Radio Technology for Engineers and Managers

Radio Guide

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May-June 2008 – Vol. 16, No. 3

Disaster Strategies

Plans You Hope You Never Need

Inside Radio Guide

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Cover Photo Credit:

One of the KTCK, Dallas, TX towers knocked over by a tornado earlier this year. Photo courtesy of Rob Chickering, VP/Engineering for the Kidd Kraddick Network.

Radio Guide

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Radio Waves

by Barry Mishkind – Editor

Recently, I had the privilege to speak at the Great Lakes Broadcasting Conference, put on by the Michigan Association of Broadcasters. The topic was how engineers could survive and thrive in an industry struggling with various problems.

We have heard about round after round of cuts. Some lament budgets that seem to emulate water buckets riddled with holes. For others, the workloads of five or six years ago almost seem like a vacation.

But you know what? The sky is *not falling.*

Yes, the attendance at NAB clearly showed that some budgets have been severely cut. But exhibitors on the floor reported that a larger than normal percentage of the attendees were serious customers, ready to buy.

This mirrors what we hear from around the country: even as the Media obsesses over the major broadcasting corporations and their financial woes – *that is not the whole story*, any more than the daily news from inside the DC Beltway truly reflects what is happening in the country as a whole.

While budgets are certainly under scrutiny everywhere, many stations and small groups are doing well, focusing on their local communities and businesses. Indeed, sales at the NAB indicate these stations are buying and installing a lot of gear.

It is true: energy and food prices are cramping the economy. However, for radio – at least in many ways – the sky is not necessarily falling.

AM TRANSMISSION SEMINAR IN AUSTIN

We are pleased to let you know another of the ***Radio Guide AM Transmission Seminars*** has been scheduled. In association with the Texas Association of Broadcasters, the next Seminar will be held in Austin, August 5-7.

Due to the hands-on nature of the seminar, seating is limited, so we suggest you reserve yours as soon as possible. The price for this limited seating seminar has been held as low as possible to accommodate even stressed budgets. Take a look at www.radio-guide.com/seminar for complete information. *– Radio Guide –*

*Above: Rays broadcasters **Andy Freed** (left) and **Dave Wills** (right) interview Rays' star third base prospect **Evan Langoria** on the "The Hot Stove Radio Show."*

*Top: **Larry McCabe**, Tampa Bay Rays Senior Director of Broadcasting and **Rich Herrera**, broadcaster and Director of Radio Operations are shown on the field during spring training.*

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Fans of the Tampa Bay Rays baseball team are intimately familiar with Dave Wills and Andy Freed, play-by-play announcers and hosts of "The Hot Stove Radio Show." Offering the inside track on all things Rays, the show kicked off its 2008 season with the "Countdown to Opening Day" series. While at a remote from a well-known sports bar, ACCESS showed its true worth. Two minutes before the broadcast, the ISDN line that was supposed to be used for the broadcast failed to connect. Luckily, they had the ACCESS running on Wi-Fi provided by the restaurant. The broadcast got on the air and was flawless for the entire one hour show.

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Preparing for the Unpredictable – Yet Probable

by Gary Peterson

No one wants to think about some disaster happening to their station and/or community. Nevertheless, things can – and do – happen. With this article, ***Radio Guide*** *begins an effort to help you put plans in place now that will keep things running when the unthinkable happens to you.*

This project began when my company asked that I write a disaster recovery plan for our radio stations. Not wanting to "reinvent wheels," I began asking around for information or guidance regarding anything similar that had been previously done. This eventually led to a dialogue with Barry Mishkind. With his encouragement, I hope to write our company's plan and, via this article, inspire others to contribute some of their vast experience.

NOT IF, BUT WHEN

Since being employed in broadcast engineering, I have experienced a devastating flood that killed over two hundred people in my community. During my employment with a nationwide broadcast group, I saw the photos of the straight-line wind damage to three self-supporting towers at one of our sister stations in Peoria, IL and ordered vast amounts of replacement equipment for our cluster in Biloxi/Gulfport, MS after Hurricane Katrina.

Part of the storm aftermath at WMBD
(Courtesy: Wayne Miller)

If you have not yet had to deal with a disaster, it is probably not a matter of *if*, but rather *when*.

I started to form a list of all the probable things that could affect our radio stations, sooner or later. Tornado, flood, blizzard and wildfire come to mind. If you live in another geographic area, you might have listed hurricane, earthquake, tsunami or volcanic eruption. I am quite sure some readers have had to deal with ice storms, protracted power outages, protracted communication outages, chemical spills, studio fires, collapsed towers, and a host of other things I have failed to list. With so many things that can possibly go wrong, one should never have the attitude that "It can't happen here."

IT IS BEST TO PLAN NOW

Planning before a disaster happens seems to be the first, best approach to disaster recovery. Trying to "wing it" and develop solutions on-the-fly is rarely ooptimal – a great deal of time can be lost and large amounts of money can be wasted.

Clearly, if the big problems are anticipated, recovery could be simplified. Once each potential problem (many of which are common to most disasters) is identified and set down on paper, strategies can be formulated, within the confines of the budget, to find a workable solution.

Perhaps the best course of action is to try to identify all the critical areas, and develop a checklist to ensure you have planned so a rapid recovery can be facilitated as much as possible. After all, what sort of Public Service can a "dark" radio station perform? Additionally, being off the air for an extended period likely will cost the station substantial revenue.

STARTING A CHECKLIST

Some questions that should be asked include all the "single points of failure" and answer the "what if?" questions with strategies to facilitate recovery and get a programmed signal back on the air.

For example, the most basic questions relate to the stability of the program chain. What kind of answers would you have for the following questions if you were trying to recover from a disaster?

