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PO Box 1214, Falls Church VA 22041

August 15, 1987

Volume 11, Number 16

Study Alters Antenna Plans

by Alex Zavistovich

Washington DC ... The anti-skywave AM antenna project sponsored by the NAB is continuing, although one of the two antennas in the project will be modelled on a smaller scale, due in part to a recently published thesis which was critical of its design.

The antenna thesis, prepared in March, was directed at the beleaguered single monopole AM antenna designed by Richard Biby, of Communications Engineering Services, in Arlington, VA.

Biby's design involves a central monopole of 90-135°, encircled by a ring of 10° antennas located 5° from the monopole. To block radiation and prevent lessening of the groundwave signal, Biby's design also suggested a fence or screen ¼ wavelength from the smaller antennas.

The second antenna in the project was designed by Ogden Prestholdt, formerly of A.D. Ring & Associates. Prestholdt's

antenna design is an array comprised of a vertical element intersected by a horizontal element.

Although progress on the Prestholdt side of the NAB project has also been proceeding slowly, Biby's contribution to the study has been beset by various problems for almost a year.

In November 1986, the NAB was refused a waiver of zoning ordinances for the Biby antenna's test site in Loudoun County, a rural area 40 miles west of Washington DC. The decision, made by the Loudoun County Planning Commission, was subsequently overturned by the county's Board of Supervisors.

Earlier, in September 1986, at a sym-

posium of the Institute of Electrical and Electronics Engineers (IEEE), the effectiveness of the Biby monopole was questioned by Professor Richard Adler, of the Naval Postgraduate School, in Monterey, CA.

Adler made a numerical electromagnetic code (NEC) model of Biby's antenna, noting "discrepancies" between the NEC model's performance and Biby's own calculations.

Prestholdt's antenna was also NEC modelled, by Jim Breakall of Lawrence Livermore Labs. Breakall's study showed that design to deviate from Prestholdt's calculations, as well.

But most recently, a second paper

analyzing the performance of Biby's design was submitted by Sarfraz Hussain, a master's degree candidate from Pakistan studying at the US Naval Postgraduate School. The thesis advisor was also Adler.

New thesis also critical

In his thesis, titled "Anti-Skywave AM Broadcast Antenna Design," Hussain, like Adler, studied the Biby antenna by numerical modelling with the NEC code.

Also tested was the ability of different sized radiators to launch the skywave and the groundwave, both for isolated elements and closely-coupled radiators with cancelling phasing.

Hussain maintained that, using NEC modelling, the Biby design showed "overall attenuation of both the skywave and the groundwave." The NEC model also indicated that the antenna, with top-loaded ¼-wavelength ring radiators around the monopole, was "highly sensitive to the drive phase."

The sensitivity, Hussain wrote, "suggests a potential unstable performance" (continued on page 8)

FCC To Review AM Rules

by David Hughes

Washington DC ... As it had promised earlier this year, the FCC has begun a formal review of its AM assignment criteria.

In an open meeting 16 July, the Commissioners voted to begin what the FCC termed a "comprehensive review" of "the technical principles pertaining to AM broadcast assignment criteria and related issues."

The FCC said that with the decline in overall listening of the AM band, coinciding with the rise of FM in the last 20 years, it is prepared to "reassess the policies and technical criteria related to AM station assignments and interference protection that have been applied through the years."

This latest study, a Notice of Inquiry which would result in rule change proposals, originated with the Mass Media Bureau's 1986 report on AM improvement.

That document proposed a major overhaul of the FCC's rules regarding AM, including many technical, legal and policy changes to combat listeners switching to FM.

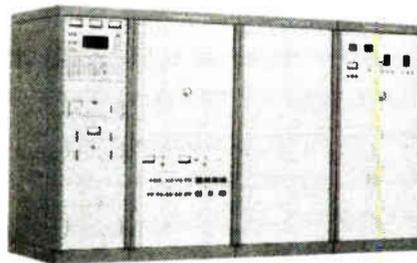
While comment and reply comment deadlines for the latest inquiry had not been set by RW's mid-July press time, FCC Policy and Rules Division Asst. Chief Wilson LaFollette said that with (continued on page 6)

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The Big Buy, see page 7

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Circle Reader Service 47 on Page 28

NTIA Has AM Study

Washington DC ... At press time, the National Telecommunications and Information Administration (NTIA) had just received the long-awaited results to its investigation into the workability of multisystem AM stereo receivers.

On 20 July, the NTIA received a technical study from the Institute for Telecommunications Sciences (ITS), its Boulder, CO-based research and test facility. The study was requested by the NTIA after the agency released in February a report on the status of AM stereo.

In that first report, the NTIA avoided naming a defacto standard for AM stereo, which had been expected by many in the industry. NTIA claimed instead that additional research was required to determine whether multisystem AM stereo chips significantly degraded the performance of the two main competitors—Kahn Communications' ISB and Motorola's C-QUAM systems.

The ITS study, titled "Performance of Single and Multiple System AM Stereo Decoder-Receivers," reportedly includes 30 pages of text, description and methodology, and 150 pages of tables, an NTIA source said. The work also reportedly relied on both laboratory and field tests of equipment.

ITS Executive Officer Val O'Day declined to give any indication of the (continued on page 15)

REGULATORY NEWS

Congress Looks At Trafficking

by David Hughes

Washington DC . . . The tide of deregulation, which former FCC Chairman Mark Fowler championed, may be ebbing, particularly involving two broadcast license issues—trafficking and renewals.

While there is little chance that many of the technical engineering regulations that the FCC has cut in the past seven years will resurface, there is increasing action in Congress to put back some regulations on the non-engineering side.

One hotly debated issue during a series of Senate Commerce Committee's Communications Subcommittee hearings held by Senator Ernest Hollings (D-South Carolina) involves the possible reinstatement of the three-year license trafficking rule.

During the mid-July "Broadcasting Improvement Act" hearings, which involved testimony from current FCC Chairman Dennis Patrick and NAB President Eddie Fritts, as well as a host of other industry officials, Hollings indicated that the Fowler-esque notion of the radio or TV station being equivalent to any other profit-making business may be becoming tarnished on Capitol Hill.

Hollings blamed what he called a "new generation" of broadcasters who care more about the "bottom line on their balance sheet" than serving the public. He said that all too often radio and TV properties are seen as mere investments to be purchased and then sold off, often in a year, at fantastic profits.

The broadcast act he had proposed with Senator Daniel Inouye (D-Hawaii)—dubbed S. 1277—would reinstate the three-year license trafficking rule, which was dumped by the FCC in 1982.

FCC divided

Hollings found the leaders of the FCC divided on the issue. FCC Commissioner James Quello said that he fully

supports reinstating the three-year holding rule for broadcast licensees, while FCC Commissioner Dennis Patrick opposed its reinstatement.

"Eliminating speculative trafficking in broadcasting would help reestablish the public interest standard by recreating the economic incentives for broadcasters to serve their communities," Quello said.

He pointed to data provided by New York's Com Capital Group that indicated that 1600 radio stations were sold in 1985 and 1986. Quello indicated that other data showed that "approximately 29 percent of the radio stations that were resold for significant capital gain in 1985 and 1986 had been owned for less than three years."

Quello said that "continued trafficking in broadcast properties is inconsistent with the public interest . . . Servicing heavy debt burdens and short-run financial objectives impede the provision of issue responsive programming."

Patrick: don't bring it back

However, Patrick said at the hearings there is no need to reinstate the rule. He pointed out that broadcasters, even those interested primarily in the value of their station as an investment, must adequately serve the public in terms of higher ratings in order to command a higher value for their station.

Two equally-powered stations in the same market can sell for drastically different prices because of ratings, transaction records have indicated.

Patrick added that even without the trafficking rule, fewer than 4% of the stations sold in 1985 were held by the party for less than three years.

Before the hearings, the NAB had come out against a similar reinstatement of the trafficking rule that was proposed in the House. "There are no hard data to show that the absence of a rule has

negatively impacted broadcasters' public service offerings," the NAB said in response to H.R. 1187.

License reform

Another hot topic at the hearings was a plan, contained in the broadcasting act, that would require that a broadcaster's overall programming be deemed by the FCC as "meritorious," which is defined as "respond(ing) to the interests and concerns of the local community," according to Hollings' staff.

The bill also proposes the elimination of comparative hearing requirements for license renewals.

The so-called two-step procedure contained in the bill would require (1) that the broadcaster's application be examined, in isolation, by the FCC.

If the Commission deemed that the broadcaster was responsive to the issues of the community, and made no serious violations of the Communications Act, the license would be approved.

If, however, the FCC found the broadcaster deficient, then (2) a hearing would be held to deny the renewal. The license would then be open to other applicants.

Reform needed

While Patrick disputed many of the Senate bill's proposals, he did agree that the current process involving often costly comparative hearings is in need of "serious reform."

The existing renewal system, he indicated, "bear(s) little relation to which applicant will in fact best serve the public. The incumbent, already disciplined by market forces and party to the unavoidable compromises that operating in the real world requires, faces the promises of the challenger unencumbered by anything other than the need to carefully groom and polish its presentation."

"From an evidentiary point of view, the challenger can look to the full record of the incumbent station's operations during the entire license term, while the existing licensee can do little but speculate on the likely performance of its putative replacement," Patrick said.

"This places the decisionmaker in the
(continued on page 15)

FCC Clips

Commission appropriations set

Nearly one quarter billion dollars in funding has been authorized for the FCC through fiscal year 1989, following approval in the Senate of the Federal Communications Commission Act of 1987.

The legislation was introduced by Senator Daniel Inouye, Chairman of the Commerce Committee's subcommittee on communications.

Under the terms of the Act, the FCC will receive \$107,250,000 for fiscal year 1988. For the following fiscal year, \$109,250,000 has been authorized.

The additional \$2 million for 1989 is to cover projects which may be authorized later by Congress.

For more information, contact Emilio Pardo at 202-224-0411.

Minority ownership reports

Minority ownership reports received from broadcast stations after 31 July are considered delinquent, the FCC announced.

The forms, required from stations since 15 May, are to be used by the Commission in an inquiry regarding minority ownership of broadcast stations.

In the FCC report and order on the issue, licensees concerned about confidentiality were permitted to omit their call letters and community of license. Instead, the licensees were to declare the county and state in which they were located, along with certification that a report had been filed.

The Commission stressed that false certification would be a "serious offense."

For additional information, contact Florence Setzer, at 202-653-5940.

Main studio rules remain

The FCC on 17 July declared a limited stay of its main studio rules, temporarily suspending that portion which would require public inspection files to be kept in a station's community of license.

One month earlier, the Commission ruled that TV and radio licensees could locate their main studios anywhere within their principal community contours. Public inspection files would be kept within the community of license.

A number of petitioners, including the NAB, requested a stay of the main studio rules.

The FCC, while not allowing a full stay, did allow a limited stay pending reconsideration of the issue. The stay allows licensees now keeping their files at the AM transmitter main studio or authorized main studio location to continue doing so.

For additional information, contact Eileen Huggard at 202-632-7792.

Radio broadcast station totals

As of 30 June, a total of 10,128 radio broadcast stations were licensed in the US, the FCC announced. Of those stations, 4,887 were AM facilities, 3,969 were FMs, and 1,272 were FM educational.

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NAB's NRSC Filter Kit Plan Off

by Alex Zavistovich

Washington DC ... The NAB has decided to abandon a plan to make 10 kHz stopband filters available at low cost to AM broadcasters who might otherwise be unable to afford to comply with the National Radio Systems Committee (NRSC) standard.

The association changed its mind on the filter issue on 20 July, after learning that the New York-based equipment manufacturer Energy-Onix was planning to sell an NRSC compliant filter circuit board starting in August.

Before learning that other companies planned to market filter circuit boards, the NAB had laid the groundwork for an agreement with Circuit Research Labs (CRL), an Arizona-based processor company. Under the agreement, the NAB would have had CRL filter kits for sale at the Radio '87 convention, in September.

The kits, which would have been sold by CRL for the cost of expenses, were expected to cost broadcasters approximately \$125 apiece.

The attitude at the NAB was, "Why should we do it (sell filters) if somebody else will," explained NAB engineer Mike Rau, an NRSC member.

The 10 kHz filter is one part of the NRSC standard for improved AM broadcasting. Other recommendations in the standard include a 75 μ S preemphasis and corresponding deemphasis.

Rau said the NAB had contacted processor manufacturers, inquiring whether the companies would consider making filters alone, as add-ons to broadcasters' existing processors. Several companies had not responded until very recently, Rau commented.

The delay in hearing from some companies may have prompted NAB's overture to CRL as a stopgap measure.

CRL Engineering Manager Stan Salek said that CRL's side of the agreement would have been to provide a circuit

board, kit of parts, and instructions on assembly and installation of the filter. A section in the instructions would have cited several ways to adjust processors for the 75 μ S preemphasis.

Salek told RW in July that CRL was not "looking to make a profit" on the filters. He had hoped that the cost to stations could be kept below \$100.

Bernard Wise, president of Energy-Onix, acknowledged that the NAB had contacted his company about the possibility of selling the NRSC filter alone.

The firm recently introduced an "AM Protector-Enhancer"—a preemphasis circuit, NRSC filter and monitor deemphasis circuit in a single unit.

Wise decided that the filter circuit board could be sold separately from the larger unit. The board, which would be prechecked and pretested, includes group delay compensation and has all the features and characteristics required of the NRSC filter, he said.

The unit would be compatible with any existing processor, he added. The

output of a station's limiter would be connected to the input of the NRSC filter, which would then go to the transmitter.

The Energy-Onix board, at \$275, is over double the cost originally anticipated by the NAB for selling the CRL filter kits. However, Wise stressed that his company's offering would be a pre-checked filter circuit board, not a kit.

Wise said the NAB had not suggested an agreement with Energy-Onix similar to the one it had been developing with CRL.

For additional information, contact Mike Rau at 202-429-5340 or Bernard Wise at 518-828-1690.

FM Booster Increase Approved

by David Hughes

Washington DC ... The FCC has approved a plan that will allow FM stations to increase the power of their booster facilities.

At a 16 July meeting, the Commissioners voted to allow FM boosters to be increased from their previous 10 W maximum power limit to "20 percent of the maximum permissible ERP for the class of primary station they rebroadcast."

The FCC also amended the rules to permit boosters to be fed "by whatever technical means,"—including microwave or common carrier. In the past, boosters were required to receive the primary station's signal.

The new rules also allow FMers to use aural broadcast auxiliary channels, otherwise known as intercity relay stations, on a secondary, noninterference basis to transmit signals to boosters.

FM boosters are employed in order to eliminate areas of poor coverage within a station's coverage area. Unlike FM translators, which relay the parent station's signal on a different channel, boosters operate on the same frequency as the parent station.

The booster power increase plan, which was unveiled by the FCC in February, came in response to a 1986 re-

quest from Evansville, IN-based Brill Media Company. The firm contended that the previous 10 W booster limit made it difficult to overcome coverage gap problems.

While the new rules will "provide opportunities for more efficient and effective use" of boosters, the FCC stressed that "the fundamental nature and purpose of booster stations will not change."

It maintained that boosters will continue to provide fill-in service, on a secondary basis, to areas within the primary station's contours.

While the FCC removed the 10 W maximum limit for boosters, the rules will continue to prohibit their operations

from extending beyond the 1 mV/m contour.

"The requirements and technical standards will ensure that high-powered boosters will not cause interference to co-channel and adjacent channel stations in excess of that which is currently permissible for full-service stations," the FCC said.

In addition to revamping the FM booster regulations, the Commission also approved the creation of a similar, on-channel booster service for TV.

The FCC contact on the FM booster issue, which is contained in Docket MM 87-13, is Marcia Glauber, 202-632-6302.



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A Little Bit of Dis and (R)DAT

by Judith Gross

Falls Church VA ... Despite the questionable efforts of the recording industry to keep DAT from hitting these shores too quickly, it looks like there will be consumer machines in the stores for the Christmas holiday shopping season.

Expect to see professional models at the shows this fall in prototype ... production models on sale early next year.

Rotary-head-based Digital Audio Tape (R-DAT) is hot on the minds of radio and audio engineers—it's evident—from the healthy turnout at a local joint SBE-AES chapter meet here in July.

Clayton Blick, district sales manager for Sony's professional audio division was swamped with questions about where, what and how soon.

It seems sales of the consumer units, expected to run from \$1200 to \$1400 for starters, will help subsidize the introduction of professional machines to the broadcast industry a few months later.

Sony has already shown its TCC 630 portable Nagra-like recorder in prototype ... Blick says the units will sell for around \$7000.

Unlike the consumer decks, the pro unit will record at the sampling rate of CDs—44.1 kHz—as well as 48 kHz. It can record up to two hours onto metal-particle tape, with helical scan recording and a transport similar to Sony's Beta, U-Matic and 8mm video formats.

Anyway, Blick, or maybe Sony, seems to harbor some interesting opinions about where R-DAT is going ...

He doesn't think the TCC 630 would make a very good cart machine replacement, which is obviously what most radio engineers have in mind.

"You'd need to pre-roll it to cue, because of the servo and lock-up," Blick explained.

He also doesn't think stations would be likely to go for the consumer machines. Really? Take a look at what happened with CD players. For years

there was hardly any hardware for the pro market, but did that stop stations from playing CDs?

In fact, at least one (possibly more) company on the west coast has been importing consumer DAT players from Japan and selling them through ads in audio magazines.

And I know of at least one station whose engineer returned with an R-DAT machine from Montreux and intends to do just what Blick thinks stations won't do—put it on the air.



Blick also doesn't think that with the \$1400 price tag, and pre-recorded cassettes going for around \$12, there will be many 14 year-olds rushing to buy R-DAT machines and heading down to the local record store for the latest copy of *Twisted Sister*. And I'd be willing to bet that's precisely who will be buying!

One marketing hint Blick alluded to: when Sony comes out with a personal portable R-DAT player there's already a natural name for it—DAT-Man ...

☆☆☆

NRSC, yes ... altruism, no ... It was a nice idea the NAB along with the NRSC subgroup had. Offer kits to implement the 10 kHz stopband of the NRSC standard to stations who can't afford whole new processing units.

CRL magnanimously agreed to make the kits available to NAB for under \$100 ... no profit required ... and NAB was going to sell them for stations to assemble themselves for about \$125.

No sooner had RW reported the good news, than the deal was off. Seems a pri-

vate enterprise, Energy-Onix in upstate New York already had plans to market several NRSC products, one of which was a stopband filter card.

The NAB, as we all know, does *not* like to step on the toes of private entrepreneurs, and figured, why duplicate somebody else's efforts? Of course, we'll forget for the time being, that NAB has their own for-profit subsidiary called **NAB Technologies**.

Anyway, stations can now get pre-assembled NRSC filters from Energy-Onix. And while the company is charging about \$275, stations take note that in addition to being already assembled, the cards will be pre-checked and pre-tested.

Oh well, NAB, it *was* a noble idea ... By the way, some 158 AM stations have converted to the NRSC standard already ...

☆☆☆

In the midst of the NABET strike at NBC comes the surprise sale of the NBC Radio Networks to Westwood One. Arthur Kent, president of NABET Local 10 in NYC worries about the sale affecting the jobs and pensions of NABET members there.

But NBC VP/Labor Relations Day Krolik doesn't want to discuss it with the union at all ...

It kinda sounds like a program director's dream. Every listener, no matter what station they tune to, will get *your* station.

That's exactly what happened to one Washington DC FM recently. Seems the station was helping FEMA test emergency broadcast use of the **Blaupunkt ARI system**.

ARI, you may recall, is the traffic system which, if you're listening on a special Blaupunkt radio, will actually interrupt a cassette or other station to tune you to updated road reports.

The interruption feature makes ARI a natural for EBS. Fears are that EBS is being used too much for non-threatening emergencies, plus listeners are immune

to the familiar EBS tests and tones.

Anyway, the station had the ARI equipment at the transmitter, and along came a weekend of violent thunderstorms. The transmitter was down for awhile, and next thing you know, listeners are calling to say no matter what station they tuned to **they can only get the one station**. Too bad it wasn't in the middle of Arbitrons ...

☆☆☆

Olliemania ... It was inevitable that stations would capitalize on the media event of the summer: the **Iran-Contra hearings**.

DC FMer WAVA came up with an "Ollie Kit" in honor of you-know-who which is now—get this—being considered for a spot in the Smithsonian Institution's *Blessings of Liberty* exhibit in September.

The kit consists of an "OllieBurger," a manual paper shredder (scissors), a \$10 traveler's check, a \$3 gift certificate from Parklane Hosiery, and a personal security system (padlock) ...

Meanwhile, the hearings themselves made use of the Automatic Microphone System from **Shure Brothers Inc.** Seems the automatic off-on helped keep down extraneous noise and took the guesswork out of who was speaking next ...

☆☆☆

Where have you gone, Joe D'Angelo? ... In the middle of lots of continuing talk about Harris Broadcast, comes word that long-time manager for Broadcast Product Marketing, Joe D'Angelo has left the company to pursue interests of his own.

For a long time Joe was, among other things, the point man on AM stereo. Most recently he handled the experimental synchronous AM transmission issues, the new DX-10 digital transmitter, and was helping the NRSC in its development of an RF mask. Sorry to see ya go, Joe ...

☆☆☆

Whoops Award of the month goes to the well-meaning PR firm for KOMO-AM in Seattle.

A zealous account executive wanted the world to know, via a press release, that KOMO was the recipient of the RTNDA's prestigious "Edward R. Morrow Award."

We figured that award must be a cross between one honoring the late legendary newscaster Edward R. *Murrow* and one honoring long-time WABC radio DJ and broadcast owner "Cousin Brucie" *Morrow*. Nice try ...

Farewell Old Friend ... It is with genuine sadness that I report the passing of RW's **Old Timer**, Floyd Hall. Floyd was an original ... one of the early pioneers of radio who helped make this the fascinating business it is.

His columns were widely read and liked, and his reminiscences on the early days of radio were a joy to all of us. His cheerful little notes and his off-beat down to earth humor helped make those tough and tedious days a little easier. He will be missed ...

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

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OPINION

Readers' Forum

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

International synchronous

Dear RW:

I have just returned from one of my periodic trips to Europe to read the article in RW of the problems in synchronizing transmitters in this country.

It is hard to understand why a system of sync tones is still used to establish synchronization of two or more AM transmitters when this system was phased out elsewhere in the world many years ago.

I also find hard to understand that the FCC's nominal tolerable frequency difference between groups of synchronized transmitters is 5 Hz, where in practice, anything above 0.05 Hz tolerance is inviting a large "mush" area.

The New Zealand government's broadcasting service has three or four synchronous groups operating within 3 Hz limits and the "mush" area is so large that a third transmitter operating at a second frequency is installed.

Since their groups have only two transmitters it is puzzling to see why they did not start off with two transmitters using the two frequencies.

France no longer operates synchronous groups; this is not because of technical problems but because of the proliferation of privately owned FM stations that have commenced operations in the past few years.

The French government offers synchronous channels for use by private broadcasters but there are few takers.

Italy, Britain, Spain and other countries with government operated stations continue synchronous use with stable crystal drives having stability of two parts in 10^{10} over a 24 hour period, or a month long operation not exceeding 1 Hz.

Better operating conditions are ob-

tained with biweekly visits to remote transmitters taking an atomic standard for reference.

Since the variation is principally due to the crystal aging rate, any drift is usually in the same direction for all crystal drivers under the same precise physical and electrical conditions.

Therefore, drift figures relative only to other transmitters are somewhat better.

Because of the common language, it has been easier for me to evaluate the BBC's services on 692, 809, 881, 1052 and 1214 kHz.

All these transmitters use stable crystal drivers without external synching.

Reference is made to longwave station Droitwich which presently operates on 200 kHz using an atomic drive. All other transmitters are adjusted by visual displays to Droitwich or its synchronized slaves.

Apart from the obvious precautions of maintaining close frequency stability and audio delays, is the problem of nighttime reflected signals creating "mush."

So antenna vertical patterns, frequency of operation and terrain play a large part in stable operations.

Daytime "mush" can be restricted to a small area less than a half mile in diameter and most of the distortion is observed only by listening at one site.

Listening in an automobile in motion, one can pass through a "mush" area in seconds or a minute or so, depending upon the direction of the car compared with the direction of the wave created by two or more transmitters.

Our construction of a group of three synchronous transmitters on the Island of Hawaii has been delayed by my prior FM commitments in Italy but we hope to have commenced installation by 8 July.

This will be the first true synchronous group in the US since more than two transmitters are to be used, all 5 kW and crossovers occur in areas of 1000 to 500 μ V.

Apart from using free running crystal drivers to operate within 0.03 Hz, two sites will use a Paran antenna system which it is hoped will have reduced sky-wave.

One big problem with synchronized groups in Europe that we will not have to combat is "external interference."

That is interference from stations on or near the operating frequency and not included in the group. A large part of our 1 and 2 mV/m areas have no radio service whatsoever at this time.

Alan L. Roycroft, President
Broadcast Services, Inc.
Honolulu, HI

Kudos for NRSC standard

Dear RW:

I just had to let someone know how excited I am about the new NRSC standard for AM improvement.

Our standard pre-emphasis/filter arrived on June 3. Installation and adjustment took place that night after sign off.

There's been an increase in station sales since the FCC's anti-trafficking rules were lifted. Since that time station prices have soared to new highs.

Whether this has hurt or helped stations and the communities they serve is something Congress has been trying to ascertain.

The NAB maintains that there is no hard data to support fears that the elimination of the anti-trafficking rules has led to sellouts that are not in the public's interest.

But there are signs that the absence of such regulation has driven station prices up, and that extra debt servicing costs have reduced capital budgets, resulting in a gradual erosion of the technical plant.

Buyers paying millions for stations may have been forced to hold the line on new equipment purchases, and may have found it necessary to sell out within increasingly shorter periods of time to make a return on their investments.

