER LOWDOWN

The first boxes were made by Keith Anderson of Black Hawk, SD, and they were TV translators, not FM. But because FM reception out west left much to be desired, innovative people would modify Anderson's units to receive and transmit FM channels.

Such use was illegal, and in such an application the equipment lacked sensitivity and selectivity, because the IF bandpass was 30 times wider than necessary for FM.

Spreading the word

Meanwhile, the same TV translator was also pressed into FM service in another part of the world, on the West Indies island of Haiti. There, Christian missionary and radio ham Dave Hart spent most of his life, ministering to physical and educational needs, and offering spiritual hope.

He must have parted his hair to suit the Haitian government, for Hart was allowed to build three AM stations and one FM in the capital city of Port-au-Prince, and to establish remote outposts nestled between Haiti's many mountains. The centers were staffed by native Christians, and by Radio Lumaire, the radio stations operating in

Port-au-Prince.

You guessed it . . . too often, the FM signal was shadowed by the mountains. So, Dave used Anderson's TV translators on mountaintops to deliver the signal to valley communities. Some of the translators required innovative ideas. They were often powered by solar energy—or by wind, using old windmills donated by farm owners in the US.

Illinois consulting engineer Robert A. Jones, upon hearing of Hart's struggles in Haiti, decided to visit the island for a firsthand look. A warm welcome included a tour of outlying translator sites, where sometimes Jones was aghast. For what he saw were antennas fabricated of galvanized water piping and plumbing elbows!

That visit was the first of 19 trips for Jones, who took time out from a busy practice to provide free consulting services and paid his own expenses. Radio Lumaire's directional AM stations needed attention and there was a new 20 kW station to be installed. But somehow, the FM projects fascinated Jones.

Words into actions

There must be a better way, Jones thought. On a flight back to Chicago, he sketched ideas for a new concept of an FM translator. What should he call it? The translator's purpose was to help spread the gospel . . . ah, J-316, taken from the New Testament gospel according to John. That's why all Jones's equipment continues to carry that type of designation.

In 1977, Jones came to visit me for a few days at my South Dakota home. We sat in the sun on the just-poured concrete slab of my lab and office building as he shared experiences of Haiti and his problems in getting the FCC type-accepted J-316 manufactured and into the field.

I agreed to help, and got the nearby Tepco Corporation, a 20 year old microwave firm, to build the equipment. I gave up general consulting work, spent 14 months inside the plant during tool-up, and launched a national promotion of FM translators. All the fears of traveling, of long days and nights at far away radio stations came to an end.

For some readers, I should describe an FM translator. At an ideal site, a directional receive antenna intercepts a primary FM station's signal on one FM channel, rebroadcasts it on another.

The signal should be received along a direct path in order to preserve stereo characteristics, with a minimum of 18 to 30 μ V provided to equipment input. It is

signal input; power supply voltage; RF power output; muting; metering of various parameters, including antenna load and power; and sensing/power reduction in the absence of a proper RF load.

An optional internal module may be used for local modulation capability. In such applications, a small FM modulated signal substitutes for the primary FM station signal, activated on command, either locally or by remote control.

FM translators are usually powered by 120 VAC, but they may also be powered by low voltage DC, such as from batteries kept in a charged state by solar or wind energy. Conventional systems faithfully process the primary signal, with all main and sub-channel informa-

The first boxes were made by Keith Anderson of Black Hawk, SD, and they were TV translators, not FM.

preamplified, made to beat with a first oscillator voltage to produce a heterodyne signal of 10.7 MHz in a process called "down-conversion."

Successive IF stages, with shaped bandpass characteristics, further amplify the converted signal, which is then mixed with a second oscillator voltage, having a difference frequency to produce a heterodyne signal on a different FM channel, in an "up-conversion" process. The still minute signal is then amplified in RF stages to levels of 1 or 10 W.

Elaborate technology

While the concept is simple, the technology is not. Solid state semiconductors and integrated circuits do the work of control and regulation to automatically compensate for variations of

tion, to produce a replica of the primary signal.

FM translators cannot receive and transmit on the same channel. That would create positive feedback, with an effect similar to what happens when an auditorium PA system's volume is turned too high. FM boosters, however, use common input/out frequencies. But that's a subject for another issue.

I will be writing much about the most important aspect of FM translators, receive and transmit antennas. Suffice to say now, that while the early translators used mostly horizontally-polarized arrays for transmit, today's best systems use circular, or dual polarized radiation for superior penetration.

FM translators deserve the same careful design considerations as any other station. In light of what surely will be new rules addressing class contour protection of other services, the designer must be careful to focus maximum permissible radiation upon the community to be served, with a minimum toward other communities served by stations entitled to their signal contour protection.

Cards on the table

I am frequently asked which FM translator is best. The only fair answer I can offer is facts about each, based on my years of field experience and close relationships with the manufacturers. Let me put it this way—both TTC and Jones equipment are thoroughly reliable.

In proper environmental conditions, they give years of trouble-free service. TTC equipment runs about 30% higher cost, rack mounts, is somewhat larger in size, uses dual meters, and has an attractive appearance. Shipping runs about six weeks after receipt of an order. TTC manufacturers many other broadcast products, so technical support can sometimes be sluggish.

Tepco-made Jones equipment is less expensive, smaller, rack mounting, single meter and functional but plain in appearance. Delivery runs two to three

(continued on page 39)

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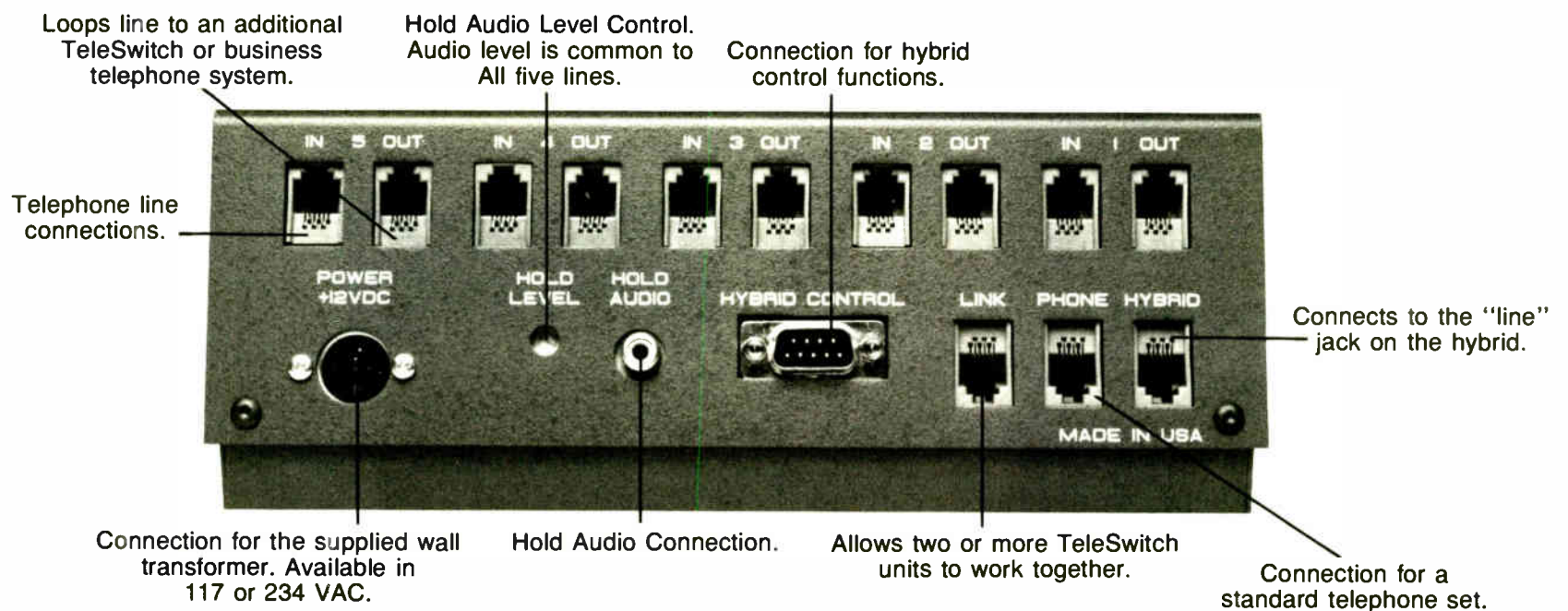
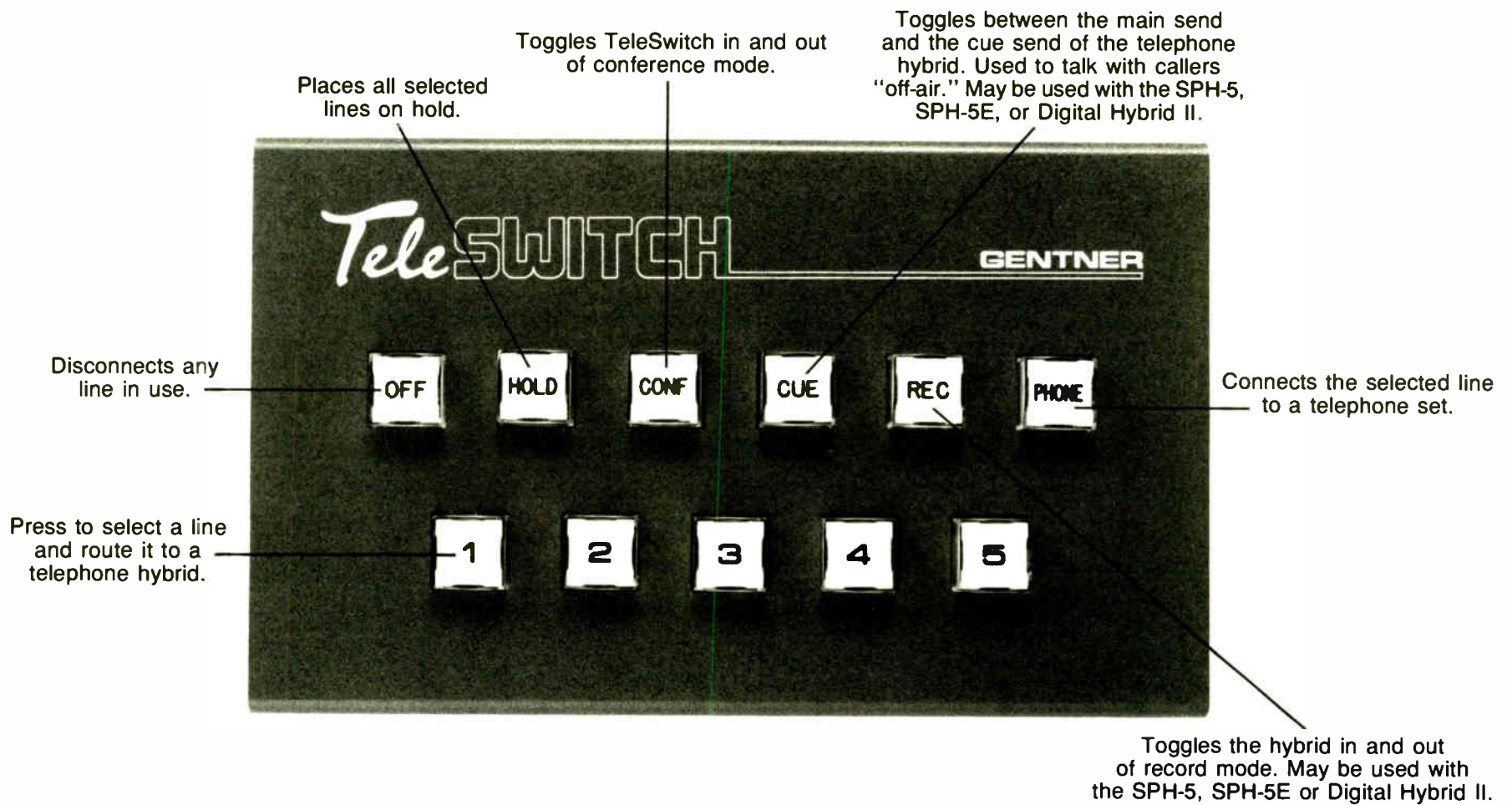
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Facts about Amplifier Feedback

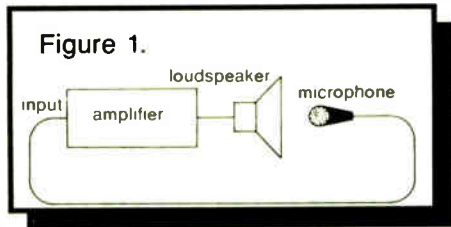
This is the fourth in a 12-part series called Amplifier Fundamentals. Northern Virginia Community College will offer 1.2 CEUs (continuing education units) to registered students who successfully complete the course and an examination mailed at its conclusion.

Successful completion of the course and the final exam will also earn 1.3 professional credits toward recertification under the maintenance of certification provisions of the SBE Certification Program. To register, contact the Director of Continuing Education, Annandale Campus, 8333 Little River Turnpike, Annandale, VA 22003, or call 703-323-3159. The fee for the course is \$35.

by Ed Montgomery

Part IV of XII

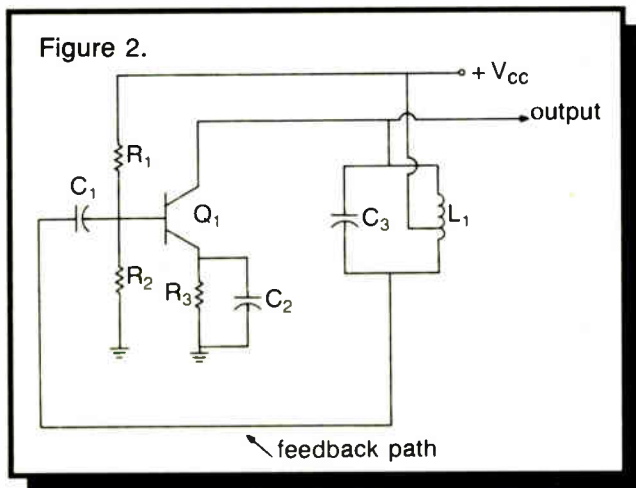
Annandale VA Amplifier stabilization is an important factor in circuit design. As solid state devices took over vacuum tubes, it was discovered that temperature



changes had a great effect on the performance of the amplifier. To improve the operating characteristics of the circuit, "feedback" was introduced.

Feedback is not new to electronics. It has been an important part of the design of vacuum tube amplifiers and has been a factor in electronics from the earliest days.

