

Radio Guide

Radio's Technology Magazine

May 1992



Station Stories

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*All Digital WIXC
Has Engineer
At The Helm*

JG's Earwaves - Pg. 8

Empty Pockets and a Hot, Hot Hall

Tips From the Field - Pg. 18

Tangled Patch Cords (and more)

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Raymond C. Topp
President/Publisher

Bob Dennis
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Art Constantine
Vice President Sales

Judith Gross
Editor

George Whitaker
Tech-tip Editor

Scott Fitzpatrick
Washington Bureau Chief

Steve Shrader
BBS Editor & Sysop

Gordon Carter
Studio Editor

Business & Production

Raymond Topp - Publisher

511 18th Street SE
Rochester, MN 55904
Phone: 507-280-9668
Fax: 507-280-9143

Editorial Office

Judith Gross - Editor

101 S. Reynolds St., Ste. H-405
Alexandria, VA 22304
Phone: 703-370-7943
Fax: 703-212-0838

Advertising Sales Office

Art Constantine,
VP Sales and Marketing

200 S. Van Dorn Suite A-112
Alexandria, VA 22304
Phone: 703-212-0622
Fax: 703-212-0838

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Reader Service #047

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Publisher's Page - Editorial

Equipment Guide and Radio Guide BBS, New Information Services For Radio Guide Readers

By Ray Topp, publisher



Equipment Guide

Occasionally, a service is created that generates response exceeding all expectations. The Equipment Guide classified ad fax service is one such service. The evidence? In just over a month of operation, the Equipment Guide has been handling hundreds of your calls each week.

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We need your input. Let us know if there are any changes, improvements or additions that you'd like to see on the BBS. Call us or leave a message on the BBS system, and we'll talk about it. The purpose of this BBS is to support you and your engineering activities. We'll do what we can to make that happen. R.T.

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Reader Service #048

New Ownership Limits to Stand

By Scott Fitzpatrick, Washington Bureau Chief

Despite grumbling from Congress and a wide range of discussion during the NAB convention in Las Vegas last month, the Commission is sticking by its ownership rule changes. Mass Media Chief Roy Stewart has said the changes will go into effect on August 1.

FCC Chairman Al Sikes conceded at a Las Vegas press briefing that some of the numbers may be worked around, but Sikes' support for the new 30-30 caps was echoed by James Quello, who called the changes a "common sense" approach.

There's some concern over the use of Arbitron ratings to include a station in a particular market's count and to tabulate market share for total number of stations owned. But generally the rules as written are expected to stand.

To sum up, in addition to the 30-30 cap and to the viewing of LMAs as part of the total ownership, the limits per market are as follows:

Markets w/less than 15 stations: 3 stations per owner (no more than 2 FMs and no more than 50% of market total).

Markets w/15-29 stations: 2 AMs and 2 FMs per owner (no more than 25% of market total).

Markets w/30-39 stations: 3 AMs and 2 FMs per owner (no more than 25% of market total).

Markets w/more than 40 stations: 3 AMs and 3 FMs per owner (no more than 25% of market total).

The grumbling in Congress was heard in hints of threats to revisit the rules. At one point, Telecommunications Subcommittee Chairman Ed Markey promised to introduce legislation to reinstate the previous 12 AM-12 FM limits. Many other senators and representatives expressed grave doubts about the plan.

Also upset about the rule change is Commissioner Andrew Barrett, who abstained from voting in protest for what he considered hasty action, call-

ing it: "long-term solutions to a short term economic problem."

Barrett said his abstention was to draw added attention to what he pointedly referred to as inadequate research. "This should not have been a decision to provide relief to the radio industry by blindly eradicating our structural rules and attendant public interest concerns," said Barrett.

He added that he felt "the Commission embarks on a quick-fix program that will result in shorter-term bursts of radio station trading. The beneficiaries of such shorter-term activities will be station brokerage companies and a few large group owners with deep pockets."

An angry Barrett also said, "I am sorry the American listening public and the radio industry will be required to withstand the gross experimentation undertaken with the ownership rules."

Other Rule Changes

The FCC will review the comparative hearing process to examine integration credits (the amount of preference an applicant receives for promising to work at the station), proposed program service, past broadcast record and auxiliary power, as well as awarding a preference for the first person to find and apply for a station.

In addition, in a move reminiscent of the anti-trafficking rules, the FCC is considering a credit for those who promise to operate the station for three years. The Commission would like to set up a concrete point structure for preferences, with given values for each applicant, rather than the current confusing system.

Finally, the FCC wants to reconsider the basic attribution of ownership (the amount a person can own before he is considered having an ownership interest). Currently, anyone with more than 5% is considered an owner, but the FCC wants to raise that to 10%, allowing a single investor to have a 10% stake in any station, in any market

without regard to ownership limitations.

The FCC is also deciding on whether it should allow more passive investors, Small Business and Minority Enterprise Small Business Investment Companies to invest without ownership attribution.

FM Freeze Not Likely Soon

Despite the fact that the freeze on AM stations was lifted last month, a similar freeze on FM stations seems not to have FCC support. The freeze has been sought by the NAB.

FCC Chairman Al Sikes told the Senate Subcommittee on Communications he would not support the NAB's proposal to freeze allocation of new FM stations unless they meet much tighter technical standards. Sikes felt the proposal would limit market response to changing economic and social conditions.

The AM freeze was lifted with the final acceptance of new AM technical rules. It seems likely that those rules will stand despite petitions for reconsideration from those who believe new AM restrictions will hurt stations who want to make changes to their facilities.

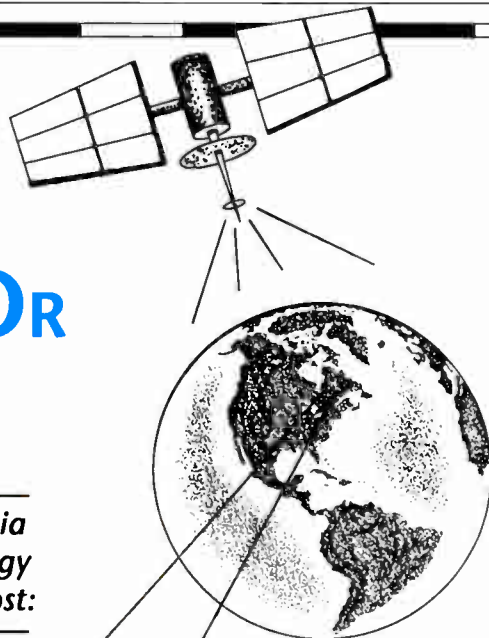
FCC Streamlines Processes for Experimenters

Permission to conduct experiments under Part 5 of the Commission's rules (everything from development of new equipment to test marketing of new technologies and services) will be greatly sped by a simple change in procedures.

By treating routine renewals and new applications on a fast track, the FCC expects to trim the time for approval from 60 days to within a week of receipt of the application.

The FCC hopes that increased experimentation will play a role in decisions to grant licensing guarantees to inventors of new technologies or services under the 1991 pioneer preferences policy. ■

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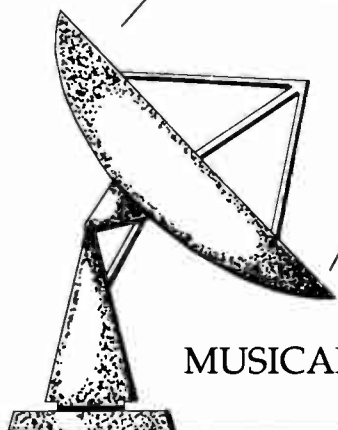
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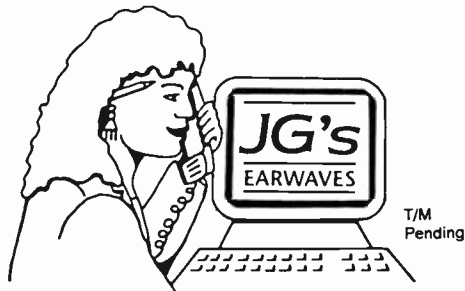
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Reader Service #049



Empty Pockets, But a Hot, Hot Hall

by Judith Gross

Just about through pouring that **desert sand** outta my moccasins and counting up those **slot machine losses** ... Sure, I know what I said, but I just couldn't stay away from those **one-armed thieves**.

Vegas was hot, and I don't just mean **temperature-wise**. There were times there, when you couldn't see the widgets for the crowds. Yeah, I have lots of products to give you the run-down on. But I'm going to save all that until **next month's NAB wrap-up** and get right to the **juicy** stuff first.

OK, first let's get the **big one** out of the way. You saw it on the news, no doubt, so I won't belabor the **melee** caused by the protestor who smashed former **President Reagan's** one-of-a-kind, engraved crystal award. All I'll say is, if I were protected by **secret service** guys, I'd be a teeny bit worried right now. Didn't that guy look even a **little** out of place? Or do you Washington types think all broadcasters are that **scuzzy** looking?

Enough about that. What was great was the new look of the **Vegas convention center**. Elegant desert-sand pink exterior, jazzed up '90s look, and a brand new **Radio/Audio hall**. There it was, as soon as you stepped in the front door, easy to find and just the right size. And it didn't hurt that the new **coffee shop** (and even a happy-hour lounge) was within throwing distance. Big improvement.

But what's this? Where, oh where are the **DAB exhibits**? Well, you had to have a road map and decent hiking shoes to get to them, but there they were, stuck way back in the **farthest corner** of the last corridor, just beyond restaurant reservations, First Aid, carpet-laying and right across from the cappuccino bar. No joke.

If you had any uncertainty about the NAB's position on **in-band** in these post-Eureka days, you might have drawn some hard-hearted conclusions based on the positioning of the **USA Digital** and **Strother/Lincom** booths. And the lack of signs directing attendees to them.

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I mean, come on now. Everywhere you turn at these shows you see **shameless** self-promotion. NAB Store here, NAB Store there, don't forget our other conventions throughout the year and all over the world. And last year, how many signs pointed you to the **Eureka bus demo**?

But this time, now that in-band had some **real progress** to show, not a peep. No wonder Gannett's **Mike Callaghan** had to have signs made up at the last minute and lure attendees with cardboard cut-outs, like my pal **Wendy**, in the picture. Or how 'bout one of **President Bush**? Well, there was one of him, too, but the NAB folks nixed that.



Sorry, guys, she's only cardboard.

I guess they figured it was irreverent. After all, humiliating **one President** per convention is enough.

Anyway, the **DAB demos** were encouraging. All you theorists who said that extracting a digital signal from an analog FM was akin to defying the **law of gravity** ... Nyah, nyah, nyah.

The **Acorn folks** had an itty-bitty chip. Yep, it demodulates the FM and extracts the digital signal and it sure looked fine on the analyzer. FCC Chairman **Al Sikes** came around to have a look and a listen. He seemed to like what he heard.

Next door, the **Strother/Lincom** folks, who had to change the name NAB put on their booth so it would be correct, showed the beginnings of a **first adjacent** in-band system. There's some more work to do there, since the signal was actually spilling over to the second adjacent. But it's coming along.

Up the hall always, folks were busy taking the **AMAX challenge**. No, it probably wasn't as tasty as the Pepsi challenge, but it sure sounded good.

These are the new **AM, NRSC** radios with noise-blanking, stereo and even a blend circuit, made by **General Motors** and already available in new models of cars. The **AMAX challenge** had you listen to AMAX and to FM and asked if you could **tell the difference**. Now, I won't say everyone couldn't, but **Al Sikes**, for one, didn't.

But what will they do for an AM station? Well, just ask **John Quinn**. John's kind of an amazing guy. He owns **WJDM** in Elizabeth, NJ, right outside of Noo Yawk. Now, John has already managed to get some Congressional action giving his station an **expanded AM band** slot. And he also recently got himself elected to the **NAB radio board**.

But just to show you what an enterprising guy he really is, he really has made a **one-man campaign** to promote AMAX. He went down to his local **Cadillac dealer** and told him about the new radios.

Being from **Joisey**, the Caddy man probably said something like: "Get outta here. You pullin' my chain? **Delco** dint say nothin' 'bout no Ay-macs, Mac. Whadya talkin' 'bout? Get lost."

But the **Mighty Quinn**, not one to be daunted, took the Cadillac man, his sales manager, another dealer and even the local mayor for a little spin in a brand new '92 **Eldorado**.

They went a half hour on **Route 22**, past all the places where guys in cement shoes were dumped by the boys from Newark over the years, past the toxic dumps and all. But never

(continued on page 9)

mind the scenery, they were listening to **WPAT**, a light music station broadcasting **AM stereo**.

The result? The Caddy dealer bought **\$20,000 worth of spots** on John's station and now all his salespeople feature an **AMAX demo** when they sell those '92 models. (Make mine a **pink convertible**, please.) How's that for a success story?

Yep. AM stereo, like the Thing from The Crypt, is back, alive and kicking, if this NAB was any indication. The fact that Japan, amid much hoopla and fanfare, went AM stereo in mid-March didn't hurt, either.

But over there, they **do it right**. You ride the trains in Tokyo, you see **AM stereo billboards**. You hear it on the radio. And, you see it on TV. My favorite was the one where a teen-aged boy takes his **boom box**, puts it on the ground, takes a **sledge hammer** and bashes it to smithereens, saying (in English) "**Mono sucks.**" Is that a great promo, or what?