1. Primary Equipment issues: What could we do to recover ...

- if we lose power at the studio?
- if we lose power at the transmitter?
- if the transmitter (and/or antenna) is destroyed?
- if the console (and/or automation computer) takes a lightning hit and smokes?
- if the STL link fails?

What do you do if the transmitter shack is destroyed and the contents are strewn across the field?
Courtesy: Art Morris, KTBN

2. Getting the signal back up:

- Do we try to keep multiple transmitters on-air?
- If so, do we feed one audio stream to all of them?

3. People issues:

- How do we get staff to the station and secure their possessions?
- What if there is a curfew or martial law has been declared (requiring special credentials)?
- How do we feed emergency staff and provide for their personal security?

4. Program issues:

- What do we need to tell our listeners?
- How do we inform the public once we get back on the air?
- How much staff will it take to do the job?
- How do we locate our staff?
- If the studio is damaged/destroyed, how can we get audio on the air?
- Is there another location that we could use for an emergency studio or transmitter site?
- Can we program from the transmitter site itself? (Is there room in the building for someone to sit and at least pull audio together – or would they be sitting outside the xmtr building because there is no room?)
- What if landline, cellular telephones and the Internet are not working?

5. Information issues:

- Is the local EAS system set up in such a way as to be viable?
- How do we communicate with Law Enforcement and Emergency Management?
- Has the station attained First Responder status with local authorities?
- Has the station obtained high priority telephone circuits?

6. Continuing concerns: Once you get back on the air, with staff, the issue is to make sure you *stay on the air.*

- How do we fuel and maintain our generators for the duration?
- Where do we obtain additional fuel?
- How do we avoid hijacking or confiscation of fuel?
- Are vehicles available that are capable of accessing our sites, if necessary?
- How do we communicate for outside assistance with the FCC (applying for STAs), and making emergency equipment and parts orders?

Many readers could, and should, add additional important questions to this list. Please share your experience and comments by email (address below).

DEVELOPING A VIABLE PLAN

The next step is to try to come up with practical answers to each question.

The answer to a question such as "What if our STL link fails," might be as simple as pressing a Marti RPU unit into service as an emergency program link. Many of the questions could be addressed by small purchases, such as keeping a supply of non-perishable food and potable water at the studio site.

If your staff were stuck at the studio, is there some food and water available?

Other questions might be addressed by meeting with state/local governmental, law enforcement and emergency management officials. Some questions will have to be addressed with major purchases, which will need to be budgeted for. Generators, backup transmitters, backup studios, auxiliary sites may fall into this category. Major communication failures might be addressed by building a good relationship with a local amateur radio organization with HF radio capability.

SHARE THE PLAN

All staff members need to be given a written copy of the emergency plan, which should include who should and who should not attempt to come to the studios, any assigned emergency tasks, how to make contact with the station and – this is very *important* – that they *are not* to endanger their life or safety, or the life or safety of others, in an attempt to perform their duties.

With some planning, it is hoped that when the unexpected happens, there will already be well-thought out strategies in place, ready to assist with operating in the public interest and rapid recovery.

This project begs for your input. Please let us hear from you.

Gary Peterson is the Chief Engineer for Schurz Communications, Inc. in Rapid City & Sturgis, SD. You can contact Gary with your comments, suggestions and ideas at engineer@newrushmoreradio.com

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- Christian Vang
Chief Engineer
Clear Channel St. Louis

"The codecs sounded great. My management was very, very impressed with the demos"

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FCC Focus

by Cary Tepper

Public File Alert - The FCC Releases a New "Public and Broadcasting" Manual

The FCC has released the third generation version of "The Public and Broadcasting (Revised May 2008)," a manual that each broadcaster is required to place in their station's Public File. Cary Tepper gives us an overview of the publication, available at http://www.fcc.gov/fcc-bin/audio/public_and_broadcasting.pdf

The FCC's release of the new manual is intended to coincide with the agency's efforts to promote localism in broadcasting. The contents of the new manual have been expanded and updated in an apparent effort to encourage more members of the public to take an active interest in their local broadcast stations.

As the manual explains, the Communications Act created the FCC to regulate interstate and foreign commerce in communication by wire and radio (including TV) so as to make available to all the people of the United States, without discrimination on the basis of race, color, religion, national origin, or sex, a rapid, efficient, nationwide and worldwide communications service.

Essentially the manual walks you through all of the programming regulations governing broadcasters, certain business practices such as sponsorship identification and false, misleading and offensive advertising, and some of the paperwork and record-keeping obligations of broadcasters – all of which is designed to promote the best interests of the public.

A MUST READ

The new 32-page manual is reasonably easy to read and is essentially a small introductory textbook to FCC 101. It is intended to provide a general overview of the FCC's regulation of broadcasters, including the licensing process, basic law and policy, business practices and advertising, and how members of the public can send comments to the FCC.

At the same time, broadcast station owners and managers would be wise to require all station employees to read the new manual so that everyone gains a greater appreciation for the regulatory environment in which every broadcast station operates.

There is no better way to understand the business of broadcasting than to understand the Law, Policy and Rules to which broadcasters must adhere. Of course, this new FCC manual is not a substitute for legal counsel on specific matters of law and policy. Many of the Rules and Policy generally discussed in the manual might be subject to varying interpretation depending upon the specific facts and circumstances of a situation.

UPDATED INFORMATION

If you want to find out the eleven factors considered by the FCC in processing a station's license renewal application, check out the new manual. If you want to know how the FCC reconciles freedom of speech with a broadcast licensee's editorial discretion to criticize and ridicule, check out the new manual.