Figure 1 illustrates a feedback example with which most readers are familiar. If you turn the amplifier on, it will pick up the sounds of the microphone, reproduce them in the loudspeaker, and have them picked up again

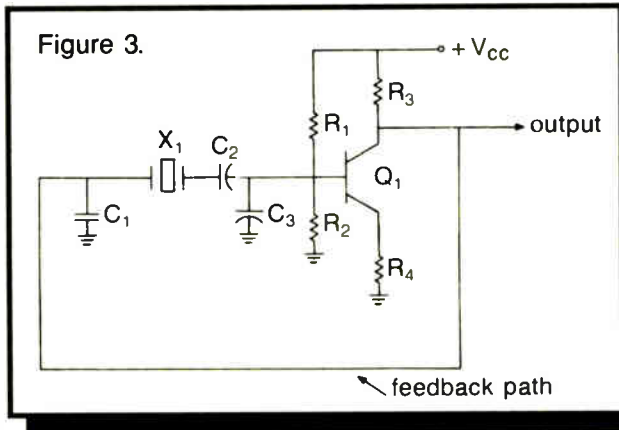


by the microphone and re-amplified. This has been termed "feedback" and that is precisely what it is: in this instance, positive feedback.

The microphone is used to regenerate a previously amplified signal. Amplifiers employing positive feedback have a very special classification. They are identified as oscillators.

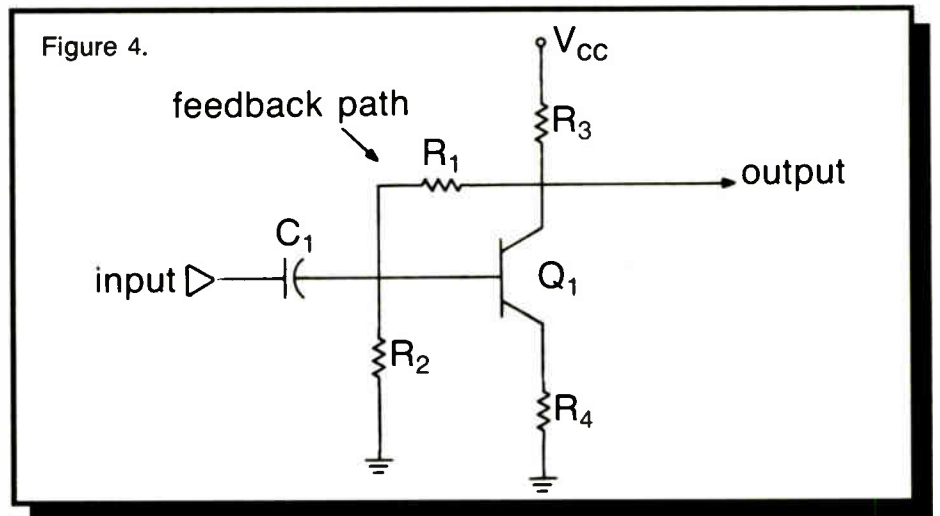
Figure 2 illustrates a Hartley oscillator. The capacitor C_3 in parallel with coil L_1 is a resonant or tuned circuit. This "tank" or tuned circuit will display maximum voltage output at only one frequency and returns a portion of this signal back to the base of Q_1 .

There are various other types of oscillators, usually named after their inventor. All attempt to produce a continuous output at a specified frequency. The stability of the oscillator can be improved



with the use of a quartz crystal.

Quartz exhibits piezo-electric characteristics. When a voltage is applied to it, the quartz will vibrate at a specific frequency determined by the thickness of



distortion, increase the frequency response and change impedance.

Figure 4 is an illustration of a common-emitter amplifier using DC and AC feedback. The DC feedback stabilized the

the crystal.

Figure 3 illustrates a crystal controlled oscillator. Crystal X_1 will oscillate on one specific frequency. Capacitors C_1 and C_3 control the amount of feedback. C_2 is a "trimmer" used to slightly adjust the oscillator frequency. This circuit is essentially a common-emitter amplifier employing positive feedback.

Oscillators are highly specialized amplifiers. In recent years many of their tasks

biasing of the transistor. R_4 is not bypassed with a capacitor in this design and when an input signal is applied, the voltage on R_4 will vary. This will increase the input impedance.

R_1 can be used to employ collector feedback. If the temperature increases, the gain of the transistor will increase. This will result in more current flowing through the transistor, resulting ultimately in thermal runaway destroying the device's junction.

R_1 is connected to the collector; when the collector current starts to increase, collector voltage will drop and R_1 's voltage will also drop reducing the bias voltage.

If Q_1 had to be replaced with a new transistor with different characteristics, R_1 would again stabilize the circuit and help keep the amplifier operating in its originally designated parameters.

Ed Montgomery currently is an electronics teacher in the Fairfax County school system. He has taught broadcast engineering at Northern Virginia Community College and worked as a broadcast engineer for several radio stations. He can be reached at 703-971-6881.

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World Radio History

KRVN: The Farmers' Favorite

by Dee McVicker

Lexington NE KRVN-AM, along with later arrival KRVN-FM, was raised by Nebraska farmers and ranchers in two old farm houses. Joined together, the two farm houses had no insulation to speak of and heat was generated by old-fashioned steam boilers.

These humble beginnings are now history. Recently, the "best farm station in the nation" moved into a new facility. In sharp contrast to the old farm houses, the new 7300 square foot building not only has modern heating, but

that make up the Nebraska Rural Radio Association, an organization that owns commercial Lexington stations KRVN-AM/FM as well as Scottsbluff stations KNEB-AM/FM, this move was a community achievement. Part owners of the

FACILITIES SHOWCASE

stations, these 3000 members are voting participants in what serves as their information source for weather and mar-



The studio complex of KRVN, Lexington, NE

is environmentally efficient, with 4' earthberm construction and heat pumps that use ground water for heating and cooling.

To the 3000 or so farmers and ranchers

ket reports.

Given the importance placed on KRVN-AM by member farmers and ranchers, the director of engineering for the two stations, Vern Killion, didn't take the

move lightly. He made uninterrupted service a top priority. "But," he said, "we didn't waste a lot of time. We did basic planning and then a lot of it was fitting our existing operation in with minimum disturbance."

Sound of silence

The building, erected originally for the Federal Land Bank and Production Credit Association, would easily accommodate the stations' needs, according to Killion's initial assessment. However, there were still concerns with sound-proofing studios as well as wiring the building for radio.

After initial blueprints were drawn up, Killion worked directly with a construction contractor rather than through the architecture firm. Said Killion, "We worked directly with the contractor on a cost-plus basis so we (would) not have to waste the time of going through a month to six weeks of architectural drawing and documentation." Although he doesn't recommend this for every studio project, for some it can save money and time.

Of the changes he would make to the building, sound-proofing was one of the most critical. Double layers of 1/4" plaster board were mounted on mechanical isolators to 2x4 stud walls, along with a coating of sound absorption panels.

The panels, or Conwed Silent Acoustical tile, were hung floating, explained Killion, "and the cavity between the plaster boards was stuffed with fiberglass wool."

In addition, the walled partitions were sealed ceiling to floor, "so there's no direct air path between studios," said

Killion.

Once the building was radio ready, Killion moved in the master control studio, the AM and FM production studios, an FM automation studio, a newsroom and news booth, and what is referred to as the farm production studio. With the exception of consoles and some re-



Air talent Dick Reynolds mans the controls at the station's on-air studio.

orders, most of the equipment that resides in the new facility was brought over from the old farm houses.

Ampex 440 generation reel-to-reel recorders, for instance, were moved to the new building from the old facility, as was a Schafer 900 automation system. Comprised of six tape sources, the Schafer was installed in the FM automation studio for full-time music automation of the station.

Encasing the automation studio is what Killion refers to as the "sound lock." The studios, arranged in a "U" shaped pattern, form the outer glass wall of the sound lock, with the FM automation studio and an FM storage library located in its center.

"The automatic logging equipment for the AM and FM remote controls is located there, too," said Killion, adding that the sound lock effectively isolates these noisy components from the studios.

Adjoining the sound lock's glass door is the master control studio, which airs both the AM and FM sides of KRVN. However, except for weather and news

(continued on page 42)

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Hints for Healthier Hardware

(continued from page 33)

disk, literally gouging out part of the surface, and destroying data.

To combat this, line filters and surge suppressors are used to prevent voltage spikes while uninterruptible power supplies (UPS) to protect the computer from power failures and brownouts are found in many installations.

Additionally, there is just plain old mechanical fatigue. The bearing in your hard drive may die, or one of the memory chips weakened by a surge months before might finally give way.

Therefore, most computer users agree that regularly scheduled backup routines are necessary to ensure a copy of important data will survive even a case of cat-

astrophic computer failure.

If you don't have such a program in place, let me urge you to do it immediately. Yes, computers are much more reliable than in past years. But problems do occur.

...regularly scheduled backup routines are necessary to ensure a copy of important data will survive even a case of catastrophic computer failure.

Like EBS, it may seem like a waste of time, but the first time you are able to recover lost data from a backup, you will be thrilled it was there. A backup program is truly the cheapest insurance policy you'll ever buy.

And your computer *does* have enemies.

Keeping it clean

It is astounding how carelessly many people will treat their computer simply because it turns on day after day without trouble.

Look at Figure 1. It shows the relative sizes of things found in the common computer. Notice how a human hair is as much as 10 times larger than the normal distance between the hard disk and the head. Or how even particles of cigarette smoke on the disk are like driving your car on a road filled with three foot boulders!

Yes, you may have little "boulders" floating around your computer, ready to crash into the head, or gouge out data from the disk itself.

The "clean" rooms of yesteryear are a bit of overkill, but it is safe to say that most computers can benefit from moving the ash tray to another table and cleaning out the dust and such from time to time.

However, there is more that you must do to maintain your computer in peak operating condition.

An indication of clutter of another

kind comes to mind when I recall one traffic manager complaining how her backups were taking several hours each week. This, on a small 10 MB hard drive! Checking matters out, I found that the

traffic program left files behind for every day it was used over the past two years—hundreds of them!

We deleted the useless files and ran a defragmentation program. The backup now took about *five minutes!*

Making the pieces fit

Such dramatic improvement can be made because of the way a disk puts files in the first available space. Over time, as you shrink some files and enlarge others, your disk gets filled with lots of little "pieces" of files.

When the disk is new, for example, files are placed in order: AAABBBCCCCDDEE (each letter representing one sector or unit of disk space). Graphically, we could represent it as indicated in Figure 2A.

Suppose you deleted file "B" and replaced it with one that was longer, then deleting file "E." If you could "see" the files on the disk, they would now be in the order shown in Figure 2B. Notice that "F" is in two places with empty space in between.

Over time, newer files can be split in four, five or more segments, which takes the hard drive head more time to locate, with a greater chance for error as the head moves to each one.

A defragmenter program eliminates wasted space and puts all the program pieces back together again. This speeds

up disk access times as it does so, since the head reads the file in one motion. See Figure 2C.

So, after the defragger utility is run, the files would look like this: AAACCCDFFFF.

Defragging is less important than backing up, but after a computer has been in use for a while, you'll find that it makes a real difference.

Next time out, we'll consider a few of the programs available that will help with backups, defragging, and more.

■ ■ ■

Barry Mishkind is a consultant and contract engineer in Tucson. He can be reached at 602-296-3797, or on FidoNet 1:300/11.

Translator Heritage

(continued from page 34)

weeks after receipt of an order. FM translators are Tepco's principal product, so technical support is excellent and responsive.

Both firms also produce companion multiple output amplifiers that can be driven with 1 W of RF power, used when multiple communities are to be served, or when extra power is needed for dually-polarized antenna arrays.

Next month, I'll discuss sites, antenna hardware and coverage.

■ ■ ■

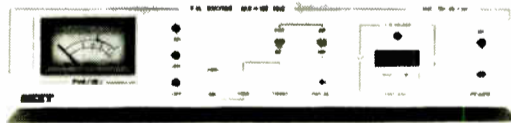
Howard L. Enstrom is a broadcast consultant, and president of FM Technology Associates, Inc., a firm specializing in design and sale of FM translator equipment. He has owned and managed an AM station. He can be reached at 30925 Vista View, Mount Dora, FL 32757. Phone: 904-383-3682; FAX: 904-383-4077.

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

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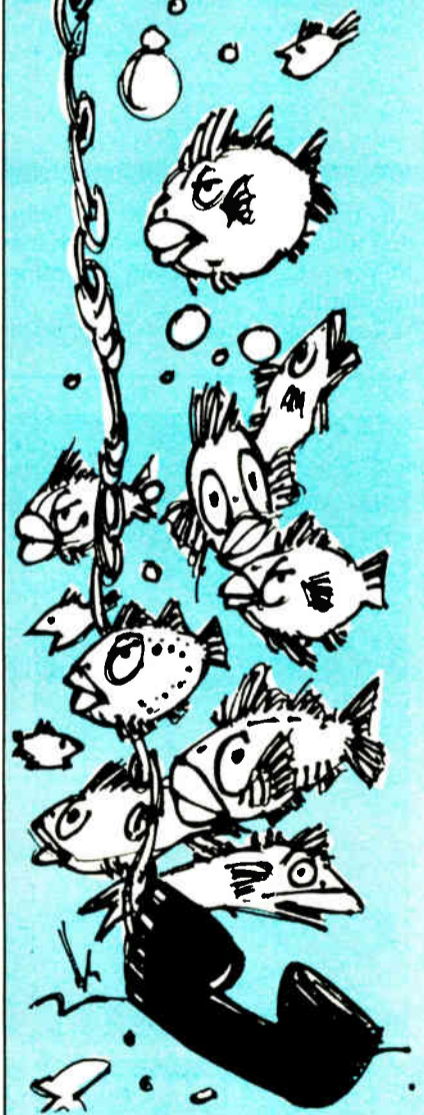
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WORKBENCH

Transmitter Monitor

by John Fischer, CE
KFOU-FM

St. Louis MO Our FM transmitter and studio are separated by about four miles.

We had need of a transmitter status monitor which was independent of the power source at the studio so the DJ on duty would know the status of the transmitter at all times, even during power outages at the studio.