Lots of yelling and screaming at the **SBE Chapter Chairmen** meeting held during the show, where folks weren't exactly singing "Do You Know the Way To San Jose?" Seems it's not just the **dues increase**, but the **national convention**, that has a lot of members wondering how these decisions get made in the first place.

After the smoke cleared and the wounded were bandaged up, the dues increase from \$30 to \$55 **still stands**, and so does this year's SBE national gig in **San Jose**. But at least there's some new procedures to deal with members' gripes.

On the plus side, I hear that the **SBE Day**, the one day of the **NAB Engineering Conference** put together by the society, was a smashing success and will lead to either a definite repeat next year, or maybe even some **stronger ties** to NAB in the future.

Happy to see an industry manufacturer finally get a **movie credit** you don't have to have a magnifying glass to read. The kudos went to **Pacific Recorders** for those nifty sets in the Dolly Parton flick, "**Straight Talk.**"

And talk about feeling unwelcome. The **FCC** sets up this **EBS Advisory** committee, and some conscientious engineers from **KSMO** in St. Louis and **WBAL**, Baltimore show up to do their part. The meeting is in Washington, DC and also present is Field Operations Bureau Chief, **Dick Smith**.

So, as the **two chief engineers** are sitting there, doing their duty to help their industry, what happens? At that very instant, **FCC inspectors** show up at KSMO and WBAL for an inspection. Gee, if you don't want us to come, just tell us next time!

Well, I wanted to tell you all about the warm reception for an admirer of **radio's pioneers** and a special **industry wedding** that took place in a Vegas chapel during the show. But it'll have to keep. I just found one last **\$1 slot token** in my pocket and it's dying to join its brothers.

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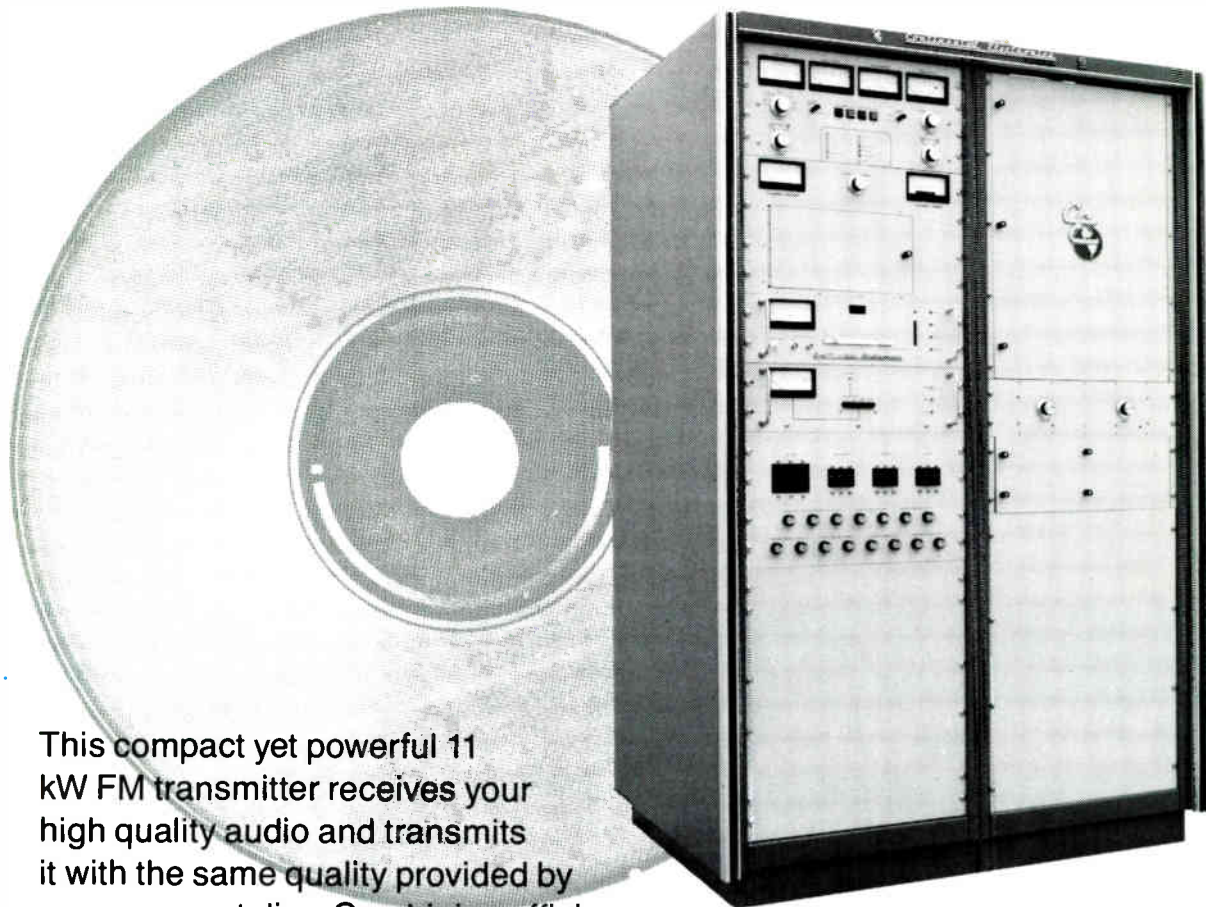


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Early News From the NAB

By Judith Gross

Progress For In-Band

DAB was not the raging controversy it was at last year's NAB convention; for one thing, there was no Eureka bus or booth demo this time. But there were some surprises. Most impressive was the progress by two U.S. DAB proponents in booth demonstrations.

USA Digital and Strother/Lincom each showed a different way of achieving in-band DAB. Doubters who as recently as a few months ago had said that extracting a digital signal from analog FM "defied the laws of physics" were asked to rethink that stand as Acorn in-band, on-channel proponents showed the extraction process taking place on a spectrum analyzer.

USA Digital

The Acorn demo brought a Las Vegas FM signal into the booth through a standard FM antenna and receiver. At the same time, a digital source – in this case music recorded on DAT – and FM DAB modulator created a digital signal.

Both the digital and the analog IF were sent into a combiner. The combined digital/analog signal went into an IF/RF converter and the analog FM was then demodulated as FM audio. The combined FM and DAB IF was also put through an FM extraction/DAB demodulator where it, too, could be heard as audio originating from the DAT source.

A switch on the set-up let an observer view both separated and combined signals on a spectrum analyzer screen. First was the FM only signal. Then the digital signal was switched on, some 35-45 dB lower than the analog signal (depending on program content). No interference could be seen or heard to the FM signal. Then, at the flick of a switch, the FM signal was "extracted" from the digital signal;

either one could be observed separately from the other.

The demonstration showed that a digital signal can be added to analog FM with no noticeable interference and extracted cleanly as a separate signal in its own right. CBS Radio's Tony Masiello showed the proprietary 3/4-inch-long chip which was used to demodulate the FM signal and extract the digital signal at the same time.

FCC officials, including Chairman Al Sikes, saw and heard the demo, as did representatives of receiver manufacturers, Eureka 147 researchers and even a few engineers from the NAB. All reaction was favorable. The next test will be whether the USA Digital system can operate in a mobile environment and successfully eliminate multipath.

Strother/Lincom

Next door in the Strother/Lincom booth, a closed circuit demo similar to one shown to the FCC and NAB's DAB Task Force last October showed a first adjacent in-band DAB system. Lincom used a CD player as a musical source for both the digital and analog signals. A digital Optimod 8200 and stereo generator and a Broadcast Electronics FX 50 digital exciter created an FM signal at 100.1 MHz.

For the digital signal, a waveform generator and Dolby AC-2 source coding produced a signal at 100.35 MHz. Lincom engineer Steve Kuh noted that the "first adjacent" digital signal did spill over into the second adjacent as well.

Kuh said that the spillover was needed to duplicate comparable coverage to the analog FM. He added, however, that the waveform generator could be altered to spectrally shape the digital waveform differently and that lower bit rates on the Dolby AC-2 could be used to keep the digital signal within a station's first adjacent channel.

Kuh also said the digital signal could be "sliced in half" and placed with each half on the upper and lower first adjacents to protect an FM's second adjacent channel. For the purposes of the demo, Lincom was using Dolby AC-2 at 256 kb/s.

Both Strother/Lincom and USA Digital plan to meet the April 1993 deadline for hardware submission to a DAB test group set up by the EIA (story below).

EIA Timetable Set

U.S. DAB proponents say they will be ready to meet deadlines for system submission set by an EIA standards committee, despite an aggressive schedule.

The timetable calls for proponents to notify their committee by June 15 of this year if they intend to participate in the standards setting process and to provide "detailed descriptions" of their systems by December 15.

By April 15, 1993, all systems should submit hardware to be tested to the committee. From April until October, a test subgroup will actually test the DAB systems submitted and plans to have a recommendation ready in October, 1993.

EIA committee chairman Randy Brunts said that while the timetable is short, none of the system proponents has protested or asked for changes. He said the timetable is set to come up with a recommendation in time for a November, 1993 CCIR meeting to select a DAB standard.

Brunts said it was the committee's intention to test both satellite and terrestrial systems if they are submitted to the committee. He also said the committee would test the Eureka 147 DAB system. But during a panel discussion at the NAB convention, Eureka re-

(continued on page 12)

searcher Georg Plenge said he believed that the committee was only testing U.S. systems, or that Eureka would need a U.S. advocate in order to be submitted for testing, so Eureka participation is not yet certain.

So far, USA Digital, Strother/Lincom and American Digital Radio, the only systems represented at the convention, all say they intend to meet the April 1993 deadline.

First Adjacency Tests Criticized

Meanwhile, results of tests of FM first adjacency interference from digital signals were outlined in a paper by NAB digital engineer Ken Springer. Springer tested interference from digital signals to FM signals; to FM broadcast material; and interference to digital signals from strong adjacent FM signals.

Springer used QPSK and 256-QAM modulation, both filtered and unfiltered. The filtered signals used a 6-pole bandpass filter. The idea was to see how much interference DAB signals could cause to FM signals. Multipath and SCAs were not included in the tests.

Springer noted that the test results showed "spectral spillover" interference from the digital signal in an FM's first adjacent, second adjacent and third adjacent. For on-channel, the receivers used in the tests required 43 dB protection, but the FCC only currently requires 20 dB.

He also noted that while filtering, or containing, the spectral energy of the digital signal might help the spillover interference in the adjacent channels, the interference for on-channel could not be helped by the same methods.

While in-band DAB proponents were reluctant to criticize Springer's test results publicly, USA Digital and Strother/Lincom proponents addressed the issue of using QPSK modulation during their presentations to an engineering audience.

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CBS' Tony Masiello noted that a single carrier at QPSK, such as that used in Springer's tests would yield interference but that the USA Digital DAB system uses 21 separate carriers, each 43 dB down and "at those levels, you can't hear it."

Lincom's Steve Kuh also observed that the QPSK waveform used by Springer, even when filtered, produced substantial side lobes which would cause spillover, but that "not all filters are the same" and that a digital waveform could be shaped to avoid that kind of spillover.

The observations of both proponents seem to have been confirmed by each company's booth demonstration, where no interference to the FM signal could be detected on channel or in the first adjacent.

RDS Seeks AM Compromise

It was tough going there for awhile at the NRSC's RDS working group. After 18 months of work on an RDS standard, and after settling issues that came up concerning the use of Cue Paging, tempers flared over the exclusion of AM stations.

Although RDS, which uses a 57 kHz subcarrier to transmit data, had always been proposed just for FM, AM broadcasters, backed up by the NAB, protested just prior to the NAB convention that they feared exclusion from the system would hurt their listenership.

It seemed as if a draft standard, which was to be ready for a full NRSC meeting at the convention, was rapidly falling apart.

Representatives from car receiver manufacturer Delco said they felt that they were being betrayed by broadcasters, after going ahead with AM receiver improvements with the hope of broadcaster support for RDS. And the EIA, which coordinates NRSC activities with the NAB, said if the NAB would not support an RDS standard it would become an EIA standard only.

But at a meeting held in Las Vegas during the convention, an air of calm prevailed and a compromise was worked out. Pierre Schwob, developer of an RDS-like system called ID Logic, which is already available in some radios, agreed to work out a system that would take care of AM stations when FM stations go RDS.

ID Logic B identifies stations by call letters and format, like RDS does, but uses a database instead of having each station transmit information via the 57 kHz subcarrier. It covers both AM and FM stations.

The plan is to include ID Logic B as part of the standard, and hopefully, to encourage receiver manufacturers to include both RDS and ID Logic B in their receivers. FM stations can then use their subcarriers to take advantage of the RDS system, while the ID Logic B database will provide similar information for AM stations.

In addition, the ID Logic B database could be updated, also through the 57 kHz subcarrier, by a "designated" FM station in each market. AM stations could change information in the database by notifying the designated FM station, which would most likely be an NPR station.

The only drawback for AM stations is that the ID Logic B system does not include the automatic switching feature of RDS. But AM broadcasters as well as Delco representatives seemed to welcome the compromise. The NRSC agreed to take more time on standards work to develop the idea further.