If such is the case, this could be considered detrimental to maintaining the technical integrity of the station and to serving its community.

The NAB is right when it says there is no "hard data" on negative effects from lifting the anti-trafficking restrictions.

Therefore the FCC should reevaluate the situation and try to collect data. The Commission should look at recent buying activity and see if stations held less than three years have suffered as a result.

Have capital budgets been reduced and equipment purchases been put off? Have stations suffered technically? If the facts show the lack of anti-trafficking regulation has hurt stations, then the FCC should consider reinstating the rules.

Deregulation only works when it carries long as well as short term benefits.

—RW

Hard Data Needed

All went smoothly. KIMM signed on the morning of June 4 with the standard in place.

That morning, at home, I listened to our 5 kW daytimer on every radio in the house and in both cars. (I live about 5 miles from the transmitter.)

We sounded just as good as ever. Maybe a little better. I have been using some audio pre-emphasis for several years. Our program director liked the sound. So far so good.

Now the scary part. While tuning across our signal, a weak but readable station with a C&W format appeared just below us on 1130 kHz.

By golly, it's KBMR in Bismark, ND—about 220 miles airline distance from Rapid City. I've never heard them here before.

We have always taken pride in running a clean transmitter, but there was enough extraneous "trash" 20 kHz away from the carrier at 1150 kHz, to obscure them. Now they're in the clear.

Imagine the potential for interference reduction if every station in the US converts to the NRSC standard! We will all benefit.

Thanks go to everyone involved in developing this standard. I'm impressed.

Gary Peterson, CE
KIMM/KGGG-FM
Rapid City, SD

Reply to K-W call change criticism

Dear RW:

In response to your editorial of June 1, "If It Ain't Broke" you neglected to acknowledge the large amount of call letters that are currently assigned to the maritime service.

With your 17,000 possible combinations, you should see what great call letters are floating around the Mediterranean Sea!

The Commission should loosen its policy towards K and W calls nationwide, the return of three letter calls and

the ability to acquire maritime licensed calls for broadcasters.

We are a business based on creativity, much of it based on our image projected through our call letters.

Mark Heller, President
WTRW-AM
Two Rivers, WI

Applaud AM stereo car radios

Dear RW:

What came first, the chicken or the egg? Or with AM stereo, the broadcaster or the receivers?

If AM broadcasters don't get off their "nests" and offer stereo quickly, receiver manufacturers will stop producing AM stereo radios.

In the meantime, while my fellow broadcasters rush to the phones to order AM stereo equipment, we should go one step further and write letters of thanks to auto manufacturers who pioneered by offering AM stereo radios in their cars and trucks.

Let them know we appreciate all that they are doing. We definitely need their continued support—don't take them for granted.

Now, let's stop bickering about which AM stereo system to install.

Foreign countries have chosen only one system, the retired FCC Chairman pointed to one system, and assuming you are going stereo to be heard by listeners—only one system is found in 100% of radios equipped to receive AM stereo.

WGNS installed C-QUAM in 1984. Sales of new cars and trucks with factory installed AM stereo radios have brought the total to approximately 5,000 in our rural county (Rutherford County, population 97,800).

Let's work *together* now to strengthen and improve the AM broadcast industry.

Bart Walker, President
WGNS
Murfreesboro, TN

Radio World

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AM Rules Set For FCC Review

(continued from page 1)

the wide variety of issues raised in the study he expects a "relatively long" comment period.

He added that the FCC will study the comments it receives and begin issuing a series of rulemaking proposals in 1988.

"There will be a series of NRPMs (Notice of Proposed Rulemakings), all of varying lengths, next year," LaFollette said. "Some of these issues will take more time than others."

Issues examined

In the July Notice of Inquiry, the FCC will examine whether to overhaul the rules which "prescribe the degree of interference protection" for day and night

operations in the AM band, as well as those that "establish the areas of service AM stations are entitled to under their particular circumstances."

Also to be placed under the magnifying glass will be the "standards and procedures used in applying the technical assignment principals."

On a broad level, the Commission will examine how changes in the assignment criteria will affect interference, the creation of new station assignments and the modification of existing assignments.

Among the specifics the FCC has targeted for scrutiny include field strength values of station contours protected from interference, in addition to the levels of interference permitted at these contours.

It will also examine radiated emissions, skywave propagation curves, ground propagation and interference calculation methodologies.

Antenna systems and more

The inquiry, which covers a lot of ground, will also examine the development and identification of antenna systems that, according to the FCC, "could provide greater flexibility to AM stations to overcome difficulties such as antenna site restrictions and skywave interference to other stations."

The Commission pointed out that by redefining protected contours, stations could possibly increase their powers to overcome atmospheric and

man-made noise.

The FCC added that it will also examine the improvement of protection ratios to reduce adjacent channel interference as well as the impact of improved receivers on protection criteria.

Other topics open for examination include greater accuracy in calculating interference between AM assignments to ensure against unintended interference, along with the issue of greater flexibility in choosing the type of antenna system most appropriate for a station's particular circumstances and site.

In addition, the FCC said it would look into ways of applying less rigid technical assignment principles, such as allowing the interfering contours of other stations to extend into the service area of a station where interference already exists.

The Commission said it would also look at removing the restriction that prohibits applications for new or modified assignments that would result in interference being received by an applicant station.

The Commission added it will review the possibility of allowing stations to enter into "private agreements" to resolve interference conflicts. This issue, which was originally unveiled in the 1986 report, will be examined in greater detail, according to LaFollette.

Even though references to AM stereo are missing from the FCC's statement about the inquiry, LaFollette indicated

“...except in 'more remote areas,' the band is filled to capacity.”

that the issue will be up for discussion because it relates to several of the items raised in the study.

AM evolution

The FCC maintained that the AM assignment principles have "evolved over many decades" at which time the band was undergoing "considerable growth." However, except in "more remote areas," the band is filled to capacity.

That maturation of the AM band combined with the rise in popularity of the FM band (with its 5,200 stations), has "dramatically altered the listening habits of the public over the past two decades, generally resulting in significant changes in the economic position of AM stations," the FCC said.

Despite the proposal to improve the overall technical quality of AM, the FCC admitted that many of its proposals involved "trade-offs that are necessary to reach a balance between quality of service and extent of service."

"In view of the congestion in the AM band today, without accepting such trade-offs AM broadcast stations essentially would remain locked-in with the current quality of service because opportunities for improvements would be foreclosed to a large extent," the FCC added.

At RW's press time, the full text on the inquiry, which will describe the study in greater detail, was scheduled to be released in August, LaFollette said.

For more information on the AM improvement issue, which is contained in Docket MM 87-267, contact Wilson LaFollette at 202-632-5414.

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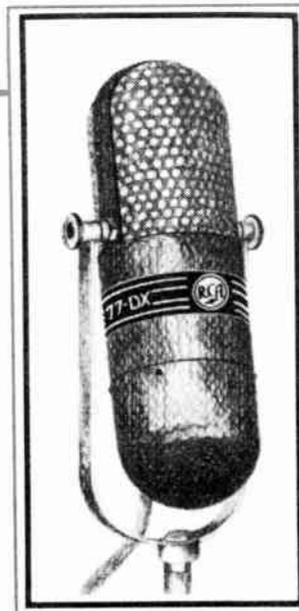
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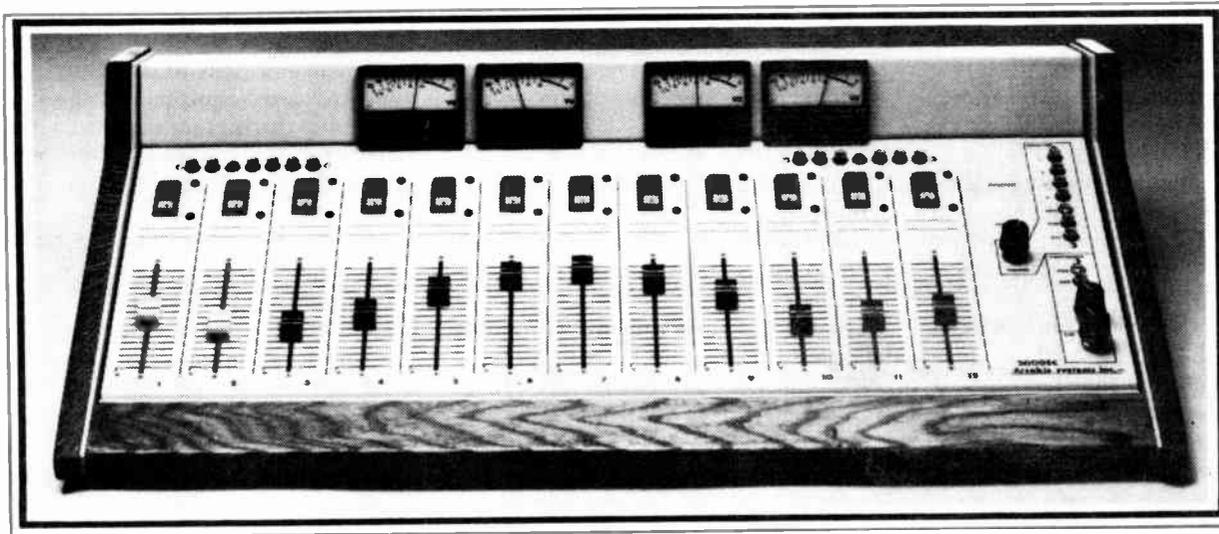
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Westwood Buys NBC Networks

by Alex Zavistovich

Los Angeles CA ... Pending final authorization by their respective executive boards, Los Angeles-based Westwood One may soon dramatically increase its share of radio revenues by purchasing the NBC Radio Networks.

On 20 July, NBC announced that it had entered into a "letter of intent" with Westwood One, the first step in the transaction.

Under the arrangement, Westwood One will purchase the NBC Radio Network, The Source and Talknet. NBC Radio Entertainment, the network's long-form program unit, would also be part of the acquisition.

Not included in the sale, however, are any of NBC's eight owned and operated radio stations, said NBC spokesperson Cathy Lehrfeld.

Lehrfeld stressed that the transaction had not yet been finalized, but expected the deal to be closed by late August.

Before the closing, both companies will conduct board meetings and will "review each other's operations," she said.

Purchase price plus stock options

In the purchase of the radio properties, Westwood One will pay \$50 million to NBC. Additionally, NBC and its parent company, General Electric—which bought NBC in 1985—would have the right to buy up to one million shares of Westwood One stock over the next five years at \$36.40 per share.

The figure reportedly represents a 35%

premium over Westwood One's stock price in mid-July, before the announcement.

Westwood One was founded in 1975 by Norman Pattiz, formerly a sales manager for a Los Angeles television station. At the time, the company developed radio programs, which it also distributed.

In December 1985 Pattiz acquired the Mutual Broadcasting System from Amway. The purchase of Mutual quickly turned Westwood One into an affiliated radio network, and—with 4,000 affiliates—it is the largest such network, in terms of stations.

With the acquisition of the NBC properties, Westwood One will also control between 25 and 30% of the revenue of the radio network industry. Latest reports had listed Westwood One with a 15% share of the market; NBC reportedly had a 13% share.

Despite the additional revenues brought in by the NBC facilities, Westwood One will still fall behind ABC in market revenues. ABC Radio reportedly controls revenues between 35 and 40% of the total market.

Spirits high

At the NBC camp, spirits seemed high about the upcoming transaction. NBC Radio President Randall Bongarten called Westwood's planned acquisition a "strategic network radio alliance."

"We believe this (purchase) will allow us to broaden the exposure of our news product in the radio marketplace," Bongarten commented. He maintained that "both companies will benefit from the ef-

ficiency and flexibility of a combined organization that is totally focused on radio."

What remains unclear is the effect of the change in ownership on NBC's radio employees. Although no one would comment about personnel changes, the tone on both sides was generally upbeat.

Lehrfeld could not comment on the fate of the people currently employed by the NBC radio networks. She pointed out that Westwood One would be operating the facilities, and would have control of personnel changes in the organization.

Still, Lehrfeld said, "The people we

have (at the network) are good. I can't speak for (Pattiz), but they are part of what makes the network what it is."

Pattiz generally concurred. While acknowledging that some jobs may be lost as a result of consolidation of the businesses, he stressed that "Westwood is not going in for a wholesale bloodbath."

"We look forward to working with the excellent people at the NBC Radio Networks," said Pattiz, adding that he expects "they will play important roles in the success of this new enterprise."

For additional information, contact Cathy Lehrfeld at 212-664-2594. Contact Norman Pattiz at 213-204-5000.

No Progress In NBC-NABET Labor Talks

New York NY ... At press time, the negotiating committees of NBC and the National Association of Broadcast Employees and Technicians (NABET) were engaged in several days of meetings, in the hopes of resolving a strike at the network, in effect since 29 June.

The union and the network have been at odds for months over a new master contract. The strike action followed notification by NBC to its NABET employees that the network planned to implement a final contract offer.

In a joint session at the New York Federal Mediation and Conciliation Service offices on 20 July, NABET's negotiating

committee offered a document to the NBC representatives, which the union said "removed 350 items from both sides of the bargaining table."

NABET stressed that if the network wanted to restore any of the items, the union might also restore some of its positions.

NBC said it was "disappointed" by the union's document, which reportedly removed three-quarters of the NBC issues. Further, NBC spokespersons maintained only minor changes would be considered in the network's final offer.

For additional information, contact NABET at 301-657-8420.

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AM Antenna Project Changed

(continued from page 1)

in the proposed design." He also added that "the 10 degree high fence at quarter wave from the origin does not help appreciably in attenuating the ring ground wave without affecting the monopole ground wave."

The conclusions made in Hussain's study caused some ripples when the thesis reached NAB headquarters. Although the project is expected to continue, the association plans to build a smaller-scale model of the Biby design.

According to NAB Director of Spectrum Engineering Mike Rau, the Hussain thesis raised enough questions about the design, such as the effectiveness of the ring radiators, that "building a full-scale antenna might be a mistake."

On the other hand, Rau continued, "it would not be an especially burdensome or expensive thing to build a model."

Rau said the model would operate at a higher frequency—in the range of 3 to 7 MHz, rather than the 1650 kHz originally proposed. The higher frequency would allow the model to be reduced from 200' to approximately 30', keeping its operating characteristics proportionally similar to a full-scale version.

The antenna's designer, Richard Biby, said that the 3 to 7 MHz frequency for the model "seems plausible," but stressed that no final frequency for the model had been chosen.

Biby noted that, before a frequency could be selected, the permissive height for structures in the area must be established. Local ordinances usually include provisions for TV or ham radio antennas, he explained.

The permissive height for such structures would "set the frequency that would be appropriate to be scaled under those constraints," Biby said.

Rau expected the model, which will be constructed by Rockville, MD-based contractor Ed Osborne, to be completed by fall.

Will not affect outcome

Although the changes to the antenna project will require a model of Biby's antenna less than a third the size of the original design, project participants do not believe it will adversely affect the outcome of the study.

On the contrary, Rau indicated, the smaller scale antenna would enable the NAB to "catch any problem the (Hussain) thesis may allude to, before building a full-scale antenna."

Biby added that a scale model would adequately represent the performance of the full-scale antenna, as long as the study of the project considers the "geometries" of the low-profile antenna.

"We can make due well enough modelling the geometries involved, not the actual performance of the overall system," Biby stated.

While Biby was confident that the smaller scale model of his design would not adversely affect the outcome of the antenna project, he questioned whether the NEC modelling had been "used correctly," by Hussain or his advisor Adler.

In his September 1986 presentation to the IEEE, Adler, using NEC modelling, concluded that Biby's antenna indicated lower signal, different impedance and lower current (therefore lower signal

strength), than its designer had calculated.

Breakall's analysis of the Presholdt design also showed that the antenna would have large field strengths at high angles, suggesting possible skywave troubles at night.

Apparently, however, Biby and Adler had met the day before Adler's presentation to the IEEE. At the time, Biby said, both men "immediately agreed" that the antenna design would not work over perfect ground.

Adler had apparently referred to the design as a "poor dirt antenna"—meaning, Biby said, that some antennas need imperfect conductivity of the ground in order to work. Nonetheless, Adler applied the perfect earth NEC analysis to the antenna in his presentation the following day.

Biby could offer no explanation for why Adler chose to continue with NEC modelling after agreeing that the antenna would not work over perfect ground, which Adler actually stated during his IEEE presentation. "The antenna becomes a fallacy if you insist on perfect conductivity," Biby explained.

However, Adler told RW that the NEC analyses run on Biby's antenna were "not a shoot-out of any kind." The computer modelling was used on both the Biby and Prestholdt antennas to refine the NEC code.

Biby's antenna was selected, Adler said, because a great deal of test data would be available from the NAB's project.

"Our intention is to find whether, when the antenna is tested and measured, it shows the good results (Biby) said he would get," Adler said. "If it does, we'll have to sit down and discuss it with him, because it means we're missing something when we build our computer model," he noted.

Still, Adler said, he was confident that, so far, he and Hussain were "doing a pretty good job of representing the mathematics of the antenna."

According to Cap Cities/ABC Director of Engineering Al Resnick, who with Breakall and Adler co-authored the computer modelling study presented at the IEEE, Adler's concentration on the Biby design was not unusual.

Adler, Resnick said, is involved in the verification of NEC models, to predict what will happen in an antenna's performance before it actually happens.

While NEC is a computer model, it does not operate exclusively in cases of perfect ground, Resnick explained. The code can also study the effectiveness of the design of a monopole over lossy earth.

Such a study "gives a hint at what's going to happen" in the operation of the antenna, Resnick said.

Resnick concurred with the NAB's decision to build an operating model of the antenna at a reduced scale. The model would not have to be full size to study its operation, Resnick said, and would be more economical to build.

Despite any problems raised by computer modelling, there is "still a green light on the antenna project," including Biby's design, according to Rau. The NAB was "happy to receive the (Hussain) thesis and to have its input, but we're not sure if the thesis alone is enough," he said.

Beyond citing a fall time frame for construction of the model of Biby's antenna, Rau was unable to provide any additional information on how long the subsequent study may take.

The Prestholdt antenna project is also reportedly continuing, with the NAB concluding an agreement with the Laurel, MD-based firm of Kidde Consultants for a survey of the Beltsville, MD project site.

A building permit must also be obtained and a lease signed with Howard University, which owns the Beltsville property. At press time, the NAB had not entered a contract with a builder for the Prestholdt tower.

For additional information, contact Mike Rau at the NAB: 202-429-5340. Contact Richard Biby at 703-522-5722, or Al Resnick at 212-887-5283. Contact Richard Adler at 408-646-2352.

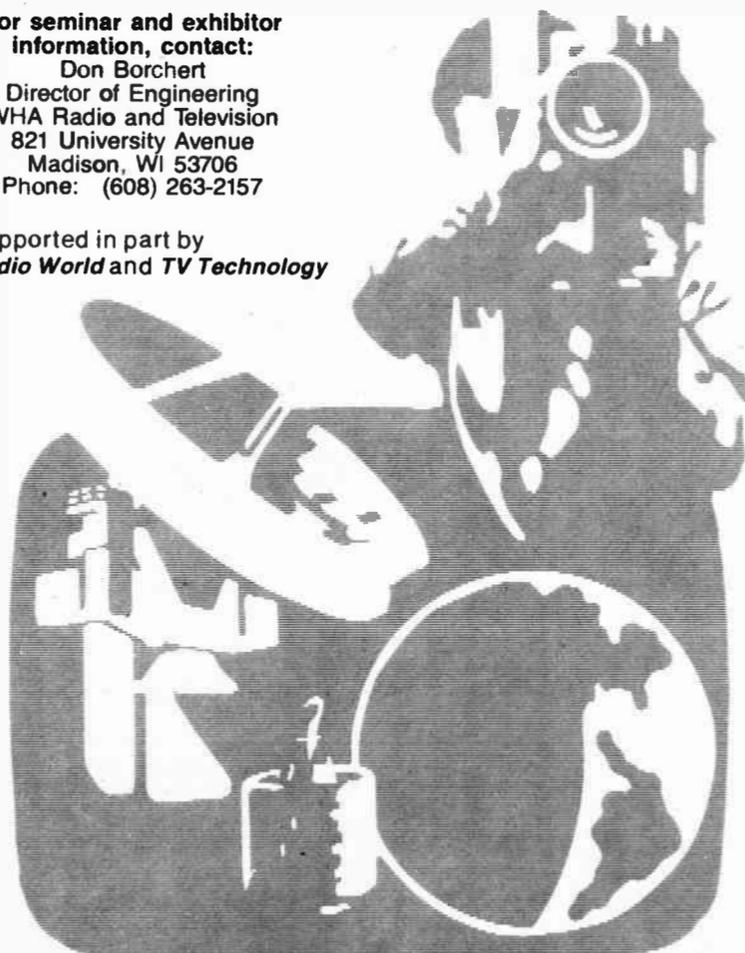
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Jullien Names VOA Equipment Choices

by David Hughes

Washington DC ... The subcontractor that is handling the purchase of broadcast equipment to modernize 19 studios at the Voice of America's (VOA) Washington DC headquarters says it has lined up its major suppliers.

Despite the revelation of the names of the equipment suppliers—which were made according to VOA specifications—there is still some question in the industry as to whether the project can come in at or under budget.

Mike Hoover, VP of Jullien Enterprises, the Chantilly, VA firm that is handling the subcontracting work to obtain and install broadcast gear for the new studio facility, told *RW* in mid-July that the major suppliers had been selected to supply approximately \$2 million in gear.

While the firms were selected, at press time, contracts for the gear had not yet been finalized, he said. Orders were to go out by the end of July, he added.

Jullien's portion of the overall VOA contract is pegged at \$3.2 million. With the \$2 million in major equipment purchases about to be made, that would leave the firm with \$1.2 million to handle the remaining equipment purchases, installation work, and related tasks.

While the entire \$6.6 million project is handled by Rockville, MD-based Grunley-Walsh Construction Co., that firm has subcontracted the electrical portion of the contract to Dynalectric Co. of Vienna, VA, for \$3.9 million.

That firm, in turn has arranged for Jullien to handle the acquisition and installation of the broadcast gear.

Firms named

Hoover announced that the console contract will go to Harrison Systems of Nashville, which will provide 19 custom on-air consoles according to VOA specs.

Tape decks will be provided by Studer, and cart decks by Fidelpac. Cassette decks will be supplied by Tascam and turntables by Technics.

In other product lines, phono preamps will be supplied by RTS, CD players by Sony, hybrids by Studer, audio distribution amplifier/IFB/mix minus system by RTS (with Jullien custom work), while speakers will be provided by JBL and ADS.

Hoover said that the VOA contract specifies that one vendor be selected per category. In one case, however, two speaker/monitor manufacturers were chosen because large and small speakers were considered to be two categories in the contract specs.

Hoover's assertion that the contracted gear so far totals just over \$2 million agrees with the bottom line "cost" prices

supplied by the manufacturers at the time bids were being accepted. When tallied out from those prices and multiplied for quantity the "cost" price of the specified gear was some \$2.17 million.

The fact that the manufacturers named correspond to those mentioned in equipment specs drawn up for the VOA by National Teleconsultants puts to rest speculation about product substitutions to save on equipment costs.

Doubts still exist

However, some broadcast equipment industry sources maintain that they would be surprised if Jullien can arrange to get the specified gear for only \$2 million. They say there would be little or no advantage for equipment firms to sell gear at the "cost" price.

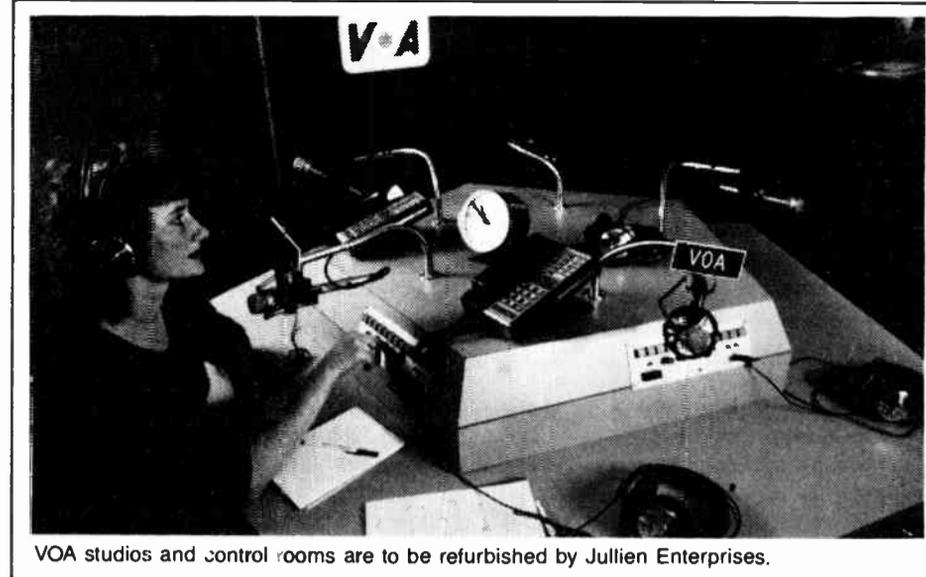
One equipment manufacturer, who wished to remain anonymous, said his rock bottom estimate for the specified gear comes to \$2.8 million. In order to get the same amount of gear for less than \$2 million, he said manufacturers "would have had to drop their pants."

He added that the only way a subcontractor could purchase gear for less than \$2.8 million would be to substitute gear from the original specs, a process that Jullien says it is not doing.

Bud Harrison, of Hyattsville MD-based Harrison Systems, said that he "hesitated" to make a statement saying that Jullien could not obtain the gear for about \$2 million, but he added that "it will be interesting to see how they do it."

While Harrison would not reveal what he thought the acquisition and installation of the broadcast gear would cost, he said his firm's bid was the next highest to Jullien's.