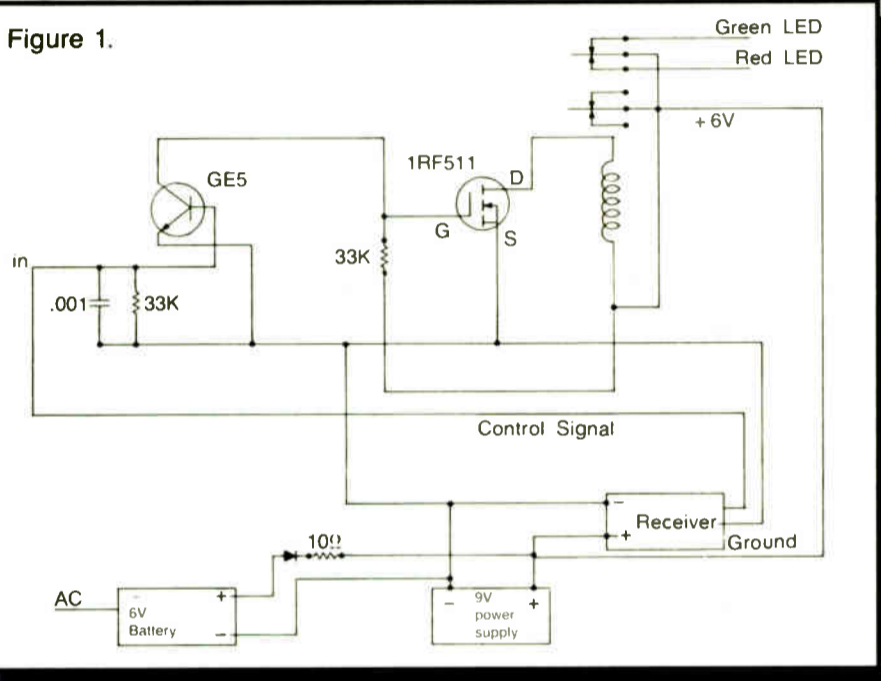
Considerable confusion results during times when studio power fails concern-

easily obtainable and designed a reliable, low-cost status monitor with battery backup for local power outages. A green LED indicates transmitter operating and a red LED indicates carrier Off condition.

We used the following parts:

- Radio Shack catalog #12-716 AM-FM portable receiver
- Magnecraft W67 CSX-1 relay
- GE 5 or other NPN Germanium transistor
- Radio Shack 276-2072 IRF 511 MosFET

Figure 1.

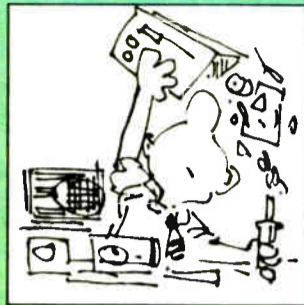


ing the transmitter. This unit also helps during times when the audio chain fails by helping the staff to know the transmitter status.

We used parts that were on hand or

- Radio Shack 23-181A 6 volt 2.5 AH battery
- Radio Shack 9 volt 250 ma. power supply
- 10 ohm, 10 watt resistor

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Share your expertise with your engineering colleagues by getting your tech tips published in *Radio World* and get paid while you help others.

- 2 each 33 K 1/2 watt resistors
- .001 capacitor

Construction is fairly simple. Refer to the diagram. In the portable receiver, locate pin 12 on ICI. There is a positive voltage here of around .7 volts when the station carrier is present and around 0 volts when no carrier is present.

Connect to this point for the control voltage. Mount a phono socket in the receiver to couple the control voltage to the relay circuit as per the schematic. The receiver ground is the reference for the control voltage.

...

John Fischer can be reached at KFOU-FM, 85 Founders Lane, St. Louis MO 63105.

AM Service at Risk

(continued from page 32)

has adopted rules to encourage interference reduction efforts between stations. With the proposed 50 kW power limitation for Class IIIs (Class IVs aren't eligible), the mechanism is in place to enable a station to pay another to go dark and then expand into its former coverage area.

Interestingly, though, the proposed increase in the first-adjacent channel protection ratio from 0 dB to 16 dB stifles this plan. Today, 0.5 mV/m contours of first adjacent stations are not permitted to overlap. Under the proposed rules, overlap of 0.5 mV/m and 0.079 mV/m contours is prohibited. Since many first-adjacent 0.5 mV/m contours are close today, there will instantly be massive amounts of 0.5 mV/m and 0.079

mV/m overlap.

We've looked at a lot of stations that might be able to take advantage of the interference reduction rules. With the present 0 dB ratio, it's practical. Increase the protection ratio to 16 dB, and the number of stations you would have to take off to comply with the new interference standards becomes prohibitive. It's first-adjacent gridlock.

The 16 dB ratio, by the way, comes from the Angell study, which shouldn't be used as the sole basis for establishing an interference ratio. Moreover, interference between stations is not AM's biggest problem.

Words to live by

There is hope for AM—even in a digital world. The band has some desirable propagation characteristics that can't be matched by DAB, either terrestrial or satellite. But we need rules that are pro-service, not anti-interference. What can we do?

Don't tighten interference standards. Interference between stations will take care of itself as stations leave the air.

Increase the power limit of Class III stations to 50 kW.

Permit stations to improve service by receiving interference in newly expanded coverage areas if no interference is caused to other stations.

Any station going off the air now gets a preference for digital audio broadcasting, if such a preference is given to stations in the future. This will keep stations from hanging on just to see how DAB plays out.

If this plan is adopted, I claim a "pioneer's preference" for Travelers' Information Stations in the expanded band. Next month, we'll take a look at the rules proposed for that territory, and see why WOW won't be racing to move to 1650 kHz.

...

Steve Crowley is a registered professional engineer with the consulting firm of du Treil, Lundin & Rackley, Inc., 1019 19th Street NW, Third Floor, Washington, DC, 20036. He can be reached at 202-223-6700, or by FAX at 202-466-2042.



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Setting Your Sights On Better Planning

Visualize Your Goal and Then Act Accordingly

by John M. Cummuta

Downers Grove IL Chicago's an interesting town. Over the years it has lost its position as the number two population center, and some of the industries that called Chicago home have gone the way of the dinosaur. But, being the vibrant, work-ethic engine that it is, the city just won't give up striving to be number one at as many things as possible.

ENGINEERING MANAGER

Thus was born the Sears Tower: the world's tallest building. But the decision to build the highest structure on earth was just the initial cell in a very complex organism, eventually resulting in the architectural monument at the south end of Chicago's downtown business center.

What does this have to do with engineering management? Well, while you probably won't be building any 100-plus story structures, you continually face projects, large and small, that require a methodical, planned approach, to result in success. Building that successful project outcome is much like building a building. So, let's start at the beginning.

The vision

Before any investors would consider buying into the idea of this huge office building, before any blueprints were drawn up, before the first bag of concrete was ordered, someone had to have a vision. The vision was simply a relatively clear picture of the desired result.

In the case of the Sears Tower, that result was a big building. In your case it might be a new studio, a directional array that's in spec, or a desired SNR.

Whatever it is, you have to start with a clear definition of where you're trying to go.

From this "vision" stage, the planning process is one of funneling your way down from the generalities to the specifics. I call it moving from the macro picture to the micro picture. This may sound simple and obvious, but I've seen many professionals who tried to build the big picture by first concentrating on specific sub-elements and then on stringing them together.

What they ended up with was a bunch of parts that wouldn't fit together. So, you have to build your plan, by working downward from the overview.

The strategic view

The first step in moving from the macro picture to the micro picture is that of developing your strategy. It may sound silly, but whether you're building a completely new studio or just replacing a cart machine, you will either consciously or unconsciously create a strategy.

Your strategic view does not deal with

details. It's more of a *what* approach to the task rather than a *how* mentality. And while strategy speaks of the major moves in a project, in broadstroke terms it also deals with the *why* questions. Not just, "Why are we doing this task?", but also, "Why do we do this step first, this step second, and so on?"

Now that we have our vision, our what and our why elements in place, it's time to look at the *how*. That brings us to the Tactical View.

The tactical view

Where strategy deals with the big picture, tactics involves the implementation of strategic goals on the local scene. A military strategy might involve capturing an entire island, but the individual tactics would deal with securing a specific beach, bridge or hill.

More than that, the tactics would include *how* we will capture the beach, where the strategy simply said *that* we will capture it. In the case of broadcast engineering, tactics would include the

...whether you're building a completely new studio or just replacing a cart machine, you will either consciously or unconsciously create a strategy.

specific job assignments and the step-by-step instructions that go with them.

While taking the time to plan all this out in advance for a small project might seem inefficient, the larger the task the more necessary these steps become. I've met more than one person in my life who was unemployed because of trying to ad-lib through a complex project.

The logistical view

In almost every project situation, you'll be dealing with management and/or bean counters. At some point in the preparation process, you're going to have to stop painting "blue sky" pictures in your communications to these people and start talking dollars, cents and other resources.

A contractor can have the best blueprints and the finest tradesmen, but if the bricks and mortar don't arrive on the job at the right time nothing gets accomplished. And if the funding and ordering of those bricks and that mortar aren't planned and executed ahead of time, you can count on their being late.

Logistical planning involves *all* the components of a successful outcome. It is a resource analysis and planning process, which includes everything from the necessary physical space to do what you're planning, to having the materials, equipment and people to put it all together.

Whatever you do, don't skip lightly over the importance and potential cost of that last element. People are the best

(continued on page 42)

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KRVN Touches the Heartland

(continued from page 38)

bulletins that operators interrupt FM automation for, the master control studio's primary function is to broadcast AM programming.

Said Killion, "If we need anything live (for FM) we do it from the FM production studio." Whereas sporting events are typically aired from the FM production studio, weather alerts for the FM are typically broadcast from master control.

Master control hardware

For the master control studio, Killion purchased a new Broadcast Electronics Mix Trak 90 console. Surrounding the Mix Trak, in solid oak furniture made by a local cabinet-maker, are two new Broadcast Electronics Dura Trak 90 cart machines, as well as four Ampex 440 reel-to-reel recorders and two Technics SP-15 turntables imported from the old facility.

Presiding over the 2-track studios are Arrakis 2000-C consoles, one each for the AM and the FM production studios. Along with the equipment brought over from the old facility for these studios, including Ampex 440 generation reel-to-reel machines, ITC cart machines and Technics turntables, Killion installed Nakamichi CD players.

"We're going into CD very slowly," related Killion, stating that although KRVN-AM is primarily a farm news and weather service, country music recordings are dubbed from compact disc to

cart to fill in part of the programming hour.

For the newsroom, the stations also took advantage of current technology. Eight personal computers, including one that resides in master control, are networked for access to UPI, AP and other data services stored on hard drive.

Separating farm and agriculture actualities from news, the farm studio is manned by three full-time farm reporters. Likely to be the largest staff of its kind in radio, according to Killion, the farm reporters produce their reports on the studio's RCA console. Although an early generation solid state, Killion elected not to replace the console because "most everything that is done in there is voice only."

Wired for audio

To tie a variety of audio sources together into one common bridge for complex-wide access of feeds, Killion married several distribution amplifiers. "We have a common feed and each studio (operator) bridges across for whatever feed it wants to utilize," he explained. Currently, there are 30 audio sources—including inter-studio feeds and network feeds—available to each studio.

In addition, a dozen telephone feeds are brought in via Comrex frequency extenders that studios can call up for on-air telephone broadcasts. Comrex decoding is available in both the master control studio as well as the FM production

studio.

For wiring, Killion looked at other recently constructed facilities to get ideas. Finally, he settled on 25-pair, unshielded and balanced cable because of its reputation for eliminating crosstalk. He hasn't

regretted the decision, stating that this telephone technique gives the stations the flexibility to expand at any time.

Killion reports that the new facility required over a mile of coax cable, more than 20 miles of wiring and 15,000 connectors.

■ ■ ■

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

Guide to Better Planning

(continued from page 41)

and worst parts of any planning process. They're like the opposite sex in that old saying, "You can't live with them and you can't live without them." Consider your needs and theirs, every step of the way through the planning and execution stages of your project.

You are the general contractor

The general contractor on a building job is the orchestra leader. That's the person who makes sure that the electricians get on the site at the exact moment in the process that their contribution is needed and that their required supplies arrive simultaneously. The general contractor watches the budget, the clock and the quality.

That's you.

If you're managing a department, a station or a business that is planning and executing a project, you have to be the general contractor. It's your responsibility to keep everything in harmony. That does not mean that you need to get in there and do the work yourself, but you do have to know what is being done.

Maybe in your situation you are both the manager and the doer. Be careful if that's true. You can easily fall victim to the "forest for the trees" syndrome, meaning that you're so bogged down in details that you've lost the overall vision. Step back every once in a while and see how it all fits together.

And that's the art of planning. You may never be involved in a project that busts up through a low cloud deck like the Sears Tower, but when you're up against an ambitious engineering project it can seem just as tough.

Plan your work and work your plan. Move from the big picture to the details, don't forget the people and the logistics, and you should have it all work out fine. Yes, there will be unexpected turns in the road, but you'll be able to negotiate them better when everything else is organized and in place ahead of time.

■ ■ ■

John Cummata is president of Advanced Marketing Concepts, Inc., a broadcast management and marketing consulting firm, and a regular RW columnist. He can be reached at 708-969-4400.

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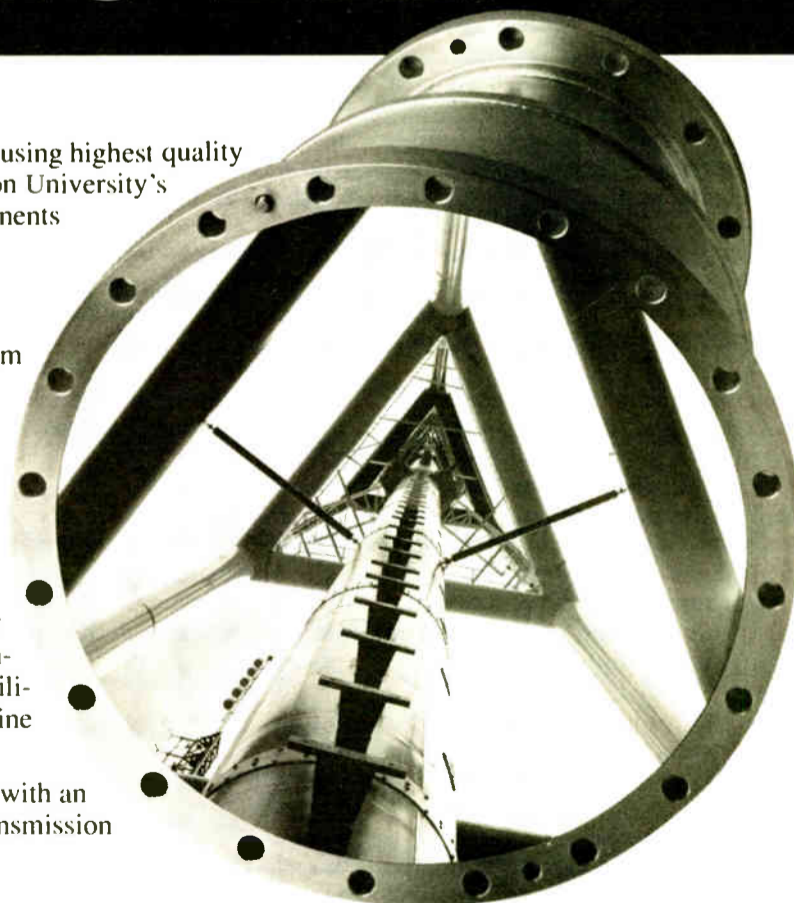
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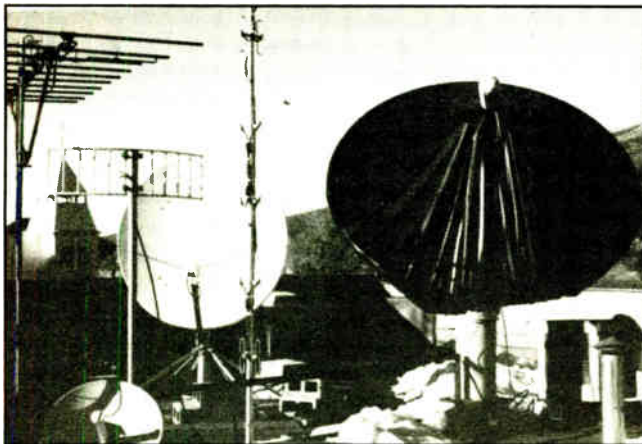
STL, Remote and Telco Equipment

NSN Keeps Watch at KSNO

by Vic Garrett, Ops Mgr
KSNO

Aspen CO Two years ago, we changed KSNO from an "oldies" rock format to a satellite delivered program service. Combined with a new automation system, this low cost format fit a niche not served in our area.