SBE Chapter Chairs Vent Anger

It was more a case of blood-letting and anger-venting than any real agenda to get problems solved as SBE Chapter Chairs met with board members to discuss the myriad of financial and communication problems facing the society's membership.

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Radio Update

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In fact, two days prior, in a meeting that lasted until 2 AM, the board had already voted on changes which would accommodate the discontent.

The new measures would allow any petition for changes to bylaws that have 5% membership support to be brought before the board. The board would have to vote, and if it turned down the petition, it would go before the membership as a general referendum within 120 days.

The board also sought to make better known its previous policy on financial disclosure, namely, that chapter chairs will get financial statements at the end of each year. "Since October, when I became president, that's one thing I've been promoting, an open policy on finances," said SBE President Richard Farquhar.

Not a real solution?

The board actions anticipated complaints of closed-door decisions and lack of communication which surfaced as major problems during lengthy chapter chair and general SBE membership meetings in Las Vegas. The bylaw initiative represents a compromise with Sandra Woodruff, Chapter 47 Chair, who first vocalized the concerns of other chapters.

Woodruff said, however, that she felt the solution hadn't really solved the problems which precipitated the crisis: the dues increase from \$30 to \$55 and the money-losing national convention and its yearly of venues.

Woodruff said that she would be presenting her proposed bylaws changes to the board under the new measure, as part of a compromise she agreed to. "These basically call for more regional representation and shift powers from the Executive Board to the Board of Directors and from the Board of Directors to the general membership."

She also said that as a separate proposal, she would ask the board to reconsider its \$55 dues increase and propose a more modest \$40. She would ask that those who had already paid \$55 get to choose whether to apply the excess to next year's dues or

Convention Concerns

All of this still does not address the problems of the national convention, which resulted in a \$60,000 revenue loss last year. SBE Board members assured those at the Las Vegas meeting that this year's gathering, to be held in San Jose, would not be as costly as last year's in Houston.

But the concept of a national convention itself, as well as last year's loss of revenue, brought some harsh words from Chapter Chairs.

"If we aren't making money, let's not have a convention," said several chairmen.

"Would you have a problem with the national convention if we made money?" asked VP Jerry Whitaker.

"Can you guarantee us that we will?" was the reply. Another chairman asked "Who said the purpose of our organization is to make money?"

Other chairmen asked "Why can't we keep the convention in St. Louis, where it has made money?" SBE Board members answered that the intention was to allow attendees from different regions to attend each time.

"Why not put it where it will work? NAB keeps coming back to Las Vegas," another member pointed out. And regarding last year's convention in Houston, another noted, "For the money we lost we could have flown the entire Houston SBE chapter to St. Louis."

But Whitaker pointed out that contracts have already been signed for this year's convention. "I firmly believe San Jose will be a successful convention and that we will make money. We are doing San Jose," he said.

IN BRIEF:

AM Stereo, Alive & Well!

With all the talk of digital radio, it was a bit of a surprise that the NAB show revealed renewed optimism about AM stereo. There were several reasons.

AMAX radios -- new, improved AM receivers made by General Motors -- incorporate NRSC, AM stereo, noise blanking and even a blend circuit for

AM. The new models showed up in a special AMAX booth and even a new Bonneville on the exhibit floor.

Then there was the news that Japanese AM stations have gone stereo and Japanese manufacturers have come out with AM stereo "walkmans." And one manufacturer, Broadcast Electronics, is now incorporating stereo exciters right into its new, solid state AM transmitters.

Supertuner Debut

Also with AM stereo, but a whole lot more besides, is the Denon/NAB Supertuner, appearing in the form of two prototypes at the convention. The receivers also incorporate AMAX (NRSC) with noise blanking, variable bandwidth for AM, switchable bandwidth for FM, and an AM antenna connection.

One technology that has not been included, however, is FMX, because of the non-availability of chips. The NAB said FMX may be included in a future model of the receiver.

Denon said that the supertuner would be ready for August, but no price has been set yet. Denon and NAB each plan to market the receiver once it's ready.

Digital Interface Standard

It now looks like a digital interface standard for broadcast will actually be a two-part standard: one to handle the studio audio and another for RF.

A committee consisting of equipment manufacturers eager to come up with a way digital products can talk to one another meets about every three months, with their most recent discussion at the NAB convention.

Committee coordinator Bob Weirather, from Harris Allied said there's agreement that for studio audio the current AES/EBU standard does the job. But he said the committee still needs to figure out how to handle RF.

Weirather said the need is to figure out a way to handle a composite signal. He said it's likely that in future configurations, digital STLs will transmit discrete L/R and the stereo generator will be at the transmitter site.

One other issue that still needs to be resolved is what sampling rates to use in digital equipment, according to Weirather. ■

A World of Information on a Silver "Platter"

By Steve Shrader

Stardate 5047.5 – Captain Kirk places a five-inch silver disk in the library computer and observes past years roll by in an attempt to find Spock who has jumped through a time portal.

Stardate 1992.4 – I place a five-inch silver disk in a CD-ROM player and have access to every issue of Time Magazine since 1936; put in another disk and read about President Kennedy or hear him speak; put in a third disk and get a detailed map of any place in the U.S. complete with terrain heights and streets. After many years, our five-inch silver disks, also known as CD-ROMs, have come of age.

Untapped Resource

There's a wealth of information now available on CD-ROM disks. I've been the editor of the HamCall CD-ROM from Buckmaster Publishing for the past 2-1/2 years and during this time I have seen the growth of CD-ROM-based information explode.

Yet, during the past few months I've come to discover that most computer users still think CD-ROM drives

and disks are exotic and expensive. Perhaps, if I had not been personally involved with the production a CD-ROM, I would have the same thoughts. I bought my first CD-ROM drive more than four years ago at a cost of about \$700 and since then the prices of the drives and disks have plummeted. And why not? If I buy something, it will always go on sale a week later!

Today you can purchase a CD-ROM drive, its companion driver card and Compton's Multimedia Encyclopedia for less than \$300. If you are willing to spend about \$70 more, you can get a drive that will double as a stand-alone audio CD player and get four ROM disks to boot.

About this time you may be thinking, "Wow, this is really neat, but how can I ever sell the boss on buying me this 'toy' (we all know that if it's not a transmitter, console, or cart machine the boss thinks it's a toy) and how could we use this at the station?"

Well, it's an easy sale – if you can explain how using CD-ROM information will make the job of nearly every-

one who works at the station easier and more productive. To help you with this, what follows is an outline of some of the disks available and their possible uses at the station. I'll start with the disks that are included with the drive that costs \$368 and is also a stand-alone audio CD player.

Soup to Nuts to Maps

Grolier's Encyclopedia: This disk is a complete 21-volume encyclopedia which has audio as well as text. You can search the whole set using key words and the program leads you to the specific article of interest.

When the news director says "I'm doing an interview this week with the Social Security Commissioner and I need some information to put together the show," lead the way to the computer. If the PD wants information to prepare promos for Presidents' Day, you can be the hero with your nifty new "toy." As you can see, the possibilities are endless.

Microsoft Bookshelf Library: This is an incredible reference tool which includes a dictionary, thesaurus, world almanac, familiar quotations handbook, style manual for writers, a directory of business forms and letters, a complete zip code directory and business information directory.

Just imagine not having words misspelled in your letters, producing more colorful commercials or obtaining information about perspective co-op clients.

PC-Globe: Need maps or facts about anywhere in the world? You can use this to find your way home from the Bahamas after taking those critical long distance AM field readings, or perhaps to SHOW as well as tell that part-time jock (you know - the one that called at 2 AM because the console quit – after the coffee drained through

(continued on page 15)

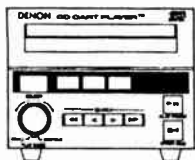


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Bits, Bytes and BBS

continued from page 14

the faders) where you'd like him to go. Then again, that place may not be on any map.

Programs For the Taking

PC-Sig Library: This disk contains over 20,000 programs covering any subject imaginable. From simple text editors to full-blown database programs to thousands of pictures, you'll have it at your fingertips. If you thought public domain software and Shareware was "junk," this will change your mind.

This disk contains programs that will rival anything on the market. Sure, there are some that aren't great, but that's true of some software you pay big bucks for, too. The difference is, if you don't like it and you don't use it, you don't have to pay for it.

Every department in the station can benefit from the programs and info on this disk. There are collection letters for the sales manager, spreadsheets for the accountant, word processors and spelling checkers for the secretary, label makers for the production department, appointment schedulers for the sales people, music databases for the PD and client databases for the harried traffic director.

There's also a lottery program for the manager when the home office wants increased revenue but business is slow and the competition is cutting rates. And for you, the engineer, there are electronic, math, and graphing programs galore as well as a Real Estate Management program, should you decide on an alternate career. As you can see, selling this purchase to the GM shouldn't be too hard.

City Streets and Headlines

In addition to the disks I have quickly reviewed, there are two others that really caught my attention. The first one is a disk from DeLorme Mapping in Freeport, Maine. This disk contains virtually every street in every city in the U.S.

Using a mouse, you pick the state and zoom in from there. You can also get the maps by referencing zip codes or telephone area codes. The amount of information on this disk is truly staggering and it costs just \$99. Never get lost again!

The second disk is titled "Front Page News." This disk contains a year's worth of news from about ten national and international newswires. This disk is updated on a quarterly basis and sells for \$149.

The program lets you retrieve articles by using key words and will find all instances of a word or phrase. As a research tool for current happenings in our ever changing world, the news department of any station should find this disk invaluable.

Calling All Hams

Before I sign off, I want to mention the two CD-ROM disks that the Radio Guide/AVS Broadcast BBS runs online. The first is a disk which contains 20,000 public domain and shareware programs of all types. A listing of these files by category is sent when you enter various commands in the Files Conference on the BBS.

The other CD-ROM is the HamCall disk. As the editor, I have been able to assemble a lot of data on this one disk that can't be found anywhere else. Since I use the CD myself, I've included information that I need to perform the various tasks dealing with broadcast engineering.

This disk contains all of the FCC, FAA and terrain databases that are used while running the various programs in the AVS Conference. In addition, the CD contains about 120 Mb of program files which deal specifically with electronics, broadcasting, amateur radio, cable and other related subjects.

As I mentioned last month, I added the terrain retrieval program for our users. The data comes from this disk. This month, I have added the FCC Amateur Radio Callsign database to the system. The "hams" out there can now retrieve the name and address of any Amateur Radio Operator in the U.S. or its possessions. As a matter of interest, the "ham" database consumes about 80 Mb of disk space.

As time allows, I will be adding other databases and programs to the system. Setting up the system has been quite tedious but it's worth it. If you have any questions or would like to order your own copy of the HamCall CD (\$50) you can contact me via the BBS or by phone during business hours.

As you can see, we already have the little silver disks. Now I wonder when Scotty is going to perfect that time portal?

Call the Radio Guide/AVS BBS at 804-468-4957 (2400 baud, N-8-1). Steve Shrader can be reached at AVS Broadcast Services at 804-468-4344.


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Contract Engineer

The Business of Radio Contract Engineering

The Mark of a Professional

by Mike Patton

In my neck of the woods there are several contract engineers who run the gamut of professionalism – from a PE with an excellent track record to a couple of full time engineers who take care of another station after hours.

Rates range from \$70/hour to as low as \$10/hour. Some of the low-priced guys don't have invoices or business cards; some can't even take a call from their clients at their day job.

Obviously, there are orders of magnitude of difference between the "professionalism" of these different people, and the radio stations know it. It shows in the amount of respect they get, in the rates they can charge and in the presumption of their technical competence.

I'm not here to knock our brethren who take care of only one or a few stations on contract and manage to do so without the expense of car phones, pagers and the like. But more and more contract engineers are having to compete in an open market, and in this market, in this day and age, professionalism counts, big time.

Dress For Success

Let's start with the basics. It's what you look like, not who you are. First impressions are important. Dress like a pro and you'll be treated like one. This means you might have to forego wearing that Grateful Dead tie-dye to a meeting with a prospective client.

Appearance extends to your demeanor and anything else that represents you. Look and act like a pro and you'll be treated like one.

Next on my list: If they can't find you, they can't hire you. Get a pager, one that works everywhere you are likely to be. Get an answering service, or at least an answering machine. Keep the message updated and accurate. I have two separate message tapes. One is the usual, the other is one I use when I'm away. The second one refers callers to my engineering friends who cover for me when I'm out of town.

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Remember to return your calls the first time someone calls you. If someone has taken the time and effort to call, for heaven's sake, call them back! If he or she gets the impression that returning the call is the last thing on your list, they'll find someone else to help them.

Details, Details, Details!

Pay attention to details. Spell out the fine points of a deal up front, including the payment terms. Get a client's approval before ordering equipment. If you agree to do a job, do all of it, not a half-baked effort. If you install something, make it neat, orderly and well-documented. If you repair something, clean it thoroughly and replace missing hardware.

Neatness counts. To a non-technical person, how clean or neat something looks is sometimes all they can appreciate. The better it looks, the harder for your competition to shoot it down. When you're done, provide detailed invoices and carefully kept records of expenditures.