He stressed that even though the VOA studio contract is for 20 months, the clock started running in May. As of July, he said that three months had already passed with the gear still not even com-



VOA studios and control rooms are to be refurbished by Jullien Enterprises.

pletely contracted for.

Hoover told *RW* that the work would be completed in 18 months. However, he indicated that if snags develop in other

portions of the project it would add time to the contract and not be considered a delay. That would let the project be **(continued on page 17)**

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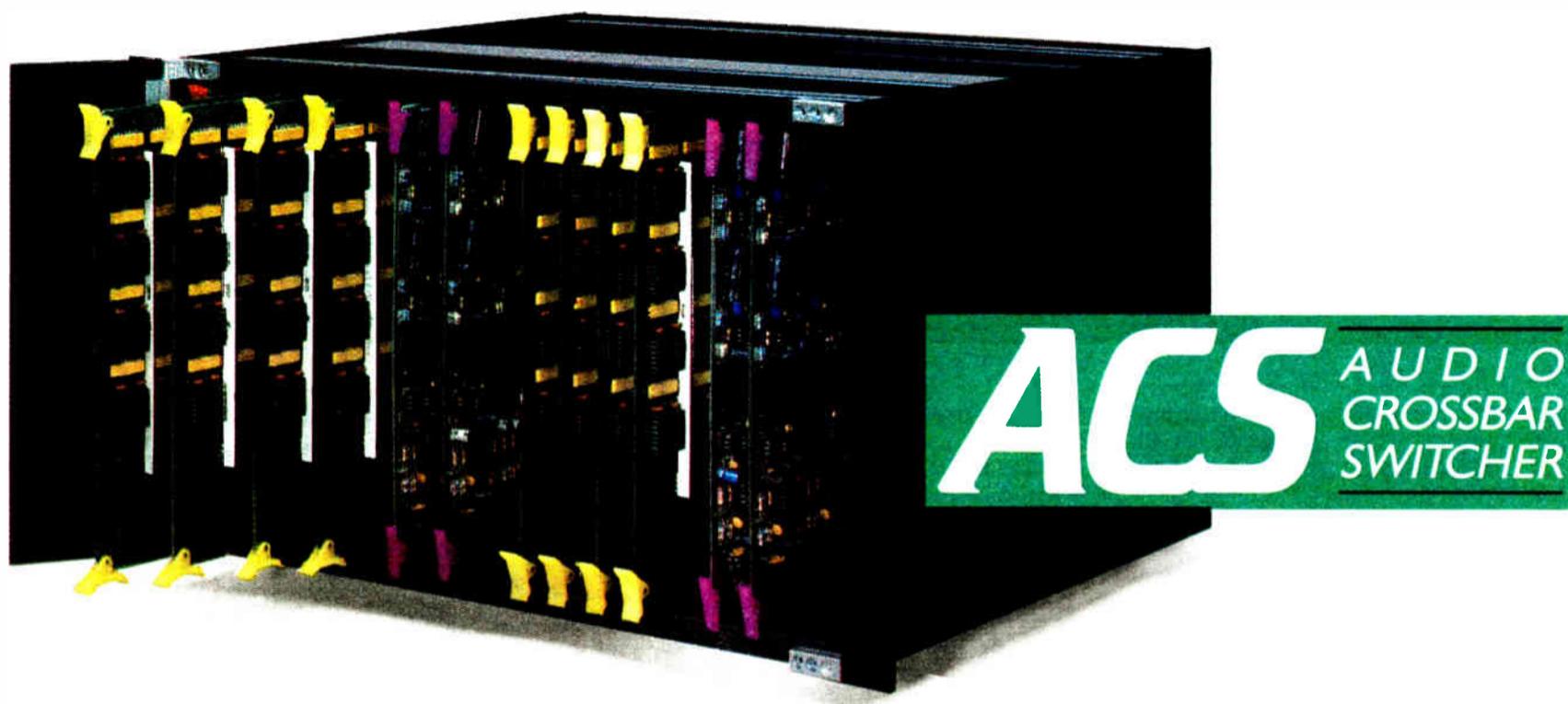
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FCC Vacancies Remain Unfilled

by Alex Zavistovich

Washington DC ... At RW's press time, no further progress seems to have been made in the selection of a fifth member for the FCC, a vacancy created when Dennis Patrick stepped up to the role of Chairman, following the resignation of Mark Fowler.

Also remaining a mystery is a successor to former Mass Media Bureau Chief Jim McKinney, who left the FCC in July to take up a position with the White House.

After Fowler, who served as FCC chairman for six years, left the Commission in mid-April, Patrick assumed the responsibility of piloting the FCC. His succession to Chairman, however, has left a opening on the panel.

A crop of candidates has sprung up for the Commission slot, both from within and outside the FCC.

By some accounts, among the least likely serious candidates for the opening is Bradley Holmes, who had been Chairman Patrick's personal aide, and one of Patrick's early choices. Now the Chief of the Mass Media Bureau's Policy and Rules Division, Holmes has reportedly met with some resistance to his selection.

Holmes acknowledged that he was in the running for the vacancy, but refused to speculate as to why he was not being more seriously considered.

Most recent rumors have been circulating about the possible selection of Peter Pitsch, chief of staff for Chairman Patrick. Pitsch, formerly chief of the FCC's Office of Plans and Policy, had reputedly been an early choice of both Patrick and Fowler.

However, the selection of Pitsch was reportedly opposed early on by some broadcasters, who considered him to be an "ideologue," and disapproved of his support of spectrum auctioning.

Pitsch is currently enjoying the good favor of some of his former detractors in his new role in the Patrick administration, where one FCC source described him as a "man who gets things done."

The chief of staff had no comment about his chances for the vacant commission slot. However, he did say he was "pleased about people's reaction to (his) job," supporting Patrick.

"I enjoy the job," Pitsch maintained.

Another reported frontrunner for the opening is Susan Wing, a communications attorney with the Washington-based firm of Hogan & Hartson. According to unsubstantiated reports, Wing, whose husband has served as a

White House aide, is receiving some support from within the White House.

Wing would not comment regarding her possible selection to the FCC. However, if appointed, her addition would create a female majority on the Commission for the first time since its creation.

Less pressing, but no less important, is the question of who will ultimately succeed Jim McKinney in the position of

Chief of the Mass Media Bureau.

McKinney, once rumored in contention for the commission slot himself, left the FCC on 1 July to accept an appointment as Director of the White House Military Office. Upon learning of McKinney's imminent departure, Patrick named MMB Deputy Chief William Johnson as acting chief.

Johnson assumed the responsibilities of MMB chief 17 June, and although he

has reportedly handled the duties adequately, was told earlier "not to expect anything permanent to come of this."

The 20-year veteran of the FCC would not speculate on other candidates for the position. He was also unable to pinpoint a date when a permanent successor might be chosen.

"I'm pretty low on the rumor mill," Johnson said.

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Committee Tackles FM Issues

by David Hughes

Washington DC ... The NAB's FM Transmission Subcommittee tackled a number of issues, including terrain models, a new intermediate Class C proposal, and a soon to be filed Class A power increase plan, during its meeting 22 July in Washington DC.

According to NAB Engineer Mike Rau, the group formed a task force to examine "terrain compensated propagation models." The group has been working on the overall development of more accurate models for FM coverage patterns.

Rau said a report on the task force's activities will be made at the next subcommittee meeting which is scheduled for

23 September.

The group also discussed a proposal, unveiled at the NAB Board of Directors meeting in June, to create a new, intermediate class of FM station in Class C "territory" with a 25 kW power level. The new class would be used primarily west of the Mississippi River.

The group is working on a computer analysis to determine the feasibility of the plan.

Rau also indicated that the subcommittee heard about continued proposals to institute an across the board power hike for Class A FMs to a 4 or 6 kW level. A proposal is being developed by Clear Channel Communications and also a group of New Jersey Class A broad-

casters.

He said he expected a filing on the matter with the FCC by late July or early August.

The subcommittee continued its discussions on FM directional antennas. The FCC, in April, said it wanted to expand the use of directional antennas in order to allow more shortspaced stations onto the band. The subcommittee is drawing up technical guidelines for the NAB's comments on the plan.

However, the comment deadline on the docket was extended from mid-July to late-August giving broadcasters more time to study the situation.

While the NAB Board opposes the plan, Rau indicated that some subcommittee members are not totally against the plan if DAs are used in certain ways that will not cause too much clutter on the band in already crowded areas of the country.

For more information about the subcommittee's activities, contact Miike Rau at the NAB, 202-429-5346, or subcommittee Chairman John Marino at New City Communications, 203-333-4800.

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WGBH Digital Audio Broadcasts Extended

Boston MA ... The FCC has granted the WGBH Educational Foundation a one-year extension of its experimental license for digital audio broadcasts.

Originally, WGBH had been given an authorization for a four-month period beginning in July 1986, however that was extended to July 1987. With the FCC's latest extension, the experimental broadcasts can continue until July 1988.

"The extension," the FCC said, "is being granted because of the continued interest in digital audio technology by the public and discussions in international regulatory bodies concerning possible standards for digital sound broadcasting."

Tests started a year ago

Last summer, WGBH inaugurated digital audio transmissions over its sister UHF facility, WGBX, Channel 44. Digital audio was transmitted after the TV stations ceased programming for the day.

The tests utilized Sony's PCM-F1 digital audio processor which converts the audio to digital video information and featured WGBH-FM classical music programs.

To receive the digital transmissions, home participants need a VCR or TV set

with video output ports. After the Channel 44 signal is tuned in during the special testing times, the video output is linked to a PCM digital audio processor which, in turn, is connected to a home stereo system.

Listeners can also tape the digital video transmission on a VCR and play the tape through the PCM to listen at their leisure.

During the test times, the Channel 44 visual signal features a series of modulated black and white lines, while the audio carries a monaural version of the program material.

Japanese concert

According to the FCC, several hundred listeners in the Boston area are partaking of the digital transmissions. Recently, WGBX transmitted a live concert performance from Japan in the digital format.

WGBH Promotions Supervisor Lynn DuVal said that the project is "going wonderfully." She said the station was still working on a count of how many listeners are participating in the reception of the digital transmissions.

For more information, contact Lynn DuVal WGBH at 617-492-2777, or the John Reiser at the FCC, 202-632-9660.

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Madison To Feature Radio Tech

by Alex Zavistovich

Madison WI ... Radio news applications for Ku-band satellites, audio processing and advancements in AM radio will be among topics addressed in technical sessions at the 33rd annual Broadcasting Engineering and Management Seminar, to be held 14 to 17 September at the Holiday Inn Southeast in Madison, Wisconsin.

Organized by the University of Wisconsin and sponsored in part by **Radio World**, the regional event is expected to draw up to 250 attendees. Don Borchert, director of engineering of WHA-TV and seminar organizer, said the figure "should be about equal to last year."

"Over the years, the number of attendees has leveled off at about 230 to 250, which is just the right number to do what we want with the clinic," Borchert noted.

Developments in AM radio

The program's technical sessions run from 15 to 17 September, with discussions highlighting technological developments in AM radio and the work of National Radio Systems Committee (NRSC).

On 17 September, Bill Ammons, of CRL, will speak about practical audio processing for NRSC standards. The discussion is expected to touch, in part, on the recommended 75 μ S voluntary national preemphasis guideline established by the NRSC.

Glen Clark, president of Texar, is expected to discuss technical steps to AM revival. At press time, particulars of his presentation were not available.

Borchert acknowledged that this year's seminar emphasized radio technology more than past sessions have. He added that the emphasis was appropriate, because "70% of the attendees are radio folks."

However, the clinic will not be solely devoted to AM technical issues. Also on the agenda for this year's gathering is a focus on satellite technology.

Conus Communications' Director of Engineering Ray Conover will speak on "Radio and Television News Applications for Ku-band." And, Ed Mamarre, RF products manager for Roscor Corporation, will address the "Value of Ku for Satellite News."

"We hadn't covered anything in up-linking for years, and ran out of gas on downlinking," Borchert said, explaining

the increased attention paid to the subject this year.

To offset the attention paid to the satellite aspects of the industry, NAB VP/Science and Technology Tom Keller will speak on "The Future of Terrestrial Broadcasting." Details of his presentation were not available at press time.

Other topics of interest include electrical and mechanical aspects of phase correction for cartridge tape systems in a presentation by James Rick, of Broadcast Electronics, which introduced a cart machine with built-in phase correction at this year's NAB show.

Rick Scaggs, a member of Harris Corporation's Transmitter Design Team, will speak about digital amplitude modulation, with special emphasis on their new DX-10 transmitter.

Another session focusing on digital technology will be given by Charles Bates of ITC/3M, which introduced a digital cart machine this year.

And a session on choosing capacitors for audio quality will be headed by Bill Sacks of Straight Wire Audio.

An open forum featuring engineers in charge of three of the FCC's field operations bureaus is scheduled for the evening of the seminar's second day.

change tricks of the trade, he explained. Past forums have been an "anything goes" affair. Topics have ranged from contract engineering insurance to problems of tower icing.

Besides the nuts and bolts session, another venue for airing engineering advice is the "Great Idea Exchange," another Madison favorite. With their conference registration, attendees are encouraged to submit engineering suggestions, in schematic or other form.

Entries in the exchange will be judged, and winners will receive prizes donated by some equipment manufacturers in the seminar's exhibit area. Companies exhibiting at the conference include Allied, Sony, Panasonic, Ampex, Harris, Tektronix, ITC/3M and others, Borchert said.

The equipment exhibit, held concurrently with the clinic, saw more than 50% of its display area snapped up a few days after the first mailing from show organizers, according to Borchert.

He noted that this year's exhibit space is somewhat smaller than last year's—down from 70 to 65 booths. However, he added, those booths were in a "low-traffic" part of the hall.

Management sessions

The first day's sessions are devoted entirely to technical management issues, and are led by WCFL (now WLUP) Chicago GM John Cummuta and Timothy McCartney, CE of KBSU, Boise State University.

Also on 14 September, Garrett Lysiak, of St. Paul-based Owl Engineering, will present "Station Engineers—An Endangered Species?" Debate and audience participation are encouraged.

For additional information, contact Don Borchert at 608-263-2157.

Nuts and bolts

This year's Broadcast Engineering Forum also features, as in years past, a "nuts and bolts session" for engineers. Typically a favorite among clinic attendees, the session provides practical engineering information in an open forum, Borchert said.

The session allows engineers to ex-

Broadcast Engineering and Management Seminar

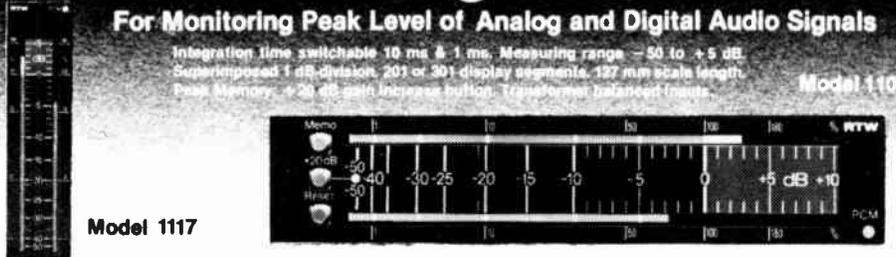
Monday, September 14		
7:45	Registration and Continental Breakfast	
9:15	Introduction and Welcome Don Borchert, Director of Engineering, WHA Radio and Television, Madison, Wisconsin	
9:30	Technical Management Seminar Discussion Leaders: H. Richard Miner, Director of Navy Broadcasting, Washington, D.C. John Cummuta, General Manager, WCFL, Chicago Timothy J. McCartney, Chief Engineer, KBSU, Boise State University	
10:30	Technical Management Seminar, continued	
12:00	Luncheon—"Station Engineers—An Endangered Species?" Garrett Lysiak, Owl Engineering, St. Paul, Minnesota	
2:30	Technical Management Seminar, continued	
4:30	Reception ... Cash Bar	
Tuesday, September 15		
7:45	Registration and Continental Breakfast	
9:15	Introduction and Welcome Don Borchert, Director of Engineering, WHA Radio and Television	
9:30	Understanding and Using the New ANSI/EIA 222D Standards Donald L. Markley, Consulting Engineer, Peoria, Illinois	
10:30	Radio and Television News Applications for Ku Band Ray Conover, Director of Engineering, Conis Communications, St. Paul, Minnesota	
11:15	Choosing Capacitors for Audio Quality Bill Sacks, President, Straight Wire Audio, Arlington, Virginia	
12:00	Luncheon—"Digital Audio Basics for Radio" Charles M. Bates, Chief Engineer, International Tapetronics/3M, Bloomington, Illinois	
2:00	Sound Re-enforcement for Broadcast Applications Jim Brown, President, Sound Engineering Associates, Chicago, Illinois	
2:45	Radio Station Design Considerations: A Routing Switcher? Chuck Kelly, International Tapetronics, Bloomington, Illinois	
3:30	Reception ... Cash Bar ...	
8:30	Equipment Exhibits	
6:00	Dinner (Optional)	
7:30	FCC Forum With: Russell "Joe" Monie, EIC, Chicago; Dennis P. Carlton, EIC, Denver; Al Jarrett, EIC, St. Paul	
2:45	Storing, Handling and Retrieving Lots of Audio Panel: James Oliver, Media Touch Systems; Thomas Ransom, IGM Communications; Dave Acker, For-A Corporation; Matthew Martin, Digital Broadcast Systems	
3:45	Reception ... Cash Bar ...	
8:30	Equipment Exhibits	
7:30	"Great Ideas Giveaway" and Nuts and Bolts Engineering Forum Stephen Brown, Chief Engineer, WLTE, Minneapolis, Minnesota	
Wednesday, September 16		
7:45	Continuing Registration and Continental Breakfast	
8:30	Practical Aspects of Studio System Grounding John Freberg, WXRT, Chicago, Illinois	
9:15	Roll Your Own: the DOs and DON'Ts of Building Custom Chassis Projects Mark Persons, President, Mark Persons and Associates, Brainerd, Minnesota	
10:00	Break	
10:15	Digital Amplitude Modulation—DX 10 Transmitter Rick Riggs, Transmitter Design Team, Harris Corporation, Quincy, Illinois	
11:15	Technical Steps to AM Revival Glen Clark, President, Texar, Inc., Monroeville, Pennsylvania	
12:00	Luncheon—"The Future of Terrestrial Broadcasting" Thomas Keller, Senior Vice President, Science and Technology, National Association of Broadcasters	
2:00	Electrical and Mechanical Aspects of Phase Correction for Cartridge Tape Systems James R. "Rick" Carpenter, Manager of Audio Engineering, Broadcast Electronics, Quincy, Illinois	
Thursday, September 17		
7:45	Continental Breakfast	
8:30	Value of Ku for Satellite News Ed Mamarre, RF Products Manager, Roscor, Mt. Prospect, Illinois	
9:15	Why 18 GHz for the Broadcaster? Ernest Mickin, Senior Engineer, M/A Com	
10:00	Break	
10:15	Tape Format Forum Panasonic—Advanced Technology in the M-II Format Ampex—Capabilities of the Composite Digital Recording Sony—Betacam-SP in Context with Other Formats	
12:00	Luncheon—"HDTV Update" Larry Thorpe, Director of Studio Products, Sony Corporation, Teaneck, New Jersey	
2:00	Care and Feeding of Flexible and Semi-Flexible Transmission Line Hugh Knudd, Senior Design Engineer, Andrew Corporation	
2:45	Practical Audio Processing for TV Stereo and NRSC Standards Bill Ammons, CRL, Phoenix, Arizona	
3:30	Adjournment ... Farewell 'til next year!	

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Audio Logic Shines On Brightly

by Tyree S. Ford

Baltimore MD . . . If you're the type of audio engineer/producer who tends to be somewhat conservative, acquiring outboard gear only after it's been around long enough to warrant enshrinement in the Smithsonian, this month's *Producer's File* will probably give you a nasty case of the hives.

On the other hand, if you're a cutting-edge kind of person, read on!

I got a tip from Radio Resources' Bernie O'Brien that Dean Stubbs, Marketing/Communications Manager at DOD/Audio Logic, Salt Lake City, had a device similar to the Aphex Aural Exciter which performed so well during testing earlier this year.

My concern that this was just another copy-cat circuit in a market where it's hard enough to stay on top of the good new pieces changed after I spoke to Dean and had a chance to put the PA88 through its paces.

A lot of production people who haven't had the opportunity to work with these brightness processors assume that they can duplicate their effect and sound performance with equalizers.

While it is true that you can get a similar sound with an equalizer (I proved this with a UREI graphic) there are other considerations, as a closer look at the PA88 reveals.

How it works

According to the somewhat skimpy documentation, "The process preconditions the signal to match the human hearing process. The ear is not linear and has mechanisms which prevent ear damage and perceptual overloading.

"The ear has built-in narrow band limiters which, when triggered by one frequency overload, also affect adjacent

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

frequencies. The release times of these limiters increase relative to signal intensity and duration.

"Boosting equalization to get clarity triggers the ear limiters and causes ear fatigue making the entire sound harsh or hurting.

"The human voice frequency peaks out at about 3 kHz. Intelligibility depends on the upper part of the range between 2.5 kHz and 3.2 kHz.

"To give clarity to a vocal without PA88 processing, the audio professional must boost the upper mid-range EQ at those frequencies. The increase in sibilance caused by an equalization boost must be tolerated.

"The sibilance is caused by an electronic overload and/or tape saturation at critical frequencies. The PA88 process notches out the critical frequencies that trigger the ear's limiters without affecting adjacent frequencies by using a totally unique phase cancellation process.

"The holes are then psychoacoustically

“ “

It took me 15 minutes before I recalled that I had set the radio to the AM instead of FM.

filled by delaying a related portion of the frequency spectrum."

The bottom line is, you get "bright" without sacrificing headroom, something equalizers are hard pressed to do.

Other claims include: increased off-axis frequency response, increased vocal articulation, reduced ear fatigue caused by high SPLs (Sound Pressure Levels) and system distortion, and apparent increased high frequency response, even in transducers not capable

of reproducing the perceived frequencies.

This last claim made me reach for the phone to call Lang Sturgeon, CE at WYST AM/FM here in Baltimore.

Improving AM for music

I had been listening to WYST's AM for the last few weeks to get a good dose of the station's recent "Rock Hits" format.

I was reminded of the early days of progressive radio in Baltimore (1971) when I programmed WAYE, a 1 kW day-

Producer's File

timer. Because the station was unique, and because FM penetration was low, we were able to capture a workable market share of the Baby Boom.

Other than the fact that we were a day-timer, the most frustrating aspect of running the station was the limited audio bandwidth.

If the PA88 could create the impression of an extended high frequency response, it would be a boon to AM radio, particularly to the remaining music formatted AM stations.

Lang was as intrigued with the idea as I was. Lang, Herb Haynes (Lang's assistant) and I met at the transmitter site, installed the PA88 in the line to the standby transmitter which we fed into the dummy load, and listened on the monitor.

After assuring ourselves that the unit was working well (remember the PA88 was not necessarily intended to be part of a radio station's audio chain) we put it in-line with the main transmitter.

That chain began with a 15 kHz phone feed from the studio to the PA88, to a Texar Prism with Eagle clipper, to a Continental 314-R transmitter.

How to work it

The operation of the PA88 is simple. The front panel has a process level control, a selection of four enhancement set-

tings, a mix/solo button, an in/out switch, and a process level LED display per channel.

Inputs are 47K ohm, balanced or unbalanced. Outputs are 600 ohm transformerless, and, like the inputs, use 1/4" jacks.

After considerable experimentation, the consensus was that setting "B" gave us the best results. Lang then rebalanced the four stages of the Prism for maximum loudness/minimum distortion. We spent the weekend independently evaluating the new sound.

I was amazed and appalled at the incredibly wide variance of audio that came from the AM receivers we listened to.

The lack of front-end design conformance made it necessary to make considerable compromises in adjusting the processor. With all of the other problems AM is challenged with, this is one they could well do without.

This is AM?

We listened during that weekend at different times, on different radios, at different distances from the transmitter, and compared notes. We were close, but decided to fine tune.

At our next session we installed a parametric equalizer ahead of the PA88, and "pre-conditioned" the audio by rolling off the bottom at about 150 Hz, and the top above 13 or 14 kHz.

With the extreme lower and upper bands reduced, we were able to achieve increased overall loudness, while retaining plenty of psycho-acoustically generated highs.

In the end we had a very different sounding AM station. I awoke the next morning to my clock radio and it took me 15 minutes before I recalled that I had set the radio to the AM instead of FM. (WYST simulcasts morning drive.)

Other listening checks, while less dramatic, all had one thing in common: the station sounded loud, dense and bright. Not as bright as FM, or with quite the bottom, but noticeably different than any other AM station.

When the processing was turned off, it was as if bath towels had been draped over the speakers. With the PA88 in-line, we heard snare snaps, cymbal rides and chimes that you just don't hear on AM radio. Voices were crisper too.

Since the Audio Logic PA88 is a two channel unit, if you did decide to use it in your mono AM audio chain, you could use the second channel for the auxilliary.

Production uses

In multitrack, the unit can be used on individual channels, subgroups, or across the mix output.

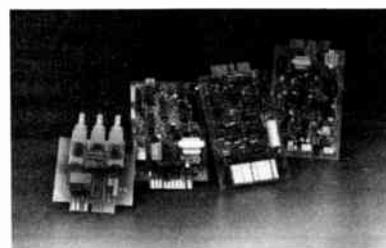
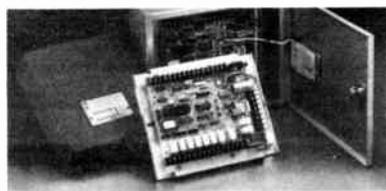
One nice feature is a phase switch on each channel which operates when the unit is used as a solo device with its own console return.