If you need a refresher course on obscenity and indecency, or information about the upcoming DTV transition, a status report on digital radio, or blanketing interference complaint guidelines, the new FCC manual is the place to look.

"LICENSEE DISCRETION"

As the FCC continues its ongoing efforts to promote more localism in broadcasting, it is interesting to note that some of the new material in the manual concerns "licensee discretion."

Perhaps the FCC recognizes that its localism efforts have created the false impression in the minds of the public that each broadcast station should address issues of interest from every segment of society, or that broadcasters must heed every programming suggestion from its audience. This new section of the manual is a reminder that neither the FCC nor any member of the public can dictate what programming a station should place on-air.

Broadcasters still maintain broad editorial discretion so long as good faith efforts are made to ascertain some of the issues of concern in the station's community of license.

AN IMPORTANT ROLE

Most of us view the abundance of FCC Regulations as an annoying burden. However, a careful reading of *The Public and Broadcasting* manual might afford you a better appreciation of the important role broadcasters play in educating and informing the public.

Broadcasters have a unique tool at their disposal to influence public opinion and entertain the minds of their listeners and viewers. As the new FCC manual summarizes some of the most important Rules and Regulations, it becomes quite obvious that the business of broadcasting is an intrinsic element of the free and open society in which we live.

KEEP IT AVAILABLE

Every broadcast station should place a copy of the new *The Public and Broadcasting* manual in its Public File immediately. Should a member of the public wish to view the new manual in your studios during regular Monday through Friday business hours, you are obligated to allow such activity without prior notice – and without the necessity of asking for any type of identification.

Broadcasters are also required to provide a photocopy of the manual to any member of the general public that makes such a request. Unlike requests for copies of other Public File documents, broadcasters are not allowed to charge a fee for the photocopy of the manual. Therefore, it may be prudent to offer a PDF email copy of the manual to anyone requesting such a copy so as to keep your expenses to a minimum.

Cary Tepper is a principal of the law firm Booth, Freret, Imlay & Tepper, PC in Bethesda, Maryland. Mr. Tepper represents hundreds of commercial and noncommercial radio and TV stations. He can be reached at 301-718-1818 or tepperlaw@aol.com

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Security Guide

by Jay White

Protecting Ground Systems is Snot Hard

Last month Jay White described a tactic to reduce copper theft by using a transparent, bio-degradable product he called "Glue," which, when applied, essentially cemented together the soil particles around the ground system. Several readers wrote or called for more information, so we decided to ask Jay to give us some more specifics.

Need to protect your ground radials in soft soils and sand? Try some Gorilla Snot (www.gorilla-snot.com). Or Rhino Snot (www.envirotac.com). Or one of several other trade names for what some contractors simply call "Glue." After the article in the last issue of ***Radio Guide***, many of you were interested in finding out more information about soils fixatives.

REWIND

In January of 2006 about half of the ground system for Morris-owned KNWQ-AM in Palm Springs, CA was stolen. They did not have to work too hard; it was an easy operation for the thieves to find a radial in the sand and pull it up.

We needed to protect our new ground system after installation, and the best solution seemed to be deterring further theft by making the radials more difficult to steal. The theory was that if thieves had to work too hard to retrieve their reward, they just will not bother.

I learned about soil stabilization and fixatives from a local contractor and was convinced that if we applied the right product thickly enough, it could probably do a good job of sealing the ground system in the ground. A pick and shovel would need to be used along the length of the radial to unbury it – something that should discourage most thieves.

ANOTHER CONSIDERATION

In addition to the theft problem, KNWQ is located in an area where winds are constant. Those of you who deal with this sort of situation know there is really no easy way to keep up with wind erosion.

We did try installing a fence around the site to preclude off-road access by the general public to the site (the main concern was someone being hurt on the property) so as to protect the ground system from damage. Nevertheless, the wind continued to expose a number of ground radials around a couple of the towers.

WHAT IT IS

In the research, I found several sites like www.Gorilla-Snot.com. It describes their product as: *"a polymer-based emulsion used primarily to stabilize all soils from dust and erosion. It is specifically engineered for ease of use for large commercial projects down to smaller residential applications. It can be as simple to apply as watering the ground. Furthermore, Gorilla-Snot is designed to work its way down into the soil to maximize the penetration depth. The result is a thicker protective barrier with a more rigid and stable base."*

While easy application is important, it is the "staying power" that is of special concern to us in order to protect the radials in the ground system.

The Web site continues: *"Once cured, Gorilla-Snot becomes completely transparent, leaving the natural landscape to appear untouched. Gorilla-Snot results are based on the application rate used. Modest applications can create a light temporary surface crust that is permeable by water and is useful for dust control needs. On the other hand, heavy applications can generate results similar to the qualities of cement. Most importantly, Gorilla-Snot is a truly biodegradable product that is completely environmentally safe to use."*

RESULTS OF APPLICATION

Application was accomplished at the KNWQ site in one long day using a water truck and spray canon. The product was applied thicker closer to the tower and less thick farther out.

At this point, KNWQ's soils fixative has been in place for about a year. It hardened in about a day and now you can walk on top of the sand. Since the sand now is one huge slab, there has been no wind erosion. The heavy rain we had over the winter did nothing to the surface because, once cured, the product is no longer water soluble and therefore will not wash away nor dissipate.

The site looks like it did the day they finished applying the stabilizer, and the process appears to be good for weed abatement. More importantly, our new ground system is still intact.