It's important to project confidence. Stand up for yourself. Nobody respects a "yes man." If you report a problem or FCC rule infraction to a client and he or she does not correct it promptly, cover yourself with a paper trail. Document it, with dates, in writing. If you don't document your notification of the client, they may try to claim that you were negligent and even liable for damages. I think it's unlikely you'd be sued, but who wants to take that chance?

Make the limits of your liability clear and stick to them. That goes for the limits of the job you agreed to do. Don't allow yourself to be pressured into rewiring the studio when all you agreed to do (and are being paid to do) is fix the console. If the only way to fix it is to rewire it, tell the client it's going to cost extra, and why.

This doesn't mean you should be petty and difficult to work with, totaling up every penny. But stick to your

guns. You are not responsible for the fact that the last guy here couldn't engineer his way out of a paper bag.

Professional Credits

Get SBE certification. Take the PE exam if you qualify (rules vary from state to state; check with your state licensing board). Your trophy wall may not say anything about whether you can fix it when it's broke, but credentials definitely help you get in the door.

Network. Attend SBE meetings if you can. Get to know other engineers in your area. Let them know they can call on you if they need a hand. Remind them how useful an extra brain, or hand, or set of tools can be during a crisis. Also get to know equipment manufacturers and some D.C. area consultants. Sometimes these businesses need an engineer in the field. You can earn a lot of money by being in the right place at the right time.

Keep your eyes and ears open for stations making changes. Attend state broadcasters association meetings and advertise in their newsletters. Offer to lead a seminar on engineering for managers. Be visible. You have a sales staff of one – yourself. Whether you like it or not, if you're in the contract engineering business you're in the sales business. Never thought of yourself as the Herb Tarlick type? Get used to it.

Give your client an honest day's work for an honest day's pay. Loyalty and duty have not yet gone out of style. Don't put your client's business on the street. Don't let one client play you off against another. Don't lose a deal over a \$20 disagreement. Be willing to compromise, within your principles.

Of course, I constantly revise these guidelines as I learn from experience. They may not all apply to every situation, but one thing that I suspect is universal in every business is the axiom: take care of your customers and they will take care of you.

Mike Patton can be reached at 504-292-4189, even when he's out.

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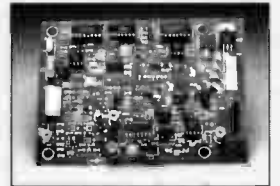
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Tech-Tips From the Field

Practical Solutions to Practical Problems

1. S/A Digital Receiver P.S. Replacement

2. Raise the Roof to Cool the TX Site

Sharing information – that's what it's all about. And, a "tip of the lid" to each of you who have shared your tech tips.

Every engineer has learned something other engineers can use. Share yours with us by sending your tech tips to me at:

George Whitaker
3505 Daniel Drive
Arlington, TX 76014

Each person sending in a tech-tip will receive a shirt pocket calculator identifying them as a Radio Guide Tech-Tipster as a token of our appreciation.

Our first item is a money-saving suggestion from Charlie Ryan of Little-

ton, NH. Charlie, who can be reached at 603-444-2398, went shopping when he lost a power supply and found that you can:

Save Money When Replacing S/A Digital Receiver P.S.

When ABC/Cap Cities decided to add Scientific-Atlanta's SEDAT it caused an already existing problem with my Scientific-Atlanta digital receiver to come to the forefront. At first I thought the problem was the SEDAT card because the receiver would work in the old configuration, but not with the SEDAT card installed. We got hum in the 7.5 KHz card used for sports feeds.

It turned out that the power supply for the audio section would not carry the extra load and ripple was causing the hum and buzz. Replacing the caps did nothing.

A phone call to S-A revealed that they do not repair the supplies; they are considered a throw-away. Therefore, a new one was the only way to go. The original equipment replacement supplies turned out to cost about \$375.

A phone call to Newark Electronics, had lo-

3. Tangled Patch-Cord Fix

4. Harris SX Keyboard Bezel Fix

by George Whitaker

cated Sola supplies that would work, and they were much less expensive. The Sola 5 V supply, type SLS-05-030-1, Newark stock #89F1266, was less than \$50, and a Dual 15, Sola SLD-15-1515-15, Newark #89F1255, was less than \$80.

The supplies arrived the next afternoon and were installed during the night. The 5 V supply bolted into the position of the old supply and required only a minor adjustment in the leads to operate. The 15 V supply did not fit into the card, but after I extended the AC, ground, + and - 15 V and 15 V common leads out the rear of the power supply card, terminated the wires in a 6 conductor Molex pair and mounted the supply on rails across the rear of the rack, the supply worked like a dream.

There were two bonuses. First, with the 15 V supplies mounted in the open air, the whole system ran cooler. Second, I was able to get enough supplies to replace both the receiver and audio chassis supplies for about the cost of one original equipment 15 V supply. ■

Next, I'd like to share a section from my book that explains why you should:

Raise The Roof Before The Boss Does

In my experience, I have found that there is one thing that will eliminate more transmitter problems than any other single thing you can do. That one thing is to *keep it cool*. A properly cooled transmitter will generally operate for years without failure and tube life can be astoundingly long.

However, of all the small market transmitters I visited during my years as a technical consultant, I only remem-

(continued on page 19)



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Tips From the Field

continued from page 18

ber one that was properly cooled. Almost all of them had air conditioners in the building and yet it was hot in there. Why? Because there was only an eight foot ceiling in the building.

When you have no air space above the transmitter, the hot air can accumulate and will remain trapped right down next to the transmitter blowers. Then, it is sucked back in to be heated again and then exhausted to begin the cycle all over. The poor air conditioner never has a chance to cool anything because the room air is being heated every few seconds as it cycles through the transmitter. I have seen quite a few air conditioners that would freeze up and be covered with ice while the building was sweltering.

However, if you put a 10- to 14-foot ceiling in the transmitter building, you can put a relatively small air conditioner in the building and still keep it very cool. I have used a 14,000 BTU unit in a building with a tube-type 5 Kw AM rig and kept it cool enough to be only slightly unpleasant for a human being. But we operated for years on the same set of tubes and I only remember being off the air one time in the last two years I had that site. If your transmitter is properly cooled, your tubes should still be shiny silver after two or three years.

In any event, if you raise the roof to a point that will allow for adequate ceiling height, you will find that the expense of maintaining the site will go down. ■

Being a natural born slob (ask my wife), I will probably never get around to taking advantage of Steven Priis's upcoming tip (He can be reached at 505-266-8668). However, I realize that there are many of you who are organized. Therefore, from KFLQ in Albuquerque comes a tip to avoid tears and swears caused by:

Tangled Patch Cords

Our transmitter site is located 14 miles north of our studio, on top of Sandia Crest, on a mountain just over 10,800 feet tall. It is over an hour's drive, uphill all the way, to the site, and

despite the fact we are in the desert, not always a pleasant drive.

For that reason, I always try to bring anything and everything that I would possibly ever need: adapters, meters, test leads, coax assemblies, etc., during our preventive maintenance, or other trips to the peak. It is very frustrating to need a cable, and know that you have one...back at the studio.

Another point of frustration, though, is to have all those cables needed to connect the test equipment, and reaching into the box find everything tangled together, making all that stuff nearly useless.

A remedy that I have found is to put these cables in heavy duty plastic zip-top freezer bags, one cable per bag. I use the new ones that have a place to label what is in that bag. I then stand the bags, on their ends, and look for the description of the cable I want.

I pack these bags around other small pieces of test equipment, and I can now find any cable I want, without having to fight with a tangled mess. No muss, no fuss, and cheap. Another advantage of the labeled bags is that it tells me exactly what cable is misplaced.

By the way, the box I pack these in is an old hat box from a suit-case set picked up at a garage sale. ■

If you have an older model Harris SX series transmitter, as I do, you may find that the next tip from "Big Sky" country can save you a lot of head-scratching and mumbling. Rhett Downing of KOWB and KCGY in Laramie found out that there had been some changes in parts and that:

The Keypad Doesn't Fit The Bezel

We've experienced an above-average number of heavy lightning storms this summer in the Laramie Valley area. After one such evening I noticed that the diagnostic display did not always read out the channel that was addressed through the keypad.

After another series of storms I found that any attempt to address one of the diagnostic channels with the keypad netted a total carrier failure.

Some basic trouble-shooting narrowed the problem down to the keypad and the microprocessor that it addresses. Every time the keypad was activated, the +5 DC supply would drop out. This, of course, shut down the transmitter. However, no fuses would blow nor would any breakers trip out.

I contacted Harris' Field Service and they confirmed my diagnosis of a short somewhere in or between the keypad and the digital display PC board and components. At that point I went ahead and ordered an entire new assembly from Harris since we don't have the test equipment necessary to make the diagnosis. And, considering the fact that the heavy storm activity was in full swing, I didn't want to be without that diagnostic capability for any great period of time.

That's when I encountered the second stage of the problem. When I received the new display board/keypad assembly, the keypad did not fit the faceplate bezel on the front of the transmitter.

And, that's not readily apparent (although the keypad's appearance is different -- the old style uses black keys with white lettering; the new keypad uses white keys with black lettering and the surface area appears smaller) until you start to install the keypad at whatever o'clock in the morning.

I knew, at the time I placed the order, that the part number was changed and there was an Engineering Change Notice (ECN) bulletin that was internal at Harris. But the ECN bulletin made no mention of any modifications that were necessary.

But the keypad didn't fit and the only way I could make it work and make sign-on was to face-mount it on the faceplate bezel with four #4 self-tapping sheet metal screws. I called Harris later on that day and found that there is an adaptor that is required as well. Be advised, though, that no mention of that is made in the ECN bulletin and you won't know it unless you just happen to notice the difference in the keypads.

Keep those tech-tips coming and we'll keep sharing. George Whitaker can be reached at 214-528-1600.

Equipment Guide

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Regaining Modulation Lost Through SCA

by Eric Small, Modulation Sciences

Old assumptions often stifle innovation. Until the 1970s most FM stations transmitted power only in the horizontal plane. Then someone came along with the "radical" idea of radiating power vertically, too. Everybody thought this was a new idea. In fact, vertical polarization had been part of the FM Rules since 1946 when Carl E. Smith did his landmark studies of circular polarization.

It was just that for 20 years, no one noticed what the Rules actually said. The same holds true for the measurement of peak deviation. As FM rose to dominance, everyone, including myself, assumed that peak modulation had to be measured with an instantaneous response monitor.

This assumption led to three generations of audio processors battling for the title of "fastest limiter." The pursuit of "peak control" caused the disappearance of good-sounding but slow-acting recording limiters from broadcasting. Recording engineers turned a pained ear away from broadcast audio processing and went their own, good-sounding, way.

Fast Monitors and SCA

We got fast monitors because people made assumptions about what the Rules said, in order to get through the Commission's type-acceptance process with the least amount of problems. The FCC never required peak modulation control faster than one millisecond.

However, it became fashionable (and cheaper), to build monitors with much faster response time. Instead of responding to just ten cycles of 10 kHz (1000 microseconds), most monitors responded to overmodulation of two cycles of 10 kHz or less. Some popular monitors respond to one cycle of 50

kHz – that's five to 50 times faster than the Rules ever required.

Stations using SCA pay a high price for fast peak response. These monitors exaggerate the impact of SCAs on total modulation. The more SCAs in use, the greater the impact. Fast-acting modulation monitors rob deviation from the main program.

The reason is simple. Intuitively, we expect the subcarriers and program to add together in a simple arithmetic way. If the 19 kHz pilot, 67 kHz SCA and 92 kHz SCA are each set to 10%

injection one at a time, then the total deviation of all three together should be 30% plus the program modulation, right? Wrong!

No Harmonic Relationship

Figures 1a through 1c illustrate three components: 19, 67 and 92 kHz sine waves. Figure 1d is a short segment of the waveform that results when the 19 and 67 kHz signals combine. Figure 1e illustrates the combination of all three signals.

Because the three components of the waveform are not harmonically related, the shape of the wave changes constantly. Note that as more sine waves are added, the peak-to-RMS ratio of the resultant waveform increases – it becomes more "peaky."

Observe the waveform in Figure 1e. Because the three sine waves that make it up have no harmonic relationship with one another, they beat together, creating a waveform that changes constantly.

It is so random it appears to be an oscilloscope display of program material. Its peak-to-RMS ratio is almost 5 dB; about the same as a heavily processed rock music station. Certainly most engineers, seeing even a lengthy sample of this waveform, would never guess that it was made up of only three sine waves, constant in frequency.

Imagine what happens with the addition of real program material. Even highly processed program material has randomly distributed peaks.