This comes in handy when working with other outboard gear that gives you a 180° phase flip from input to output.

Other suggested applications include live sound, disc mastering and cassette duplication.

For \$300 (and that's list) the PA88 is an inexpensive way to put the brights back on your audio. Find out more by giving me a call or by calling Dean Stubbs at DOD, 1-800-453-7484.

Stay in touch, I hope to see you at Radio '87. My production session starts Saturday morning, 12 September at 9 AM.



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Anti-Trafficking Reconsidered

(continued from page 2)

untenable position of comparing the challenger's promises with the broadcaster's actual performance," he maintained.

In addition, Patrick pointed out, the existing system creates a concern among broadcasters of the "possibility of governmental retribution for errors in programming judgment (which) is the very antithesis of free speech."

He also said the system features "ambiguity and uncertainty," the possibility for abuse by the government and private parties, and is "unreasonably expensive."

"Laudable" but . . .

Patrick said that the Senate's attempt to "create a proper balance between public interest obligations of broadcasters and broadcasters' interest in maximizing service to the public by operating unfettered in the marketplace is laudable."

While he said the FCC agrees with the proposed renewal approach that would eliminate the need to conduct comparative renewal hearings, Patrick also admitted that "the bill would continue the Commission's substantive oversight of broadcasters' programming."

The legislation would require that 10% of the TV license renewal applications filed in any given year be audited to determine whether a meritorious service standard has been met.

"Government regulation is not necessary to ensure the availability of programs that viewers and listeners want," Patrick said. He pointed to the marketplace being the best way to regulate.

Patrick said that the Senate should develop legislation in which to renew a license, the FCC would determine

whether the licensee "substantially complies with the Act and our regulatory requirements." However, he said the process should not be based on having the FCC determine whether stations have met the needs of their community.

NAB opposes plan

NAB President Eddie Fritts also testified against the Senate's renewal plan.

While he said that the concept of establishing what has been called a two-step renewal process that would prohibit payoffs to renewal challengers are worthy, he criticized the current Senate proposal saying it "presents to the broadcasting industry a price tag for needed

reform that is prohibitively high."

He called it "a wholesale return to unneeded and overly restrictive federal regulation." Fritts said that the NAB has been working with key Congressional participants. "We still do not have an agreement on many points, but we remain confident that progress can be made."

However, Commissioner Quello told the committee that while the FCC and other groups may have found fault with this and other particular proposals, "the time has come to reaffirm the public interest standard for broadcasting."

He said that broadcast licensees are "public trustees and have a fiduciary obligation to their communities of license.

Broadcasting is a unique and distinct industry. We are not dealing with toasters, pork bellies or any other commodity."

The Senate hearings also touched on other issues involved in the Senate bill including minority and female preference policy, distress sale and tax certificate policies, restrictions on owning multiple broadcast licenses and assignment questions.

"This bill will provide some meaning to the broadcaster's public trust requirement," Hollings said. "It will also reduce some burdens on broadcasters that are no longer warranted. But most important it represents a return to common sense."

For more information on the activities of the Senate on the development of legislation affecting broadcasters, contact Toni Cook at 202-224-9340, or Katherine Meier or Gina Keeney at 202-224-1251.

NTIA Study

(continued from page 1)

report's findings. According to O'Day, the ITS study was still in a draft mode, and subject to modification based on questions from NTIA headquarters in Washington, DC.

Charles Schott, deputy administrator for the NTIA also declined to comment on the matter, but at RW's press time said he was "hopeful" that NTIA would be able to release results of the study by the end of July.

O'Day stressed the study was kept as an analysis of the viability of multisystem technology. The institute did not analyze the Kahn and C-QUAM systems themselves, he said.

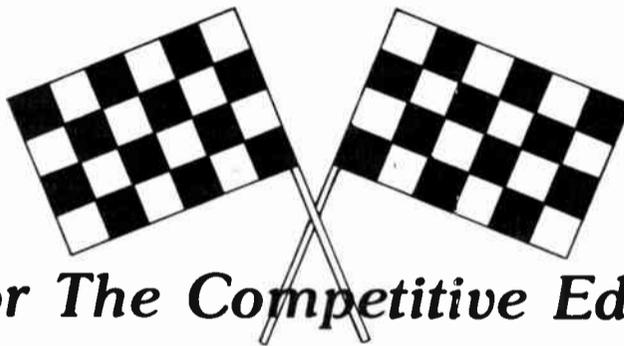
Research at ITS had been slowed somewhat by the reluctance of Motorola to provide the Boulder facility with C-QUAM equipment. Motorola had maintained that multisystem technology was a proven failure in the marketplace, and the company made engineering presentations to the NTIA to support their contention.

NTIA, however, was undaunted by Motorola's assertions, and requested the C-QUAM gear to investigate multisystem performance in its own facilities. Motorola complied, not without some protest on its part.

For additional information, contact the NTIA at 202-377-1551. Contact Val O'Day at 303-497-3484.

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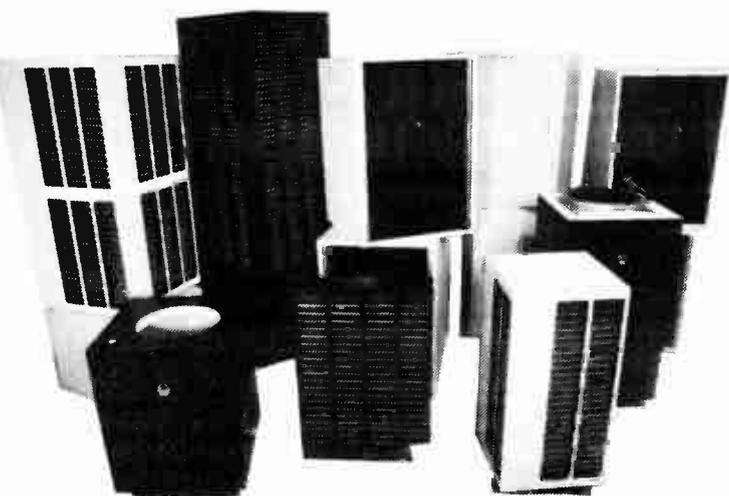


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SBE To Coordinate Frequencies

by Alex Zavistovich

Los Angeles CA ... Out-of-town news crews who expect to cover the visit of Pope John Paul II to Los Angeles 15-16 September will have to coordinate with the Southern California Frequency Coordination Committee first.

According to SBE President Richard Rudman, anyone coming to cover the pontiff's tour should be advised that "coordination is not desirable—it is mandatory."

The advisory is part of the SBE's increased attention to the issue of frequency coordination, which includes scheduled meetings with voluntary and professional coordinators, and features the development of a standardized database for coordinators.

Other recent SBE projects have touched on power line interference and the dissemination of information on certain toxic substances in the broadcast environment.

Database tutorial

On 14 July, the FCC's Office of Engineering and Technology (OET) hosted an SBE presentation on the society's plan for Part 74 national frequency coordination, including an overview of the database format and administration of the plan.

The tutorial also provided a description of the all-industry National Frequency Coordinating Committee (NFCC), which is developing standard recommendation procedures for local coordinators.

According to Rudman, who presented

the overview for the tutorial, "coordination is no longer a luxury; it is now a necessity." Some bands covered under Part 47 of the FCC's rules are now nearly "saturated," he said.

Rudman addressed the problem of coordinating shared bands between cable interests and common carriers. During the presentation, it was suggested that common carrier mobile bands institute a plan along the lines of the home channel plan used by TV ENG crews in Los Angeles.

In the plan, which in Los Angeles operates in the 2 GHz band, local licensees voluntarily observe on-line coordination efforts by maintaining a so-called "home channel," recognized by other area licensees.

The home channel plan assures relatively interference-free operations for broadcasters who may be clustered in an area to cover a breaking news story.

The SBE also hopes to open dialogues between local coordinators, the NFCC and professional frequency coordination groups which coordinate microwave transmissions, Rudman said. He added that "coordination is incumbent on the industry because the FCC isn't (providing coordination)."

Other SBE projects

The SBE has also involved itself in several other projects besides frequency coordination.

On 17 July, both Rudman and SBE VP/Engineering Jack McKain visited Capital Hill to offer the society's services in spectrum management as a resource for the House of Representatives' Subcommit-

tee on Telecommunications and Finance.

Rudman said the SBE is also "looking favorably" at a proposal made by the NAB, which would allow smaller radio stations to use SBE chapters as a "focal point" for information on polychlorinated biphenyls (PCB)—liquid coolants, now considered carcinogenic, which were commonly used in transmission equipment until the 1970's.

In addition to providing information on the chemicals, Rudman said, the SBE

is looking into working with the NAB on proper disposal of PCB equipment. The two groups may contract with toxic waste handling companies to haul away PCB-laden gear gathered from smaller stations, he added.

The SBE is also laying groundwork for a project aimed at reducing interference from power lines, Rudman noted. To that end, the society plans to meet with local power companies and hopes to have the assistance of the FCC's John Reiser, an electronics engineer with the Mass Media Bureau.

For additional information, contact Richard Rudman at 213-462-5392.

VOA Suppliers Selected

(continued from page 9)

completed in a period greater than 20 months and still come in on schedule.

"I think a lot of firms will be watching to see if (Jullien) can pull it off," Harrison said.

Yet, broadcast consultant Ron Schiller, of Ron Schiller Associates, said that a \$2 million figure "is possible, with proper negotiations." He said he ballparked that portion of the contract and could have gotten the figure to \$2.2 million.

Schiller pointed out that negotiations could have saved 5% to 10% if the gear had been prepaid, and additional costs could have been cut if the order from each firm were shipped in one large batch rather than many smaller ones.

If a bonded warehouse is used to store the gear, still more money could be saved, Schiller added, not to mention actual negotiated changes in the contract.

"I think they (Jullien) will pull it off," he said. But Schiller added that many broadcast-oriented firms that bid for the

project and lost are still angry that a firm that is not broadcast-oriented got the contract.

Hoover said he expects some "sour grapes" from the firms that were not selected. He said that there are 11 console manufacturers, three of which "actively pursued" the order, and only one winner.

"One will get it, 10 won't. All won't be happy. There is a lot of competition," Hoover added.

He had indicated to RW that Jullien utilizes many cost cutting measures in its contracts such as handling its own cabinetry work.

If Jullien receives gear in the near future it will almost certainly have to warehouse it. "They are still pulling PCBs and asbestos out (of the old studios at the VOA facility). There is a lot more demolition to go, Hoover said.

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

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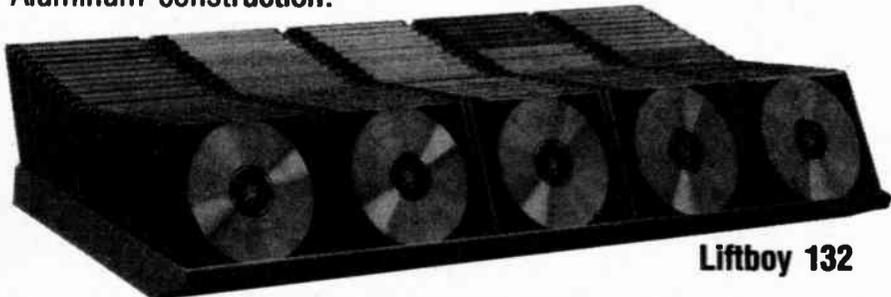
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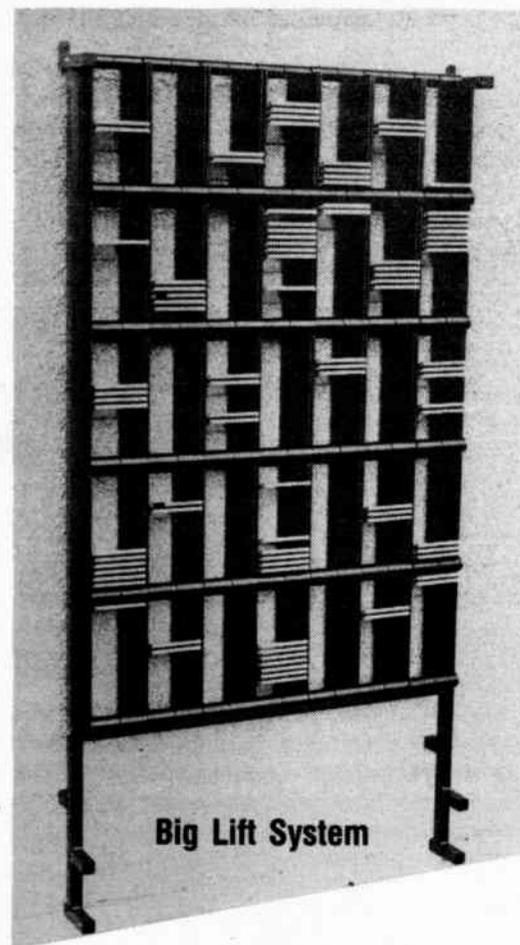


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Reradiated Energy Is A Curable Concern

by Thomas L. Vernon

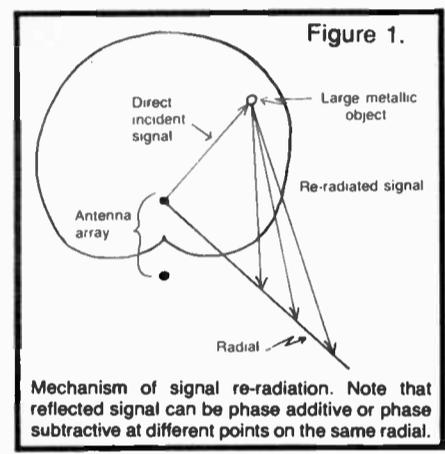
Harrisburg PA ... Sometimes the results of monthly directional proofs can look really strange.

While many factors effect the field strength on a given radial, extreme high or low readings in the null region often suggest a reradiation problem.

The erection of power lines, water tanks, or even bridges in the main lobe of a station's array can wreak havoc with the pattern you've worked so hard to maintain.

The mechanism of reradiation is fairly

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



simple. A large metallic object (or objects) in the main lobe will reflect RF energy into the null areas.

In many cases, the amount of reflected energy is not insignificant. Up to 10% of the incident signal may be reradiated in some circumstances.

Other causes

The main lobe is often also deformed by the presence of reradiating structures. The reflected energy can be additive on some radial points, and subtractive on others.

Station Sketches

While the causes of reradiation are simple, the solutions usually are not.

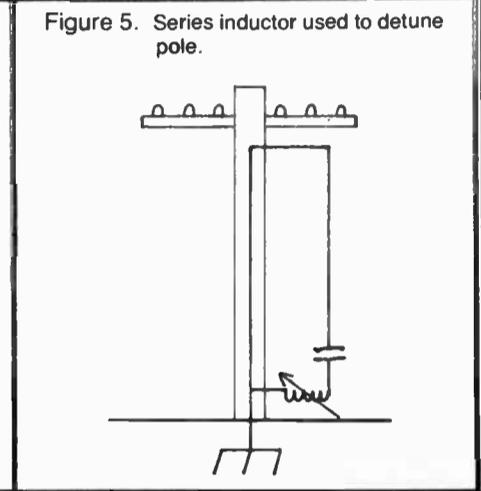
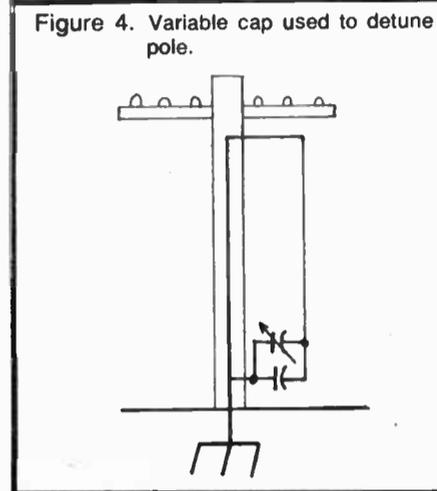
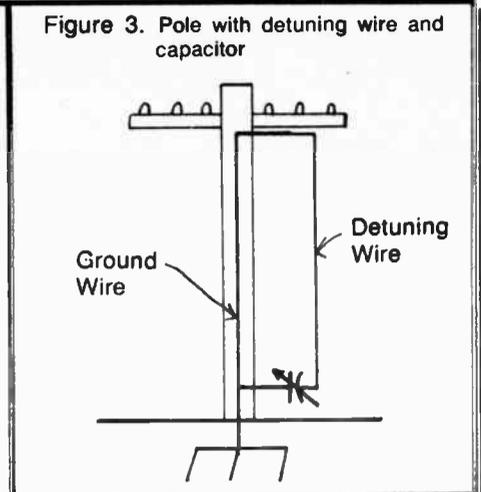
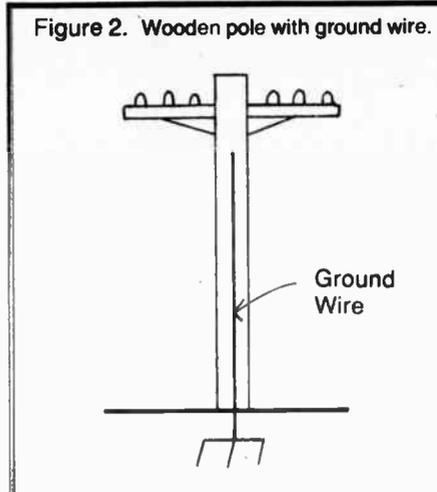
Exorcising such problems is usually a combination of black magic and engineering practiced by consultants using various methods and devices.

With the continued onslaught of urban sprawl and development, many once rural transmitter sites are now part of the suburbs.

This increased construction means that there is a greater need for the esoteric business of detuning to be understood by station engineers.

While I won't hope to make you an expert, I can help you to understand the basics of detuning.

The first step of course, is to locate the



source of trouble. This isn't always easy, and usually entails extensive work with a field strength meter.

It's important that the source be positively identified because the installation of detuning hardware is costly, and the cooperation of the owner of the structure(s) in question must be secured.

The best indication of reradiation is the presence of a standing wave pattern in measurements taken in a line between the transmitter and offending structure.

The simplest problem is a wooden pole with a ground wire, as in Figure 2.

Simple solution

One common solution is to attach a wire to the ground wire at the top of the pole, and run it down the opposite side from the ground wire.

It is then connected to a variable capacitor or capacitor decade in series with an RF ammeter to ground.

Adjustments are then made for minimum RF current in the ground wire. A current reduction of 10 to 1 should usually be possible

Once the null has been reached, the variable capacitor may be replaced with a fixed cap of the closest standard value. Usually these are installed in a weather-proof box. Such an installation is shown in Figure 3.

The size of capacitor to be used is determined by the circulating current to ground.

Typically, "G" series caps are used. In situations where very large currents are involved, G2 caps would be necessary.

Various circuits

There are several circuit variations used to detune poles or other objects.

A fixed cap may be put parallel with a variable cap in circumstances where an oddball value is required.

Some engineers feel that a variable cap is prone to shorting, and instead opt for a variable coil in series with a fixed cap.

A variable coil may be used on top of the pole, although this may be difficult to adjust in the field.

Inserting an RF ammeter of the right
(continued on page 26)

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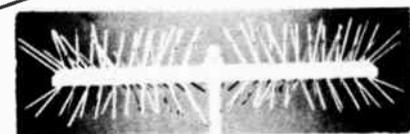
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CONTRACT ENGINEERING

Having The Law On Your Side

by Steve Conover

Part I

Hyattsville MD ... For whatever the reason, every day many people start into the business of contract engineering.

And every day, many people bail out of the business of contract engineering.

Why, if the attraction for "quick money" or "fame" is so glorious, do so many people leave the trade?

First, you have noticed that the term "business" has been used numerous times.

Contract engineering is like any other business involving financial books, inventory control, record keeping, custom correspondence, operating expenses, taxes, and so on.

When first starting out as a contract engineer you can do one of two things.

You can plan ahead and learn the business of business or you can just jump into the field and start contracting.

Without planning or protection you will eventually get burned by a contract.

The trick is to try not to get too

Steve Conover has been a corporate engineer in Omaha, NE, and is a former contract engineer. He is currently residing in Maryland and can be reached at 301-559-7224.

burned, but just singed enough to learn a lesson about good business practices.

Perry Mason

Step one is to contact a good business attorney and draft a very good set of contract terms. The terms of your contracts should cover the majority of situations you will become involved with.

Most generally, there will be two types of contracts you'll need for your business—fixed price or flat rate contracts, and time and materials contracts.

The body of the fixed rate or price contract should include enough area to allow you and your client to write a complete description of *all* of the work or services to be performed by you or your company.

Some of the contract forms I have seen usually included a column on the right hand side to allow the entry of the dollar amounts.

Be sure to leave some space between each of the job descriptions on the contract to prevent the possibility of confusion of facts later.

If you need more space use another contract form, nothing wrong with that. Just make sure that you note on the face of the document that this is page one of however many pages are involved.

Somewhere on the face of the contract

you should have the description of the contract terms. Don't make this the typical "fine print" many companies place on the back of their contracts. Keep it up front and readable.

The following examples were drawn up by the attorney I used in Nebraska and are based upon Nebraska law and therefore may not be applicable to all areas.

Be sure to check with a local attorney.

Fixed price contract

The terms of the contract as described here should appear *in writing* on the contract.

This is a fixed bid for the completion of the job described and does not include any additions or modifications. Any changes to the contract should be in writing and signed by both parties.

State the fact that all expenses and labor will be billed to the client in periods not to exceed an agreed upon number of days.

Payment of materials expenses required by the company should also be specified as to percentage to be paid at time of contract acceptance and that which shall be paid in full at the time of contract completion.

Should a contract be delayed by the client in excess of an agreed upon number of days (say, three weeks) from the

agreed starting date, inform the company that all material expenses will be due and payable unless agreed in writing to the contrary.

The time and materials contract body will require extra space to allow the entries of time and materials as separate billing items.

Keep the wording short and to the point and avoid using big technical words or phrases. Also make a simple notation that proper entries will be (have been) made into the station's maintenance logs if the work is on the transmitter.

Time and materials contract

A similar approach can be taken with this contract, but the cost will only be an approximation.

As an example: "Based on the information provided the contractor estimates the approximate cost of completion of the job bid at (fill in amount).

"However, the contract is based on the time and materials actually expended, and the actual contract price may be more or less than the above estimate."

Changes or modifications to this bid, other than in the hourly rate set forth, may be made orally by agreement, and you should so state.

On the other hand, an item such as changes in the hourly rates might be required to be acknowledged in writing.

Billing period, payment terms and material expenses payment may be stated as above in the fixed price contract. Ditto

(continued on page 21)

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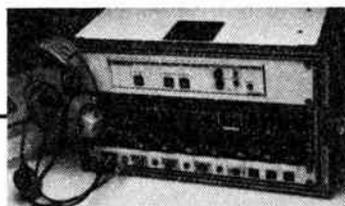
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Circle Reader Service 48 on Page 28

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Blane Webster,
Chief Engineer, WLAK-FM



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

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

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

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

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CONTRACT ENGINEERING

The Case Of the Ten Second Interference

by Mark Persons

Brainerd MN . . . I ran into an interesting situation recently. A man called an FM station to complain that he was hearing the station on his TV.

The station is Class C with 100 kW of ERP.

Receiver front end overload is a common problem within two miles of the transmitter site.

But the caller lived about six miles from the transmitter and reported that the interference to the TV picture and audio happened once an hour like clockwork.

The interference would last about 10 seconds and would then disappear until the next hour. No one else called with reception problems.

This was very interesting. How could an FM station overload a TV for 10 seconds at the same time each hour?

After I took a drive to the area, the answer became quite clear.

There is a power substation about a half mile from the troubled TV. There is also a VHF transmitter sending data from the power substation to the power company's headquarters.

The datalink transmitter turns on for 10 seconds every hour to report power system status.

Power from the transmitter overloaded a sensitive antenna preamp on the antenna connected to the TV receiver.

Narrowband modulation from the datalink was only heard faintly in the background while the ± 75 kHz FM station modulation was heard loud and clear as it intermodulated in the overloaded preamp.

The cure involved putting an FM band filter and a quarter wave open stub filter for the datalink frequency ahead of the overloaded preamp.

In some ways you wonder how a company can justify the purchase and maintenance of a transmitter that runs only 10 seconds per hour, which is 0.2777% of the time.

The world was a simple place years ago when the first radio transmitter was turned on. It was the second transmitter that caused all the havoc!

It is rare today when no apparent new interference is created when a new transmitter is signed on.

I was reminded of this the other day

Mark Persons is president of M.W. Persons and Associates engineering consultants. He can be reached at 218-829-1326.

Legalities

(continued from page 19)
with the penalty for delays caused by the company.

Hopefully your need for an attorney after starting the business will be minimal, but when needed, you will have a greater peace of mind knowing your rights are being represented.

Next time we'll take a look at what to some contract engineers is a dirty word: accounting.

while bypassing a mic preamp input on a studio console.

It seems CB radio transmissions were being heard loud and clear on a radio station when the announcer's mic was turned on.

The CBER's amplitude modulation was easily and readily demodulated by the

preamp's active input. Installing a couple of 0.001 MFD disc capacitors on the input to ground took care of the RF.

Ten-four, good buddy.

Co-located AM and FM transmitters are common and are potential sources for cross-modulation. Mixing products appear on sum and difference frequencies.

An example is if the FM operates on 94.3 MHz and the AM at 1000 kHz. Try tuning your radio to 93.3 MHz and 95.3 MHz.

If you hear the FM station on one or both of the two extra frequencies more

than a half mile from the transmitter site, there is something wrong.

RF from the AM is mixing with the FM to produce sum and difference products.

The FCC requires all off channel emissions from FM transmitters be 80 dB below the carrier.

A spectrum analyzer or Potomac Instruments FIM-71 FM Field Intensity Meter can be used to make measurements when in doubt.