After the system was installed, KSNO engineering established a local "off-premise" control point at an answering and security alarm service company so that we could leave the station unattended on nights and weekends.



NSN's 1.8 m VSAT dish (center), atop KSNO's downtown Aspen studios, connects the station to the network.

This system failed immediately in several areas. Thus, we were somewhat skeptical when we were approached by the National Supervisory Network in late

1989. The company claimed it would link our stations to its Command Center via satellite and run the transmitters and EBS systems around the clock.

NSN further guaranteed full FCC rules compliance for off-premise control, licensed engineers on duty, immediate response to out-of-tolerance conditions and said it would provide all of the satellite equipment necessary for one monthly fee. Despite reservations, we agreed to sign up.

Installation

A few days before installation was to begin, a site survey crew determined where and how to locate the 1.8 meter transmit/receive dish on our roof. Mounting the offset feed dish, completing the aiming process and addressing the system took less than one day.

The following day, NSN sent an engineer who, together with our contract engineer, connected the NSN PC-type computers to the satellite system and our AM and FM remote controls.

KSNO's AM and FM transmitters are at different sites and use different brands of remote controls—the FM uses a Moseley MRC-1600; the AM has a Burk TC-8. In order to become compatible with NSN, we added the CRT option to the Moseley and bought the computer interface for the TC-8.

The National Supervisory Network computers plugged directly into these RS-232 ports, and we were ready for setup.

Our engineer typed in the definitions of all our remote control channels into the NSN SETUP program, as well as analog upper and lower limits, alarms and descriptions of what the Raise and Lower commands did for each transmitter site. This information was then uplinked via satellite to the National Supervisory Network Command Center.

Next, our engineer installed the Emergency Broadcast System interface. This required a quick tie-in to our air chain audio, EBS decoder, encoder and receiver, off-air audio monitor, and a telephone line that provides a back-up audio link for EBS functions.

NSN service

After six months, I have been very impressed by the quality of service we receive from the staff of NSN. The company reacts instantly to technical problems day and night and has been able to restart our transmitters after a power fluctuation faster than I have been able to get into the control room—even though I have been in the station!

NSN changes the power on our AM

transmitter reliably and even notified the FAA when our tower lights were out one night due to a malfunction in the automatic light switch. All of our technical data—including EBS activity—is logged

Once, I sent them a suggestion for an improvement in the software. They made the change, compiled the program and sent it via satellite directly to our computers. They telephoned when the transmission was complete, I pushed one button on the keyboard and we had our new feature!

NSN's Trend Analysis Graphs have provided us with long-term plots of our technical performance that have let our engineer solve problems that appeared "intermittent" until tracked over time and correlated with other parameters. NSN's services are a lot more than anything I ever expected them to be.

Editor's note: For more information on the National Supervisory Network, contact Bill Sepmeier at 1-800-345-8728, FAX: 303-949-4364, or circle Reader Service 56.

USER REPORT

every 30 minutes, or more often in the event of alarms. I receive weekly summaries of all logs, ready for me to sign and place in our station log.

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BUYERS GUIDE INDEX

National Supervisory Network Monitoring Service by Vic Garrett, KSNO	43
QEI CAT/Link STL System by Dick Byrd, WZGC	44
Graham-Patten Systems VAMP by Bill Ruck, KFOG	47
Gentner PeopleLink Phone System by Tom Knauss and Kent Lewin, WLUP	49
Comrex Multiline Frequency Extension System by Brian Kerkan, WMYG	50
Burk ARC-16 Remote Control by Anthony Kord, WWRX	51
Telos 100 Digital Hybrid by Conrad Trautmann, WSYR	52
Sine Systems RFC-1B Remote by Ken Eklund, Demaree Media, Inc.	53
Marti STL System by Craig Kingcaid, The Lincoln Group	54
Hnat Hinds SX-87 Hybrid by Sam Brown, UPI Radio	55
Moseley RPL 4000 by Eric Hoehn, KFMZ	55

Also, a Technology Update from Intraplex, Inc.

WZGC Gives Nod to CAT/Link

by Dick Byrd, CE
WZGC

Atlanta GA In late March of this year, WZGC became the first radio station in Atlanta to use the QEI digital audio device known as CAT/Link. This new digital audio device, along with a T-1 carrier leased from Southern Bell Telephone Company, provides the station's primary studio-to-transmitter link (STL).

I first became aware of digital T-1 carriers during conversations with a fellow engineer who was looking for less costly STL backup audio lines. A few days later, I received a timely call from a Southern

Bell.

Bell's marketing representative was anxious to discuss high speed digital service. The company's proposal showed that a 1.5 megabit-per-second digital link

USER REPORT

called "T-1 Megalink" would cost slightly less than a pair of 15 kHz equalized audio lines.

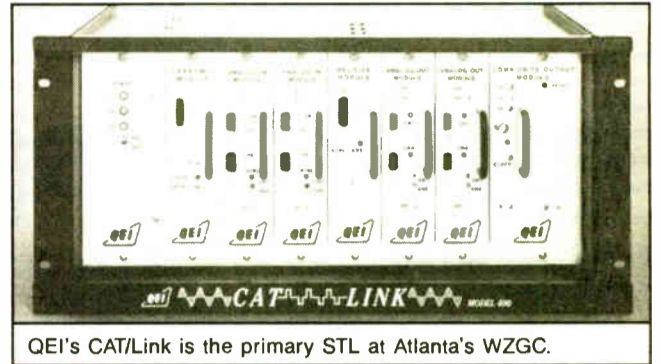
Shortly thereafter, QEI announced that it had perfected an interface that

would allow an FM broadcaster to couple the composite output of a stereo generator to a remote transmitter through the use of digital audio techniques. The carrier could be up to 5000' of #22 ABAM cable, a radio link in the 18 or 23 GHz range, fiber optics cable or telephone company DS-1 (T-1) service.

Trial by fire

WZGC's QEI CAT/Link has been in service for six months, through some of the most searing summer heat that Georgia sunshine can generate and under some of the most extreme RF levels outside of a microwave oven! During that time, I experienced only one outage in late August after an intense thunderstorm

caused damage at the local central office. Explaining T-1 service is beyond the scope of this review (and reviewer), but it should be pointed out that this high speed digital service is the central nervous system that interconnects the telephone central offices. Once into the sys-



QEI's CAT/Link is the primary STL at Atlanta's WZGC.

tem, my circuit has the same priority as the phone company's—and it has the same "self-healing" characteristics.

The circuit was installed as promised six weeks after the order was placed. The only special provision required on my (continued on page 50)

Remote, Telco and STL Growth Rapid

by Alex Zavistovich

Falls Church VA Changes in the technology of remote, STL and telco products are taking place rapidly. As in some other product categories, "digital" continues to be the buzzword of choice and new equipment is routinely springing up to make better use of the advantages of the digital domain.

The promise of new technology for some, however, goes beyond even digital breakthroughs. At least one industry observer prognosticated a radio station of the future where almost everything is computer-controlled, allowing full-time operations to be conducted by skeleton staffs.

Evolving technologies

Jeff Detweiler, QEI's domestic sales manager, said that in the area of STL, many stations are switching from analog to digital. He said his company's CAT/Link allows users to gain some noise improvement while also "squeaking out that last bit of modulation."

However, he also said that it's "tough to make the 905 MHz STL user go with a T-1 telco line which might cost \$40 per

mile, even though there's some sound improvement." For 15 kHz analog phone line users, CAT/Link can save them money when they switch to DS-1, Detweiler noted.

In the realm of telco products, Gary Crowder, national sales manager for Gentner said that telco technology is still in the evolutionary stage. He pointed to 56 kilobyte transmission schemes and Integrated Services Digital Network (ISDN), which allows for transmission of voice or data, as emerging technologies.

INDUSTRY ROUNDUP

These new technologies may be the cutting edge for telco gear. Detweiler commented that "high quality audio on switched circuits" such as these systems provide, will offer the user "flexibility and quality at a fraction of the cost" of current systems. However, he noted such systems are still "several years off."

Crowder also stressed that standard (continued on page 49)

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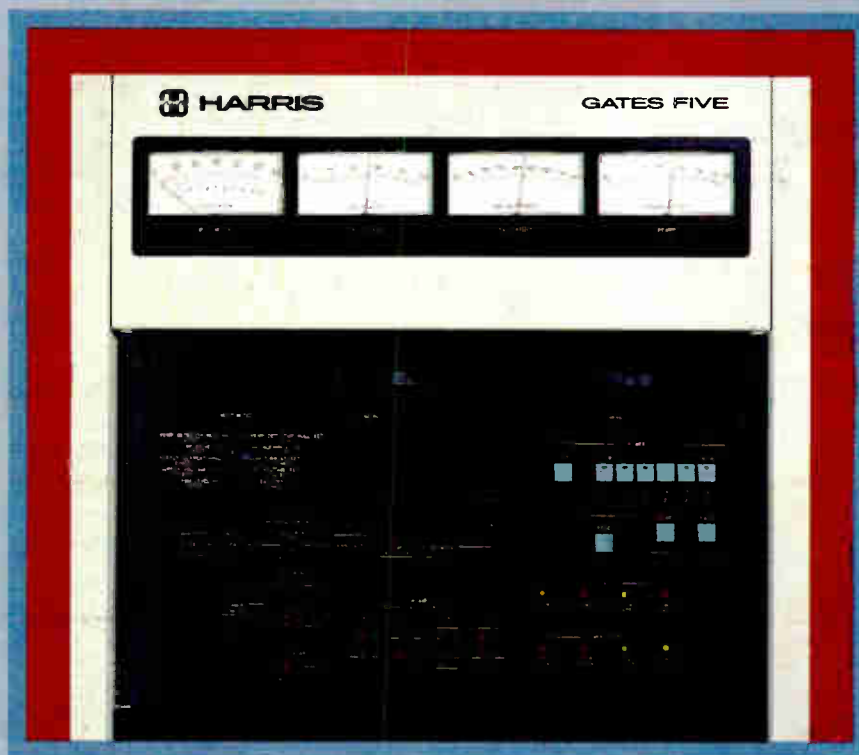
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VAMP Does the Job at KFOG

by Bill Ruck, Eng Mgr
KFOG/KNBR

San Francisco CA When KFOG moved into its new studios we knew that a microwave STL would be a problem because the new studio location was behind a hill from our transmitter at Mt. Sutro. We had a path from our old studios at Ghirardelli Square to Mt. Sutro but it was on an STA "out of band." Many months were spent attempting to make a two-hop STL work on a Part 74 frequency.

Then I learned about the VAMP system from Graham-Patten Systems. GPS was going to make available a system that could be directly connected to any DS-1 transmission system, including microwave or telephone copper or fiber circuits.

At the same time I had been researching true digital 23 GHz microwave systems. Motorola was interested in breaking into the broadcast market with its equipment and the company was most cooperative with our system.

USER REPORT

KFOG now has a two-hop full duplex digital 23 GHz STL. The two audio channels are encoded with a VAMP III encoder at 16 bits/44.1 kHz into a 1.544 MHz DS-1 bitstream at the studio. This feeds one microwave transmitter to a receiver on the roof of the Clay-Jones building, which can see both our studio and transmitter.

From there it is demodulated, regenerated and feeds a second 23 GHz microwave transmitter to a second receiver at our transmitter site at Mt. Sutro. Then the DS-1 bitstream is demodulated into left and right audio channels in the VAMP III decoder.

Our digital STL is about as transparent as short lengths of wire. The system has a greater than 90 dB dynamic range, measures distortion around the residual of our equipment (less than 0.01%), with flat audio response.

Helpful hints

There are a few things that you should keep in mind about this system. First, 23 GHz transmission is definitely "short range." Those of you with 50 mile STL paths cannot use this equipment!

The most significant problem at 23 GHz is heavy rain cells in the path. Large rain drops are resonant at 23 GHz and greatly increase the path loss. When the path loss increases beyond the system fade margin the system fades into noise. Because 23 GHz is now used all throughout the country, microwave manufacturers have a large base of experience to advise you on the suitability of such a system for your area.

Also, the VAMP system uses a standard CD D/A converter IC which also does error correcting. When you have a fade on a digital microwave, the error rate increases. Up to a point the D/A converter is able to correct for errors. (Keep in mind that a CD has dramatically more errors than any microwave.)

When the D/A converter runs out of error correction it mutes. Our experience is that when the path has problems we don't lose audio for any great amount of

time but have tiny "holes" punched into the audio when the D/A converter mutes. They are in the order of 100 mS long, but they are annoying and sound exactly like a bad CD.

Although the total "outage" time for our 23 GHz microwave system is probably in the order of less than a minute, it represents hundreds of very short mutes.

Testing considerations

Very few broadcasters are capable of checking or testing either DS-1 circuits or 23 GHz microwave equipment. If you have a problem with this equipment,

you become blind. The specialized equipment for testing DS-1 circuits is rare outside of the telephone industry, and 23 GHz RP testing equipment is delicate and expensive to rent. Fortunately, we have not had any problems with our system.

If you've aimed a 950 MHz antenna, you know how easy it is to set up a path. At 23 GHz your error is less than a couple of degrees! One or two turns of the azimuth or elevation adjusting nut is all that it takes to go through the peak. If you don't find the highest peak you could easily find a minor sidelobe of the antenna and have much more path loss

than predicted.

In summary, a 23 GHz/VAMP digital microwave may not be the solution for everyone. However, in very congested areas like the San Francisco Bay area there simply may not be a channel in Part 74 to use. With relatively short (5-10 mile) paths 23 GHz is a reliable option, and the audio quality of the Graham-Patten Systems VAMP III system is impeccable.