When music is added to the program-like waveform formed by the combination of SCAs and a pilot, the sum will be even more random. This results in fewer instances of overmodulation when measured on an accurate modulation monitor responding in no faster than 10 cycles of

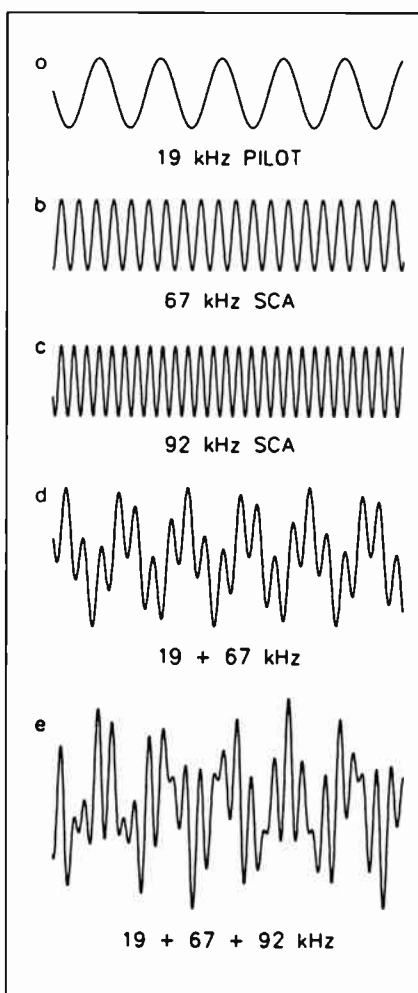


Figure 1a-e:
Composite Baseband Components

Radio Basics

continued from page 22

Regaining Modulation

10 kHz, instead of a faster monitor. How much less overmodulation depends on the kind of program material and the type of processing used.

your monitor will have the greatest impact on the results.

The difference between the actual drop in peak modulation and the static injection of the SCA is the advantage gained with a slower monitor. Typically the advantage is about 50% of the SCAs' injection. That means that when combined with the FCC-allowed increase in modulation when SCAs are used, no modulation at all is given up for SCAs.

ences' modulation monitor is certified NIST (NBS) traceable to 1% accuracy.

Because this response is five to 50 times slower than previous monitors, the result is a more correct indication of peak modulation and the impact of SCAs.

Occupied Bandwidth

It is reasonable to assume, then, that the newer, slower modulation monitors give you a modulation edge.

# SCA	MOD %	Audimax/Volumax	% CHANGE	8100	% CHANGE	8100+ XT	% CHANGE
NONE	100	160 kHz	-	164 kHz	-	180 kHz	-
1	105	168 kHz	5%	172 kHz	2%	184 kHz	2%
2	110	168 kHz	0%	180 kHz	2%	188 kHz	2%

Figure 2: Increase in occupied bandwidth with addition of SCAs, expressed in absolute bandwidth and percentage increase

Test It Yourself

Here's a simple test that you can do to understand what is going on. Using a conventional, fast responding monitor, add stereo program modulation to a carrier already modulated by a 19 kHz pilot and two SCAs. Adjust total peak modulation to 110%.

Removing one of the SCAs will reduce total peak modulation to between 107% and 104%, not to the expected 100%. Removing both SCAs will drop peak modulation to about 100%, instead of 90%.

Exactly how much it drops depends on the stereo content of the program material and the nature of the audio processing. The amount of change increases with increasing stereo content and decreasing processing. Of course, the response time of

Need For A New Design

But in order to reap that advantage, you would need a modulation monitor that has not existed until quite recently. It should be a monitor with carefully controlled response time characteristics and significantly greater accuracy than what has been available previously.

With the recent introductions of a new breed of modulation monitors and by modifications to existing ones, every major manufacturer of monitors now offers controlled peak response.

In Modulation Sciences' case, we used digital technology to develop a modulation monitor that takes nine cycles of 10 kHz response time before indicating overmodulation, yet still complies with FCC Rules. In addition, the calibration of Modulation Sci-

It is also reasonable to ask what the impact of this increased modulation has on occupied bandwidth. The increase in occupied bandwidth from no SCAs to two SCAs is between 4% and 8%. This increase remains well within the FCC limits for occupied bandwidth.

See Figure 2 for both the occupied bandwidth and the percentage change in bandwidth as SCAs are added with different types of processing.

It is worth noting how occupied bandwidth varies with increased processing, without any SCAs, as measured on a conventional fast monitor. As processing increases from none to heavy, occupied bandwidth goes up about 60%. To cite just one example, switching from a CBS Audimax and

(continued on page 35)



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Solve Your On-Air Phone Problems

by Steve Church

In the 1880s, as the first telephone networks were being strung across the U.S., farmers sometimes used barbed-wire fences to carry the calls. That worked well enough, as long as there was no moisture in the air or cows leaning on the fence. Today, digitized voice travels across the country over optical fiber at 1.7 gigabits per second.

Phones are on the air at radio stations everywhere and, as with all on-air sources, quality counts. Despite (or sometimes because of) advancements in the telephone network, getting good phone audio for broadcast can be especially frustrating. Phones are an audio source which were never intended to be high-fidelity and are nearly completely out of our control.

Phone line quality varies widely. In some cities, good phone lines seem to be as difficult to obtain as pineapples in the independent Soviet states. In these circumstances, the goal is to negotiate to get the best we can from the phone company. Other locations are blessed with lines of decent quality that do not require special effort. In either case, we want to do the best to optimize what we get.

What follows is a catalog of telephone related problems and what can be done about them. Some problems require a bit of careful "jawboning" with the phone company people, while others are amenable to improvement from changes under your control.

achieves the equivalent of around 13 bits, or 78 dB theoretical dynamic range. That's because the CODEC allocates the bits logarithmically, resulting in more bits used for lower signal levels than when straight linear coding is employed.

Another source of distortion in telephone CODECs comes from the anti-aliasing and reconstruction low-pass filters. Telephone network specs call for a roll-off of only 33 dB for out-of-band signals, corresponding to a distortion level of around 3% when audio rich in high-frequency is being fed.

One reason the rather minimal 33 dB spec was adopted was that telephone engineers were counting on a long length of phone wire to provide the "first stage" filtering. Unfortunately, when these same CODECs are used in PBXs, the usual short wire length provides little attenuation.

What is the effect of this kind of distortion? The sound is a sort of "raspy noise," maybe with a little bit of tone mixed in, that moves up and down in level with the speech. (The sound is unmistakable once you've heard it and had it pointed out.)

What can you do?

Reach Out and Talk

Talk to the phone company. They may be able to make an adjustment to alter the gain at the analog-to-digital interface or reroute your lines to use better equipment. Low-frequency noise can be the result of line imbalance to ground, a problem which is easily measured and corrected.

Note that noise on phone lines is measured using a weighting filter, called C-message, designed to simulate the response of a handset earpiece, which has tremendous roll-off at low frequencies. You may have to convince the technician to switch his

(continued on page 25)

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Raspy Callers

Phone line noise and distortion. These two go hand-in-hand because both are usually the result of too few bits being tickled at some point where analog becomes digital. As with any digital system, phone line noise and distortion worsen as level declines.

The phone network currently uses single chip CODECs (CODer/DECoders) with a rather "low-fidelity" resolution of 8 bits. However, an instantaneous digital companding scheme is employed which

Solve Your Phone Problems

gear to the flat position in order to get a reading better reflecting on-air frequency response.

You can also use a phone interface with a tight 3.4kHz low-pass filter on the phone audio. The shortcoming with CODEC reconstruction filters described above is helped by adding further low-pass filtering locally. This "comes for free" with digital hybrids since the first thing the phone audio hits is an anti-aliasing filter.

Unfortunately, nothing can be done to eliminate the distortion caused by the aliasing created at the other end. A noise gate can reduce phone line noise, but at the expense of having some very low-level calls being gated-off.

Simultaneous Conversation

This is the most frequent problem encountered by those using a "switching-type" interface. It is the lowest cost interface method, since it involves just tapping into an existing phone set or a speakerphone connection of some kind.

The downside is that "shouting-match" duplex conversation is impossible because the system allows a path in only one direction at a time. When the announcer speaks, the caller is cut off and when the caller is active, he may not hear the announcer trying to break in. A hybrid-type interface will solve that problem, if more polite callers or hosts aren't an option.

A different type of problem occurs when only the announcer sounds bad. This is caused by bad hybrid cancellation caused by complex phone line impedance-vs-frequency characteristic.

The bad news is that this is perhaps the most difficult problem to resolve at the phone company level. Phone company personnel won't understand you at all should you discuss this with

them and don't have the equipment to measure it if they did understand.

Impedance and Your PBX

The good news is that this is the easiest problem to fix at the user level. Phone line impedance is specified to be a 600 ohm resistance in series with a 2.16mF capacitor, creating a smooth "1st order" R-C curve. If only it were so!

I've measured scores of phone lines, and not one has come close. Many have very weird curves with multiple break points and huge peaks and valleys creating problems for hybrid interface equipment.

In order for a hybrid to be effective at delivering pure phone audio at the output, it must have a "balancing network" which matches the phone line impedance. Analog hybrids have balancing networks which are designed to match smooth R-C curves, but are overpowered by complex impedances. Thus, these units can be good performers on some phone lines but poor on others.

Fortunately, hybrids which use digital technology are designed to be effective even with difficult lines. If your on-air system phone lines connect through your station PBX, check to be sure that it is not creating problems. Some have significant signal attenuation.

One very popular large PBX cannot be effectively used with hybrid interfaces because it generates a strange "comb-filter" effect line impedance. If your phone company delivers service to you on a digital "T1" line and converts it to analog in or near your building, investigate whether the "T1 bridge" is one of the newer, low-cost integrated types. (One popular "new and improved" bridge causes big problems for hybrid interfaces.)

Next month I will explore the problem of feedback when monitoring callers through open speakers.

Former talk show host and radio group CE Steve Church is president of Telos Systems which specializes in the manufacture of telephone-to-broadcast interface equipment. Steve can be reached by phone at (216) 241-7225 or fax at (216) 241-4103.

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Reader Service #063

Radio Guide Page 27

Studio Site

Repair and Maintenance at the Studio

Hire Good Help For Your Station

by Gordon Carter

Once the decision has been made to move your radio station, you will have many months of work before you and your co-workers can realize your dream. Finding the right kind of help will make that dream happen. Finding the wrong help will turn the dream into a nightmare.

Most stations will need three different individuals or types of firms to help them relocate: a real estate agent, an architect and a studio consultant. These three will all fulfill different and unique roles in the move and their importance cannot be underestimated.

Three Distinct Roles

In very simple terms, the real estate agent will work with you to find the right place — one that meets your needs. A good agent knows the territory and the market. He or she can direct you to a suitable place that is within your budget.

The architect will then take the building or location the real estate agent has helped you find and make it a practical work space and aesthetically pleasing. The architect will also work with designers from various disciplines to make sure the electrical system, heating and air conditioning, and various other structural aspects are correct.

The studio consultant will work with you and the architect to design a suitable suite of control rooms and studios that are acoustically as well as electronically correct.

Don't Cut Corners

Many radio stations try to save money by not hiring a studio consultant and either doing the studio design themselves or having the architect do it for them. This works fine...sometimes, but certain conditions must be right.

First of all, the person doing the studio design (either your own engineering staff or the architect) must

**A good consultant
can avoid a lot
of mistakes.**

have a knowledge of the acoustical concerns unique to a radio station. Isolation of one room from another, quiet air handling and good monitor and microphone acoustics are all important in order for your station to sound professional on the air.

Then, the designer must know how to put together an efficient array of equipment and make it all work well together. Depending on the size of the

facility and the ability of the designer, this can take days or weeks to do well.

A good consultant can also help avoid a lot of mistakes that may cost hundreds or thousands of dollars and extra time to correct. If you do not have the expertise yourself, the price of a consultant can be money well spent.


The Right Skills For the Job

Choosing the right people or firms for these roles is very important. While each one has special talents and abilities, all must fit into the big picture. All three must be able to work with you and your co-workers, as well as each other. They must be able to ascertain your needs and translate them into the realities of space and hardware.

Many radio stations that are planning a move find a real estate agent fairly early in the process, and then hire an architect and consultant after a building has been chosen. Unfortunately, this can sometimes create serious problems, especially if your needs have not been properly evaluated before selecting the space.

A better process is to find an agent, architect and consultant before making any decisions other than to move. The three can then work together to ascertain your needs, define the various work areas that will be needed,

(continued on page 29)



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Studio Site

continued from page 28

Hire Good Help For Your Station

and then find a suitable space. In this way work can proceed smoothly and with minimum delays.

When choosing these people or firms, do your homework. Check their references carefully. Just because someone gives you a long list of clients, don't assume that these are all happy ones. Call at least some of their clients and talk to the person who most closely worked with them. Ask pointed questions about how well they performed, and especially how happy the client is with the work.

Also ask the reference for other clients that you can contact. Sometimes you will dig up information in this manner that may indicate that you won't be able to work with that person. Remember that you are hiring these people to serve you, and if they don't do it or don't do it well, they are going to give you unnecessary headaches.

A First-Hand Look

After you have checked the information and talked with clients, try to evaluate the work they have done for any clients with needs similar to yours.

In the case of the real estate agent, try to find out how well the budget and time schedules were met. For the architect and studio consultant, check out their work, either in person or at least through photographs. An architect may do a fine job for one client, but not be able to serve you well if your needs are vastly different.

Check the work of the studio consultant to make sure the rooms sound good and the equipment layout and wiring is usable, especially after a few years. Of course, make sure they can work within your ideas of what will look good.

Eventually you will be at the point of signing a contract with the various firms. Make sure that the contracts contain clauses that will release you from the commitment if you find you are not working well together or other guidelines are not met.