It may be a thrill to be heard on three spots on the FM dial and wipe out the competition. However an FCC inspector probably wouldn't see it that way.

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From Homing Pigeons To Tubes

by Floyd Hall

Crestline CA ... Did You Know That ...

One of the first means of communication was the homing pigeon? True. They go back farther than recorded history.

Also the first organized system of communication was a postal system established by King Cyrus of Persia about 500 years before the birth of Christ!

It worked just like the Pony Express of frontier days in the US.

During WWI the Army's communication was not advanced very much beyond the Pony Express. In fact they used motorcycle mounted dispatch riders for much of their communication.

I had a friend in my hometown who had served in the Signal Corps as a dispatch rider and he was able to bring his bike home. This thing was armored with curved steel plates on each side of the engine.

When he wanted to get off in a hurry, he just stepped off his bike and let it go skidding along on these side plates!

Of course the Signal Corps had field telephones, and those kids strung wire over half the French countryside.

The trouble with this was that an artillery barrage would usually wreck their telephone communication system.

It wasn't until about the middle of 1918 that the Signal Corps began to receive some more or less portable radios.

Versatile triods

My ham partner had enlisted in the Signal Corps and served in France for a short while. When he came home he brought back a large box full of radio parts including some of the Western Electric tubes that were in these portable radios.

Made by WE, they were marked VT-1 and VT-2. They were absolutely round and about 3-inches in diameter with a sizable nipple on the top where they were evacuated.

These were the first really usable

triodes, and were used for everything from RF amplifiers, to detectors and audio amplifiers.

They had, by the way, 5 V filaments which established this value for a long time since they would be powered by 6 V storage batteries, with a rheostat in series to give fine adjustment!

It was over a year later—late in 1919—that my partner and I began to experiment with these tubes for ham transmission.

It was not as simple as our 1 kW spark rig which ran off 110 V house current, however, since we had to have a 6 V "car battery" for filament.

At first we ran with AC-CW, which, if you have ever heard it, sounds as bad as spark. We had no source of high voltage DC so we saved up our money to buy some 45 V "B" batteries.

Old Timer

It was quite a while later that we built ourselves a "soup" rectifier.

I well remember when we hooked up one of these tubes in a Hartley oscillator, and put this tiny pipsqueak on the air.

Right away we found out that this little 4 or 5 W got out farther and better than our old 1 kW spark rig!

Along come audio tubes

From these early beginnings at the end of WWI, the development of radio communication absolutely snowballed. By 1920 there were broadcast stations on the air.

Magnavox came out with a "dynamic" loud speaker, and with the advent of audio tubes—the UV201A amongst others—we could fill the room with sound from our horn loud speaker!

Some time back I posed the question, "How many of you can tell me the difference between a UV tube base, and a UX?" Well I got no response, but I'm go-

ing to tell you anyway.

About half way down the base of a UV tube was a metal pin, about an eighth of an inch long. On the bottom of the tube base were 4-short "buttons."

Now, the socket had a metal sleeve about an inch and half long, and a little larger than the tube base, in the side of which was a horizontal slot.

You placed the tube in this metal sleeve, dropped the pin in to the entry slot and turned it clockwise to the end of the horizontal slot. The buttons on the bottom made contact with flat springs.

UX replaces UV

Now the UX base had no pin on the side, and on the bottom four metal pins about 3/8" long, two of which were larger. These were the filament.

The UX socket had no sleeve, and just four holes in the black bakelite. You simply oriented the large pins, and pushed the tube down in the holes, where spring contacts laid along the side.

All tube manufacturers soon went to this UX base, but I cannot say I liked it as well.

With the UV base you could insert a tube in the dark, or with both eyes shut, by simply dropping the tube in to the sleeve and rotating it until the pin dropped in.

When tetrodes and pentodes came in they went to the octal base which was also easy to insert. I never had any love for six or eight pin miniatures either!

Rules prevail

As I travel around I am gradually coming up to the realization that most station engineers believe that all FCC engineering rules have been thrown out!

Nothing could be further from the truth.

If you say something to one of these people about their audio performance he says, "Ah, you don't have to do that anymore!"

Of course everyone knows that there have been a proliferation of rules changes in the last two years—"deregulation"—but few people really know what they are or what is still specifically on the books.

I doubt that as much as 25% of stations has an updated copy of the Rules!

The Rules are no longer published in the old Volumes I, II, III, etc., but instead are published by the Office of the Federal Register.

Telecommunication categories are titled 47 CFR, and for Section 73 of the Commission's Rules you need Parts 70 to

79. The latest copy is revised as of 1 October 1986.

CFR by the way stands for "Code of Federal Regulations." You can obtain this publication from the Government Printing Office, and I think the price is around \$20.

The easiest way to obtain a copy is to call the Government Printing Office at 202-783-3238 and they will take your order on a credit card number.

Proofs still required

Now, to get back to this "audio proof" that nobody has to do anymore.

When you get your copy of 47CFR, look up Section 73.1590(a)(6): "must make Equipment Performance Measurements, annually for AM stations, with not more than 14 months between measurements."

This "data must be retained for a period of two years, and on request must be made available to duly authorized representatives of the FCC."

I don't see any difference in this as far as AM is concerned than it always has been except for the extra one before filing for license renewal.

I strongly recommend that you procure a copy of 47CFR and look it over carefully.

You will find, contrary to popular opinion, that deregulation has not been total! When you get an inspection one of these days it will be brought home forcefully!

Floyd Hall Remembered

Floyd Hall, Radio World's Old Timer columnist died Friday 24 July, 1987 at the age of 79.

Floyd was a radio pioneer whose interest started as a hobby and became a life-long career.

He was a ham operator, and graduated from USC with a degree in electrical engineering. He put many early stations on the air, and worked as chief engineer to maintain them.

In the 1950s Floyd started his own consulting business and became "engineer-at-large" for many stations. He belonged to the IEEE, SBE and ASPC.

Floyd began writing for RW in September, 1984 and was widely read and well liked. His colorful style and remembrances of radio's early days quickly made him a favorite among RW readers.

He is survived by a wife, a daughter and two grandsons.

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Accounting For Error Vectors

by Tom Osenkowsky

Brookfield CT ... Field tune-up of a directional array will almost always involve measurement and calculation of error vectors.

Error vectors are generated when the antenna monitor sample readings do not agree with the theoretical parameters of the array. Some reasons why error vectors are generated are:

- 1) Array not adjusted to theoretical parameters.
- 2) Unequal length sample lines.
- 3) Sample loops not placed precisely at the current loop (80° down) from the top of each tower, or mixture of toroids and loops.
- 4) Reradiator(s), most likely located in major lobe(s).

There are three generally accepted methods in practice by which error vectors are calculated.

All monitored minima or null radials are simultaneously "talked in" to zero field. The exact process for "talk in" was previously discussed (see 15 June RW).

In symmetrical multiplied arrays this should be accomplished by a single set of parameters.

Another method is when each minima or null is individually "talked in" to zero field one at a time regardless of the other radial values.

In a third method, each minima or null is adjusted for the desired monitor point value one at a time regardless of the value of the rest of the points.

During the initial setup or readjustment of an array, it is important to ascertain that in fact the proper adjustment is realized.

It is possible to secure the correct monitor point readings and yet not have the proper pattern (even after completing a partial proof!).

In some cases, undesired nulls may appear in the pattern. How is misadjustment possible?

For starters, the theoretical loop operating parameters are seldom realized during tune-up.

The standard pattern is quadratically determined from the theoretical field values, which are actually attenuated fields given 1 ohm (or other specified) loss.

It is usually desirable to fill in the nulls as much as possible while maintaining a safety factor. You are allowed a greater margin of fill given the standard pattern.

Let us suppose the theoretical IDF of a minima radial is 15.5 mV/m. With a Q factor of 10, the standard pattern value is 19.4 mV/m.

If you produce an IDF of 17.5 mV/m, your array is no longer adjusted to the theoretical parameters.

Misadjustment can also be accomplished by varying the wrong parameter to accomplish an end. For example, consider a two tower array having a field ratio of 0.750.

If you wanted to fill in the minima (increase the field) you could do the right thing and lower the ratio (i.e. 0.700) or you could vary the phase angle, shifting the null but not filling it in.

By varying the phase angle, you are displacing the minima or null away from

the central angle and thus the field would be higher due to the fact the null is no longer centered about the original azimuth.

This is certainly not the way to go. Since most proof-of-performance

RF Reader

radials are spaced greater than 20°, this type of variation probably wouldn't show up during a proof.

If the null fell closer toward a city of interest, the station revenue might indeed suffer. Most of yesterday's arrays were of the in-line multiplied variety.

Simple to design.

Unfortunately, these arrays produce unwanted complimentary nulls due to symmetry which is maintained throughout the multiplication process.

A great deal of thought was given this concern during the recent development of the CRANK computer program.

CRANK asks for the array parameters, error vectors for each azimuth, maximum and minimum radiation limits for each azimuth of interest, iteration bounds and increments.

In this way, via a recursive C process, all possible parameter combinations for the desired fields are computed.

Such programs were normally used in-house by many consulting firms and

not available otherwise.

The foremost reason is that given all those combinations that produce the correct MPs, how many are actually "right." That is, produce the real pattern?

In addition to CRANK, I also developed SYMCRNK, another program designed specifically for symmetrical arrays.

SYMCRNK first breaks down the array to its original pairs. Then each pair is analyzed to determine where the nulls fall.

Then the user may alter the field ratio of any pair(s) to produce the desired field change. Lastly, the pairs are remultiplied to realize the new final parameters.

This method represents the only correct way to treat a symmetrical array.

Remember, just because the MPs are showing the correct readings, doesn't mean the array is in proper adjustment.

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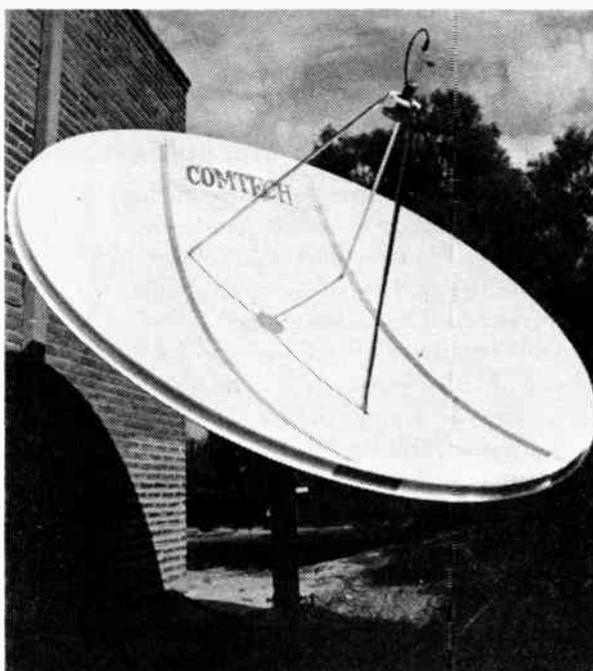
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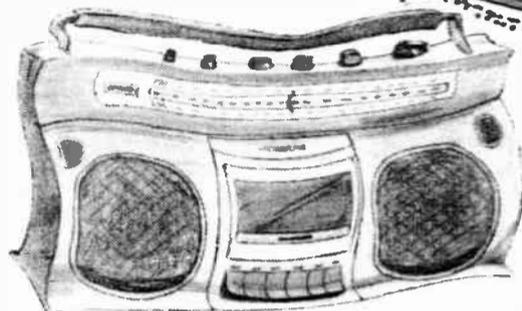
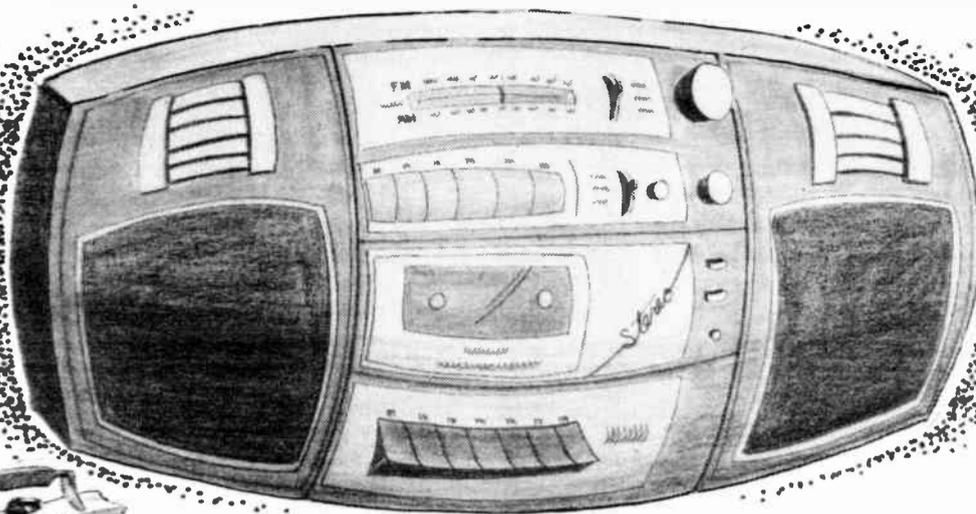


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Tom Osenkowsky is a radio engineering consultant and president of MASTER Software, and a regular RW columnist. He can be reached at 203-775-3060.

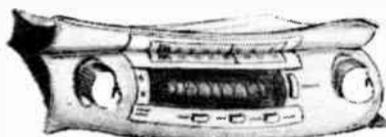
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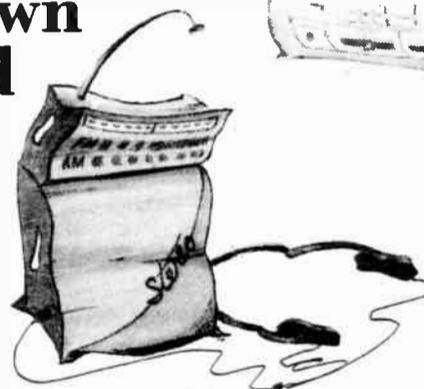


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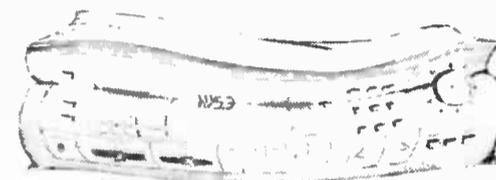
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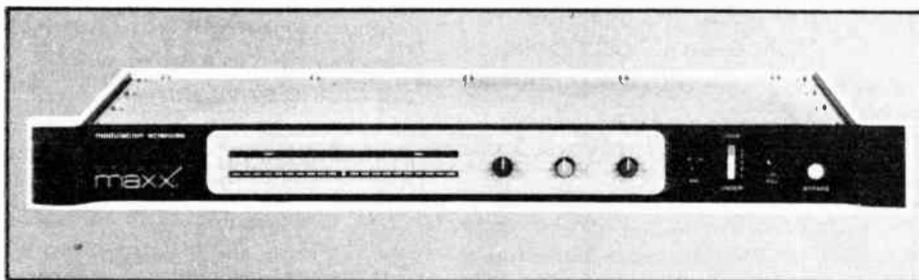


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Circle Reader Service 7 on Page 28

Using DAs For FM Short-Spacing

Editor's note: The FCC is currently seeking comments on allowing more widespread use of directional antennas for short-spaced FM stations.

by W.C. Alexander

Dallas TX . . . Many FM stations across the country, especially in the midwest and northeast, are restricted to ERPs below the maximum for their class because of short-spacings.

If yours is one of these, then a directional antenna could provide a way to upgrade your facility.

If the short-spacing is to a single station or a number of stations all in the same general direction from your transmitter location, then a directional antenna can be used to upgrade your facility to the maximum ERP for your class in all azimuths except those where the short-spacing exists, provided that all of the requirements of 73.213 of the FCC rules are met.

It is important to note that a directional antenna cannot be used to create a new short-spacing under current FCC regulations.

First step

To determine if a directional antenna will help your situation, a channel search must first be run.

This will tell you exactly what the spacings, including short-spacings, are to all stations within a given radius.

It will show where the short-spacings are, the bearing and distance to the short-spaced station(s), and the height and ERP of all the stations within the radius.

The search can be conducted by your consultant, or you can use any reliable database that is known to have current information.

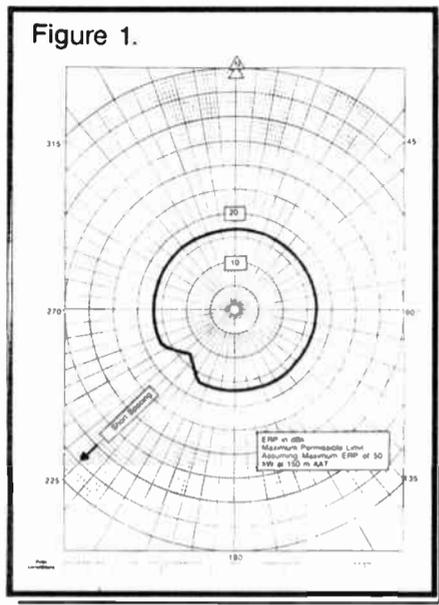
Using this data, the next step is to draw a permissible radiation graph.

Developing the graph

Using the table contained in 73.213 of the FCC rules, determine what ERP your station is permitted to radiate in the direction of the short-spaced station(s) at the maximum height for your class of station.

For example, a Class B station that is

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



located between 105 and 128 km from a first adjacent channel station is permitted 20 kW ERP in the direction of the short-spaced first adjacent channel station at an antenna height of 150 m.

On a piece of polar graph paper, set up your scale with zero at the center, and the maximum ERP for your class of station at a convenient scale division near the outside of the graph.

Find the azimuth of the short-spaced station and plot a point on it that corresponds to the permissible ERP on that bearing as derived from the table in 73.213.

Then from the point you have plotted, move one degree at a time in either direction and move out to a point 2 dB higher in ERP from the last point on the adjacent azimuth and plot another point.

Continue this in either direction from the starting point until you reach the maximum ERP for your class of station (see Figure 1).

Plot the maximum ERP on all other radials and then join the points together in a smooth line. It is probably necessary to employ a French curve or hire a draftsman for this part.

Carefully and clearly label the graph, noting major scale divisions, azimuths, and note the bearing and permissible ERP toward the short-spacing.

Ideal pattern

What you now have is a graphic representation of the radiation pattern of the ideal directional antenna for your station.

Ideally, it will radiate the maximum ERP in all directions except toward the short spacing, and on radials close to

that bearing, the radiation will taper off 2 dB per degree until the short-spaced station's azimuth is reached.

In that azimuth, radiation will be restricted to the level found in the table in 73.213.

So call up the local antenna man and order one up, right?

Well, almost.

Real world antennas

In the real world of antennas, such a perfect pattern is impossible to achieve.

It is possible, however, to achieve a directional pattern that approximately resembles the ideal, and that restricts radiation where needed and otherwise meets FCC specifications for directional antennas.

The first thing to do is to talk to the manufacturers. They will give you an idea of cost, gain (thereby allowing you to choose one with the right number of sections or choose a transmitter), and mounting requirements (allowing you to arrange for a new tower of the appropriate type or the required modifications to your existing tower, if possible).

Most antenna manufacturers will, at no cost, take a permissible radiation graph from a customer and from it design an antenna and pattern that will work.

A complete description of the proposed antenna, along with a tabulation of relative field, ERP and field strength at one mile will be provided to you with the proposal.

Polar graphs are usually included with all the above parameters.

Preparing the 301

With the data provided to you by the antenna manufacturer, you are ready to begin preparation of FCC form 301.

The 301 for FM directional systems is cumbersome with requirements related to the directional antenna, but it is certainly nothing to be afraid of.

The important things to watch for are:
• Letter perfect forms and exhibits.
Cross check everything, including coordinates, heights, descriptions and ad-

dresses with your station license and/or the last form 301 that was filed.

• Be sure to include *everything* specified in 73.316(d). This includes all the data on the proposed directional antenna, which should have been provided by the manufacturer.

• Maps as required by the FCC. The Commission has tightened its map requirements considerably, and will no longer accept anything but the best quality topographical map reproductions.

There are some specific guidelines set forth by the FCC in a public notice dated 5 April, 1985. Copies are available from the Commission.

Consult the consultant

It is an excellent idea, if you did not employ a consultant to aid in preparation of the application, to have one check
(continued on page 26)



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Reradiation Answers

(continued from page 18)

range in series with the ground wire can become cumbersome, and most people use other methods.

Alternate methods

One popular method is to build a toroid pickup loop, and connect it to the AUX INPUT of an FIM-21 field strength meter.

Some people have tried to use the amp clamp accessory that is used to measure current with a DVM. This is not a good idea.

The ferrite material used in these devices is optimized for good results at power line frequencies, and will not work well with RF.

Some consultants have specially constructed boxes with a tuned pickup loop, diode and RF ammeter.

This box is placed next to the pole's ground wire, and the detuning mechanism is adjusted for maximum circulating current as indicated on the RF ammeter.

In metro areas where there may be several strong signals in a given area it's important to be certain that it's your signal that's being nulled out and not someone else's.

A field strength meter would be advisable here to determine the signals being reradiated.

Things become interesting when it's

necessary to detune water towers or the four legged steel towers used by the power company.

Typically, detuning wires are placed on all four legs, with each leg being detuned individually.

Each leg will interact with the others, so it is necessary to repeat the measurements until satisfactory readings are obtained.

Anytime there is a series of power company poles to be detuned, they must be treated as a system.

This is because all of the ground wires are connected via the neutral cable. Figure 6 shows the equivalent circuit of power company ground wires.

Regular maintenance

Once a group of poles or towers has been detuned, it needs periodic maintenance.

This takes the form of extra monthly field strength measurements, noting any abnormally high readings. Such readings are often traced to fixed caps that have been destroyed by lightning.

Another problem is variable inductors, which need occasional cleaning to insure reliable operation.

Of course the effects of insects in junction boxes and vandals with rifles and wire cutters should not be overlooked either.

In all cases, permission of the owners

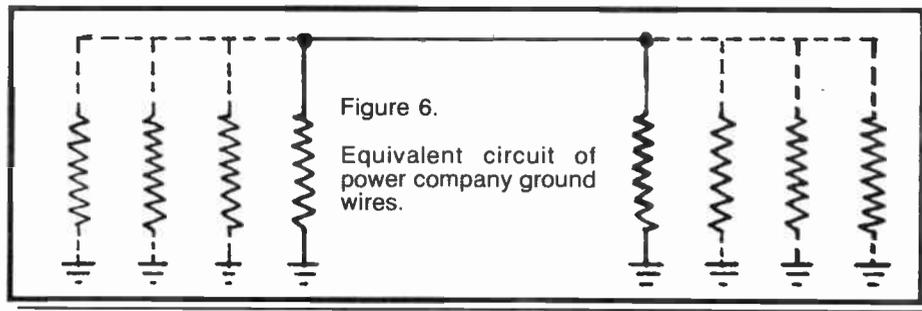


Figure 6.

Equivalent circuit of power company ground wires.

of the structures in question must be obtained before work begins.

You will often have to play the role of educator when talking to power company engineers and utility personnel, as they probably won't understand RF reradiation problems right off the bat.

Owners of water towers have a somewhat justified fear of corrosion through electrolysis if the mounting hardware for detuning wires is of a dissimilar metal.

It may be necessary to fabricate mounting brackets, etc. from the same

metal type as the tower before the utility people will agree to your proposal.

Restoring an antenna pattern by detuning reradiating structures is a costly and complex undertaking, requiring diligent ongoing maintenance after its completed.

It is generally wise to engage the services of a consultant before starting such an undertaking.

Special thanks to Ted Schober of Radiotechniques for sharing some of his detuning experiences with me.

Directional Antennas Solve FM Short-Spacing

(continued from page 25)

your completed application before you file it.

Most consultants are very conscious of the FCC's stringent application requirements, and are therefore very sensitive to what the FCC staff will look for.

Once the application is filed, you wait. Eventually, provided that you have done your homework and that everything in the application is correct and letter perfect, you will receive a construction permit in the mail.

Once you have the construction permit, you are ready to order the antenna. You must provide a copy of the CP to the antenna manufacturer, who will use the limits set forth in the CP to adjust the pattern on your antenna.

Sometime before shipment, the manufacturer will provide you with a proof of performance on your antenna. It is up to you to compare the actual field-measured values with the CP limits and give the final approval to the manufacturer.

Installing the DA

There is no great secret to installing a directional FM antenna. However, they are complicated, with many more parts than an ordinary FM antenna, and careful supervision of the crew assembling the antenna is a must.

Drawings and instructions provided must be followed to the letter.

When the antenna is installed on the pole on top of the tower (directionals always require a pole-mount), it must be aligned by a civil engineer.

Once the engineer has verified the mounting direction, he must provide

you with a sealed certification that the antenna was aligned on the proper bearing, as per the manufacturer's instructions.

Once the antenna is installed, coupled to the transmission line and transmitter, you can start program tests right away, right?

Wrong. This is the exception to the automatic program test authority rule.

You must first file the form 302 and request program test authority.

Along with the FCC form 302, you must submit the complete antenna proof of performance provided to you by the manufacturer. You must submit this to the FCC along with the Form 302 and your request for program test authority.

If everything in the 302 is in order, you should receive program test authority within ten days or so, probably by telegram.

Now you are ready to begin broadcasting at maximum facility power from your new system.

How well do FM DAs work?

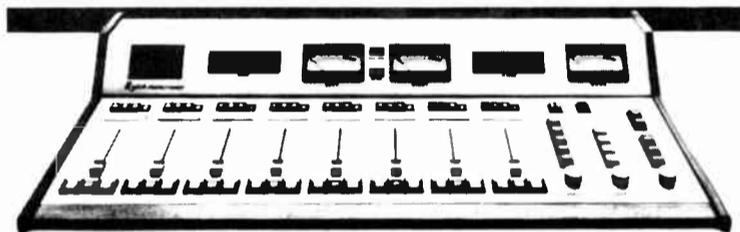
You should expect to see an increase in coverage area proportional to the increase in ERP in all directions except the short-spaced azimuth.