■ ■ ■

Editor's note: For more information on the VAMP system, contact Tim Prouty at Graham-Patten Systems: 916-273-8412, FAX: 916-273-7458, or circle Reader Service 136.

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PeopleLink Connects with WLUP

by Tom Knauss, DE and Kent Lewin, Studio Eng WLUP

Chicago IL Probably the most asked question about our station has to do with our on-air phone system. Everybody wants to know what we're using and why. That's when we take them into Master Control and show them two 6' equipment racks known as PeopleLink, from Gentner.

USER REPORT

As we begin to explain the basic components of the dual "mainframe" microprocessed system, the next most asked question is usually, "Why do you guys need 40 phone lines in the studio?" And then the answers to a year's worth of research and design questions begin to unfold.

Phones ringing off the hook

Well you see . . . we have four studios that are used for telephone talk shows. During a typical day, the same studio may get used for several different talk

shows, each using different call-in phone numbers.

On other occasions, a certain talk show may be moved to a different studio, possibly due to programming reasons or because of a major studio failure. In those cases, the phone lines must follow the move. Then, of course, there are the times when the AM and FM are simulcast from a particular studio, and then again, sometimes not. All of this makes for a lot of phone line switching.

And let's not forget the level of redundancy that's required in telephone talk programming. A phone system failure usually means "no show," or at the very least one that's been seriously compromised. That's when the "dual mainframe" scheme really comes into action.

At WLUP, each PeopleLink mainframe handles two studios while acting as a back-up for the other mainframe. If one frame fails, it's a simple matter of priorities as to which studios get the working frame.

Speaking of redundancy, each mainframe contains six Gentner DHII hybrids. While the six hybrids can be used independently or in a conference mode, a failed hybrid can be quickly removed from the system with little adverse impact. The

on-air personality in the studio would be unable to detect its absence.

From an operational point of view, each studio has a small control panel called a "control surface." The on-air personality uses the control surface to put phone lines on the air as well as selecting the many PeopleLink features. The digital display on the control surface serves as a timer in addition to a number of other useful functions.

Call screening

Most of our talk show personalities have producers that screen calls for them; not all of them, however, enjoy that luxury. In the past, those personalities would have the added task of answering the phones. Now, however, PeopleLink has a handy feature for managing this type of operation.

At the personality's command, PeopleLink will answer incoming calls, let the caller hear a pre-recorded message and then put the call on hold. While on hold, the caller hears the program in progress. Each time the personality presses the control surface's NEXT button, the next caller is put on the air. The calls are automatically taken in the order received.

PeopleLink has many other helpful features and call management systems that can assist the on-air personality or the producer. The sound quality of PeopleLink, however, has been the most satisfying aspect of the system. It has the pleasant sound of older analog hybrids, yet it seems to achieve the deep "nulls" found in the more recent digital technology.



WLUP's phone line switching has been simplified by PeopleLink, from Gentner.

We're pretty happy with our Gentner PeopleLink. It's been on the air since mid July and so far, not even a glitch.

Editor's note: WLUP-AM/FM Chicago has just completed new facilities which include four on-air studios, two producer rooms, two multitrack production studios, a voiceover studio, three edit suites and a large master control area. Contact Tom Knauss or Kent Lewin at 312-440-5270.

For more information on the PeopleLink, contact Gary Crowder at Gentner: 801-975-7200, FAX: 801-977-0087, or circle Reader Service 104.

Fast Growth in Industry

(continued from page 44)

dial-up telephone lines are still popular items. "Frequency extension and hybrid systems are still main product lines for Gentner," he commented.

Confusion and cost-cutting

Steve Hnat, president and owner of Hnat Hinds, however, believes that frequency extenders and similar equipment may taper off as demand items because of the expense of long distance phone charges and remotes in general.

Hnat sees the telco market in a state of confusion, where the real trend seems to be cost savings. "AMs don't have the cash flow" for high-end phone systems, he said.

This has led to what Hnat sees as "a diversified number of offshore phone system manufacturers" producing "non-standard devices that have to be 'black-boxed'" to make them work.

The sluggish economy also has put manufacturers of some higher-end items "between a rock and a hard place," Hnat maintained. While these companies need to sell expensive systems to offset the costs of being in business, to do so they must capitalize primarily on major markets—a narrow niche.

In another area, remote control is becoming increasingly popular among engineers, because it limits the number of transmitter visits they have to make to keep the station within FCC guidelines.

And with a service such as National Supervisory Network's satellite control of transmitter facilities from a central point, the computer may become the cornerstone of transmitter control.

Gentner's Crowder predicted a time when a PC-based system could integrate all station operations—transmitter remote control as well as billing and other related functions. He pointed out that Gentner's VRC-2000 already interfaces with a PC or clone, as does equipment from Moseley and other manufacturers.

Noting that program services are already available from outside sources, Crowder postulated a station run by only one or two people, with all tasks routed through a central computer system.

Admittedly, this is an unsettling vision of the future, but one which has clear advantages for small market stations. And it's one that may not be all too distant.

"Technology is changing faster than people can keep up," Crowder said.



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WMYG Relies on Comrex Gear

by Brian Kerkan, CE
WMYG

Pittsburgh PA WMYG was planning remote broadcasts from Toronto, Ontario. At our station's weekly promotion meeting, I was given the task of broadcasting three days from the CN Tower, the Skydome and if that weren't enough, add in a Toronto subway station.

I then began the task of putting together the various options we had available. The first option was a 7.5 kHz audio channel on satellite.

cost to deliver the audio to the uplink from three separate sites. After calling Canada Bell and inquiring about the cost and availability of 8 kHz loops, it became obvious that there had to be a more cost effective way.

Being familiar with Comrex frequency extension and the recently introduced Multiline Frequency Extender, I called Lynn Distler at Comrex and she was able to provide me with a demo of the Comrex 3XP Encoder and 3XR Decoder.

The units provide a frequency response of 50 Hz to 8 kHz over three standard telephone lines, which equals satellite quality. And with a call to Canada Bell to order lines for each location, we were road-ready.

The 3XP Encoder was small, portable and accepted a +4 dBm 600 ohm input. The 3XP works by distributing the audio into three separate bands: high, medium and low. These three bands are then subdivided into six smaller bands, which are sent through a noise

reduction and compressor circuit and then recombined into the three original bands.

Each band then is upshifted or down-

shifted to fall within the 300-3100 Hz telephone passband. The bands then are coupled to each of the three lines. The processing is done in real time, which simplified IFB requirements due to the fact that there was no delay.

USER REPORT

The 3XP has a front panel LED display that shows line status and provides a segment which displays codes for cue purposes. The codes can be sent down line 3 via DTMF tones, briefly dropping response to 5 kHz. The unit also features a built-in autodialer and telephone handset.

Setup was easy. The 3XR 19" rack mountable decoder was installed at the studio. The audio out and talkback connections were made to the console and since the 3XR contains auto answer couplers, hookup to the phone lines was as

simple as 1-2-3.

The 3XR also contains circuitry to enable it to auto equalize each line and a remote control that makes dialing and cueback a cinch. There is also a provision for satellite delay requiring optional plug-in cards.

The 3XP went from the case to the air in under 15 minutes. The encoder has an auto setup button that, when pushed, auto-equalizes all three lines by sending a 3 kHz tone to the 3XR which in turn measures and adjusts the levels accordingly.

From 1800' high atop the CN Tower to the center of the Skydome, to the depths of the Toronto subway, the Comrex gear performed flawlessly. We were so impressed with the quality of audio the Comrex provided that we used it again two weeks later for a broadcast from Atlanta, during a morning show convention.

We have decided to make the Comrex 3 Line Frequency Extender part of our remote gear and we would highly recommend it to anyone.

■ ■ ■

Editor's note: For more information on the Comrex 3 Line Frequency Extender, contact Lynn Distler at Comrex: 508-263-1800, FAX: 508-635-0401, or circle Reader Service 72.



The Comrex multiline system has become a key part of WMYG's remote gear.

After a few calls to some of the uplinks in Toronto it became clear that satellite time even for a single channel was quite expensive, not to mention the additional

CAT/Link Ideal for Z-93

(continued from page 44)
part was a 100' run of conduit on the roof of the Westin-Peachtree Plaza Hotel, where the transmitter is located.

Hooking up a CAT/Link is easy. Composite audio goes in a BNC port on the studio unit and comes out of a BNC port on the box at the transmitter. Both boxes look the same. A four-wire connection is made to the phone company at each end through a required third-party interface provided by QEI.

Where it all goes

In addition to the composite signal, I return Marti receiver audio from the hotel over a 15 kHz path; send cue audio for remote broadcasts over a 10 kHz path from the studio to a subcarrier generator located at the transmitter; send remote control telemetry from the studio unit over a 3 kHz path and return telemetry on another 15 kHz circuit.

QEI offers a variety of configurations to expand the bandwidth. For instance, sac-

rificing a little bit of noise floor will net another couple of channels! Mine is presently configured for optimum noise floor.

WZGC's CAT/Link has held up in extreme heat, under a hostile RF environment and during Georgia's nasty summer lightning storms. The CD-quality digital audio gives us a competitive edge in an age where listeners' demands are becoming increasingly sophisticated.

Additionally, about two dB of overshoot normally encountered in a 950 MHz system is eliminated. While the radio link is still in place as a hot standby, the CAT/Link is the primary STL at Z-93.

■ ■ ■

Editor's note: Dick Byrd has been Chief Engineer at WZGC in Atlanta for six years. He has performed engineering duties at several stations around Metro Atlanta. Dick and his wife, Liz, reside with their three children in Douglasville, GA.

For more information on the CAT/Link, contact Jeff Detweiler at QEI: 609-728-2020, FAX: 609-629-1751, or circle Reader Service 112.

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Burk ARC-16 Allows Easy Remote Control

by Anthony Kord, CE
WWRX

Providence RI "Is it back on yet?" I yelled from the studio roof, icy rain beating against my face. I knew I was pointing it at the transmitter; I knew my numbed finger rested on the power button.

Boy, was I perturbed. The guy in the TV shop said this new hand-held remote control would work with all my electronic entertainment equipment. Apparently that didn't include broadcast transmitters!

USER REPORT

Clearly a more elegant remote control, one not requiring trips to the studio roof in the rain, was in order for WWRX's main and standby sites. The desired unit would have dedicated telemetry link capability as well as dial-up control. It also had to be easily understood by non-technical personnel and competitively priced.

The Burk ARC-16 easily fulfilled these requirements. Upon discovering that one studio unit could control both our main and standby sites, Burk was the obvious choice.

Did you say two sites?

The Burk ARC-16 allows optional control of two transmitter sites from just one studio unit. WWRX utilized this feature for its main and standby locations, conserving money, studio space, and installation time. AM/FM combos could also benefit from this feature.

Transmitter installation of the Burk ARC-16 was surprisingly effortless. All too often remote control installation necessitates tedious relay panel construction. Burk addresses this problem with the IP-8 relay panel, providing 10 ampere contacts and convenient terminal strips. Mounting the IP-8 on rear rack rails made wiring at the WWRX transmitter very accessible.

WWRX chose STL subcarriers to send data to each site, while an SCA on our FM signal provides the return link. As an alternative, we could have chosen to employ phone lines or 450 MHz telemetry return links with the Burk.

Digital Speech Units (DSUs) were installed in each of our transmitter sites, allowing access to all control and status functions from any dial-up telephone. In fact if you'd rather forego a dedicated control link, the DSU can be utilized as the only control of your site.

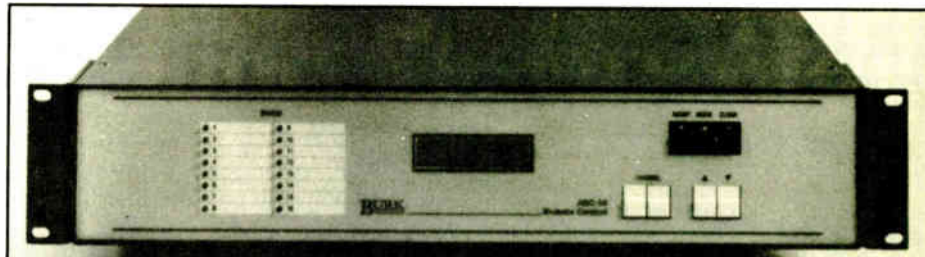
Talk to me, baby

Forget about displays, status lights, and calibration; the first thing we wanted to do was hear this thing talk! The DSU uses the popular Digi-talker chip for clear, intelligible, digitally recorded speech.

After spending weeks chatting with the DSU, time to set up the dedicated telemetry links finally arrived. Although using SCA data returns from two separate sites was somewhat unique, Burk's superior technical staff helped me quickly get my system into operating condition.

Jocks immediately grasped the unit's uncluttered layout: The front panel conveniently displays site, channel number, value and units. This non-technical appearance has the unexpected bonus that, because operators can understand it, they actually take readings once in a while!

Among the many tempting ARC-16 options, such as antenna monitor interface and computer control, I'm particularly eager to try studio I/O, which allows control of studio equipment from the



The Burk ARC-16 allows control of two transmitter sites from one studio unit.

transmitter!

The Burk ARC-16 performs extraordinarily well for WWRX, providing reliable control of two transmitter sites, full status reporting and a digital speech unit to talk to when loneliness strikes.

But I wish Burk had a hand-held remote control for their remote control. After all, having to extricate yourself from a com-

fortable chair, trudge across a room, and strain your arm to the horizontal, just to lower your transmitter's power output is a bit old fashioned, don't you think?

■ ■ ■

Editor's note: For more information on the ARC-16, contact Peter Burk at Burk Technology: 508-433-8877, FAX: 508-433-8981, or circle Reader Service 8.

TAKING IT TO THE STREETS

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

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WSYR Goes with the Telos 100

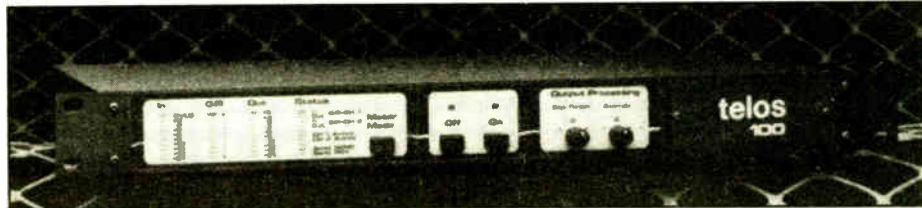
by Conrad Trautmann, CE
WSYR

Syracuse NY When we decided to rebuild our studios at WSYR and WYTY, we had to decide what phone systems to standardize on and how to best accommodate all of the requirements for our news/talk AM. Pacific Recorders & Engineering recommended Telos Systems.

The Telos 100 digital hybrid is what we chose to use throughout the facility. The hybrid can be used as a single line unit. With the Telos 1A2 interface module and external switch console, it can be used as a multiline system.