Also, be sure to check the payment schedule to see if it can work within your budget and cash flow. If you have a problem with any of these, discuss them openly with the service provider to see if changes can be made.

When you have selected your real estate agent, architect, and studio consultant, and have signed contracts, you are ready to begin looking at your needs and conceptualizing your dream radio station. Next time, we will look at this process.

Gordon Carter can be reached at Professional Audio Services by calling 708-482-4142.

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APC-88 CPI-80

High Quality Remotes Via Satellite

by Mike Callaghan

Imagine calling the phone company to order remote lines, and specifying that they should have 90+ dB SNR, less than .05% distortion, be perfectly matched for stereo, and be available that very afternoon. Impossible? Yes – if you call the phone company. But entirely possible and practical using today's modern Ku Band V-Sat technology.

Satellite remote broadcasts are a new and exciting venture for many radio broadcasters. Not only do they offer unprecedented flexibility and program quality to the programming staff, but they can also present a profit center to the station.

KIIS rents its satellite system for between \$2000 and \$2500 a day to advertisers who gladly pay extra for the digital quality audio transmission. This amount includes the operator, and the space segment. We've also provided audio services for stations and sports teams all across the country.

The "KIIS-Link" satellite system has travelled to Mexico, Hawaii, Jamaica, Las Vegas and dozens of cities. The system presents a positive return on investment to our managers and allows our engineering department to bring in extra income.

A company I work with, California Digital, pioneered this system of remote satellite broadcasting and offers help in all facets of its operation -- from start to finish.

The Satellite Advantage

Recent changes in Ku Band V-Sat and digital audio bit-rate compression technology mean that a satellite remote can be done with a much smaller antenna at both ends of the link. Typically, a 1.2 meter dish is used at the

remote location, with a 2.4 meter antenna at the studio end.

The power levels are also much smaller, typically in the 2 W range. The ease of handling this much smaller dish cannot be overstated. The entire satellite package fits into three cases, and all three of them, along with the audio equipment and console, fit into the back of a van.

One person can drive the equipment to the location and set it up without help in less than a half hour. This includes unpacking the dish, setting it up, and finding and locking onto the satellite.

The V-Sat system uses satellite frequencies in the Ku Band. Uplinking is done at 14 GHz and downlinking is at 11 GHz. Due to the short wavelengths used, raindrops will absorb substantial energy from the signal as it passes through the atmosphere, sometimes causing a signal fade deep enough for the link to stop working.

The best way to protect against this is to allow for a reasonable fade margin when you lay out the system. Obviously, for single remotes, you'll know if rain is going to be a consideration. For a long term networking application, including the necessary margin during system design will provide the needed insurance.

Unlike analog transmission systems where the signal gets noisy before it fades away, a digital system will perform flawlessly up until it runs out of signal, and then it will squelch completely and suddenly.

Monitoring the system performance during a remote

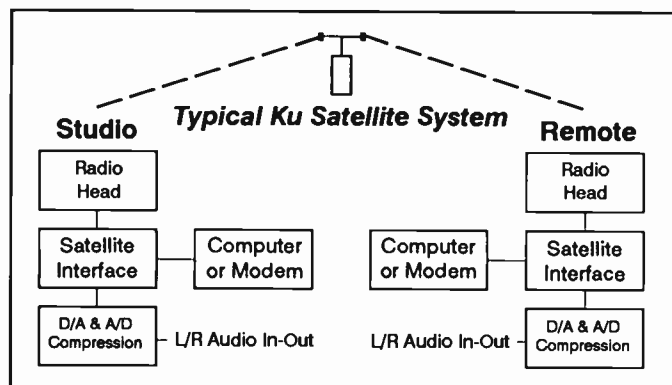
can provide warning of a potential outage. Software packages which automatically monitor signal levels and adjust power accordingly are available should this be a serious concern.

Piece By Piece

Taking advantage of this super-quality signal path involves bringing together a number of different technologies: finding a portable dish that can be easily assembled and transported, finding the right space on a satellite, getting a license from the Commission and interfacing all the various components to current audio systems to produce a rugged and compact portable system.

You first need to understand how it all goes together and how it's used.

(continued on page 31)



CD Quality Specs

The audio specifications of the system match those of a CD; a full 90+ dB signal-to-noise ratio is normal. The only decision to be made is how much audio bandwidth will be required for a specific remote. Most of the time, we go with the full 15 kHz audio, because there's no reason not to. Using MUSI-CAM encoding, 15 kHz stereo audio requires a 128 K channel on the satellite, while a 12 kHz mono audio channel needs a 64 K channel.

The transmitter and receiver at each end are fully synthesized and frequency agile. Configuring the system for stereo or mono and for system bandwidth, as well as the choice of simplex or full duplex operation, is easily done by dialing into the control computer.

Radio Satcom

continued from page 30

High Quality Satellite Remotes

Then you'll want to decide how to proceed or if you'd prefer the "turn-key" service provided by a company like California Digital.

The system incorporates a number of basics: the remote antenna; remote electronics; digital audio interface; software and computer to control the satellite system proper; satellite space spectrum; downlink antenna; downlink electronics and audio interface to the downlink. Let's take a look at each one.

Uplink antenna size is determined by the service required and the amount of power you want to get to the satellite. Larger antennas will have higher gain and will produce a greater signal level into the satellite transponder for the same transmitter power. They are also harder to move and handle. This is an important consideration in buying a portable system, especially one that will be moved in cases.

The remote electronics are in a rack cabinet that produces the necessary signals to go to the remote antenna. It must be coupled to the uplink antenna with quad-shielded coax. It diplexes the actual digital data as well as the frequency and power control into the same cable.

This unit also supplies the raw DC power to operate the radio head, which is at the focal point of the uplink antenna. An RS-232 connection between this unit and an IBM-compatible computer will give you full control of operating parameters.

The digital bit-rate audio compression can be configured to connect either a satellite uplink or, alternatively, to feed ISDN or switched-56 terrestrial lines. The cards in the electronics require specific levels and balancing configurations. These electronics amplify or attenuate the input signals as required and meter the various levels in the process.

Computer Monitoring

There are many different parameters that must be controlled in operating any satellite system. While only a few of them are used in everyday operation, they must all be available for adjustment. A set of custom control and monitoring programs is available to make the necessary changes, to completely reset the system when needed and to provide a continuous bargraph of system performance while a remote is underway.

In a fixed location, a desktop computer may be used for other functions as well as satellite control; for the remote end, a laptop with a small hard drive or floppy is dedicated to the control functions.

A number of vendors are available to supply the actual transponder spectrum. Which of them to choose depends on the function of the system, the location of the uplinks and downlinks, and the service required. Some users will want to buy satellite time on the "spot" market, while others require a 24-hour full time channel.

Again, the best way to explore options is to acquire the equipment from a vendor that can advise the best choice to make in this decision. Satellite time is a commodity; the more you buy, the less expensive it gets. A long-term contract will offer the best value, and many times a group of users can combine forces to obtain the best rates.

Getting the necessary FCC license can be an arduous process; the application form is long and involved, and professional help is definitely called for. Mistakes in completing the applications can be costly and time-consuming, so be meticulous.

Next month, we'll look at the downlink portion of the system and suggest ways you might begin planning your own satellite remotes.

Mike Callaghan can be reached at KIIS-FM at 213-466-8381. For more information on satellite equipment contact California Digital at 805-523-2310; Comstream at 619-458-1800.

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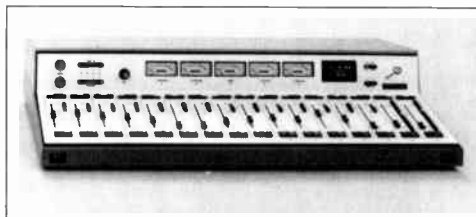
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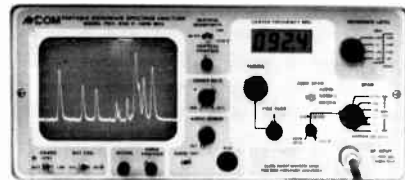
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Reader Service #075

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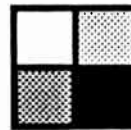
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Reader Service #079

continued from page 23

Regaining Modulation

Volumax to an AKG Orban 8100+XT results in almost a 30% increase in bandwidth, when measured by a method compliant with CCIR/ITU Handbook monitoring techniques.

If just altering processing can increase occupied bandwidth this much, by comparison, the effect on occupied bandwidth of the added modulation of SCAs is statistically insignificant.

Correct response time performance of a monitor must not be confused with degraded frequency response. The apparent impact of SCAs on total modulation can be easily reduced by simply rolling off the monitor's frequency response above 53 kHz. However, that would produce a monitor that would never give a correct indication of SCA injection on the same scale of that used for reading total modulation.

Less Loss of Loudness

In terms of day-to-day operation of an FM station, accurate modulation monitoring will deliver less loss of main channel loudness when SCAs are employed. A modulation monitor operating at close to the FCC maximum response time means less reduction in main channel modulation from SCA operation. Such monitoring also removes a station's incentive to do the kind of signal processing that increases crosstalk into SCA.

Left and Right audio clipping, composite clipping without pilot protection, and inadequate stereo anti-aliasing filters are all techniques for controlling brief overshoots of modulation. By measuring modulation accurately and with carefully controlled peak response time, such techniques are not needed to maintain a loud, competitive main channel signal.

Eliminating these devices not only reduces crosstalk into SCA, but makes the main channel sound better, too.

The monitoring of FM deviation had been a stagnant technology for more than twenty years. In its 1983 Report and Order deregulating modulation monitoring, the FCC tried to encourage the application of new technology, but the industry seemed to ignore this.

By employing state-of-the-art digital technology, a station can regain all the modulation lost to SCA operation. State-of-the-art modulation monitoring also makes it possible to reduce audio processing without giving up any loudness. And this technology is consistent with both the letter and spirit of the FCC Rules.

Eric Small is president of Modulation Sciences, Inc. He can be contacted at (800) 826-2603. To obtain a full version of this paper, complete with footnotes, contact Modulation Sciences.

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Station Stories

Radio Station Installation Reports

New All-Digital WIXC Has Engineer at the Helm

By Judith Gross

What happens when a morning man-turned-chief engineer becomes President and GM of a new station? Better yet, what happens when he ends up locating the new station in the same building where he got his first commercial radio job?

It happened to Geary Morrill, who, after a successful engineering tenure with Mid-West Family Broadcast Group, bought into WIXC in Bay City, MI and helped launch it. Now he's President, part owner and GM of this new Class A that he runs with the help of his wife, Nancy, who acts as business manager.

Morrill had served six years of Director of Engineering for Mid-West. As an engineer, he helped design the new studios with an eye toward efficiency. And, also as an engineer, he decided to take advantage of cutting edge technology.

"We were starting from scratch, and I decided we should be state-of-the-art digital," Morrill explained. "I knew we were on the verge of having a cost breakthrough in digital equipment, so I went to the Radio Show last September, and the pieces just started falling into place."

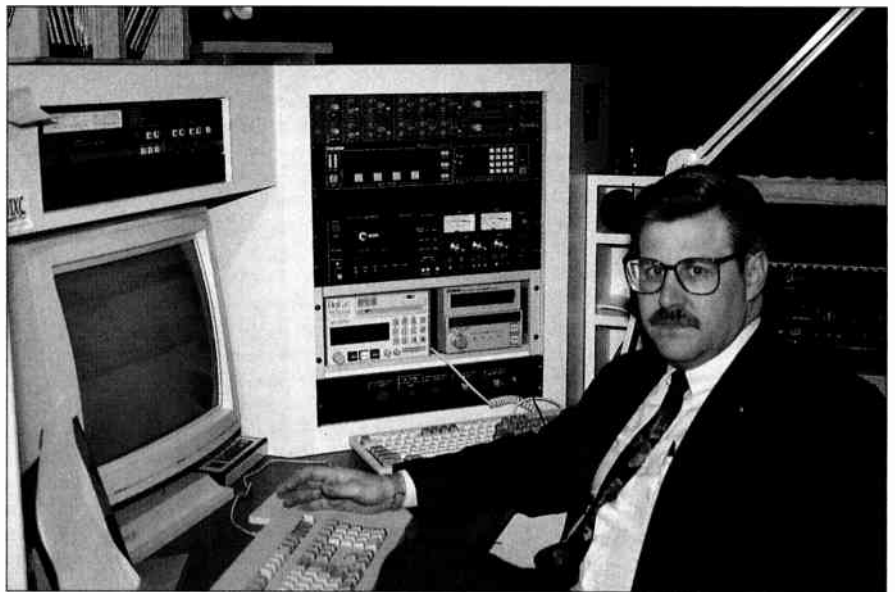
Morrill said he realized there were "replacement pieces for many of the things we had been doing analog. It was obvious that with digital gear, over the long term, we could do away with all of those maintenance costs, although it was a little more expensive up front."

Ultimate Studio

Now all of the source equipment is digital, with studios built around TM Century's Ultimate Studio, 360 Systems' DigiCart as the medium for spots, jingles and promos, and music on TM Century's Hot Country CDs.