As with any antenna change, results can be misleading. Changes in fresnel zone clearance, Brewster angle, and other factors can lead to decreased or increased multipath in some areas.

Take a scientific approach to evaluation of the antenna's performance. If all was done correctly, you will see a proportional increase in coverage area.

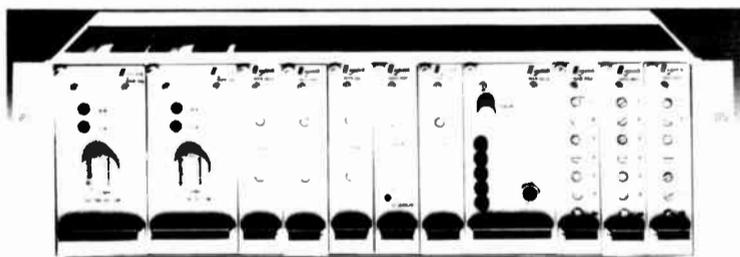
And of course there is the advantage of being able to say, "50,000 W" or "100,000 W."

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Circle Reader Service 16 on Page 28

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Circle Reader Service 22 on Page 28

One Start For Carting Up Music

by Philip Hess

Pittsburgh PA . . . Recently, at a college station I consult, I was asked by the program director to come up with a device that would improve the consistency of the station's carted music.

WPPJ, Point Park College, was rebuilding its cart library and encountering a few problems.

With several people involved in the project, the carts were inconsistent.

Philip Hess is an on-air announcer at WAMO-FM in Pittsburgh who has spent part of his seven years in radio learning engineering tricks of the trade. He can be reached at 412-366-1249.

Quality was suffering.

Some carts were too tight and "burped" when they recued, while others were so loose three or more seconds would elapse before the song began.

After I spent some thought and some time watching people cart the music something became certain.

Different people cart music differently. The CHR jocks would tightly cue the records and run their levels hot. But the AOR announcers would back-cue the record as much as a half turn.

Clearly some consistency and quality control were needed.

By the way, none of the announcers were monitoring the output of the recording deck in audition, and were

thus spending twice the amount of time needed to cart the song, since they would then have to listen to the finished product.

After digging in the parts box I came up with one idea and two KRP relays. Why not have the cart machine start the turntable with the press of one button? Thus, the "One Start" was born.

In order for this device to be used it had to be simple, easy and novice-proof. Being free or inexpensive would be attractive to station management also.

Since the ITC RP deck has a provision for a remote lamp for both the "Rec" and "Start" buttons, I used the contacts for these lamps to operate two 24 V relays.

The relays were connected in series to form a switch that paralleled the motor start switch on the station's QRK 12-C turntable.

A DPDT toggle provides a convenient bypass of the One Start should its operation not be desired.

Construction is simple. By using a double space rack panel already in place I secured surface mount relay sockets for both relays.

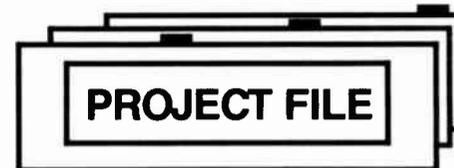
Then with a length of four conductor cable I connected the relays to the lamp circuits for the "Rec" and "Start" lights.

Finally, the turntable start switch was connected into the circuit with a short piece of zip cord.

Now the carts are right on the money.

The operator inserts a bulked cart in the machine, runs it to take up the slack and engages the record mode.

Next, the operator cues the record, backs it up a quarter turn and presses "Start" on the ITC deck. We get a consistent cart every time.



The station's staff liked the One Start so much they didn't stop at carting the older material in the library. They went on to cart much of the daylight (CHR) programming.

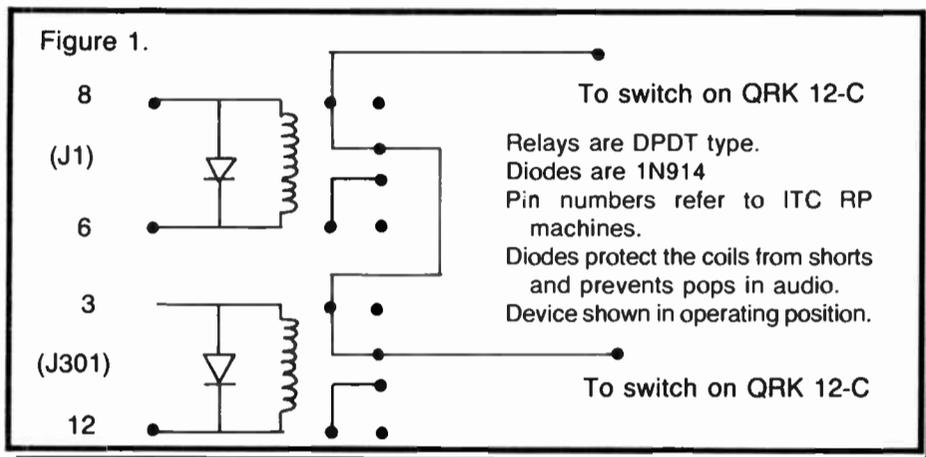
It would be easy to add bells and whistles to the circuit. But for a college station on a limited budget the cost was just right. Free (not counting the hour or so of R&D I put into it).

I used KRP relays out of an old remote control the station had laying around. You can use whatever you have handy.

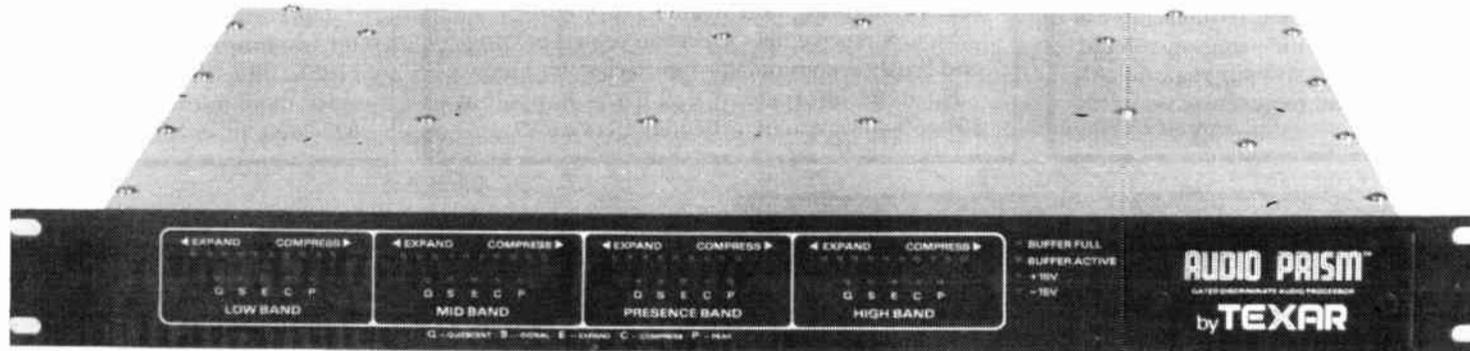
I hope you'll find this a workable solution for your station. Thirty some college kids won't part with theirs.

Note: RW does not guarantee the workability or safety of the projects printed here. Build them at your own risk and contact the author for more details.

If you have a build-it-yourself project, send it to "Project File" and earn \$25 if we publish it. Send to Radio World, PO Box 1214, Falls Church VA 22041.



ALL CD BY THE END OF THE YEAR!



That's the goal that many stations have set for themselves: to generate 100% of their music programming from CDs by the end of 1987. Using copyrighted station identifiers like "Lazer 104," broadcasters are able to position themselves in the listeners' minds as the high-quality music source. One promoted slogan is "Declare your independence from vinyl on July 4th 1987!" Surprisingly, it's not necessarily the big chain stations in major markets that are leading the charge. Medium and small market stations have shown themselves just as likely, if not more likely, to become leaders in their market.

Many of the early hurdles to on-air use of CDs have been removed. While early CD players were difficult to cue to music, making it impossible to run a tight air show, and were user-unfriendly, this has changed. Today's CD players (such as the Technics SLP-1200 and the Studer A725) feature instant start and incremental cueing, making it possible to cue exactly to any desired point in the music.

Many stations also questioned whether sufficient material, both oldies and current, existed on CD format to support all-CD operations. Oldies have come a very long way in the past few months. Several of the Beatles' albums have been released in CD format in just the past

few weeks, with more to follow shortly. And literally thousands of oldies titles are available on CD from Century 21 Programming in Dallas, Texas (214/934-2121). Each disc contains cuts from many different artists, so you don't pay for the album cuts that weren't hits. Each cut is a hit.

And more and more of the new release hits are being made available as a single-title CD. Under intense pressure from stations and also from influential program consulting firms like Burkhart/Abrahms/Douglas/Elliott, record firms are putting new emphasis on making hit releases immediately available on CD. Some record companies are getting the message slower than others, and are also finding themselves at a disadvantage when trying to get airplay for their new releases. Some stations simply won't add a title that is not on CD.

Why the big deal over CDs? Because today's listener has better equipment and is more quality-conscious than ever before. A higher-quality air product can translate into higher ratings and higher station revenues.

If you do or will originate a significant portion of your music from CDs, you should also consider the quality of your audio processing equipment. CDs deliver crisp, clear audio, but not all audio processors can preserve that quality. The digitally controlled TEXAR AUDIO

PRISM delivers the cleanest, powerful audio money can buy. All three networks have made multiple purchases of the AUDIO PRISM for their Owned and Operated radio stations. And the AUDIO PRISM has been the audio processor of choice for the top three rated FM stations in America's number one market, New York City, for seven Arbitrons in a row!

The secret? Digital control. Using digital technology allows the AUDIO PRISM to preserve the brilliance and quality of CD source material. On FM, the plug-in TEXAR Replacement Card Five (RCF-1) can add even MORE signal punch with no loss in quality.

For the complete story of how digital control can make you the quality leader in your market, contact your favorite distributor of high quality audio equipment, or call Barry Honel at (412) 85-MICRO.

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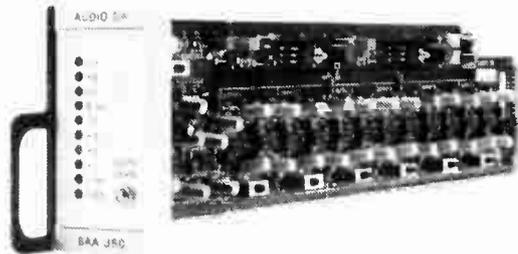
*Summer and Fall '85, Winter, Spring, Summer and Fall '86, and Winter '87 ARBITRON Ratings. Total Persons 12+ Share, Mon-Sun, 6AM-12M. (Used with permission.)

Radio World Marketplace

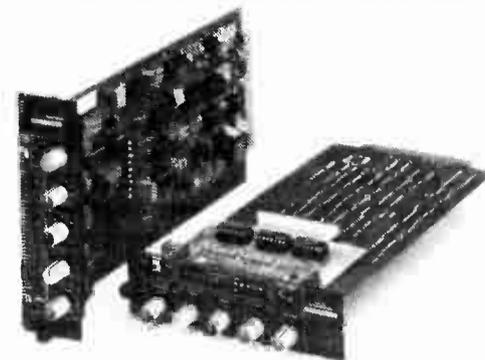
If your company has a new product you wish us to consider in *Radio World Marketplace*, please send a press release and black and white photograph to Radio World Marketplace, P.O. Box 1214, Falls Church, VA 22041



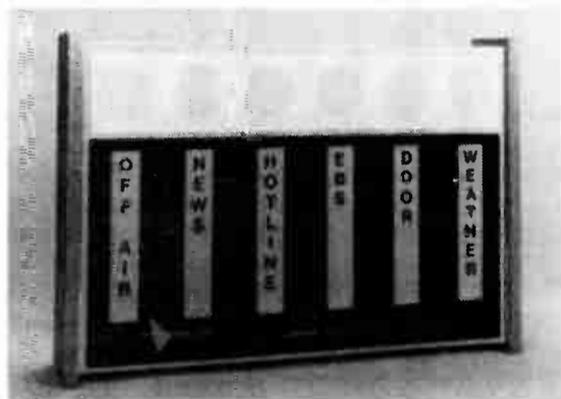
FM transmitters
QEI's new FMQ-series FM transmitters are available in 3.5 kW, 5 kW and 10 kW models. Each model is designed for quick field conversion to higher power levels. The 10 kW model requires no more rack or floor space than the lower power versions—each is housed in a single 24" wide rack cabinet. Each model employs a single tube in a grounded-grid design not requiring neutralization. The IPA section is a new modular solid state design. For more information, contact Ed Etschman at 800-334-9154, or circle Reader Service 77.



Distribution amp
BTS' new BAA-350 Audio Distribution Amplifier, utilizes totally transformerless techniques. A differential input buffer provides a balanced input for interface to either a balanced or unbalanced source, and provides common mode rejection greater than 70 dB up to 1 kHz. The output drivers are configured to drive either balanced or unbalanced loads. The measured THD is at or below the noise at any output level above 0 dBv. For more information, call Al Jensen at 801-972-8000, or circle Reader Service 75.



Audio signal processor
Valley International (formerly Valley People) recently introduced its Commander, the sixth addition to its 800 series line of modular audio signal processors. Proprietary symmetrical release coupling circuitry allows it to compress the audio signal for precise dynamic range control with complete freedom from noise level recovery. For more information, call Tom Irby at 615-383-4737, or circle Reader Service 72.



Alert monitor
Enberg Electronics' new BA-6 Broadcast Alert Monitor can consolidate station alert signals into a single location. Visual alerts can be EBS receivers, AP machines, weather bulletins, door switches, etc. Also, any of the monitor's six channels has the capability to display telephone ringing voltage. For more information, call your regional Allied Broadcast Equipment representative, or circle Reader Service 78.



Ceramic shafts for motors
AMP Services now has available new ceramic shafts for capstan motors, which it offers in conjunction with MCI capstan and reel motor remanufacturing and head relapping. Motors receive new precision sealed bearings and brushes, commutator resurfacing, and more. For more information, call Chris Rappolt at 305-659-4805, or circle Reader Service 79.



NRSC AM protector
Energy-Onix Broadcast Equipment has developed a line of equipment to meet the specific filter and pre-emphasis requirements recommended by the NRSC for AM. The line includes the AM Protector-Enhancer, which incorporates a built-in switchable pre-emphasis circuit and a low pass filter. The AM Protector has a proprietary circuit which compares the level of the high and low frequencies and prevents the high frequencies from falsely triggering the limiter circuit. The company also offers a stand alone monitor de-emphasis unit and an independent NRSC filter mounted on a PC board. For more information, call Bernie Wise at 518-828-1690, or circle Reader Service 71.

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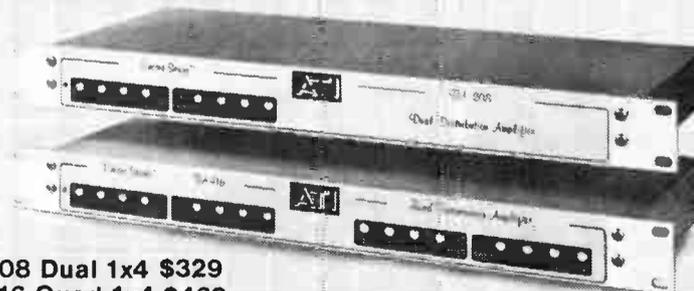
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BUYERS GUIDE

Consoles

AMX-22 a Multitask Natural

by Chris Durso, Asst CE
KPBS-FM/TV

San Diego CA ... Planning a production room from the ground up is a task requiring an engineer who is able to look into the future to predict the needs of the facility far beyond the time the last Molex pin is crimped.

When the time came to construct a new production facility at KPBS, out came the crystal ball.

What we needed was a console that would be easy to operate with a minimum amount of "patching," with built-in flexibility and a track record of high reliability.

We wanted a console that could adapt to, and be with us, in the future.

The image in the glass was clearly the AMX-22 from Pacific Recorders & Engineering Corporation.

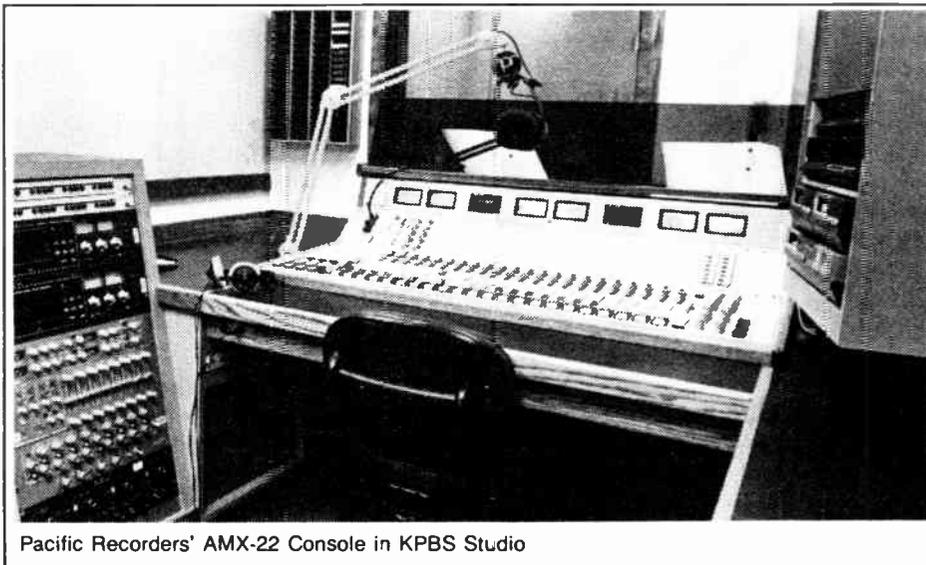
A natural for multitasking

When it comes to flexibility you can hardly shake a stick at three independent stereo audio busses. Any fader po-

User Report

sition can be assigned to any combination of the program, audition or utility busses.

This makes it simple to construct a mix-minus feed for remotes or telco backfeeds during call-in shows. For KPBS this flexibility translates into multitasking.



Pacific Recorders' AMX-22 Console in KPBS Studio

It is not uncommon for our AMX to be utilizing all three busses on the console concurrently for different purposes.

Our AMX-22 was shipped with nine microphone input modules and 13 line input modules. The console interfaces directly with two studios in the plant, each with four microphones and independent control and monitoring facilities.

This design allows one producer to supervise and record the activities in two separate studios at once.

With the two-studio talkback module installed, the operator in the control room can communicate directly and independently with each studio and one external source (i.e., the two-way system).

These features alone double the out-

put capability of the production room.

To use the multiple outputs of the AMX, each recording machine in the control room must be able to record from any source. This may be accomplished in a number of ways, the least desirable

of which is patchbays.

The most convenient method I've seen to date is the use of PR&E's LS-4 line switchers. These switchers are dual 4x1 passive switches packaged four to a box.

The console outputs feed the DAs which in turn feed the switchers.

Each machine has four push-button selectable inputs as follows: program, audition, utility and spare. (The spare input shows up on the patchbay.) Push-button source selection makes console configuration a quick and simple task.

Modern radio production often requires the use of equalizers and/or compressors to create a "sound." Above each fader module in the AMX series console is an option slot for a processor module.

Voice processor modules

Voice processor modules consisting of EQ and compression can be inserted above microphone modules and mono or stereo equalizers can be placed above line input modules.

(continued on page 34)

Digital is Detained

by Marlene Petska Lane

Falls Church VA ... "If it's digital, it's got to be good." That's what one manufacturer heard a CE say at the 1987 NAB Convention in Dallas.

But console manufacturers are not so quick to agree.

"There are a lot of things that are really neat to do in digital, and there's going to be a lot of exciting things coming in digital," says Jack Williams, president of Pacific Recorders & Engineering Corporation. But he adds, "I don't think consoles are going to be one of them."

Welton Jetton, president of Audiotronics, states his feelings more succinctly. "What's the point of having a digital console?"

Industry Roundup

There's no advantage to a (digital) console that just processes the signal and handles the routing of the signal," says Jetton.

Obviously, exactly what a digital console for radio would do is subject to differences of opinion. Manufacturers who are working on digital consoles must still address several design questions.

"As far as function, digital consoles, unlike analog consoles, are not rigidly defined," says Kristi Urquidi, senior engineer for Howe Technologies.

"Will the modules still be designed with specific functions such as EQ, pan, etc., or will each of the channels be "generic" and user defined? Will the console be driven with a CRT and keyboard,

or will functions be previously defined, and then assigned by pressing buttons?" Urquidi asks.

Digital performance

Even after these questions are answered, a digital console for radio by today's standards may not be everything that some CEs might expect—especially in the area of performance.

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A SUCCESS STORY

THE OBJECTIVE was no small task: design a radio console that would become the new standard.

THE METHOD involved listening to veteran broadcast engineers and installers. After all, they're the people who have seen and experienced all the ideas that came before. From this research we learned of the problems that had to be solved and the features that broadcasters required. We then added ten years of console building experience and innovation, and created the A-500a console.

THE RESULT: An unsurpassed console that exceeds prior broadcast standards. Its module/mainframe interface borrows from the computer industry, utilizing all-gold contact insulation displacement technology. The logic system is based on programming the module slot, allowing full module interchangeability. It also provides for separate programming of the module's "B" input selection, thus avoiding embarrassing false starts and mutes. Full console-to-machine control is supported without extensive use of interface boxes and cables. Three audio busses are provided to enhance talkshows and remote functions. There are separate processing loops for the speech and music paths, as well as individual channel insert points. A complete line of microphone and line inputs, remote selectors, and machine control modules is offered in virtually any combination, configuration or mainframe size you desire. The A-500a also features a full family of studio turret and turret components to ease facility design.

THE PERFORMANCE: Needless to say, it's a new age for audio, and the A-500a is a step ahead. While specifications don't say it all, ruler flat frequency response, .003% distortion, crisp square wave response and a noise spec that's unheard of deserve merit. Couple such performance, reliability and innovation together, and a new broadcast standard is set.

THE SUCCESS: WHEATSTONE broadcast consoles are installed in major markets all over the country, from frontline independents to national networks. They are in use right now at some of the world's largest institutions.

THE POSSIBILITIES: The possibilities are up to you.

 Wheatstone Corporation

6720 V.I.P. Parkway, Syracuse, N.Y. 13211 (315-455-7740)

BUYERS GUIDE

Small Studer Big on Features

by Carl Pedersen, CE
WPLN-FM

Nashville TN ... The Studer C279 professional mixer is ideal for use where physical space and portability are important considerations.

Public radio station WPLN has a classical format and does both remote broadcasts and on-site recording of performing groups.

Almost all of these are classical or acoustical groups and small in size, so proper recording or live broadcast can be handled by only two to six microphones.

The Studer C279 fulfills these input requirements, and the mixer's small size makes it easy to transport to and from remotes.

Input features

Features of the six input channels include mono balanced mic and line inputs and stereo unbalanced line input, phantom mic powering, gain trim control, channel EQ—LF and HF shelving type, pan control, PFL solo, auxiliary send for both pre/post fader and linear faders for VCA control.

Other features include built-in talk-back microphone/slate to program and auxiliary bus, balanced and unbalanced

User Report

stereo program outputs (separate sets) and PPM metering with stereo phase correlation.

Ease of use

A description of a recent remote broadcast will demonstrate the flexibility of this console. The broadcast was from the newly renovated Union Station Hotel (the former Nashville train station).

The broadcast lasted four days, with three hours of music and talk originating from the hotel lobby each day. The musical performances ranged from folk to classical.

Six microphones were set up for the music and mixed through the C279. A Shure M67 mixer was used to pre-mix four talk mics into a C279 mixer high-level input.

The composite mix was fed via two 15 kHz phone lines to the studio for broadcast. A mix, minus the remote, was fed from the studio over an additional phone line to the remote for monitoring.

The auxiliary mix on the C279 was used to feed a separate house PA mix to the hotel PA system and also to performer reinforcement speakers.

Since all the music was performed with no rehearsal, the PFL solo function was of particular help in setting up mix levels. The solo is also connected to a PPM meter, which is valuable in adjusting gain trim from optimum headroom on the input channels.

Performance and construction

The published electrical performance specifications for this console are in the Studer tradition. I won't mention them except to say that the measured speci-

cations of the unit WPLM owns exceeds all of the published specifications, which are exceptionally good.

The console is constructed using an all metal chassis and can be rack mounted with optional rack mount adapters. Modular cards are used for each channel and the power supply.

The linear faders are 4" throw and feel very smooth. They are also offset to reduce the chance of accidental

contamination.

An optional expansion unit is available which provides RIAA inputs, dbx type II encoding and decoding, 1 kHz test tone generator and fader start logic for all input channels.

The C279 provides the required facilities for remotes and recordings where a limited number of microphones is required. While the number of inputs is limited, the features, flexibility and qual-

ity of this console are similar to larger mixing consoles.

Editor's note: Carl Pedersen, who has earned a BS degree in physics, came to WPLN 13 years ago. He is also a public radio specialist/technical consultant for Broadcast Service Associates in Brentwood, TN.

For more information on the Studer C279, contact Doug Beard at Studer: 615-254-5651. The author may be reached at 615-244-4700.

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 - full function digital logic control • universal module positioning • full travel Penny & Giles conductive plastic faders • separate VU housing section for customer provided equipment
- As complete or as basic your budget allows, the Series 'S' offers McCurdy's unsurpassed audio quality and ultra-reliability. Simple economics with high-tech engineering. Another winning performance from McCurdy.

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BUYERS GUIDE

Vanguard Ends RF Problems

by Charles T. Wooten
Broadcast Consultant

Panama City FL . . . As a consultant for a large number of smaller market radio stations in the south, I could fill a novel with "war stories" about engineering problems that I have run into.