What really excited us was that Telos and PR&E, in a joint venture, have designed a switch console that fits into

For ease of interfacing, it was decided that a standard 1A2 key system would be installed for the studio area. The Telos



The Telos 100 digital hybrid is used throughout WSYR's news/talk facility.

the PR&E console alongside the fader modules. This puts the phone right in front of the DJ.

1A2 interface module connects to the key system the same as a 10 button set would, with the same type of connector.

The Telos 100 is entirely software driven; you can update yours by changing the memory ICs. Typical sidetone noise is virtually eliminated with a digital high-pass filter. Another filter attenuates the high frequency noise above the telephone frequency range. The null provided by the hybrid between caller and announcer is great.

The 1A2 interface module, used with the switch console, takes the place of having to use a multiline set to select which lines go on the air.

USER REPORT

The switch console has the ability to dial out, with a built-in keypad, and you can put a call on hold the same as a standard key set. The Telos equipment also enables you to lock a call on. By locking the line on (pressing the button twice), you can now take other calls without hanging up the first.

The interface module also provides a port for a single line set to take calls off the air. By picking up the single line set, the hybrid will not be activated and the operator can select the desired line by using the switch console.

We installed a dual hybrid system in the WSYR air studio. The system consists of two hybrids, a single 1A2 interface module and the Telos/PR&E switch console built into the audio mixer.

The switch console has two banks of

switches, which we have configured to duplicate the line appearances on both banks. The first bank corresponds to the first hybrid and the second bank to the second hybrid.

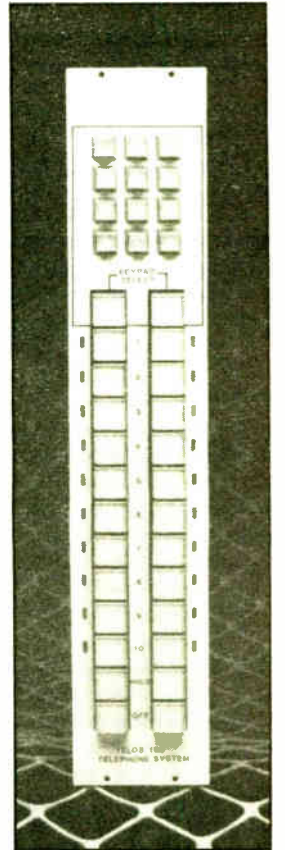
Each bank comes up on its own fader on the board. This allows us to have a guest caller on a private line on the first bank "locked" on so the line cannot be disconnected accidentally.

The second bank is used to take calls on our listener lines. Fader levels can be set up independently of the guest to compensate for different line levels.

At the news reporter desks, we need to record sound off the phone for news stories, which the Telos 100 does beautifully. We use a 10 button multiline set as the switch console.

The only disadvantage I could find with the Telos equipment was that the DJs had a difficult time getting used to the new configuration. Now that we have been using the equipment for a few months, however, this problem has been solved.

The Telos 100 telephone hybrid, the Telos 1A2 interface module and the Telos/PR&E switch console have worked out beautifully in all of our applications. We are extremely pleased with ease of operation and the excellent performance of the Telos Systems equipment.



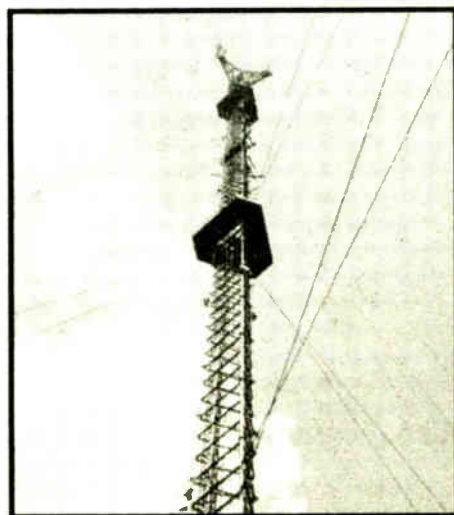
Telos 100's PR&E switch console.

Editor's note: For more information on the Telos telco systems described here, contact Steve Church at Telos Systems: 216-241-7225, FAX: 216-241-4103, or circle Reader Service 140.

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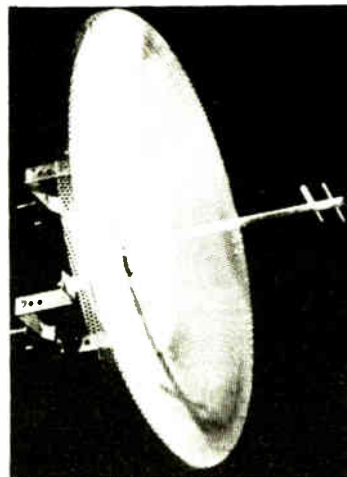


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*Based on STL path requiring two 4' antennas when bought with a complete Marti STL system.

Sine Provides Demaree Control

by Ken Eklund, Corporate CE Demaree Media, Inc.

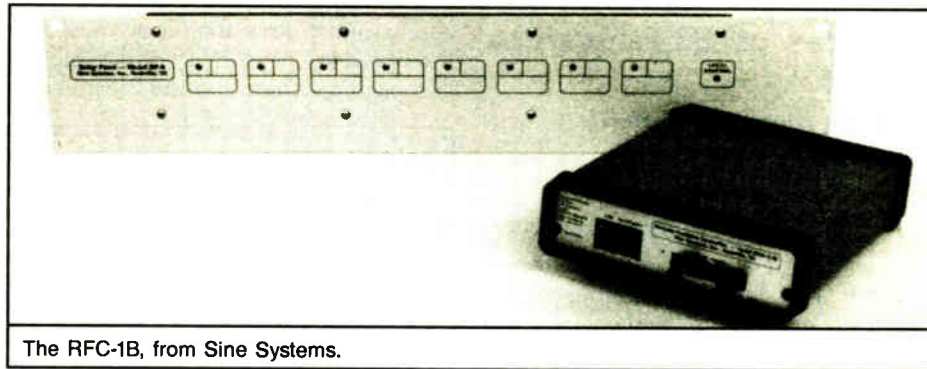
Fayetteville AR The brochure from Sine Systems could not have arrived at a better time. I had been looking for a dial-up remote for a new station we were in the process of acquiring. At that time, Demaree Media owned 12 stations in Arkansas, Missouri and Oklahoma and had no dial-up remote controls.

I wanted to convert all of the stations to dial-up remotes so I could keep better checks on each of our transmitters without having to drive to each location. Although we have engineers for all of our facilities, most are contract engineers; many times I have to go to the stations myself when they are not available.

ever, Mr. Pate assures me that new software will let it store up to nine phone numbers. When that arrives, I will be totally satisfied and will install the units at the rest of our transmitter sites.

If you want a good dial-up remote control at a reasonable price, I would highly recommend the Sine Systems RFC-1B.

Editor's note: For more information on the RFC-1B, contact John Pate at Sine Systems: 615-228-3500, FAX: 615-228-7387, or circle Reader Service 148.



The RFC-1B, from Sine Systems.

USER REPORT

The Sine Systems RFC-1B appeared to be just what I needed. The price was definitely right compared to other models. The brochure said "no frills". That interested me: I have worked some with another brand of dial-up remote control and it seemed to take forever to set it up.

The price was what bothered me the most. How could this piece of equipment work as well as the book said, for less than \$1400?

Money back offer

John Pate at Sine Systems was very excited about his product and willing to work with me on my first system. In fact, he said if I did not like the remote control, he would give me my money back.

Installation of the RFC-1B was simple and straightforward. Too simple, I thought. I figured that since installing it was so easy, I would be there all day trying to set the thing up. Wrong again—it was easy. Easy to install, easy to set up.

The next question, the big one, was how well it would work. It worked great. It did everything I had been told it would do, and it did it well.

Since then, I have purchased four more systems and all are doing fine. They all have names, of course, since anything that talks must have a name. That started when one of the transmitters went off the air, and one of the secretaries answered the telephone. She thought "Joe" was cute.

Reliable performer

In the time since we installed our five systems, I have had a failure only once. That was caused by a lightning strike that also shorted out two of the four rectifier stacks in the transmitter. Since then, I have installed Radio Shack filters on the phone lines and have had no more problems.

Two of our systems are used on cellular phones, because the transmitters are in locations that make installing phone lines not an economical alternative. We use Motorola cellular phones, with Motorola cellular connector model S1688B.

In one case we had a problem with ring voltage being too high for the RFC-1B. A call to Mr. Pate took care of everything—he simply adjusted the ring voltage level in the RFC-1B.

My sole criticism of the RFC-1B is that it will only call one phone number. How-

Telephone Interface Products

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Have you been playing telephone tag trying to solve your telephone interfacing problems? Well, have we got an important message for you. Every telephone interface you could possibly need is available with a single call.

Only Gentner Has A Hybrid For Every Application.

Rapidly growing needs for sophisticated special purpose telephone interfaces have driven our engineers to develop quite a range of products. Here are just a few for you to consider.

If you're looking for an inexpensive, fully automatic 2-way interface for your "listen line," sports line or weather phone, you're looking for our Auto Coupler.

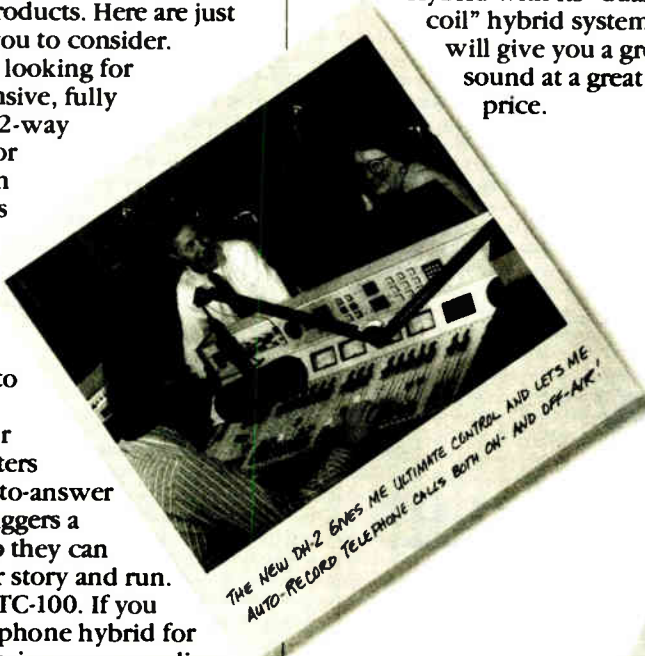
Maybe your field reporters need an auto-answer line that triggers a recorder so they can dump their story and run. That's our TC-100. If you need a telephone hybrid for on-air interviews or recording calls in the production studio and newsroom, you can rely on our SPH-3. It's a full blown hybrid that's been the workhorse of many stations for years.

Gentner telephone interfaces give you the on-air presence you need to dominate your market. That's because they're designed to make callers sound like they're right in the studio with you.

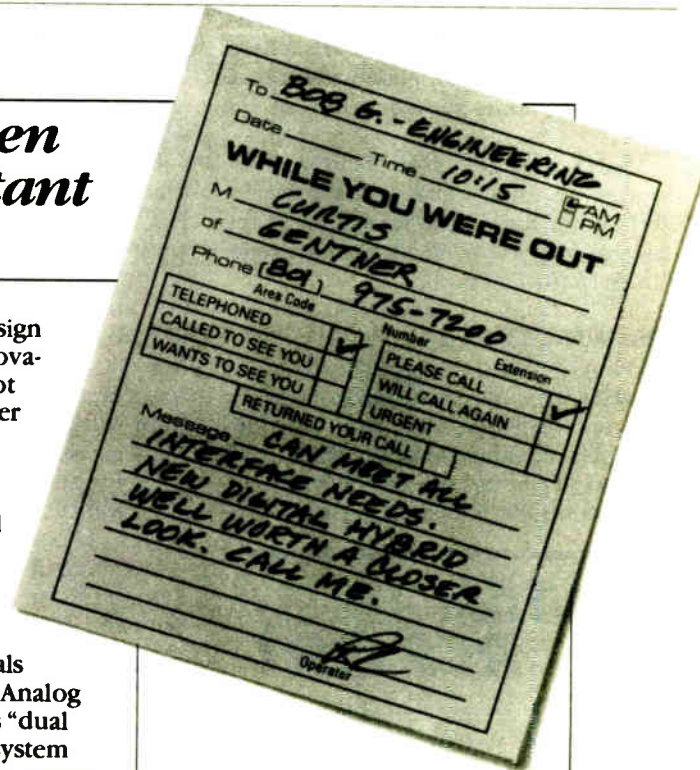
New Solutions To Old Problems.

The latest additions to our growing line of hybrids, the DH-2 and SPH-5, take proven Gentner technology to new heights.

Thanks to some real design and manufacturing innovations, we've packed a lot more features into higher performing packages. With 16 bit processing and 2X oversampling, the DH-2 Digital Hybrid gives you auto-nulling, full digital separation of "send" and "receive" signals and a sound quality that rivals analog. The new SPH-5 Analog Hybrid with its "dual coil" hybrid system will give you a great sound at a great price.

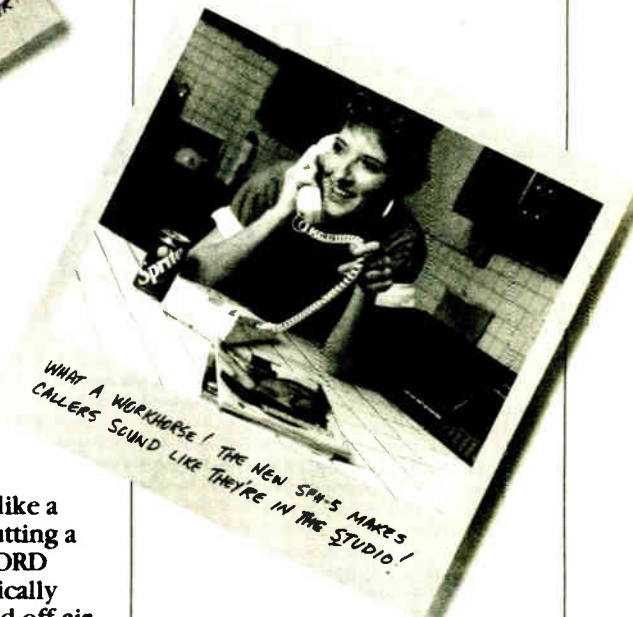


Both the DH-2 and SPH-5 give you a CUE button to toggle send audio between the console and the announcer's mic. This allows your announcer to easily use the hybrid like a speakerphone before putting a caller on-air. And a RECORD button lets you automatically record calls, both on- and off-air, for later playback. Finally, telephone hybrids designed to work the way you work.



Get The Message?