The Ultimate Studio hardware consists of three Sony CD jukeboxes and a controller, and two 360 Systems DigiCarts, one integrated into the system, and one for the talent to use as needed. All DigiCarts employ a 400 Mb hard drive and can be expanded to handle more external drives.

Morrill noted that 360 Systems DigiCart Bernoulli disks are used to transfer audio from machine to machine. He also said the air talent especially likes the DigiCart's editing capability. "The jocks like to use it for callers. They can trim off the head and the end and the edit quality is unbelievable," he said.



So much for on-air digital quality, but what about production? Morrill decided to go with the Studer Dyaxis as the mainstay of WIXC's production room. The two-channel Dyaxis sits in the center of a unique production station with an overbridge designed to accommodate a 360 Systems AS-16 switcher.

"Everything in the production room goes through this nerve center. We can have 16 mono or eight stereo pairs in and out. Now we can move audio around in the time domain without ever going back to analog," said Morrill.

He explained that the production system employs audio data compression, in the form of Dolby AC-2. "The result is 48 kHz sampling," he said, acknowledging the controversy among engineers over whether or not to use audio compression.

"The concern is that in multiple uses compression algorithms will degrade audio, but we aren't at that point

so I'm not overly concerned. When we get to that point, we'll probably want to keep the audio entirely in the digital domain," Morrill explained.

A Denon 950 CD cart machine completes the digital line-up. For analog support, there is a Tascam 122, an Otari 50-50 MK III, Electro-Voice RE-

(continued on page 37)

Station Stories

continued from page 36

All-Digital WIXC

27 mics, and even a Techniques 1200 turntable tucked away, out of sight. "There are no tape cart machines in the building," Morrill noted.

For effects, Morrill put in an Eventide UltraHarmonizer and he selected one of the new digital audio processors on the market as well, although he declined to specify which brand for competitive reasons. For field work, a Teac DAT recorder completes the digital line-up – yes, even the actualities are digital.

Unique Furniture Design

With all this state-of-the-art gear, Morrill said the challenge was to construct a new studio to accommodate it. "Nobody had ever built a studio just for the Ultimate Studio, the 360 Systems DigiCart and the Dyaxis before. We had to make the equipment fit in and still look good."

To do this, Morrill looked to Audio Broadcast Group for a design that would meet his criteria. The result is a console-less production studio designed around the Dyaxis, with the 360 Systems switcher on the overbridge.

For the control room, Audio Broadcast Group came up with a design that would accommodate the Auditronics 210 12-channel board and the CD jukeboxes, which are set on a shelf that rolls out for maintenance.

Morrill said he went with Audio Broadcast Group because "I liked the way the wood appointment is done, and I based my decision both on looks and functionality, also their ability to handle our unique requirements and still deliver on time."

Tight Timetable

And timing was apparently Morrill's biggest challenge, not for the building, which had housed radio stations since it was put up to hold WBCM's transmitter in 1925, but for the tower site and launching on air.

"We poured the concrete at the beginning of October, and were stacking steel on the tower just before

Christmas. The studio work began in mid-November," Morrill said. But somehow the station went on the air, on time, at midnight, January 1 of this year.

Morrill conceded that luck was on his side. "We had a good source of suppliers and relationships with people built up over the years," he said, but added, "I would not recommend our timetable to anyone."

The 2400 square-foot building housing the studios was home to Liggett Broadcasting's WHNN in 1973, where Morrill started his career in radio as the morning announcer. He said building WIXC in the same rooms was "like coming home."

He noted that the control and production studios were built in the original rooms holding control and production for WHNN, "and there were a lot of ghosts to be heard."

With a transmitter site seven miles due south and no hills in the Lake Huron valley, Morrill went with an analog Moseley STL. He also put in a Continental 5 kW transmitter and 3-bay ERI. For remote control, he went with a Burk Technology with voice option.

"The staff loves it and it makes transmitter monitoring a snap," Morrill said.

New Frontiers

So exactly how difficult is it for an engineer to make the transition to GM? Well, during set-up, the only engineering task Morrill had to perform himself was to wire the remote control to the transmitter, a far cry from his previous busy days as DE for Mid-West. "That

was the hardest thing, to leave it all to other technical people," he said.

He added that his past years as morning jock helped give him an understanding of programming and that he set out to learn the sales and management side of the business by reading, observing and "listening twice as much as I talked."

"This was a goal I had set for myself a long time ago. By the time I'd been in commercial radio a year, I had a long term goal of building my own team and achieving success," Morrill said.

He added that an open-minded philosophy about the management track at Mid-West helped as well. "They've had PDs and news directors become GMs. I'm their first engineer, but fortunately it's not strictly a sales person's path," he noted.

Since its launch in January, Morrill said that WIXC has had good acceptance in the community. Building a high-tech, all digital facility at a time when Michigan was still reeling from the downturn in the car industry helped the station gain numerous news stories and statewide accolades.

"I was able to talk to the Governor about being high tech and creating new jobs the day after we'd just lost a lot of jobs in this area," Morrill said.

But Morrill said the secret of the station's real success lies in his search for team members who are "possibility thinkers who want to grow and relish a challenge." And Morrill added, "we're projecting a community image and a fun image. You'd have to pry my people out of here with a crowbar now."

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Equipment Report:

Netwell Marketing

Reader Service #082

Noise Control Considerations

by Mark Rustad, NetWell Marketing

Providing acoustical solutions to the noise-control needs of the radio industry has been a trademark of NetWell marketing, Inc. of Minneapolis, Minnesota. In carrying the popular line of AZ-USA (Azonic) noise control materials, NetWell has been exposed to numerous applications for noise abatement treatment throughout the USA.

There are typically two types of unwanted sound. The first is the problem of sound transmission. The obvious example is a college dormitory with one room containing a blasting stereo while occupants of the room next door are trying to study.

The second noise problem is attenuation. Here the example could be a high school band playing at halftime at a football game in the Metrodome in Minneapolis. The reverberation causes an untrue sound. It may take ten seconds for the noise to bounce from the roof of the dome back to the fans in their seats. The original sound of the music becomes blurred with the reflected noise waves.

More common within the radio industry is the attenuation example. Most radio stations are interested in providing as anechoic an affect as possible within their recording, broadcast and control rooms. This maximizes the quality of the sound heard over the air and in recordings, and provides the professionalism that most listeners seek. Although not the size of the Metrodome, the basic principal is the same. Reflected noise interferes with its original sound source.

Noise control products being offered in today's market are primarily geared to either stop sound transmission, absorb reverberation, or both. Depending on the application, one of several potential AZ noise control products would be selected.

For transmission, NetWell Marketing offers a product called AZ-Bloc. It is a loaded vinyl mass, 1/8-inch thick, and one pound per square foot. It is designed for installation on walls, ceilings and floors, and serves to stop noise from passing through it.

AZ-Bloc is lightweight, black, flexible and not OSHA-restricted. It contains no lead additives, and also serves to insulate temperature. Other product characteristics include 250 PSI (ASTMD412) tensile strength; 160% (ASTND412) elongation and 70 shore A durometer.

For reverberation, the more common application in the radio market, are AZ-Pyramids. These are acoustical panels made of open cell, polyurethane foam, with 36-45 pores per square inch. The panels are designed to help absorb reflected noise that won't transmit through the wall, but rather bounce back into the room.

As much as 100% of the reflected noise can actually be absorbed into the material. Typically, entire walls within a sound room are covered with these panels. The panels themselves are two feet square and come in 2-, 3- or 4-inch thicknesses. The thicker the material, the lower the frequency of sound it will help absorb.

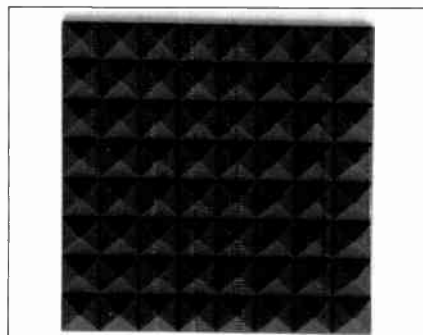
With the three inch foam panel, at 500 Hz frequency, 100% of the reflected noise is absorbed into the foam. Any NRC (Noise Reduction Coefficient) over 1.0 indicates that 100% of the reflected noise will disappear.

The foam panels are aesthetically designed with a symmetrical pyramid shaped pattern in them. The panels appear seamless upon installation. A simple caulking gun and tube of adhesive are needed to apply the panels either directly to your walls, or to quarter-inch plywood to be mounted to the wall to provide mobility of the material. They come in charcoal, blue, brown or beige.

NetWell Marketing also offers lines of acoustical ceiling tiles, acoustical wall coverings, curtains, baffles and several other products that have been successfully installed into radio stations across the country.

Though not a college dorm or a football stadium, a radio station needs to provide as true a sound as possible. In order to protect the quality of broadcast, recording or live sound, reflected noise waves need to be absorbed. Acoustical foam panels have been around for 25 years, but only recently have they been perfected and complimented with other lines of noise abatement products.

For more information, contact NetWell at 800-842-9790, 612-861-2290, fax 612-933-9089, or circle reader service number 082.



Equipment Report:

Eastboard Consoles

Reader Service #083

Considering the Human Factor

by Steve Goldberg, Eastboard Consoles

Furniture and control room designs for the broadcasting environment have changed dramatically in the past several years. Computerized logging systems, digital audio editing components, and the blending of video-related equipment into the traditional environment have necessitated new ergonomic design requirements for radio broadcasting and production consoles.

Ergonomics – the relationship of people to their work – is the key component. The objective is to enhance the well-being and comfort of all people at work, while also improving task efficiency.

Eastboard Consoles, Inc. of Philadelphia, PA, has developed a design for studio furniture which reduces the amount of effort required to accomplish any specific task.

The designers make use of anthropometric data (human body limitations) such as physical reach, viewing and sight angles, operating force, etc. These are combined with the factors that influence verbal and

visual communications, as well as engineering and maintenance concerns.

For over 13 years, Eastboard Consoles has been a leader in creating enduring ergonomic furniture systems for broadcast video/audio and computer electronics. These systems produce a sustaining environment for long-term working comfort, efficiency and well-being.

The results of this design approach are comfortable, user-friendly furniture with flexibility and service, today and for the future.

Recent studies of computer users repeatedly show that the furniture people sit at, stand at and work at has the greatest single effect on their day-to-day comfort, happiness and productivity. In fact, increased productivity is a direct result of the physical comfort level that people experience in their jobs.

The furniture and control rooms designed and produced by Eastboard Consoles follow the guidelines for ergonomic work environments established by the American National Standards Institute/Human

Factors Society (ANSI/HFS 100-1988).

The people who work at our consoles report greater ease, comfort and effectiveness during their long working hours and say they feel fine when the workday is over. Apparently, attending to the human factors of working with electronics really does pay off.

For more information call Eastboard Consoles at 215-743-8555 or circle reader service number 083.



Equipment Report:

Studio Technology

Reader Service #084

The "Can Do" Attitude

by Vince Fiola, Studio Technology

How often have you come up with an idea to make your life in the studio easier, only to be told by construction or furniture "experts" that it can't be done?

Translated, this means that they don't want to do what you're asking, or they don't know how to do what you're asking. It has been my experience that just about anything can be accomplished provided you make an honest effort to get it done.

Studio Technology makes broadcast studio furniture. It's what we do; it's our "thing" and we enjoy the challenge. I've seen what some would consider strange configurations of furniture leave the cabinet shops I've been associated with over the years.

At the receiving end of every "strange" configuration was a satisfied customer. Satisfied because he or she got what they wanted: a time or space saving idea becoming a reality. It is that philosophy that has built our reputation. We build the studio furniture our customers want instead of trying to sell them the studio furniture we have.

How much can I tell someone about a series of boxes bolted together with a counter on top? An even better question is how do

I explain to a prospective customer that the boxes I build are better than someone else's? Quality building materials are available anywhere, but quality building materials don't necessarily make a quality piece of furniture.

My opinion is that a large part of quality has to do with a product actually fulfilling the need for which it was produced. In other words, it has to work. In our case, that product has to hold a lot of electronic equipment while providing easy access to equipment and all the wiring that comes with it.

It has to look great and still be reasonably priced. It has to be "workable" for everyone from engineers to production and air staff, as well as a salesperson showing off the studio to a client.

At Studio Technology, we combine years of experience in two different disciplines. I started out several years ago learning the laminate trade and worked my way up to a management position in a shop which produced broadcast furniture exclusively.

Later I went to work for the R.C. Lagnini Company and learned the finer points of woodworking. Eventually, Studio Technology, a division of R.C. Lagnini, was formed to produce high quality studio furniture with a special flair. This network enables us to offer more choices to our customers.

For example, our millwork shop stocks many species of domestic and imported hardwoods. This allows us to offer a variety of different wood treatments cost effectively.

We manufacture all the furniture we sell right in our shop. Our crew is dedicated to producing broadcast furniture. We don't use sub-contractors. That's how we maintain our quality control standards.

Studio Technology will custom build furniture to your specifications, but we can also offer design suggestions to help make your decisions easier. We will take your ideas and find a way to make them a cost-conscious reality.

Contact Studio Technology at 215-640-1227, or circle reader service number 084.