One of the most severe RFI problems I have ever encountered was at a small class A station, WWAV-FM in Santa Rosa Beach, FL.

I had a relatively easy task—install a small console to mix liners and commer-

cial cart machines in conjunction with a Transtar audio switcher for "Format 41."

A four channel, stereo console was ordered and installed. The console, manufactured by a prominent US

User Report

manufacturer, featured FET switching on the input to each mixing channel.

When the equipment was turned on, the VU meters pinned with RF. All kinds

of beads, transformers, chokes, aluminum foil and capacitors were tried in all kinds of combinations to no avail.

Formidable RF

A phone call to the manufacturer resulted in another console being shipped, as it was thought that the original was defective. Four days later the replacement console arrived. There was no change in the RF condition.

The station owner and I were about to pull our hair out as we listened to the RFI coming through the monitor

speakers.

We talked with Bill Turney, an equipment rep that had not sold us the console, who suggested that we try an ATI Vanguard console.

Eager to please

He spoke to the people at ATI about our problem and they were eager to supply us with a console to try out. They were confident that their console would operate without any problems.

I reserved judgment because I had experienced the RFI firsthand and had tried everything that I knew to rectify the problem.

A few days later the ATI Vanguard eight channel console arrived. I eagerly drove the 50 miles from my office to the station to see how it would fare. I was ready to have this "simple installation" out of the way.

Installation was a snap—literally. All connections are made with plastic snap-on connectors which fit over Molex-type PC board connectors.

A programmable plug on each input channel that sets the input level at either -20 dB, -10 dB, or +4 dB made for a speedy installation.

A quick trip to Radio Shack was

“ATI . . . told me that we wouldn't be returning their console.”

needed for an amplifier (the console requires a separate monitor amp) which I like since different applications may require various monitor amp requirements.

Beats "Brand X"

The console was powered up and behold, no RF! The station owner and I sighed in relief. ATI really knew what they were talking about when they told me that we wouldn't be returning their console.

The "Brand X" console was packed up and returned. I have to admit that they did return our money in a timely manner.

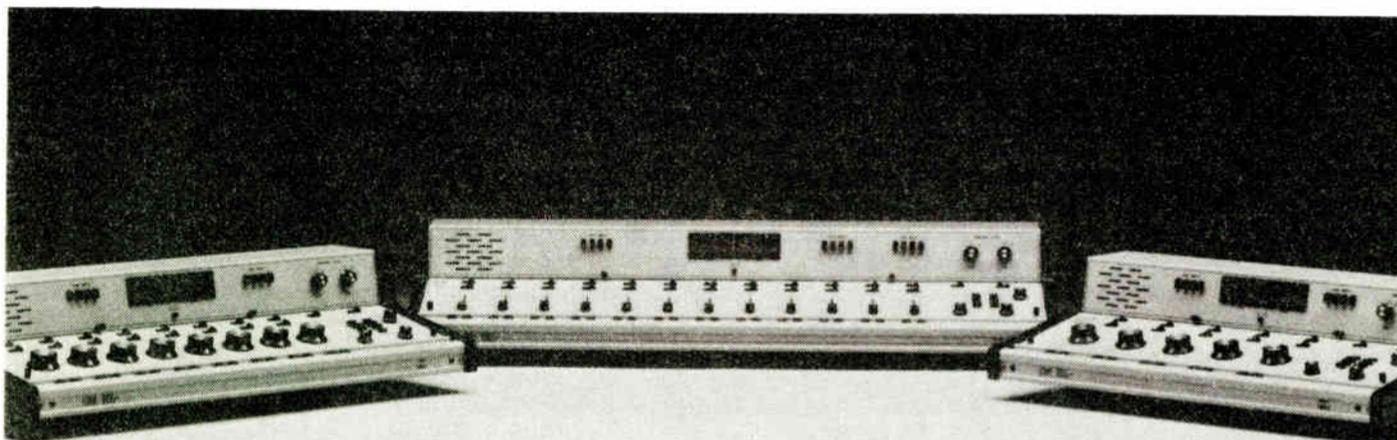
Since that day, the console has operated flawlessly with the exception of one instance when lightning took out the program amp in the board.

Since the console has two stereo program channels and the program amps are separate but adjacent, a simple plug and unplug operation was done to put it back on the air immediately. All ICs are socketed and repair was quick and easy.

Even if you are not having RFI problems with your installations, I think you will find the ATI Vanguard series will live up to everything that ATI says it will and more. I know WWAV plans to purchase another console for its production room later this year.

Editor's note: Charles Wooten is a broadcast engineering consultant serving radio and TV stations in Florida, Georgia, Alabama, Tennessee and Louisiana.

For more information on ATI consoles, contact Ed Mullin at 215-443-0330. The author may be reached at 904-234-0060.



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BUYERS GUIDE

Auditronics Impresses Voyager

by Carl W. Davis, VP
Voyager Communications, Inc.

Raleigh NC ... Choosing the right console is sometimes difficult because each station has different priorities and needs.

At the Voyager Group, we have purchased six 200 Series Auditronics consoles in the past few years. Each is custom designed for its particular use.

User Report

As is true of other high end consoles, the Auditronics is modular, which allows maximum flexibility in layout and function.

You buy only the modules you need initially. Later you can add on more as your needs and budget dictate.

All connections are easily accessible and Molex connectors make installation simple. With these connectors, changes are quick and solid connections are guaranteed. Remote and external logic connections are simple and straightforward.

Spilled coffee won't affect sound

The Auditronics 200 Series has super logic which makes it easy to interface with the "real world." Insert points allow you to interface outboard equipment either pre-fader or post-fader. At our stations, we use an Auditronics-supplied switch panel for cart sequencing.

The VCA control and Hall Effect switching make the audio performance outstanding.

Coffee spills have no effect on audio quality since the audio is outside the fader.

Our operators are most impressed with the noiseless switching. RFI is non-existent with Auditronics.

We have installed these consoles in studios next to transmitter rooms and have always been pleasantly surprised at the lack of RFI. Other consoles in these same studios have been mediocre at best.

Our engineers are impressed with the 200 Series because of the performance and ease of service.

Our dealer stocks loaners of every module in the console, which takes the heat off of servicing.

Station impressed

The factory provides prompt attention both on the phone and in their shop. You never hear that dreaded line, "Nobody else has that problem."

Our management likes the Auditronics from a cosmetic point of view. It is attractively styled and packaged; the wood and beige finish will match any decor. The surface is scratch resistant and maintains its good looks for years.

Our operators love the 200 Series. It is easy to learn and to use. They often comment on the quiet switching and quiet faders. Another operator favorite is the headphone tone controls.

The personalized equalization modules (PEQ) allow you to set each announcer's mic in a way that complements his or her particular voice. We have found this to be very important



Auditronics 218 Console in WRDU's Control Room

when dealing with a mixture of male and female announcers.

All of our Auditronics consoles have built-in compression and limiting on the mic channels. This is another valuable

option.

These can be set once and the cover plate installed to prevent tampering. A bar graph on the module constantly shows the action of the compres-

Autogram Called "DJ's Dream"

by Mark McVey, Grp Eng
Linder Broadcast Group

Ft Dodge IA ... Soon after our company purchased KRIT we felt it was necessary to rebuild the entire facility in order to be competitive.

Our choice of the Autogram R/TV-20 as our main control console was made for several reasons. Foremost, it was based on Autogram's past reputation of building consoles like tanks.

Also, the Autogram was a console an operator could use with minimum er-

“

*'It's simple.
I like it.
Why are you
bothering me
on the air?'*

rors. The technical specs were right on the money, and the standard features on the R/TV-20 were options on most other consoles.

Fewer on-air mistakes

We feel the console is a DJ's dream. It is very user friendly. Its 18 dedicated slide pots make for very few "on air" mistakes.

Each channel utilizes four lighted switches with a selection of audition, program or both. There is a switch for channel "Off" and channel "On"/"Remote Start."

The Penny & Giles faders control VCAs located on the channel board. The switches activate high voltage CMOS electronic switches to switch audio.

This keeps audio where it belongs on the printed circuit board instead of rac-

ing all over the console.

Lift the cover and you get a neat package consisting of a horizontally-mounted motherboard. All channel boards, output boards, mix-minus and preamp boards are mounted vertically with edge connectors.

Inputs and outputs of all boards external to the console are made with ingenious pluggable miniature terminal strips.

Neat ribbon cables connect DC to all front panel switches and faders.

The entire motherboard and cards are enclosed in a closed aluminum assembly to keep RF to an absolute minimum.

Channel board options

The channel boards give you the option of selecting 600 ohm terminated or 20,000 ohm bridging, with input sensitivity of -10 dB, 0 dB and +10 dB, and two fine adjustment trimmers allowing adjustment from +5 dB to -5 dB for further calibration.

Other options selectable on this channel board include mute/no mute, pre-fader—post-fader mix-minus, channel off enable/disable, reset/no reset, timer and remote slider enable/disable.

The output boards contain a processing patch in the event that you want to add processing at that point. Otherwise it is balanced bridging +8 dBm nominal.

There are left and right master gain controls located on the board as well as MOVs provided for lightning protection.

Microphone preamplification is done on a separate board. Each mic preamp board contains four separate mic preamps with the normal 150 ohm input impedance.

Output is 600 ohms designed to drive a normal 600 ohm or bridging type balanced or unbalanced input.

This allows you to use any of the 20 sliders as microphone pots. It also allows you to be creative with microphone processing external to the console.

You may add up to four more mic preamps, giving you a total of eight

sor/limiter.

My only suggestion for improvement involves the telephone module. Because so many situations are covered, it is confusing.

Auditronics does provide a mix-minus output to feed the telephone hybrid, but the operation of the module needs to be simplified.

There are more Auditronics consoles in this region than all others in its class combined. The reasons are simple—it allows the user to customize it to his budget and needs, it is simple to install and operate, it looks good, and most importantly, it sounds good.

Editor's note: Carl Davis, who has been in broadcast for more than 21 years, is a founder, past vice chairman and current certification chairman of local SBE Chapter 93.

For more information on Auditronics consoles, contact Welton Jetton at 901-362-1350. The author may be reached at 919-781-7333.

User Report

microphone preamps to work with.

A microprocessor board is available for automated, live assist stations that will control the entire station and print a log if necessary.

This board, in conjunction with the mono/silence sense makes for a safer automated operation.

The only problem with the console I can detect since its installation seven months ago has been premature lamp burnout.

I understand the Autogram engineering department is working on a solution to the problem, and will soon incorporate this into the console.

We are of the Top-40 type radio station where a lot of activity occurs in the station's main studio. So I thought you might be especially interested in what the operators had to say about the R/TV-20.

Morning Man Chris Robbins said, "I like the separate pots for each machine; the slides are less confusing." Midday DJ Carol Vohn said, "This is the easiest board I've ever worked."

Evening DJ Minnesota Maniac said, "It's simple. I like it. Why are you bothering me on the air?" And Music Director Dave Haldin said, "It exudes quality."

I feel the console was a great addition to the upgrades made at KRIT. It's a good choice if you are looking for durability, good technical specs, great options and simplicity.

Editor's note: Mark McVey attended Wichita Technical Institute and started his career at KSOK as an announcer. Since then, he has assisted in building and maintaining KBUZ, KLEE, KFMD and KDOG.

For more information on Autogram consoles, contact Ernie Ankele at 214-424-8585. The author may be reached at 515-573-5748.

BUYERS GUIDE

Arrakis Cuts Costs, Not Corners

by Mark Persons, Pres
MW Persons and Associates

Brainerd MN ... The Arrakis 500SC is a bit of a departure from what you would consider a standard, inexpensive eight-channel broadcast audio console.

Arrakis has taken a hard look at manufacturing techniques and has reduced by at least 50% the amount of labor required to build a console.

User Report

An inside look at the console shows most of the electronics are on three large printed circuit cards. Two cards handle four input channels each while the third card has stereo program, stereo audition, mono program mix, stereo headset, cue and mix minus amplifiers.

The customer must specify when ordering whether he wants stereo cue outputs or a mono cue and a mono mix-minus. The mix-minus is a full +8 dBm output and is perfect for use with hybrid telephone systems.

There are several schools of thought regarding large circuit cards handling a

number of console input channels.

One says that input amplifiers should be plug-in for quick repair and for input gain versatility to accommodate specific applications.

The other school says that module connectors are often a source of trouble. Eliminating them and building many input amplifiers on one board is better.

Arrakis has chosen the latter. They have also made changing input gain relatively easy.

There are resistor options with jumpers to adjust each input from mic to line level. Stereo-mono strapping is also possible.

The Arrakis 500SC is different from most other audio consoles in another respect. Audio gain is regulated by VCAs (voltage controlled amplifiers).

Audio gain controls on the front of the console are actually potentiometers determining a DC input level for the voltage controlled amplifiers (see Figure 1).

All audio is kept on the three large audio cards. It is never brought up to the front panel input switches or controls.

The DC control prevents noise from being added to the audio if it runs to the controls and back again. DC control also makes it possible to use a single section

carbon control and to achieve life in excess of 100,000 operations.

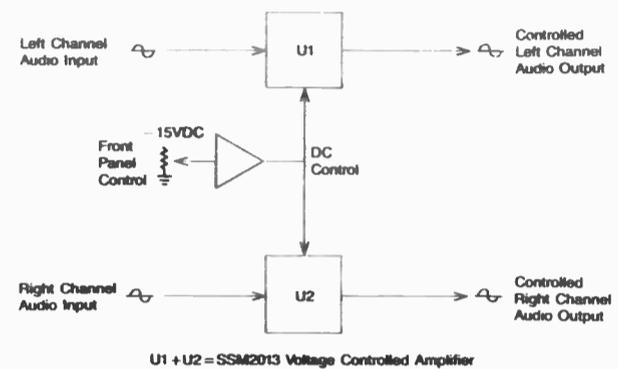
The controls are inexpensive and easily replaceable.

DC controlled VCAs can also give good stereo tracking. In this case, the manufacturer claims ± 1 dB tracking over a 40 dB range. This is as good or better than you will find on most step attenuators.



The upgraded version of the Arrakis 500SC, the 600SC, includes a clock and timer.

Figure 1.



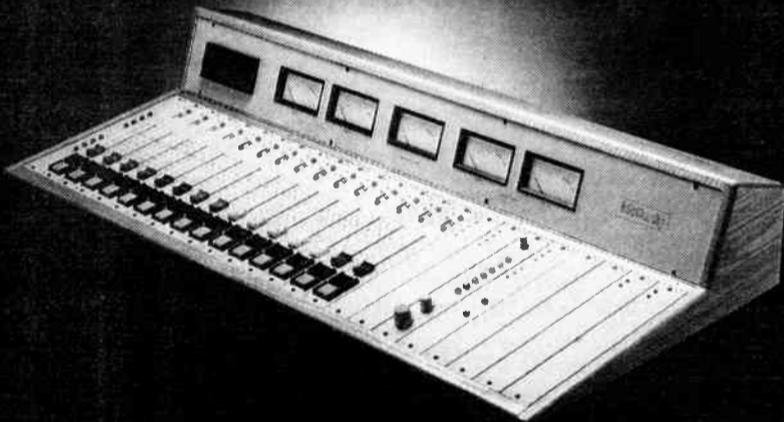
In fact, most rotary step attenuators have 2 dB steps. There is usually a point between each step where one of the stereo channels will step before the other when a control is turned up or down.

Left in one of these in-between positions, one audio channel can be 2 dB

hotter than the other on the air. VCAs with non-step input controls do not suffer from this problem.

Like many other high quality consoles the Arrakis uses an external power supply to keep hum and other noises away
(continued on page 37)

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Circle Reader Service 23 on Page 28

AMX-22 Installed at KPBS

(continued from page 29)

The KPBS console has a voice processor for the control room microphone and one for the main announce position in one of the studios. These modules eliminate the need to patch to the external rack equipment for most set-ups.

Insert points are available for each fader input for connection to external processing equipment.

One of the features that has proved to be most useful is the send/return module. The send bus can be a dual mono or stereo feed.

In order to clean up a phone feed that was recorded earlier, for example, the fader would not be assigned to anything except the send bus. The output of the send bus is patched to an equalizer in the auxiliary equipment rack.

The output of the processing gear is patched to the return module which is in turn assigned to the program channel.

If the send bus was selected post fader (pre/post selectable on fader module) the processed signal is controlled from the fader that the tape machine in this example is normalled to. This simplifies the mix process by keeping everything in its original position on the console.

Simple or sophisticated remote

Remote control of equipment can be simple or sophisticated. Separate A/B input logic is brought out to Molex connectors on the rear of the console.

Selection of studio muting is accomplished by a DIP switch on each microphone module. Optional tape remote panels were installed at KPBS to give full remote control of the MCI machines located behind the operator.

These remote panels operate in addition to the module start-stop functions. Module on, off, cough and talkback logic

functions are brought back from the studios for the microphone modules.

Installation is straightforward owing to the superb rear panel layout. All audio and logic lines interface to the console via Molex connectors.

Careful planning is the key to a successful installation. I would recommend a few chats on the telephone with the systems designer at the factory for some keen insight on how to get the most out of the console. I ended up with over one mile of wire in the production room!

Quality construction

All technical characteristics meet or exceed industry standards. The console is for all intents and purposes transparent. All linear faders are Penny & Giles Series 4000 conductive plastic.

Even the rotary faders (monitor and cue level controls) are conductive plastic. Line inputs and outputs are balanced, symmetrical input, instrumentation amplifiers.

Line output modules are electrically balanced also. An optional Jensen type JE-123A transformer can be installed in the output amplifier if desired.

The AMX-22 proved to be the right choice for KPBS. The new production room is capable of three times the output of the facility it replaced.

Based on the track record of the BMX console in master control, the AMX-22 should give us years of reliable service.

Editor's note: Chris Durso first entered into radio in high school, where he built a station. He is past chairman of SBE Chapter 36 and does contract work.

For more information on PR&E consoles, contact John Kenyon at 619-438-3911. The author may be reached at 619-265-5025.

BUYERS GUIDE

MixMinus Plus Gives Quick Fix

by Tom Koza, CE
KPWR-FM

Los Angeles CA . . . At KPWR we have a small "sub-production" studio that is used for simple production tasks, such as agency spot dubbing and tape editing. A few weeks ago we needed to record guest interviews via the phone lines.

We wanted the host (the console operator) to be able to converse with the phone-in guest using the console mic rather than the handset. This way, the interviews could be used on the air with good DJ voice quality.

console. It doesn't matter where you get the signal, just as long as it's post-fader, and before the mix bus.

In our Rockwell 212-P console, a solid state analog switch follows the output of the step attenuator, just before the summing resistors.

I tapped the audio at the output of the analog switch, ahead of the summing resistor. The audio level at this point was about -20 dBm.

The installation manual for the MixMinus Plus unit specified that the audio level at this "tap" point should be between -10 dBm to -28 dBm. Evidently this audio range is what you'd expect to

how to set the null. Basically, you just monitor the output of the unit and adjust the null until you get maximum caller audio rejection.

I used a pair of high-Z headphones and a dial tone to simulate the caller. After tweaking the Null Adj slowly, a deep null was achieved.

Since it was difficult to hear, I connected an AC voltmeter and re-tweaked. I got about 45 dB of dial tone rejection!

Once the unit is installed and adjusted, the MixMinus Plus output is connected to the hybrid's send input. The

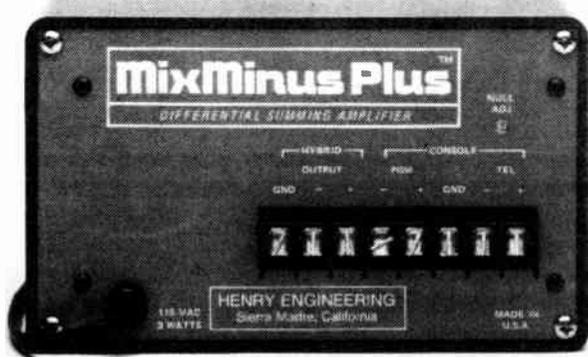
hybrid's send level control is adjusted to provide adequate program level to the caller. That's all there is to it.

MixMinus Plus is a simple gadget that solves a not-so-simple problem: adding a telephone hybrid to an older console.

With more and more stations using hybrids every day, I suspect this product will be a welcome addition to many engineers' "bag of tricks."

Editor's note: Tom Koza has been in radio for more than 13 years and is a ham radio operator and "happy father with two kids."

For more information on the MixMinus Plus, contact Hank Landsberg at Henry Engineering: 818-355-3656. The author may be reached at 213-467-1224.



Henry Engineering's MixMinus Plus

Since this required more than a simple "QKT" hookup, I installed a phone line hybrid unit that had separate send and receive circuits.

There was only one hitch: the Rockwell Mark 8 console in the studio didn't have the required "mix-minus" output to feed into the hybrid's send input.

A quick phone call to our equipment supplier provided the solution: a device called "MixMinus Plus" made by Henry Engineering.

MixMinus Plus is a "differential combining amplifier" that adds a mix-minus output to a console that doesn't already have one.

Its principle of operation is that the caller audio (hybrid receive) is subtracted from the program output of the console.

User Report

What is left is a program bus mix, minus the caller. This signal is fed to the hybrid send input, back to the caller.

Installing the unit

The unit is self-contained with an internal power supply. There are two inputs and one output. Installation is slightly different depending upon which console you're using, but the general idea is the same.

One input, labeled "PGM," is connected to the program output of the console.

The second input, labeled "TEL," gets connected within the console. You'll need to get out the schematic of your particular board to determine where the connection should be made.

The idea is to "tap" the caller audio just after the phone-channel fader on the

find at the output of most consoles' channel faders.

Incidentally, the level to be fed to the PCM input of the MixMinus Plus is nominally +4 dBm to +8 dBm, the usual output level for most consoles.

Setting the null

On the front of the MixMinus Plus there is a trim pot labeled "Null Adj." The installation instructions describe

BUYERS GUIDE CALENDAR

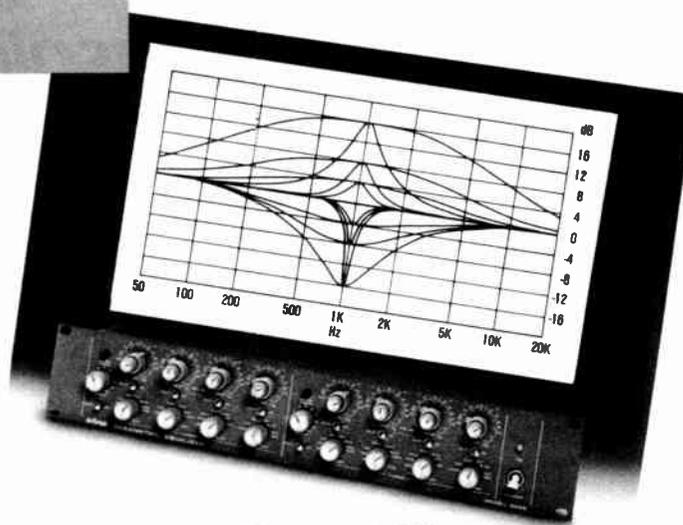
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BUYERS GUIDE

Wheatstone A-500a Willing, Able

by Joe Davis, CE
WETA-FM

Washington DC . . . The Wheatstone A-500a audio console, designed primarily for radio on-air use and production, utilizes a flexible modular approach and simple audio paths.

The console's layout is similar to many others. Each stereo line input module has illuminated on-off buttons nearest the operator for channel control and remote start-stop functions. A cue button is next, followed by a linear fader.

At the far end of the module there is a balance control, mono button, output bus assignment buttons, a stereo/left-only/right-only selector, and an A/B input selector. Microphone input modules are essentially the same, and phantom power is available.

There are three stereo line outputs (program, audition and auxillary), and a mono line output can feed from any of the three stereo outputs.

Inputs and outputs

The console comes with a control room monitor module. Any of the line outputs may be monitored, along with four external inputs.

The headphone source follows the monitor selector, and you can feed cue into the headphones with another button. The operator may adjust bass and treble EQ of the headphone output.

The console also provides programma-

ble speaker muting, and a speaker dim scheme is available for talkback and other cueing functions. A studio monitor module is optional.

Other options include an announcer's control turret, copystand and modules for telephone mix-minus, line preselector and tape deck remote control.

User Report

The VU meters are illuminated and easy to read, and a digital clock and timer are positioned in the VU meter panel.

In a typical setup, the timer is wired to reset to zero at the press of desired channel "on" buttons.

Exposed connections

The A-500a sets in a large rectangular hole in the operator's table or counter-top. Once set into position, the console's bottom cover may be removed to expose all console connections, which are all on the bottom.

You may butt the A-500a within an inch or two of a wall. The console stays in place, unlike some in which the main-frame is pivoted and the wire harness flexed.

The audio-in to audio-out path of the A-500a is straightforward and quite transparent.

This transparency is achieved through

several features. For one thing there are no transformers; everything is actively balanced. There are no VCAs either; the audio passes through the Penny & Giles faders.

Input module on-off audio switching is done with passive relay contacts. Audio ICs include familiar NE5532s, NE5534s and TLO72s.

Each input module has insert points for outboard processing. Input modules may be jumpered internally to feed one of two sets of program busses for separate processing of speech and music. All output modules have insert points as well.

Wheatstone elected not to do much fancy logic with the line input modules. They provide dry, isolated contacts straight from the channel on and off buttons for remote start-stop capability.

These are connected via the A/B input switches for separate logic for each

source. Remote channel on-off control and tally is brought out as well.

Microphone input modules have typical remote connections for on, off, tally and cough.

Logic in all input modules is done with standard TTL 7400-series ICs. NE5532 opamps are also used in the console's logic as comparator-style buffers.

Logical logic

Since Wheatstone has kept it simple, the logic is easy to trace and understand.