Your single source, for every telephone interface you could possibly need, is Gentner. Give us a call for the name of your authorized dealer. Our operators are standing by. Hello, you're on the air...



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Marti Earns WHAM's Praise

Simple Design Key to Success of STL System

by Craig Kingcaid, Tech Dir
The Lincoln Group, Ltd.

Rochester NY The Lincoln Group, Ltd. owns WVOR-FM 100 and WHAM, a 50 kW non-DA station, in Rochester. Recently we combined facilities under one roof in a mall in the center of the city.

WHAM is a full service format radio station. We access CBS, ABC, NBC and Mutual. With WHAM accessing so many audio channels, we needed to have almost every audio source on line, all the time.

What's more, the move of our facilities, along with engineering and terrestrial interference, forced the relocation of the receive dish to the AM transmitter site. Enter Marti Electronics.

The WHAM setup

WHAM radio now operates what must be the largest transmitter-to-studio link on the East Coast. We return six channels of wideband audio, 20 to 15,000 Hz and 11 channels of narrowband compressed audio, 100 to 7000 Hz.

USER REPORT

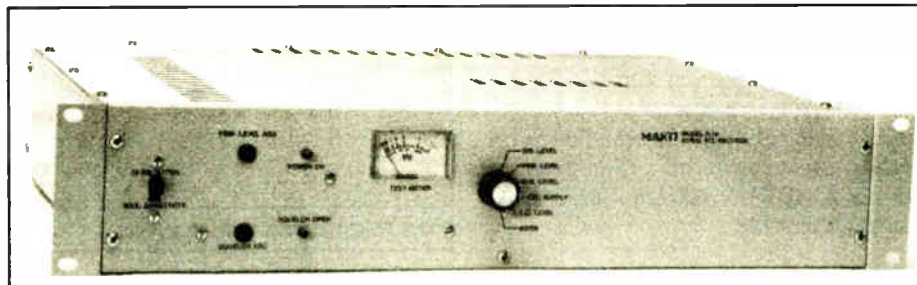
This feat is accomplished by using six Marti STL-10 systems. Four of the systems are licensed under Part 94 of the FCC Rules as a fixed microwave system. Two are licensed under Part 74 of the FCC Rules.

At present, five of the six STL-10 systems are "loaded" with two Marti subcarrier systems operating at 67 kHz and 92 kHz. These subcarrier systems utilize a companding scheme that greatly im-

proves and enhances SNR. In our case this was of great importance due to the "background" terrestrial noise caused by the operation of several cellular, mobile and paging systems around the immedi-

audio input/output RF filtering, multiplier board, power amplifier board, power supply and metering board.

They are all nicely tied together with a color coded wire harness—something



The R-10 receiver from Marti complements the STL-10 transmitter at WHAM.

ate location of our downtown receive site.

The four STL-10 transmitting systems that are operating under Part 94 of the FCC Rules are combined through a Cel-wave combiner, Model TAD900-4 and output from the combiner to a Mark 4' grid antenna. The two STL-10 transmitting systems operating under Part 74 of the FCC Rules are combined through a Marti combiner, an HRC-10 and output from the combiner to still yet another Mark 4' grid antenna.

The technical capabilities of these systems were of a paramount concern. Part of this radio system, the Part 94 system, is operating in a path environment along with the New York State Thruway Authority and The American Telephone and Telegraph Co. Proper system stability from these transmitters were most critical and they have performed extremely well.

Simple layout

When you remove the cover of the STL-10 transmitter you're struck by the simple layout. Each section of the transmitter is resident on its own PC board. A typical unit consists of a modulated oscillator board, audio input board with end user switch selectable preemphasis,

I really appreciate. Trying to troubleshoot a problem with this handful of all black or all white wires, albeit numbered, is not fun.

The Receiver, an R-10, is equal to the transmitter in every respect. Again each section is located on its own PC board

Intraplex Introduces Digital Audio Codec

by J. Peter Eadie, VP Sls/Mktg
Intraplex, Inc.

Littleton MA At Radio 1990 in Boston, Intraplex, Inc. introduced its new compressed digital program audio codec (coder/decoder), the Model PT/PR-150 stereo/dual 15/7.5 kHz digital audio program module.

The PT/PR-150 is a new plug-in module for the coding of 15 kHz and 7.5 kHz program audio for reduced bandwidth transmission over T-1 systems. It can be used with the Intraplex TDM-150 series of T-1 multiplexers, or over terrestrial and satellite fractional T-1 systems using the Model 3800 variable rate multiplexer (VRM).

The new PT/PR-150 codes 15 kHz audio channels or 7.5 kHz audio channels using linear 16-bit coding and provides CD quality performance. The data bandwidths are 64 kb/s for 7.5 kHz and 128 kb/s for 15 kHz. Using a digital signal processing chip containing an algorithm developed by the UK firm Audio Processing Technologies, the digital signal is compressed 4:1 over linear coding without compromising the subjective quality of the audio signal.

A standard bearer

The current digital standard for coding of digital audio signals is a 14-11 bit coding format recommended by CCITT's J.41 specification. Intraplex currently offers and will continue to provide 5, 7.5 and 15 kHz codecs meeting this standard.

To appreciate the savings possible with the new PT/PR-150 codec, consider that the J.41 codec requires 12 64 kb/s time slots to accommodate a 15 kHz stereo pair (there are 24 64 kb/s time slots in a T-1 digital format). The new PT/PR-150 codec requires only four 64 kb/s time slots—a 3:1 reduction in bandwidth over the modest compression provided by the J.41 codec.

In addition to the greatly reduced

and consists of an output RF audio filter board, a first converter board, a second converter board, the IF filter board, IF amplifier and detector board, audio deemphasis and output amplifier board, power supply and metering board.

I and the rest of the engineering staff at WVOR and WHAM really can't say enough good things about the effort that the Marti engineers went to on our behalf. They laid out the rack mounted radio systems for both the transmitters and the receivers to ensure the least crosstalk and intermod. They even took the time to run system response, distortion, noise and crosstalk tests for us.

The system is used daily, almost moment by moment and is working very nicely. So if your station has a situation like mine, talk to the folks at Marti Electronics.

■ ■ ■

Editor's note: Craig V. Kingcaid has been technical director for the Lincoln Group Ltd. for the past five years and in the broadcast profession for 25 years.

For more information on the STL-10, contact Dan Rau at Marti Electronics: 817-645-9163, FAX: 817-641-3869, or circle Reader Service 51.

bandwidth and superior audio performance from the PT/PR-150, the new module provides two channels, operated monaural or stereo. On a half-width plug-in module, it will maintain performance even when system error rates deteriorate to 10 E-5 or lower, and in a new configuration it can be remotely controlled to assign time slots and to enable and disable transmission.

TECHNOLOGY UPDATE

As a result of the reduced transmission bandwidth offered by these new units, a typical satellite analog SCPC link could be replaced with a digital SCPC link employing the PT/PR-150 with a space segment savings of \$3450 per month. This savings is so large that the cost of the substitution digital ground equipment could be recovered in one year and the operation still deliver an overall savings of over \$1600 per month.

Fractional services

The T-1 digital serial data stream is the basic standard rate in North America for digital transmission over both satellite and terrestrial systems. In addition to full T-1 transmission services, most major carriers are now offering "fractional T-1" services, with rates proportional to an integral number of 64 kb/s time slots.

With the reduced bandwidths required with the new PT/PR-150 codec, and with the new reduced transmission rates offered by the carriers, broadcasters can now transmit economically CD quality audio programming anywhere in the nation or the world.

■ ■ ■

Editor's note: For more information on the PT/PR-150, contact Peter Eadie at Intraplex: 508-486-3722, FAX: 508-486-0709, or circle Reader Service 126.

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World Radio History

Hnat Hindes SX-87 Hybrid Does It All

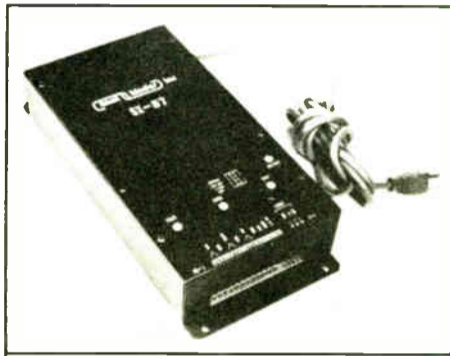
by Sam Brown, CE
UPI Radio

Washington DC Making a phone and a board work happily together can be a challenge. This is where a telephone hybrid comes in. A hybrid is a device that separates the transmit and receive functions of a bidirectional circuit, such as a phone line. There are three primary methods used for this purpose: switching, analog and digital. Hnat Hindes mixes them all in the SX-87.

Does switching turn you on?

Telephone interface by switching is the original and oldest method. The basic concept is that only one direction will be used at a time. Most of the time, it is done with either an IFB (talkback) manual switch or a modified speakerphone.

principle: phase cancellation. By amplifying the line and mixing it with the transmit audio, shifted 180° out of phase, you can theoretically obtain only the received audio with none of the transmitted mixed in. Although this works perfectly in theory, differing partial echo levels, phase and varying noise and impedance on each call



The SX-87, from Hnat Hindes.

make analog hybrids unreliable. Precise null setting is required on each call. For these reasons, some stations have turned to effective but expensive digital hybrids.

Binary bliss, budgetary problem

In the digital system, the hybrid unit sends out a burst of white noise at the

(continued on page 58)

USER REPORT

Switching leaves absolutely no chance of feedback, but does not allow fully natural sounding conversation because no overlap of voices can occur.

Analog hybrids use a very simple prin-

Moseley RPL 4000 A Winner at KFMZ

by Eric Hoehn, CE
KFMZ

Columbia MO It seems that most stations are doing more remote broadcasting; KFMZ is no exception. From revenue-producing broadcasts from clients' stores to promotion of the station to charity events, the live remote is becoming increasingly popular.

Unfortunately, with the spectrum being a fixed commodity, remotes are not as easy to do as they once were. We found that our old VHF equipment just wasn't up to the job anymore.

After deciding that the UHF RPU channels had promise, we started searching for equipment. Having seen the Moseley RPL 4000 system at the SBE convention last year, we decided to purchase one even though the unit was not available immediately.

The system began to impress us as soon as it arrived. The transmitter weighs only 12.5 lbs. and boasts features and performance that make setup and use a simple matter.

Three microphone inputs, one of which can be switched for line level, mean that remotes for our morning show don't require a mixer. For engineering, the transmitter is fully metered and comes equipped for two-frequency operation. The frequency selector automatically sets the deviation as well.

A wideband and a narrowband channel can be used without any more work than flipping the frequency switch. And, since

the carrier frequency is synthesized, changing to any frequency can be done in the shop in a few minutes by setting DIP switches for frequency and deviation.

USER REPORT

Twenty watts of output make simple work of everything we have tried. On battery power the transmitter draws only 5 amps at 13.6 V, so any vehicle can handle a remote . . . simply build a power cable for the cigarette lighter. Moseley even supplied the connector for the transmitter battery power input!

The transmitter has companding built in, but you can add any kind of noise reduction you like because the audio is routed to a rear panel connection. Just switch the front panel "NR" switch to "EXT" . . . it is supplied with a jumper installed, so you can switch off the companding if desired.

Also included is a test oscillator, a 27 Hz oscillator for repeater control, and dual color LEDs for channel selected, deviation selected, AFC locked, radiate, and VSWR higher than 3:1. The front panel also has a headphone jack with a volume control.

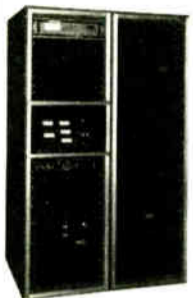
The receiver is also synthesized with DIP switch programming for the two front panel selected frequencies. The deviation is set automatically when the channel is selected, but it can be switched manually

(continued on page 58)

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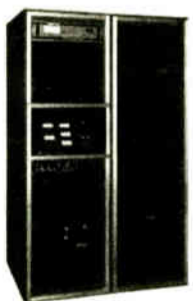
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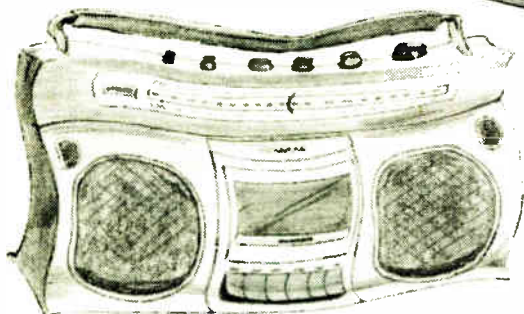
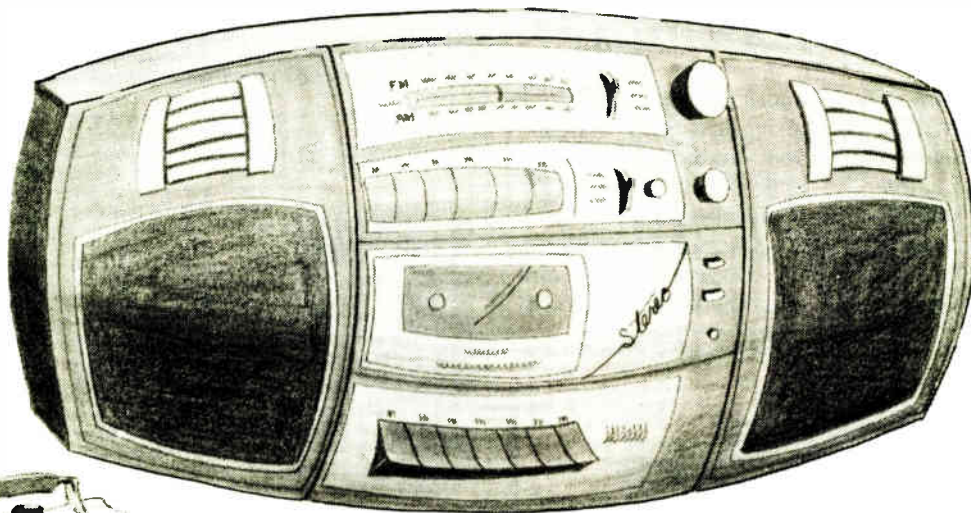
QEI's constant 50 Ohm interstage impedance lets you bypass the IPA or PA in the unlikely event of a problem.