Jay White is the Corporate Director of Engineering for Palm Springs, CA based Morris Communications. Contact him at jay.white@morris.com

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Audio Guide

by Bob Orban
Oban/CRL

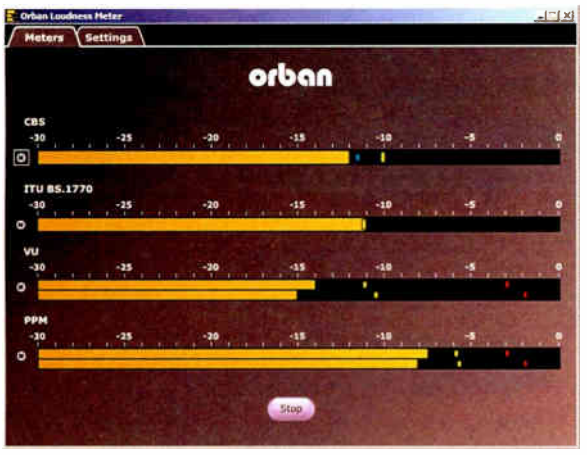
Orban's Free Loudness/Level Metering Software

The introduction of faster and more capable computer CPUs has given the software developer new tools. Among them is a better than ever ability to sample, display, and analyze audio. Bob Orban, a pioneer in this area, has produced a very nice software application that many engineers will find useful. He also shares the thinking behind it all. Interested? Read on!

Orban recently released a free loudness meter application. It runs on Windows XP and Vista computers having 1.5 GHz or faster Intel Pentium 4 or Intel-compatible processors that implement the SSE2 instruction set. The software can be driven by any installed Windows sound device.

TAKING A CLOSER LOOK AT AUDIO

The software accepts two-channel stereo inputs and displays instantaneous peaks, VU, PPM, CBS Technology Center loudness, and ITU BS.1770 loudness. All meters include peak-hold functionality that makes the peak indications of the meters easy to see. The VU and PPM meters are split to indicate the left and right channels as well as the instantaneous peak values of the L and R digital samples. (Because loudness perception combines the contributions of all acoustic sources, the CBS and ITU meters are not split.)



The Orban Loudness Meter simultaneously displays four representations of the audio.

Researchers have long been curious about the CBS meter but been unable to evaluate it and compare it with other meters. Orban developed this software because the company believed it would be useful to practicing sound engineers and researchers and also because Orban is using it in its new Optimod 8585 Surround Audio Processor. Engineers and scientists now have the opportunity to easily compare the CBS algorithm with others, including the BS.1770 Recommendation.

The free meter is the first of a family of Orban meters. Future paid versions will offer upgraded features including logging, histograms, surround monitoring, and oversampled peak measurements that accurately indicate the peak level of the audio after D/A conversion.

THE CBS METER

The CBS meter is a "short-term" loudness meter that displays the details of moment-to-moment loudness with dynamics similar to a VU meter. It uses the Jones & Torick algorithm developed at the CBS Technology Center [Bronwyn L. Jones and Emil L. Torick, *"A New Loudness Indicator for Use in Broadcasting,"* J. SMPTE September 1981, pp. 772-777]. Created using Orban-developed modeling software, the DSP implementation typically matches the original analog meter within 0.5 dB on sinewaves, tone bursts and noise.

The Jones & Torick algorithm improves upon the original loudness measurement algorithm developed by CBS researchers in 1967. Its foundation is psychoacoustic studies done at CBS Laboratories over a two-year period by Torick and the late Benjamin Bauer, who built on S. S. Stevens' '50s-era work at Harvard University.

After surveying existing equal-loudness contour curves (like the famous Fletcher-Munson set) and finding them inapplicable to measuring the loudness of broadcasts, Torick and Bauer organized listening tests that resulted in a new set of equal-loudness curves based on octave-wide noise reproduced by calibrated loudspeakers in a semi-reverberant 16 x 14 x 8 room – which is representative of a room in which broadcasts are normally heard.

They published this work in *"Researches in Loudness Measurement,"* in the IEEE Transactions on Audio and Electroacoustics, Volume AU-14, Number 3, September 1966, pp. 141-151, along with results from other tests whose goal was to model the loudness integration time constants of human hearing.

These studies concentrated on the moderate sound levels (60 to 80 phons) typically preferred by people listening to broadcasts and did not attempt to characterize loudness perception at very low and high levels. (The phon is a unit of perceived loudness, equal in number to the intensity in decibels of a 1 kHz tone judged to be as loud as the sound being measured.)

WHAT MAKES AUDIO LOUD

According to this research and its predecessors, the four most important factors that correlate to the subjective loudness of broadcasts are these:

1. The power of the sound.

2. The spectral distribution of the power. The ear's sensitivity depends strongly on frequency. It is most sensitive to frequencies between 2 and 8 kHz. Sensitivity falls off fastest below 200 Hz.

3. Whether the power is concentrated in a wide or narrow bandwidth. For a given total sound power, the sound becomes louder as the power is spread over a larger number of *critical bands* (about 1/3 octave). This is called *loudness summation.*

4. Temporal integration: As its duration increases, a sound at a given level appears progressively louder until its duration exceeds about 200 milliseconds, at which point no further loudness increase occurs.

Bauer and Torick used the results of this research to create a loudness meter with eight octave-wide filters, each of which covers three critical bands. (B & T did not use one filter per critical band because this would have made the meter, which was realized using analog circuitry, prohibitively expensive.)

Each filter feeds a full-wave rectifier and each rectifier feeds a nonlinear lowpass filter that has a 10 ms attack time and a 200 ms release time, somewhat like the sidechain filter in an AGC. This models the "instantaneous loudness" perception mechanism in the ear. Instantaneous loudness is not directly perceived but is an essential part of the total loudness model.