Some consoles give IC-timed pulsed control outputs for remote control. That's fine, but you generally end up buying or building an interface for each remote-controlled device.

Many sources require only a momentary closure to start or stop. The A-500a will let you connect these devices

(continued on page 38)

Digital Consoles Delayed

(continued from page 29)

Some are under the impression that a digital console will deliver more dynamic range than a high end analog console. This may not be true.

The confusion over analog versus digital performance lies in confusion of the terms "dynamic range" and "SNR."

Dynamic range is the difference between either no signal and distortion (in digital) or the noise floor and distortion (in analog). But, the noise floor to distortion in analog is not SNR. Headroom plus SNR equals dynamic range in analog.

In digital, manufacturers don't really specify where you are operating in the window of the dynamic range in order to tell you how much headroom you have and how much SNR you have. You are simply given an overall dynamic range figure.

"Don't be blown away by the number 96 dB," warns Williams.

Broadcasters, says Williams, tend to think of their consoles as having 70 dB SNR, and that digital will give them something they don't presently have. "But if they add in the headroom figure of their console, they're going to find out that they're very, very competitive with, if not exceeding digital performance," says Williams.

Digital limitations

It is difficult to measure digital signals the same way analog signals are traditionally measured. The noise character of analog circuits differs based on the noise energy at different parts of the spectrum.

In digital, noise floor is determined by the kind of digital system you are running, not by the quality of the circuitry, as in analog. And in digital, higher frequencies have more noise. The reverse is true in analog.

Thus, an SNR in digital equipment of 60 dB (on the supposition that you have set your operating level so your digital noise level is down wideband 60 dB) and an SNR in analog of 60 dB will sound dramatically different. The digital will be noisier, since the digital

noise is up where your ear is more sensitive.

Other digital drawbacks, according to Williams, include a bandwidth limitation of 18.5 to 19 kHz and the required use of sharp filters.

He says the filters can produce group delay distortion effects, which may be audible to some individuals, while the analog medium can tailor off the response to prevent these effects from showing up.

The most obvious disadvantage of a digital console for radio, however, is cost—at least for now.

"I don't see how you can justify the cost," says Jetton. "Of course, the cost will come down with time as technology improves."

Digital coming, eventually

Despite the problems that need to be overcome, most manufacturers do see the digital console making its way to the radio studio. It's only a matter of time, they say.

"We think it will be at least three to five years before digital consoles will begin to be in demand by a significant number of broadcast stations," says Gerald Ellis, senior technician for Howe Technologies.

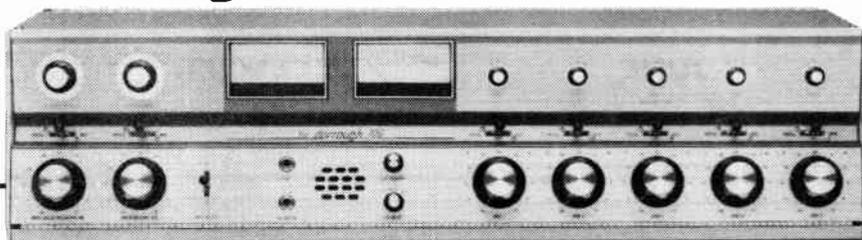
Steve Gordoni, national sales manager for RAM Broadcast Systems (distributor of McCurdy consoles), says he sees digital consoles coming to radio "in four or five years . . . because I think broadcasters—at least the purest of the bunch—are going to want to get as digital as possible."

The fastest growing area in radio where manufacturers see the digital console making inroads is in production.

"I see stations wising up and seeing that there's an extra source of revenue for them if they go into full production. RAM is very interested in this," says Gordoni.

"And, in production, digital consoles will be more versatile than analog in that you can program them to be whatever you want, he says. "I see that as a definite plus for the future."

Dorrrough Electronics Introduces

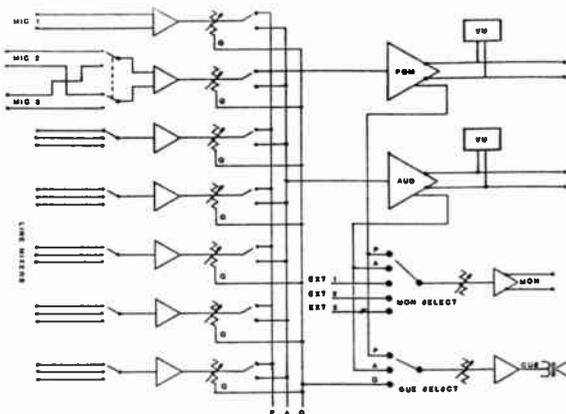


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BUYERS GUIDE

Ramsa Elected for Multitracking

by Geary Morrill, DE
Mid-West Family Stations

Lansing MI ... Once we decided to construct a multitrack production facility at WITL, we began looking for a console that would give us the performance and flexibility we needed at a price we could live with.

We wanted to eliminate patching requirements if possible, to simplify operation for our staff. Most had little or no

User Report

experience with multitrack production techniques.

The Ramsa WR 8616 was our answer.

Modular design

This unit, designed primarily as a post production console, can be equipped to meet almost any need by careful selection of optional input modules. These include mono input module, stereo input module, basic group module and tape monitor group module.

The console will support up to sixteen input modules and up to a total of four Basic Group and/or Tape Monitor Group modules. It comes with a Talkback/Oscillator module, a pair of Master Output modules and a Monitor module standard.

Bar graph LED metering is provided on the inputs, and analog meters (with peak indicators) are available for all output busses.

In cases where metering is only occasionally used (like effect, mono, send and group busses) it is push button selectable between two busses.

The console supports four output busses (ideal for four-track applications) in addition to the stereo output bus and mono output bus.

Left and Right Monitor sends and Effect sends are also available.

Arrakis Cuts Labor Costs

(continued from page 34)
from audio circuits.

Rather than go through a design process involving a lot of thought and engineering time, Arrakis chose to use an off-the-shelf high efficiency switching power supply from Power-One.

This company and several others make prepackaged power supplies for everything from vending machines to computers.

Power-One is in the business to supply the power needs of all kinds of electronics and they do it well. Reliability figures are incredibly good.

Short circuit current foldback and over voltage protection are provided as well.

Arrakis has provided relay closures for remote starts when a channel is put in program, audition or both. The closure has a jumper option for momentary or continuous closure.

This kind of versatility makes an engineer's job a lot easier during initial installation and during changes later on.

Audio specifications of the console are excellent.

Individual input modules are provided with built-in equalization. There is basic "boost and cut"/high and low pass two-band EQ in the stereo modules, and a more sophisticated "quasi-parametric" style three-band EQ in the mono modules.

WITL set-up

The mono modules are also equipped with pan pots to move a mono image around in L/R domain.

Any input module can be assigned to any program bus, or sent to monitor or effect busses.

In our application, three of the four group output busses were set up with basic modules; the other was set up with a tape monitor module.

The Ramsa WR 8616 has summing and output capability on the basic module, with the addition of a four in/four out monitor mixer, allowing four-track monitoring without assignment to any bus.

THD on the console is less than 0.3% at 20 Hz, less than 0.1% at 1 kHz to 20 kHz, typically 0.05%. Equivalent input noise is -128 dB maximum, typically -132 dB.

Crosstalk is specified at 60 dB at 1 kHz, and CMRR is 70 dB, typically 80 dB when 74 dB of mic gain is used.

Installing the console was easy, as all

input and output connections are made through XLR type connectors or 1/4" phone jacks.

Remote start and stop for six devices through dry switch contacts are built in and available on a rear connector. We are

contacts to switch an external relay solved this problem nicely. (Hint: Use a connector in this line so you can remove the module for service.)

Perhaps this could be added as a strapable option on the modules in the fu-

“ “
If you're looking to get into multitrack production, but the cost of the console has held you back, look at the Ramsa.
” ”

co-located with our transmitters (AM and FM) and have experienced no RFI problems whatsoever.

Modifying for radio

The only area where the console required some "help" was in the muting arrangements. As you might suspect, recording studio consoles are not designed for the engineer and talent to be in the same room.

In broadcast use, however, not only are they in the same room—they're frequently the same person!

Replacing the existing "channel on" switches with the 4PDT version used on the stereo modules (Part #YWSUN104-GSND) and utilizing one of the extra

ture.

Our staff has found the Ramsa console straightforward and easy to use without extensive training.

If you're looking to get into multitrack production, but the cost of the console has held you back, look at the Ramsa WR 8616. Your ears (and your pocketbook) will be pleased.

Editor's note: Geary Morrill's 15 years of experience in broadcast serve him well at Mid-West Family Stations, where he is responsible for the technical operations of 18 stations.

For more information on Ramsa consoles, contact Panasonic at 714-895-7200. The author may be reached at 517-393-1010.

McCurdy "S" Precursor to Digital

by Steve Gordoni, Nat'l Sales Mgr
RAM Broadcast Systems, Inc.

Palatine IL ... During research for the McCurdy "S" Series console, we determined that one of the most common mistakes made by a combo operator occurs when he or she switches from one source to another on a single input channel.

To prevent errors from happening,

standard input modules for the "S" Series have only one designated input source. This is a departure from the past emphasis on up to four inputs per channel.

Console remote selector module

The economics of the "S" console allow you to purchase more input channels for your additional sources.

To handle multiple remote inputs, a "Console Remote Selector" module is available; it provides for up to eight additional sources to be selected. The module may be wired to any console input module.

Since this is an "On Air" console, there is no need for a program bus On switch. Program is always assigned to the channel that is turned "On."

The audition bus is activated by the "Aud" switch.

A separate bus is provided for telephone interfacing (mix-minus).

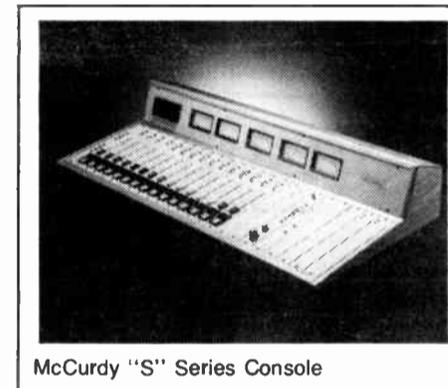
This bus can be turned on by selecting the "Phone" switch located on the top of each input channel or by preassigning through internal strapping.

There are two ways the "S" Series may be powered. A power supply module has been designed to fit into the right side support module area.

One supply will power a 12 input module console. Two supplies are needed for the larger consoles.

Should you need the space in the support area for other modules, a 1 1/2" power supply rack frame is offered that can be mounted externally to the console.

A new concept has been applied to the



McCurdy "S" Series Console

old idea of the meter housing. This is due, in part, to the modular design of the meter bussing.

Meter housing

For example, RAM custom cabinetry will provide a housing that contains a built-in overbridge with rack space for cart machines, processing, video monitors, etc.

There are also plans for an extended housing that will have an integrated copy stand.

Custom housings can be designed to meet special requirements.

Of course, a standard housing with VU or peak meters is available to fit any console size.

The "S" Series console has laid the foundation to take broadcasting into the digital era.

McCurdy has accomplished its goal of providing a mixing console that is affordable for small markets, but flexible enough for the largest of markets.

Editor's note: For more information, call the author at 312-358-3330.

BUYERS GUIDE

Long Life Predicted for BE 8S250

by Wayne Weese, TV Tech
KWCH-TV

Hutchinson KS . . . In this high-tech age where advances are made almost daily, we here at KWCH-TV were a little unsure of what we'd find when we went looking for a new audio console last year.

We wanted a relatively simple and inexpensive product, but one that would provide dependability and stand up to our versatile needs. Were we asking too

User Report

much? Was there a console out there that would meet our demands?

I'm happy to say we found one—the BE (Broadcast Electronics) 8S250.

Our needs here in Hutchinson, KS probably aren't much different than many other small operations across the country. We are a bureau for the main station in Wichita, but that doesn't mean our standards are lower here.

No skimping

In the Wichita/Hutchinson market, KWCH-TV is number one in overall programming from sign-on to sign-off.

We are not about to skimp on audio quality, especially when we are expected to produce live programming at various times throughout the day, as well as produce commercials for local clients.

We especially value the BE 8S250 for its simplicity. We only have one person

in the director's booth, and the BE audio console is ideal for a one-man operation.

It's easy to operate and preset. A flip of the bay switch puts it on line. And, it's compact enough to fit conveniently in our limited space so our director has all the buttons at his fingertips.

We use the console for eight microphone inputs including sound from our two video tape decks, a cart machine and a tone generator.

I can't stress enough how perfect this 8-mic machine is for one person to run.

A director has enough to do without worrying about where the audio switches are.

The director has to shout orders to the tape person when to roll video, tell the camera operator what the next shot is, and punch up the character generator to put words on the screen.

On top of all that, there's the need to make sure the proper audio channels are turned on, and the BE console makes that an easy task.

An Edison not needed

One of the questions an engineer is sure to ask about any product is, "Is it easy to install?"

We engineers like to tinker with new toys as long as they don't overwhelm us. We want a product like the BE console that is fun to work with and easy to operate.

In fact, I couldn't believe the simplicity of wiring the console for service. It doesn't take a Thomas Edison to install or operate it.

Anyone who can read directions and flip switches can put it to good use. It's an engineer's dream!

In planning this article, I tried to think

about the problems I've had with the product. I want to be honest with any prospective buyers out there.

But talking about problems with the gear is something I may not be able to do for a long time to come. We've been using the console for nearly a year and a half and have had *no* problems with it whatsoever—not one minor failure.

And to tell you the truth, I don't expect any malfunctions with it. The BE 8S250 is such a well constructed, dependable product that there aren't many things that can go wrong with it.

Consoles, like humans, eventually grow old and break down. But I can safely say the BE 8S250 should have quite a long life span.

Editor's note: Wayne Weese has been with KWCH-TV Channel 12 for 29 years. He is a graduate of Central Technical Institute, Kansas City, MO.

For more information on BE consoles, contact Steve Ford at 217-224-9600. The author may be reached at 316-665-5503.

Wheatstone Attuned to Radio Needs

(continued from page 36)

straight to the console, since the console's remote control connections are merely a set of the actual button contacts.

The console does not have the typical epoxy style printed circuit motherboard.

Module interconnects are made with standard PC edge connectors that connect via insulation displacement with two sets of 50-conductor flat ribbon cable running the length of the console.

I was leery of that approach at first, but it has worked well. Wheatstone points

out that the computer industry has been successfully using this technique for years.

Outside story

The A-500a is an attractive console. The modules are painted light brown. Oak trim lines the sides and front of the console. The black VU meter panel contrasts well with the VU's light color.

I have installed three Wheatstone A-500's in the Washington DC metropolitan area over the last two years, and here at WETA we are currently installing two A-500a's.

The A-500a is identical to the A-500, except that the stereo line input modules have an optional stereo/left-only/right-only input selector. These three buttons are alongside the module A/B input switches.

While these consoles are not in operation yet, I wonder if operator confusion may result from the button's location just alongside the A/B input buttons.

The earlier consoles came with very lit-

tle documentation. Prints were enclosed showing module schematics and bus designations, but the installation instructions were quite brief.

Also, the prints did not specify component numbers ("C-4," "R-18," etc.). Wheatstone has since updated the schematics and currently supplies detailed installation instructions with each console.

Wheatstone has been making consoles aimed at radio broadcasters for only a few years now. The factory has been all ears regarding improvements, and that has shown up in the newer consoles I have seen.

In addition, Wheatstone is willing to do custom work on its consoles for any special features needed.

Editor's note: Joe Davis is an SBE-certified engineer with 12 years of experience in broadcasting.

For more information on Wheatstone consoles, call Tim Guhl at 315-455-7740. The author may be reached at 703-998-2790.

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Dorrrough Box Debuts

by John Churchill, Eng
Dorrrough Electronics

Woodland Hills CA . . . Dorrrough, a company that introduced the concept of tri-band processing and the display of both peak and average amplitudes on a single scale loudness monitor, has thrown its hat into the console manufacturing ring.

The Model 700 Dual Mono console is the result of an observation that radio stations are looking to consumer oriented products, such as compact disc and tape cassette decks as the source of programming.

The output of most consumer audio products is unbalanced with an output level of -10 dBV and want to look into an impedance of approximately 10K ohms.

The Model 700 incorporates unbalanced bridging on its Hi Level inputs and has trim pots on each of those 15

inputs (three per each of five mixers).

This feature allows the mixture with standard broadcast equipment with its +4 dBV or +8 dBV output levels with -10 dBV levels, maintaining the attenuator input at a constant location level.

Program masters can now be located internally, as there is no need for the operator to compensate for any input level differences.

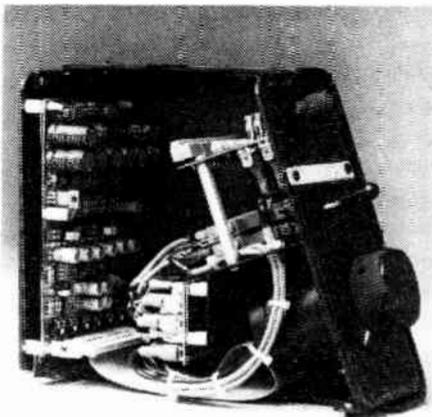
The console uses quality stepped attenuators, telephone type key switches for program/audition switching and has plenty of headroom with a +26 dBm output. There is also provision for three external inputs.

Connections to the console are by XLR connectors for the mic inputs and barrier strip for high level inputs and outputs.

Editor's note: For more information, contact Dorrrough Electronics at 818-999-1132.

Contact Radio World, P.O. Box 1214, Falls Church VA 22041
for availabilities. Phone 800-336-3045

BUYERS BRIEFS



Radio Design Labs, a newcomer to the broadcast market, recently developed a new audio console called the Pod-U-Lar™.

The console's universal source POD is designed with a true instrumentation input amplifier.

The user may jumper select input levels from mic to line with individual input level adjustment within the selected range. Thus there are no installation restrictions on the number of mic or line inputs available.

Each POD is interconnected through a common bus arrangement, and all mix busses are balanced.

Each POD uses an A/B input select through a military style, sealed Grayhill rotary switch. A remote start function can follow the input select.

Program/Audition selection is done with the heaviest key switch available. Rotary step attenuators with cue round

out the front panel.

The output POD contains the output amplifiers, digital metering and monitor selectors. Unique to the output amplifier card is the ability to select left, right or auxiliary summing input.

The output circuitry contains a distribution amplifier providing three separate balanced program and audition outputs per channel with 18 dB headroom. Digital metering is provided.

The power supply is outboard of the console and designed to mount under a counter top with a headphone jack located at one end (or it may be rack mounted).

A true 40 W RMS is provided to each of the studio speaker outputs, replacing the need for additional monitor amps. 12 W RMS is delivered to each channel of the headphone outputs (with ample voltage swing capable of driving high impedance headsets).

Each POD has active electronics, mounted on a hinged back door that is easily accessed. An input card can be removed without disturbing the balance of the console function and all IC components are plug in.

The user can arrange the location of input PODs and output PODs. PODs may be configured in a straight line, a semicircle or even separated for a news/talk facility.

For more information, contact Jerry Clements at Combined Media Corp.: 805-684-5415, or circle Reader Service 53.

JBL/UREI Electronic Products' 1650, 1680 and 1690 series consoles offer a choice of five, eight or 12 mixers and a choice of attenuator types as well. There is provision for customization to fit individual station requirements, but no accessories are required to put them on the air.

The UREI consoles have high output capability—+24 dBm into 600 ohm loads—so that dynamic program material can be handled without clipping.

An overload indicator LED is located between the VU meters.

Its threshold can be internally adjusted to alert the operator that a downstream device, such as an STL, may be clipping.

The SNR of the mic channel from input to console output is better than 74 dB with -50 dBm input and +4 dBm output, or better than 90 dB referenced to maximum output.

At the full output level of +24 dBm into 600 ohms, the THD of both program and audition channels is less than 25% over the range of 30 Hz to 15 kHz.

For more information, contact Rita Veix at 818-893-8411, or circle Reader Service 59.

Howe Technologies' Series 10000 console is a low profile console designed for both on-air and production use.

The three-tier modular design allows for expansion of size and features. Mainframe chassis are available in two sizes. One houses 14 modules; the other four modules.

These units may be arranged in any combination to create a mainframe of up

to 36 modules.

Full program output submix capability including utility is provided.

Various accessory features and interchangeable modules are available, including pan, solo, 10 position remote input selects, tape remote control units, reference tone oscillators, multiband equalization and more.

For more information, contact Kristi Urquidi at 303-444-4693, or circle Reader Service 55.

Harrison's AIR-7/PRO-7 series of modular audio consoles was developed for broadcast on-air or production use.

The motherboard, meter bridge and frame for the AIR-7 and PRO-7 are nearly identical, differing only in the types of modules and accessories.

Modules and mainframes are interchangeable.

Mainframe sizes include 16, 20, 28 and 32 slots across. Each slot is approximately 1.7" wide.

The hinged meter bridge is made up of 6" x 6" Lexan panels. Each may house a cluster of four moving coil meters, four 36-segment LED bar meters or one of two selectable clock/timer modules.

All inputs and outputs to the PRO-7 console are electronically balanced and floating.

The main gain control fader of each module is implemented with a voltage controlled amplifier and a voltage generating fader unit.

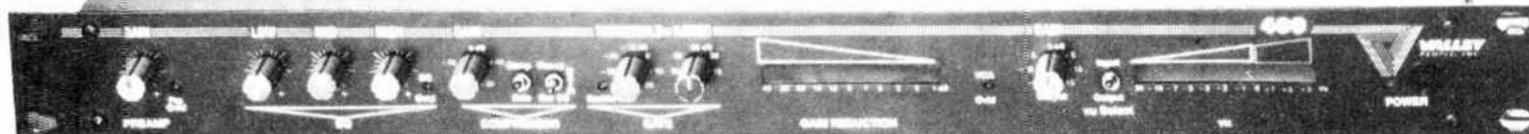
For more information, contact Martin Burns at Harrison Systems: 615-834-1184, or circle Reader Service 57.

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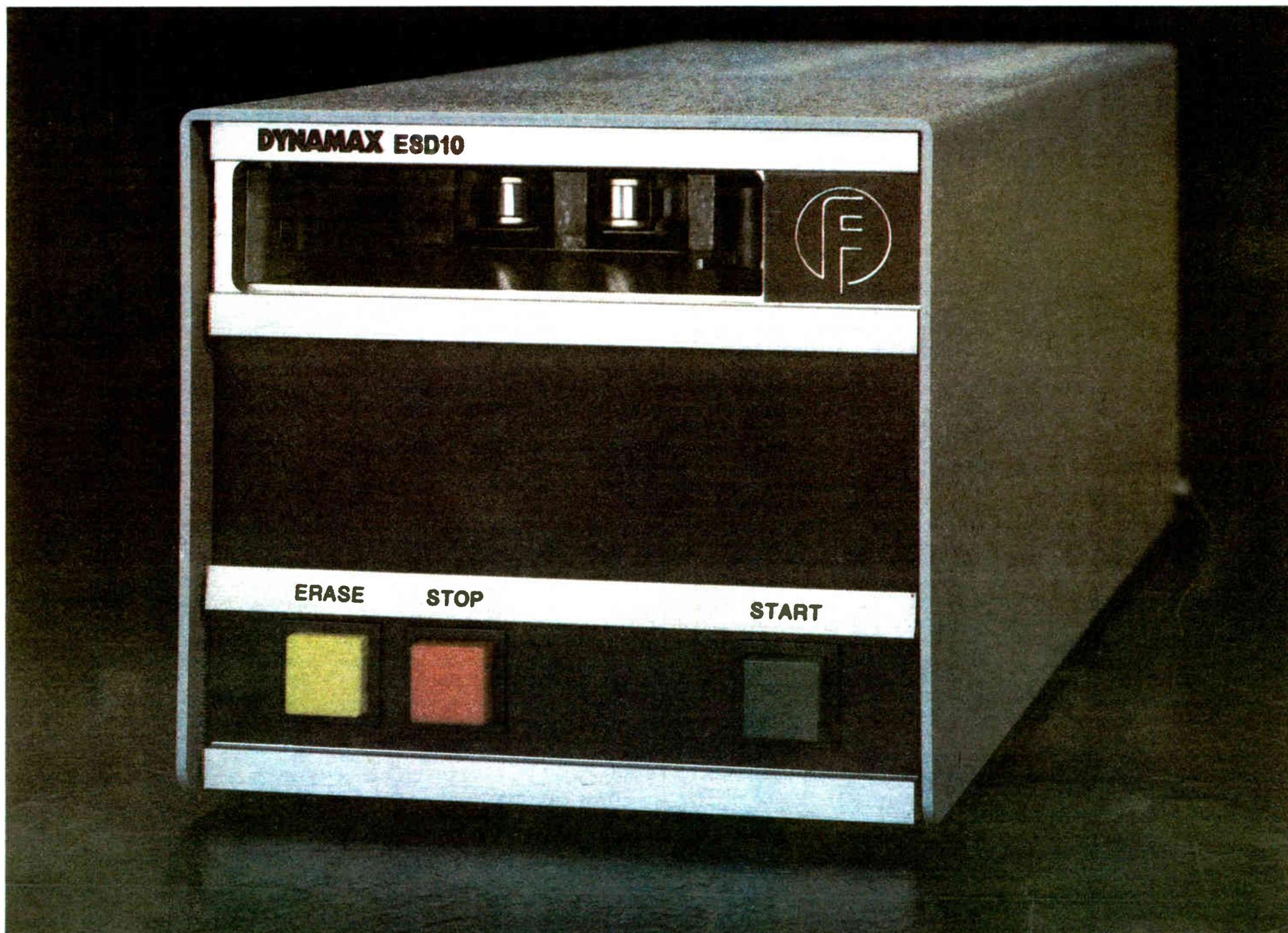
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