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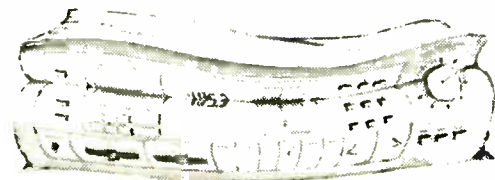
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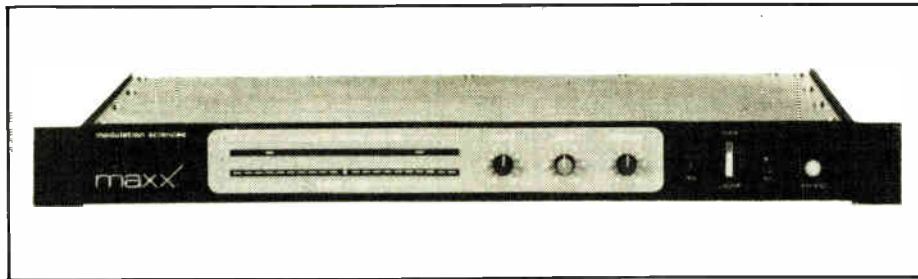


TIRED

***StereoMaxx*, The Spatial Image Enlarger From Modulation Sciences, Gives Your Station An Extra Edge ...Without Extra Problems.**

- ***StereoMaxx* Makes You BIGGER, Not Just Louder.**

StereoMaxx[™] enhances and enlarges your station's stereo image for a dramatically Bigger, Fuller sound. It works with all of today's—and tomorrow's—most popular loudness processors, because its spatial image enlargement impact is fully compatible with—but completely different from—loudness processing. From CHR to Gold to AC, *StereoMaxx* adds punch and excitement to any AM or FM stereo music format. *StereoMaxx* makes your station stand out on every kind of stereo radio from home hi-fi systems to portable boom boxes and soundabouts. And in the car...WOW!



- **Many Tried: *StereoMaxx* Succeeded.**

The idea of making a station stand out by enhancing and widening the stereo image is certainly not new: Over the years, enterprising engineers at competitive stations tried everything from simple matrix schemes to consumer hi-fi ambience gadgets. Unfortunately, their attempts always created unacceptable side-effects—mono incompatibility, increased multipath and “jet-streaming” DJ voices. But the potential benefits of stereo image enlargement were too important to ignore, so Eric Small and the Modulation Sciences engineering team went to work. And we succeeded.

- **There's No Downside Risk With *StereoMaxx*.**

With *StereoMaxx*, you get the ear-grabbing punch and dimensional excitement of stereo image enlargement—with No phase problems, No increase in multipath susceptibility, No problems for mono listeners. In fact, No problems at all. Radio professionals know Modulation Sciences is a company that keeps its promises: Between them, our renowned CP-803 Composite Clipper and our new FM ModMinder™ are keeping well over a thousand stations loud, clean and legal. And our Sidekick is the industry-standard SCA generator. So when we state that *StereoMaxx* enlarges your stereo image without problems or side-effects, you can believe it.

- **Call Now For More Info And A Free Demo Cassette.**

Once your station starts broadcasting with *StereoMaxx*, all the ordinary stations in town will sound...ordinary. You may have seen some of the imitations that have tried to follow in *StereoMaxx*'s successful footsteps. But if you've heard them, you know nothing performs like the original. So call Modulation Sciences for your FREE demo cassette and more details about *StereoMaxx*. Our toll-free number is (800) 826-2603.

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DSP cards for SPARC

Ariel Corporation is making available digital signal processing (DSP) cards and software tools for Sun Microsystems' SPARCstation™1+, SPARCstation IPC and SBus-compatible computers. The S-56 and S-56X coprocessor cards are a pair of single slot SBus boards based on Motorola's DSP56001.

For more information, contact Les Listwa at Ariel: 201-249-2900, FAX: 201-249-2123, or circle Reader Service 24.

Reference listening system

AKG Acoustics has introduced the K 1000 Reference Listening System, a new design using a transducer which creates imaging the company says yields "an acoustically transparent and accurate stereo perspective with extended low frequency response."



The K 1000 features hinged "ear-phones" that are angled away from the ears without touching them. It is connected to the loudspeaker terminals of a power amplifier.

For more information contact David Ogden at AKG: 415-351-3500, FAX: 415-351-0500, or circle Reader Service 31.



Aphex Dominator II

The Aphex Dominator II has enhancements that give it extended application in recording studios, broadcasting and related fields. It is a precision multiband peak limiter that limits the audio in three bands. Dynamic range is 104 dB.

Compared to conventional limiters, the Dominator II will provide at least 3 to 6 dB greater loudness. Two versions are available: Model 720 for most audio operations, and Model 723, for broadcasting, satellite and STL uplink.

For more information, contact Paula Lintz at Aphex: 818-767-2929, FAX: 818-767-2641, or circle Reader Service 66.

Expanded CD production library

Promusic has increased the choice of CDs in its production music library to 250 discs of a variety of styles and applications. Library labels added to the collection include Standard, Sonimage, Hibou and Studio G.

For more information, contact Cheryl Mathauer at Promusic: 305-776-2070, FAX: 305-776-2074, or circle Reader Service 119.

RDS system

The VGE 1078 from VG Electronics performs two functions within an RDS FM service: control of the RDS coder and decoding of the data. It is designed for use with a VT100 or Televideo 925 compatible VDU.

The decoder presents data in three displays: group decoding, debug, and other networks list.

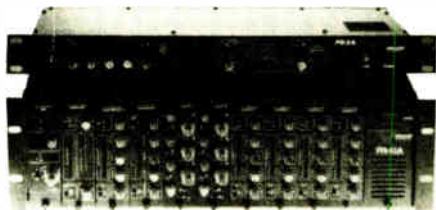
For more information, contact Barry Downing-Waite at VG Electronics in the UK: 44-424-446888, FAX: 44-424-435699, or circle Reader Service 77.

Powered racks

Valley International is delivering the PR-2A and PR-10A powered racks. These units are third generation powered rack enclosures designed to complement the operational flexibility inherent in the company's 800 series modular signal processor units.

The PR-2A accommodates one or two 800 series modules; the PR-10A can handle up to 10 modules. The latter also offers improved RFI and electromagnetic shielding. The PR-10A employs a two-section bipolar power supply with improved heat dissipation.

For more information, contact Jon Bosaw at Valley: 615-370-5901, FAX: 615-370-5907, or circle Reader Service 123.



Stereo performance meter

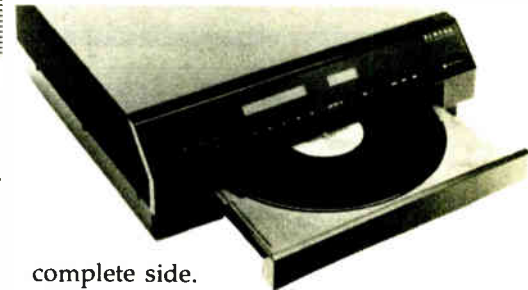
The SPM-1 from FM Systems measures the stereo separation of source program audio content. Stereo mixdown and left/right blending can be measured and set to consistent and repeatable standards.

The stereo separation display is a bargraph calibrated in 1 dB increments. The display may be placed atop VU meters on the console or incorporated into the VU meter display panel.

For more information, contact Frank McClatchie at FM Systems: 714-979-3355, FAX: 714-979-0913, or circle Reader Service 70.

Laser turntable

ELP is delivering its Laser Turntable, which plays ordinary LP records by laser instead of the conventional cartridge and stylus. Main functions include two-speed forward and backward scanning, cueing to cuts, programming and repeat play of up to 15 songs, setting of custom boundaries and display of total, elapsed or remaining time for each cut or the



complete side.

For more information, contact Ken Sanpei at ELP: 408-720-0774, FAX: 408-720-0624, or circle Reader Service 80.

Remote broadcast studios

Tri-Tech's new Cellcast remote broadcast studios combine the functions of an 832 channel cellular telephone with a two-channel or four-channel microphone/headphone mixing console.

For more information, contact Patricia Scanton at Tri-Tech: 918-425-5588, FAX: 918-749-8764, or circle Reader Service 91.



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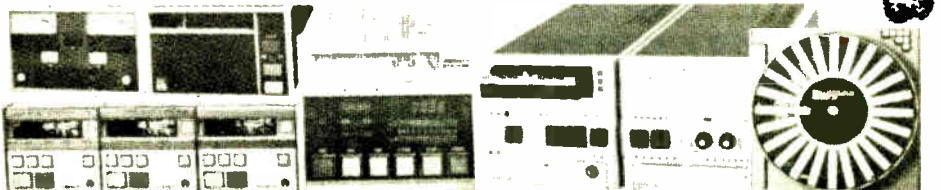
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SX-87 a Hit with UPI

(continued from page 55)
beginning of each call. It measures the line and compensates for phasing and level properties. Transmit audio is then digitized and cancelled in the digitized received material. The quality is excellent but the price will generally be over \$1000, often close to \$2000.

Then came Hnat Hines. The company's approach combines certain aspects of all the other systems in what they refer to as a multiplexed hybrid.

The mode of hybridization is somewhat similar to the time-sharing concept used in computers. A digital circuit on the logic board switches between transmit and receive at 17 kHz. This provides enough resolution on the signal that telephone audio, with a maximum frequency of 3.5 kHz, passes with no apparent degradation or artifacts.

Drawing upon analog technology, Hnat Hines employs a bi-directional amplifier that boosts the incoming side by 14 dB more than the sending line. This narrows the gap inherent in all telephone calls, whereby we transmit at about -10 dB and

receive at roughly -25 dB or -30 dB.

Here at UPI, news comes in from all over the world. We have equalized lines from many places and can often arrange for service from others. But when breaking news happens, the phone is always there. Using the SX-87, we can air live phoned-in material smoothly and easily.

UPI's measured isolation of the receive signal from transmit averages 30 dB, which is exactly as the manufacturer states. We are feeding either program output or live network to the caller and bringing up the phone on a line level input of our board. This in some ways is the true acid test, because we are not using a mix-minus configuration, and are thus subject to feedback if isolation is insufficient.

The SX-87 multiplexed hybrid represents a clever and new use of modern technology by Hnat Hines.

Editor's note: For more information on the SX-87, contact Steve Hnat at Hnat Hines: 203-935-9066, FAX: 203-935-9919, or circle Reader Service 97.

Moseley Gets KFMZ's OK

(continued from page 55)
to wide or narrow, bypassing the internal programming if desired.

The choice of companding or external noise reduction is carried through from the transmitter, as is the dual color LED scheme. The LEDs indicate signal presence and AFC lock, as well as channel selected and bandwidth selected. The squelch and output level can be adjusted with a small screwdriver from the front panel. On the rear are audio and accessory connections.

Performance has been excellent. The audio quality is outstanding even in the narrowband channels. The receiver, based on technology used in Moseley's STLs, is remarkably selective and sensitive—it allows us to set up indoors fairly often, which simplifies everything.

Probably the highest praise we can give the system is that we no longer send an engineer to most remote broadcasts . . . the talent sets up the equipment, and we can count on a good received signal.

The only criticism we have is that the power cord on the transmitter shouldn't be detachable . . . we had worries of misplacing the cord on a distant remote, but we just tie-wrapped the power cord to the back of the transmitter.

The Moseley RPL 4000 system has solved the problems that remote location broadcasts traditionally have given us.

Editor's note: For more information on the RPL 4000, contact Dave Chancey at Moseley: 805-968-9621, FAX: 805-685-9638, or circle Reader Service 142.

ADVERTISER INDEX

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Page No.	Advertiser	Reader Service No.	Page No.	Advertiser	Reader Service No.	Page No.	Advertiser	Reader Service No.
6	Allied Broadcast	19, 78	4	Burk Technology	68	51	Moseley	100
12	Allied Broadcast	12, 82	54	Cartwright Communications	75	42	Myat	33
35	Allied Bdct/Gentner	53, 128	25	CCA Electronics	116	16	Neutrik	85
44	Allied Broadcast	11, 60	47	Comrex	93	50	Northeast Broadcast	67
52	Allied Broadcast	15, 129	33	Continental Electronics	108	13	Otari Corp	49
22	Allied Bulletin Board	-	10	Corporate Computer Systems	13	21	Pacific Recorders & Engineering	69
38	Allied Bdct/Henry	21, 110	18	CRL	34	55	QEI	83
7	Altronic Research	65	36	Dataworld	101	24	Radio Systems	9
7	ATI	118	23	dbx	76	48	Radio Systems	54
20	Audio Bdct Group	43	18	DIC Digital Supply	122	32	Ramko Research	62
25	Audio Visual Assoc.	30	30	Dolby Labs	107	20	Scala Antenna	88
57	Audiopak	144	36	Econco	23	19	Sescom	2
37	Auditronics	73	29	Fidelipac	92	31	Shure	38
36	Barrett Associates	39	53	Gentner	36, 95	57	Sine Systems	89
49	Barrett Associates	117	44	Gorman Redlich	18	12	Sornich Engineering	-
11	Belar	27	9	Hall Electronics	58	14	Studer Revox	125
39	Bext	61	45	Harris	103	46	Studer Revox	131
3	Bradley Broadcast	32	34	Hnat Hines	121	38	SWR	145
1	Broadcast Electronics	7	34	Hnat Hines	96	9	Tascam	25
3	Broadcast Electronics	151	17	ITC	113	16	Titus Technology	59
10	Broadcast Services	124	49	JNS	5	26	Tri-Tech	86
27	Broadcast Services	120	22	Kintronc Labs	152	15	TTC	98
8	Broadcasters General Store	71	28	LPB	26	40	Voyager Mobile	48
43	Bryston	28	16	The Management	114	2	Wheatstone	79
19	BSW	143	52	Marti Electronics	41	59	Wheatstone	111
41	BSW	17	56	Modulation Sciences	47	60	Wheatstone	64
						28	Will-Burt	135

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TELEPHONE/TALK SHOW: The MP-500 multiphone module offers a totally new way of handling telephone talkshow functions. Operation is simple: when the announcer wishes to do a phone segment he simply activates the MP-500 module and all mute, level, combining, and machine control functions are handled automatically. The MP-500 permits conferencing between 3 callers and 3 microphones, and provides separate multitrack tape feeds for various mic/caller signal combinations, permitting simple track punch-ins to replace razor and tape edits. This module eliminates complicated announcer set-ups, miscalls, and feedback problems.

COMMUNICATIONS: The ICM-500 module is part of a completely integrated intercom system; a family of modules available for all Wheatstone broadcast and production consoles. It even includes a rackmount version for your equipment room or remote hook-ups. It allows direct communication between 8 locations in your facility. Your intercom needs are handled by simply plugging in this module set.

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The A-32EX console features modular construction, a fully regulated rackmount power supply, logic follow, full machine control and of course, an all-gold contact interface system. It has two mic channels and fourteen stereo line modules, each with A/B source select and Program/Audition bus assign, plus Cue switches on the line modules. Standard features include Program and Audition VU meters, digital timer, and a monitor module for control room and headphone functions. The console is also available in a smaller version (the A-20) with two mic channels and eight stereo line input modules.

The A-32EX is a perfect choice for stations planning an upgrade in signal quality and control room image. It's also a natural choice for the newsroom. So profit from Wheatstone's experience and reputation—call us today for immediate action!

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