To map the instantaneous loudness to perceived short-term loudness, the outputs of each of the nonlinear lowpass filters are arithmetically summed with gains chosen to follow the 70 phon equal-loudness curves of the ear. The sum is applied to a second, slower nonlinear lowpass filter. This has an attack time of 120 ms and a release time of 730 ms.

Along with the eight nonlinear lowpass filters following the individual filters, this filter models temporal integration and maps it to the visual display. Meanwhile, the arithmetic addition models loudness summation.

THE SONE

The accepted unit of subjective loudness is the *sone.* With a sinewave, 40 phons = 1 sone. A doubling of sones corresponds to a doubling of loudness.

However, because broadcasters were accustomed to working in decibel units, J & T chose to map loudness on a display encompassing -20 to +5 dB in 0.5 dB increments, with the understanding that the perceived loudness doubles every 10 dB at loudness levels typically heard by broadcast audiences. A reasonable calibration level is 0 dB = 75 phons = 11.3 sones.

The J & T meter is monophonic. Psychoacoustic studies indicate that when multiple acoustic sources are present in a room, loudness is most accurately expressed by summing the power in the sources: Driving two loudspeakers with identical program produces 3 dB higher loudness than a single speaker produces.

Therefore, to extend the J & T algorithm to multichannel reproduction, we implement one eight-filter filterbank for each channel and compute RMS sums of the outputs of corresponding filters in each channel before these sums are applied to the eight nonlinear lowpass filters. As in the monophonic J & T algorithm, the sum of these lowpass filters drives a second nonlinear filter, which drives the display. Our software version of the meter has a 30 dB range with graphic resolution of approximately 0.1 dB.

EXPERIMENTAL LONG-TERM LOUDNESS INDICATION

We have added an experimental long-term loudness indication by post-processing the J & T algorithm's output. Displayed by a single cyan bar on the "CBS" meter, this uses a relatively simple algorithm and we welcome any feedback on its perceived usefulness. (We expect to refine it in the future.)

This algorithm attempts to mimic a skilled operator's mental integration of the peak swings of a meter with "VU-like" dynamics. The operator will concentrate most on the highest indications but will tend to ignore a single high peak that is atypical of the others.

The long-term loudness algorithm displays the average of the peak indications of the meter over a user-determined time period. The average is performed before dB conversion. All peak indications within the time period are weighted equally with the following exceptions:

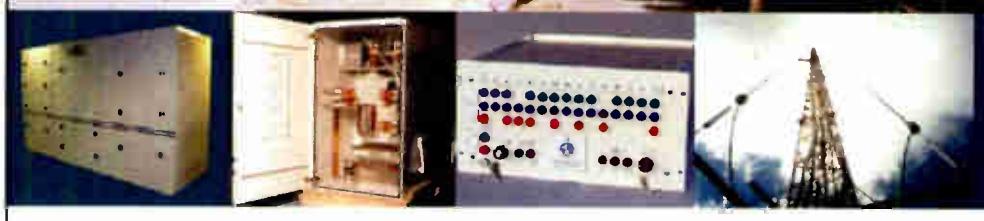
- If the maximum peak in the window is more than 3 dB higher than the second highest peak, it is discarded.
- All peaks more than 6 dB below the maximum (or second-to-maximum, if the maximum peak was discarded) are discarded.

THE ITU BS.1770 METER

In 2006, the ITU-R published Recommendation ITU-R BS.1770: *"Algorithms to measure audio programme loudness and true-peak audio level."* Developed by G.A. Soulodre, the BS.1770 loudness meter uses a frequency-weighted RMS (power summation) measurement intended to be integrated over several seconds – perhaps as long as an entire program segment. As such, it is considered a "long-term" loudness measurement because it does not take into account the loudness integration time constants of human hearing, as does the CBS meter.

(Continued on Page 14)

AM Directional Systems...



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Audio Guide

by Bob Orban

Orban's Free Loudness/Level Metering Software

– Continued from Page 12 –

Orban's BS.1770 loudness meter uses the Leq (RLB2) algorithm as specified in the Recommendation. This applies frequency weighting before the RMS integrator. The frequency weighting is a series connection of pre-filter and RLB weighting curves; there is one set of filters for each stereo channel, as in the CBS meter. The output of each filter set is squared and then summed into the integrator. To indicate long-term loudness, the meter displays the square root of the integrated value on a dB scale.

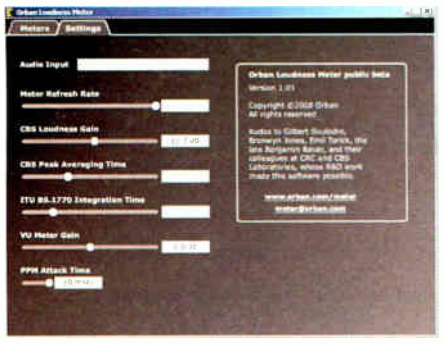
The Orban meter precisely implements equations (1) and (2) in this document by using a rolling integrator whose integration time is user-adjustable from one to ten seconds. This integrator equally weights all samples from the present time to x seconds before the present time, where x is the integration time set by the user.

To do this, the sample that is x seconds old is subtracted from the integrator before the new, present-time sample is added. This requires a substantial amount of memory because all samples from the present time to x seconds earlier must be retained.

METER SCALES

In their original publications and standards, each of the meters implemented in the Orban Loudness Meter has a different specified scale and range.

To best allow users to compare the indications of the various meters under dynamic program conditions, we chose to present their indications on identical linear-dB scales extending from 0 to -30 dB with respect to digital full-scale. The CBS and VU meters have gain adjustments that allow users to choose their preferred lineup level.



Meter settings permit users to more easily compare the different indications.