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Equipment Report:

Wheatstone

Reader Service #085

Audioarts Simplifies Custom Builds

by Mike Shane, Wheatstone

Traditionally, to get a custom, major market look in your studios, you had to do all the work yourself. You had to plan all the details, design the set-up, insure that CD, cart and rackmount spacing was correct and that the proper operating angles and reach dimensions were provided.

But now things are easier. With Wheatstone Audioarts furniture line, you can turn weeks of planning and hard work into just hours of your time.

To start with, we've made the system easy to configure. You choose from over 25 different set-ups, decide what counter widths you want, and that's all there is to it. Audioarts has done the homework for you. The designs can save work, time and money, and allow you to anticipate a smooth, on-time installation.

System features include cabinet increments in stand-up or sit-down versions (single, double and triple bay), interview counters and extensions, cart/CD storage units, elevated equipment turrets, under console cabinets (with equipment racks installed), slopefront tape recorder mounts and even glide-out drawer systems.

You can tell this line of furniture was designed with the engineer in mind; the configurations provide generous wire passages, oversized rear access panels, large punchblock panels with removable concealment doors, and more access, rack space and flexibility than many other systems.

The Audioarts furniture line conveys a look of success, one which instills client confidence. Seamless, heavy duty horizontal grade laminates provide a beautiful, scratch resistant work surface.

Detailing includes high-grade hardwood-protected corners and counter edging for an

elegant look that provides extra protection against corner chipping and peeling. And all countertops are replaceable should you ever want to make a change.

Audioarts offers a customized, attractive furniture system that is trouble-free and easy-to-order.

For more information call Mark Kaltman at Wheatstone at 315-455-7740, fax 313-454-8104, or circle reader number 085.



Equipment Report:

The Express Group

Reader Service #086

When the Goal is Quality

by Byron Andrus, The Express Group

Quality is everything. We insist on it daily with every product and service we offer. Proof? the Broadcasters Designer Association's 1991 Gold Medal for Design Excellence was awarded to the designers at The Express Group.

The Express Group is about to begin its fifteenth year in broadcasting. In 1982 we introduced the very first, truly modular, high-quality furniture system. It remains the best selling high-end furniture in the business, due to our design team.

They understand the importance of interfacing operator needs with the special requirements of the contemporary broadcast environment. Our six lines of modular furniture are the direct result of years of experience in the design of custom-tailored studios that are ergonomically and aesthetically correct.

Every module features solid hardwood vertical supports in concert with birch ply, known for its strength, durability, and light weight. Bolsters, trim and backplash are available in a choice of honey oak or natural walnut. All cover panels are of laminated, tempered Masonite or plexiglass. There is absolutely no particle board anywhere.

Any color scheme works with our standard colors of dove grey and black tops. The chromatically-natural finish is designed to highlight the equipment. Virtually any available color and finish can be combined with even the most exotic of hardwoods to create

Typical of our attitude about quality is the development of a unique corner guard system offered only by the Express Group. We use a special non-marring, non-splitting material superior, in both form and function, to any wood product.

While we do offer, at no extra cost, either oak or walnut protection, we've found that the rubberized vinyl we use is infinitely more durable and cleaner in appearance. It never requires oil or polish, will never splinter, chip or scratch and dovetails beautifully with the reveal lines of our furniture.

Another advantage is our special treatment of laminate edges around all rack openings and kick panels. We've developed an edging technique which helps to prevent chipping and snags caused by chair bases, vacuum cleaners and ongoing installation and removal of equipment. The treatment eliminates the need for ugly bumpers.

Another example of our attention to versatility and durability is the use of adjustable leveling feet on all floor modules, and just above those, the use of Kydex on all kick panels.

Interior access is provided with full-sized access panels secured by quick, quarter-turn fasteners. Enhanced passive ventilation and easy wire management is accommodated with extra large open-module access between cabinets. In addition, all floor units have large floor access for cable passes and enhanced cooling characteristics.

Our countertop rack pads can be mounted as far forward or back as operator needs dictate. Even when mounted at the

rear corners of the top, they remain within easy reach of the operator and offer several advantages, including full utilization of the valuable countertop space to the left and right of the board. A symmetrical design incorporates large airflow channels to the sides and rear of equipment.

Every pod features 14 inches of high-grade, factory-installed steel rack rails (up to 36 inches of rack rails are available), two large access panels with quarter-turn fasteners and optional CD or cart storage racks. Since the rack pods furnish the support for our overbridge copy stand, you get the advantage of easy height adjustment for copy and quick access to any style board.

The bottom line is that our designers and craftsmen ensure the production of furniture that is both a handsome reflection of your station's image and a comfortable working environment for your people.

Contact The Express Group at 619-298-2834, fax 619-298-4143, or circle reader service number 086.



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Equipment Report:

Murphy Studio Furniture

Reader Service #087

Design For Success

by Dennis Murphy, Murphy Studio Furniture

It may be hard to draw a direct line between your station's ratings and revenues and the way your studio looks and feels. Certainly, when it comes to improving your on-air sound, other equipment enhancements would take priority over furniture design.

But consider this: If station personnel have an efficient workspace, if they feel good about their jobs, the feeling will translate into more productivity and thus a better sound. And when a potential client visits your facility, the feeling of quality will come through as well.

So exactly what are the points to consider when choosing a furniture line, and how does Murphy Studio Furniture answer those needs in designing a look for your studios? Let's consider several features of our studio design.

First is modularity. Our designs are flexible enough to change with your format changes. The modularity of our Elite series can keep costs down even while we customize a look to your needs. Equally as important is durability. In a rugged, 24-hour operation, studio furniture has to hold up to wear and tear.

One way we handle the problem of how to make furniture look good and hold up over time is our curved-base design and overhanging counter. These help keep chair bases from hitting against the furniture or the equipment mounted in racks. Wood trim on all exposed edges and a non-chip base also add to durability.

Ventilation is also a problem in many closed-space studios. We solved this problem by leaving all modules open and also designed a 1/4-inch reveal into the furniture just below the main counter wood trim. This passive ventilation eliminates the need for cooling fans, thus reducing ambient noise.

We offer ergonomic efficiency with sloped rack faces allowing the best view angle for on-air talent or production staff. The rack face is an easy three-quarter's arm reach and there is a full view of the guest position. Aprons above all knee spaces add strength and provide areas for mounting headphone jacks.

In addition, notched wire ways provide ease of wiring. Wire can be laid into these passes so there is no need to string wires through "D" rings. A wire management area in the dead space of the corner tower racks and a wire trough between console supports under the console also add to the convenience.

Murphy Studio Furniture offers five lines of furniture. The Avant-Garde series, at the high end, features European styling; our Elite series has contemporary styling and is fully modular; the Premier series is medium-priced and full featured with flexible layouts; the Classic series is for the budget-conscious; and the Dub/Edit/Station design is the choice for newsrooms, offices and digital workstations.

We also offer custom-designs and professional help with layouts and studio design to save time and avoid costly mistakes. We also insure on-time delivery.

Call Murphy Studio Furniture at 619-698-4658, fax 619-698-1268, or circle number 087 on the reader service card for more information.



Equipment Report:

Audio Broadcast Group

Reader Service #088

Design Leadership & Craftsmanship

by Dave Veldsma, Audio Broadcast Group

At the forefront of each industry are the individuals who accept nothing less than perfection. They are people who are never satisfied with "good enough" but rather are always asking, "How can we make it better?"

At Audio Broadcast Group, each furniture piece is designed and crafted by people with this drive for perfection. The result is furniture that places wires out of the way, one where everything is lined up and easy to reach in a comfortable ergonomic design.

And, its furniture that features our special frameless cabinet design, which eliminates bulky framework while adding strength.

Because we're located in Grand Rapids, MI (the contract furniture capital of the world) we can employ master craftsman with years of experience.

Many studios require specialized furniture that is out of the norm. We'll build any size or shape required for broadcast, production and editing studios.

Examples of our attention to detail are features such as solid oak trim and adjustable leveling feet. Complete prewired instal-

lation services by trained technicians insure system satisfaction and reliability.

Audio Broadcast Group began studio furniture design and manufacturing in the late '70s. To date, over 200 systems have been delivered and installed in all areas of the U.S.

While we have standard systems, most of our work is for specialized design, including electronics from such manufacturers as ITC, Auditronics, Denon, Revox, Studer, Otari and Broadcast Electronics.

We build and wire systems in our shops, then deliver with our own truck and crew to our customer's location. With prewiring and testing at our facilities, we can usually install a complete studio in a day.

This allows the customer to have a minimum of down time and be fully operational with new equipment and furniture in a matter of hours. Complete, comprehensive documentation accompanies each prewired system.

With the advent of digital products, such as hard disk storage systems and workstations, we have innovative furniture designs to address these new technologies in a functional, eye-pleasing manner.

For digital or analog studios, we include such features as durable formica laminate, AC wiring and cable runs, cooling fans and ventilation ducts, heavy duty EIA standard rack rails drilled and tapped, smoked plexiglass panels and choice of colors.

Our furniture construction exceeds AWI standards and we also offer complete delivery, set-up and installation anywhere in the USA and Canada.

By bringing together the design, craftsmanship, manufacture, and installation techniques we've developed over the years, Audio Broadcast Group can assure a completed studio that is cost effective and built to serve a station's unique needs.

For more information, call Audio Broadcast Group at 616-452-1596, fax 616-452-1652, or circle 088 on the reader svc. card.



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AVS Broadcast Svc.	14	052	M-Street	24	056
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Radio Guide welcomes your comments, letters, articles and Tech-Tips. We prefer electronic submissions.

1. MCI Mail to Judith Gross, at MCI Mail #507-3038.

2. Modem: Call 703-370-7943 and request an XMODEM transfer.

3. Mail a 3.5" or 5-1/4" double or high density floppy disk (Wordperfect 5.0 or ASCII) to: Judith Gross at 101 S. Reynolds St., Suite H-405, Alexandria, VA 22304.

4. Or post to the Radio Guide/AVS BBS by calling (804) 468-4957. Please send as a private message to Judith Gross or Ray Topp.

We also accept clean, typewritten or printed manuscripts mailed to Judith Gross at the above address. Photos and clean, camera-ready art with articles and Tech-Tips appreciated.

Articles should be 750-1000 words in length and Tech-Tips should be 200-500 words.

Radio Guide pays for all articles accepted for publication and Tech Tipsters will receive a Radio Guide pocket calculator.

If this issue's Reader Service Card is missing or used, please copy the form below and fax or mail it back to us at Radio Guide.

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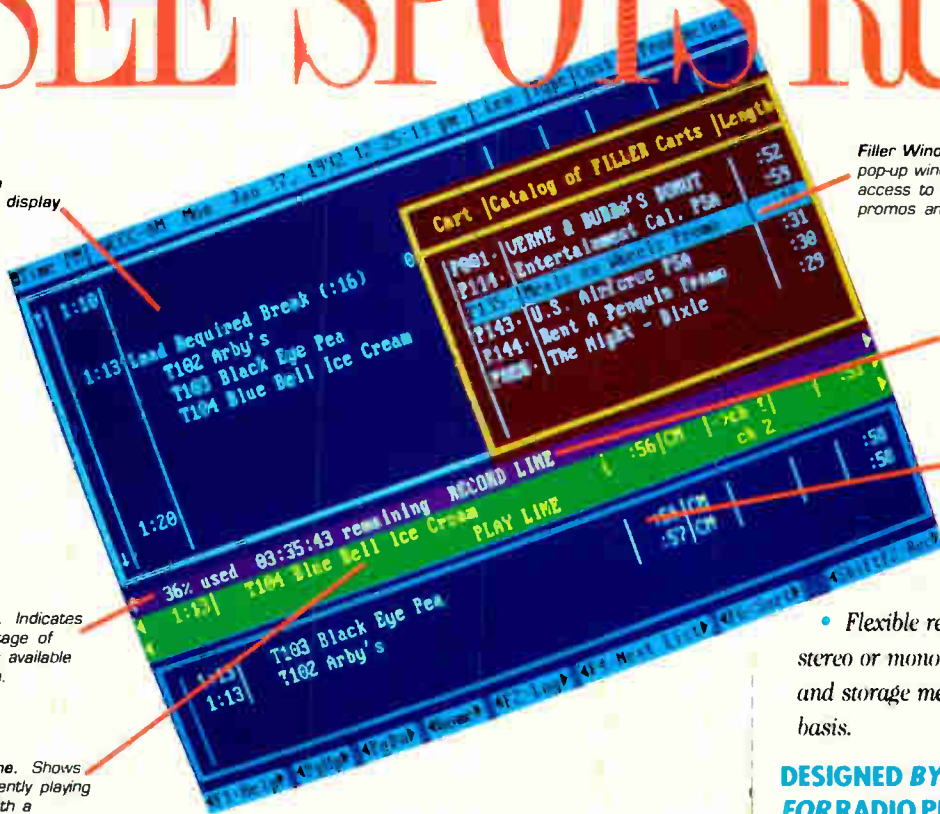
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On-screen traffic log display



Filler Window. This special pop-up window gives you quick access to PSAs, jingles, promos and other fillers.

Record Line. Shows what DCS is currently recording.

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The Play Line. Shows what's currently playing on-the-air, with a count-down timer.

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