CONFORMANCE WITH PUBLISHED STANDARDS

Our implementation of the PPM can be switched for 5 ms or 10 ms attack times because there are standards for both variations.

The "10 ms attack" mode follows EBU Tech. 3205-E as closely as possible given the difference in the scale and the limitations introduced by the Orban meter's 48 kHz internal sample rate. In practice, this means that its indication obeys the dynamic performance specification of the standard within 0.5 dB for tone burst durations of 100, 10, and 5 ms.

Because of undersampling, the Orban PPM underreads a 5 kHz 1.5 ms burst by about 3 dB and a 10 kHz 0.5 ms burst by about 4 dB compared to the standard. In a future version of the meter, we may oversample its detector to comply more closely with the 1.5 ms and 0.5 ms specifications.

Our implementation of the VU meter reaches 99% (-0.09 dB) of steady-state when presented with a 1 kHz tone burst with an "on" duration of 300 ms and an "off" duration of 500 ms or more. In concordance with the standard, the meter has an overshoot of 1%. Because its reading is presented on a dB-linear scale instead of a standard VU "A" or "B" scale, we believe that this is the closest we could come to the spirit of this meter.

Our true peak-reading meter reads the peaks of the 48 kHz digital samples within the meter. It does not attempt to extrapolate the peaks of the signal after D/A conversion, as specified in the BS.1770 standard. This requires oversampling the peak detector, which we may do in a future release.

Also, note that the Orban meter may not indicate the true peak sample values of material not originally at 48 kHz sample rate. Windows will sample-rate-convert such material to 48 kHz before the meter and will change the values of the samples when it does so.

To download your free copy of the Orban Loudness Meter, go to www.orban.com/meter

A leader in broadcast audio processing for over 30 years, Bob Orban is the Vice President/Chief Engineer of Orban/CRL. Bob can be contacted at meter@orban.com

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The transmitter employs the renowned low distortion, low noise BW broadcast PLL PLUS exciter module to drive the power amplifier which is fan cooled & temperature protected making it ideally suited for harsh environmental conditions.

our price $1390.00

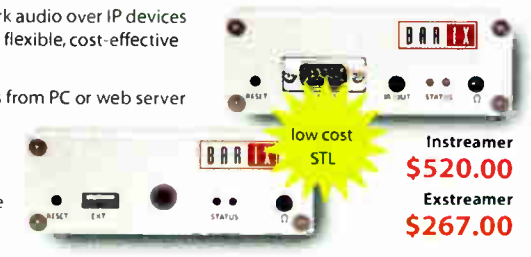
Instreamer 100 / Extreamer 100

BARIX

The Barix Instreamer and Exstreamer 100 are versatile network audio over IP devices offering a variety of applications. They enables users to create flexible, cost-effective distributed audio systems using standard IP technology.

The Exstreamer plays MP3 (soon also G.711 & PCM) audio files from PC or web server (http) as well as legacy digital and analog sources (using the Barix Instreamer) and streams from sources like Shoutcast, Icecast (Internet radio) or RTP servers (Instreamer).

Used in pairs, both the Instreamer 100 and Exstreamer 100 are needed for a complete solution.



Instreamer **$520.00**

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Zoom H2

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The H2 is an easy-to-use, ultra-portable portable digital recorder for variety of applications. From electronic news gathering (ENG), interviews and podcasting, to musical performances, songwriting sessions and rehearsals, the H2 provides amazing recording quality. And no matter what kind of recording you want to make, the H2 can effortlessly record it.

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ZOOM

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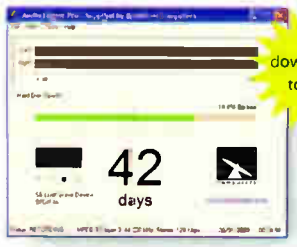
Audio Logger Pro uses your PC and sound card to record audio continously 24/7. Unlike VHS, DAT, open-reel or other tape-based audio loggers, Audio Logger Pro makes it easy to locate any day, hour, minute and second instantly with it's built in playback client. You can store 42 days on a standard hard drive, and up to 365 days by utilizing today's largest hard drives and/or RAID arrays.



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A fully duplex, two channel stereo codec designed to enable real-time transport of broadcast quality audio over IP networks.

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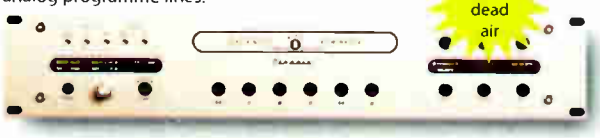
Danagger

Combines a smart silence sensor with an internal replacement audio source and voice notification to provide a complete high quality backup system for digital and analog programme lines.



our price from $2520.00

DSPXtreme FM

FM/HD Audio Processor

The DSPXtreme features 2 colour screens, one is touch sensitive, allowing you to navigate, setup and control with a touch of your finger.

It is available in 4 versions FM, AM, CD, HD.

6-Bands of audio limiting, distortion controlled clipping and 'look-ahead' limiting allows you to create your own distinct sound.

It can be configured and controlled remotely.

It's fully upgradeable - you can download enhancements and add features from our website

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NetClock (IP Based)

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Use in Production Suites, Radio & Sound Studios, Schools, Hospitals, Public areas such as Railway and Bus Stations. Financial Industries, banks, stock markets - multi time zone.

- Large easy see numerals in red, white and blue LED's
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- Powered locally or by Power Over Ethernet (802.3af)
- Configurable via embedded web server
- DHCP or static addressing
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- Strong Aluminum Extruded Case

just plug it into your network and get server or world time accuracy in any room or studio

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Airmate Production Mixer

The Airmate console was designed to fulfill the need for a low cost radio production mixer. Built around well proven low noise circuitry, this console is a reliable workhorse for the efficient self-op production DJ.

There is an extensive master section focused on radio which include:
Aux send and return
Monitor master with "follow phones"
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D&R

Radio Guide

by Scott Fybush

Hall of Achievement

Recognizing those who have made real contributions to the broadcast profession.

Warren Shulz

WLS Chief Engineer

How many stations do you have on your resume? For most of us in broadcasting, the typical career path includes stops along the way at multiple stations, usually in several different markets.

But for Warren Shulz, Chief Engineer of WLS(AM) and WZZN(FM) in Chicago, that list is much shorter: in four decades in the business, he has worked at only two station groups, both in his hometown of Chicago.

AN EARLY START

"My interest in radio started in grade school," Shulz recalls. "I can remember wanting to get into broadcasting at age eight. I had a neighbor who was active in the business, who loaned me some books he didn't want anymore."

Shulz' interest was further spurred at his high school, Chicago Vocational on the South Side, which had an active amateur radio station. Before he was out of high school, Shulz held his First Class FCC license – "all home study, on my own, by the way," he says proudly.

After high school, Shulz spent two years at a Chicago City College campus, then completed his degree at a Purdue University satellite campus in nearby Hammond, Indiana. By then, he was already working a paying job in radio engineering, assisting maverick station owner Frank Kovas at WKFM, Chicago.

A SPECIAL OPPORTUNITY

Shulz says early FM operations like WKFM provided ground-floor opportunities that were lacking at the big AM stations of the day. "The reason you could get in those (FM) stations was they had no money, they had no unions, they had no staff, so anything you did for them was appreciated," he recalls.

In the case of WKFM, Shulz found not only a paying job but a station owner who came from the engineering world. "Frank Kovas was my mentor," he says. "He was a self-taught engineer, a business owner, and very frugal.

As FM exploded in the early seventies, many of the pioneer owners cashed out, and Kovas was no exception. In 1973, he sold WKFM to RKO General, which renamed the station WFYR – and kept Shulz on board as Chief Engineer, a post he held there until 1989, through many changes at the station, including a high-profile studio move to Chicago's Prudential Tower and an even higher-profile transmitter move.

TOP OF THE WORLD

"We cracked open the doors to Sears Tower for FM radio," Shulz says of the nation's tallest skyscraper, whose broadcast facilities were initially designed solely for TV. "We were one of the first four FMs on Sears."

In 1983, Shulz chaired the committee of Sears Tower FM operators that chose the antenna for a rebuild of the radio facilities. With FM combiner systems still in relative infancy, Shulz and his colleagues tried a different tactic, stacking individual Harris CBR antennas to create a master antenna system he describes as "colocated but not diplexed."

"We wanted to be on a common site, but not connected with diplexing hardware," he recalls. To make sure the system would work right from Day One, Shulz tapped the expertise of Harris' TV antenna engineers, enlisting them to test each of the antenna elements on a full-scale mockup of the Sears Tower mast at the Harris test range before they were shipped to Chicago for installation.

The concept worked; the antennas installed in 1983 are still in use today, now serving 10 Chicago FM stations, two of which combine into a single antenna. "The antennas will probably outlive analog broadcasting," Shulz says.

A RARE CHANGE OF CALLS

It was early in Shulz' WFYR days when he crossed paths with Glen Clark, then the FM Chief Engineer for WLS and now a consultant with Glen Clark & Associates in Pittsburgh.

Clark recalls getting a tour of the automation system Shulz installed at WFYR. "Even though (Shulz) worked for what ABC considered the enemy, it was clear he was a bright guy and that he was going to be going someplace," Clark recalls. Ironically, that someplace was to be WLS.

In 1989, Shulz made the lone job change on his resume. With ownership changing at WFYR and a prominent job opening across town at ABC Radio, Shulz took the Chief Engineer's job at WLS just in time for some big changes at that legendary facility. "I walked into a studio move," he recalls. "WLS had been at the Stone Container Building (on Michigan Avenue's Miracle Mile) for 30 years and the lease was up."

HITTING THE GROUND RUNNING

In 1990, Shulz oversaw a $4.2 million build-out of new studios on two floors of the WLS-TV building on State Street, using the experience he had garnered from the WFYR studio move a few years earlier to help navigate the complications of dealing with architects, structural engineers, acoustic issues and everything else involved in moving a high-profile radio station.

Over the next decade, consolidation would bring two more radio stations into the ABC Radio family. Radio Disney outlet WRDZ(AM), the erstwhile WTAQ(AM), needed little in the way of new studios, but the acquisition of sports station WMVP(AM), now known as "Chicago's ESPN 1000," involved the addition of a third floor to the studio complex, for which Shulz and his team largely duplicated the design of the WLS studios just above.

FROM STUDIO TO TRANSMITTER

Meanwhile, all three AM stations had tower-site issues that occupied much of Shulz' attention. At the Tinley Park transmitter site for WLS, almost 30 miles south of downtown Chicago, Shulz faced a 1938-vintage tower that needed either replacement or major reinforcement.

Warren Shulz keeps WLS' DX 50 up and running well.

After much deliberation and budget negotiations, Shulz persuaded ABC to re-guy the 1938 tower, adding an additional level of guys. "A tower this age, you should have given up and replaced it," he says. "But I actually had three PEs on my side, and eventually we were able to get the project funded."

An even more complex project in recent years found WMVP replacing all three of its towers at the Downers Grove site that was once WCFL, historic rival to WLS. With the benefit of common ownership, WMVP was able to diplex into the WLS tower in order to stay on the air during the tower work at Downers Grove that wrapped up last year. Shulz also oversaw the replacement of all six towers at WRDZ, where a set of relatively new pole-style towers had rusted through from moisture.

MAKING EAS USEFUL

But the work for which Shulz became best known in the Chicago area involved a less visible aspect of station operations: the transition from the old EBS to the Emergency Alert System.

Because of the distance from its transmitter site to the core of the Chicago market, presumably leaving it outside the zone that would bear the brunt of a nuclear attack, WLS was one of the first stations to be designated as part of the "last resort network" created by FEMA in the late eighties to provide a path for emergency messages in the event of disaster.

That project evolved into PEPAC, the Primary Entry Point Advisory Committee, for which Shulz has long served as a board member. With the subsequent creation of EAS, and the requirement that each state develop its own comprehensive EAS plan, Shulz also became chair of the Illinois State EAS, working closely not only with state officials but with his engineering colleagues around the country.

BRIDGING BROADCASTERS AND EM TYPES

Shulz says relations between broadcasters and emergency officials are often tense – "they think you're there to get a story out of them" – but he prides himself on the collaborative work he has done with Illinois officials, including the establishment of a voice link from the Governor's Office into the 45 MHz EOC radio system that feeds the state's EAS participants.

While that system has yet to be called on in an emergency, Shulz says another unique element of the Illinois system, in which AMBER alerts are disseminated via NOAA Weather Radio transmitters, has seen frequent use since he helped put it in place.

Shulz says he has also helped to leave "a mark of sanity" in the EAS system, fighting valiantly to keep the government from imposing too many unfunded mandates on stations that have to pay for most of the system themselves. His only regret, he says, is that he has never been able to persuade his colleagues to conduct a nationwide test of the presidential alert code, which has never been activated since the system was developed.

AN UPCOMING CHANGE

Just as an ownership change brought his time at WFYR to an end, Shulz says he is planning to retire from WLS in the near future, leaving behind a station that went through dramatic, and often painful, changes as Disney sold its ABC Radio operation to Citadel. Since the ESPN Radio and Radio Disney operation remained with Disney, Shulz' oversight shrank from four stations to two, and budget cuts reduced his engineering staff to just himself and one assistant.

"It's just like watching a friend die," he says of the budget cuts that have all but eliminated any significant capital investment in his facilities.

Even after retirement, Shulz says he would like to continue doing some sort of part-time work – but only on transmitters, which he believes are the last remnant of the radio he grew up with. "The rest is all computers, computers, computers," he says.

A LOT MORE TO DO

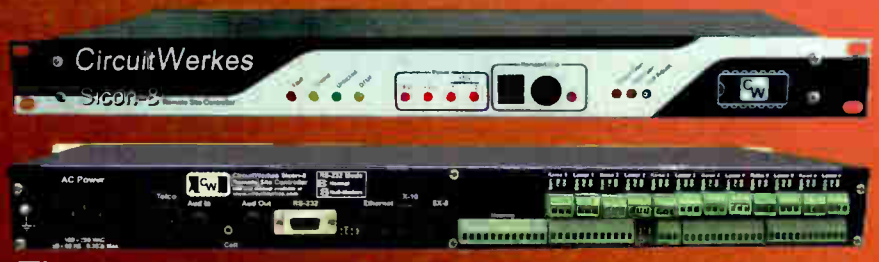
Shulz looks forward to more time to pursue several other interests, too. He enjoys automotive repair and RV camping, and hopes to hit the road to visit his daughters. One works as a nurse in Florida, while the other ended up in radio, at least tangentially, married to a morning DJ in Knoxville whose father was a former colleague of Shulz' at WFYR.

There is one other unusual hobby Shulz pursues: he is an avid drywall hanger. Weekends frequently find him in the basement of the home into which he recently moved, where he is slowly finishing the walls.

"I have about 20 sheets up, and about 60 yet to go," he says.

Radio Guide welcomes your suggestions for honoring broadcasters who have built a reputation not only for excellence and dedication to their radio careers, but for their desire to help others with their knowledge and experience. Let us know who you think has been important to the industry. Email your comments to: Editor@radio-guide.com

The New Sicon-8 Voice Remote Control



The CircuitWerkes Sicon-8 Voice Remote Control

- Use our pre-recorded voice responses or record your own!
- 8 channels of metering, status and control (expandable to 16) and up to 5 alarms per channel.
- No accessories necessary to control your site right out of the box.
- Auto-ranging, auto-calibrating meters make setup a snap.
- Function scheduler, auto-logging & alarm reporting included.

Introducing the Sicon-8, a revolutionary transmitter site controller with custom voice recording technology for perfectly natural sounding dial-up or radio link control. All of the I/O, including 8 channels of relays, are included on the main board so there is no need to buy anything else. All metering, status and control connections are on depluggable screw terminals. An expander chassis, the SX-8, adds eight channels of metering, status & control to an existing Sicon-8 for a maximum of 16 channels. Designed to be controlled from any dial-up telephone, an auto-answer cell phone or from its serial port, the Sicon-8 gives you the control options that you need. A free, Windows program, the Sicontroller, gives you full access to all of the Sicon-8's programming and control functions. Basic logging functions are included. Live Internet interfacing is accomplished with an inexpensive accessory. Visit us online at www.circuitwerkes.com for complete info on the Sicon-8.

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MicTel Mic/Line to Telephone Interface

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Unattended Dial-Up Broadcasts with the DR-10

- The DR-10 is a Dial-Up remote control with balanced, telephone audio input & output that can control many automation systems or your audio console for unattended remote broadcasts.
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- Use the DPDT relays to insert the phone audio directly into the program path when necessary, especially for emergencies.

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- Can be used as a phone tap or a passive manual telephone coupler.
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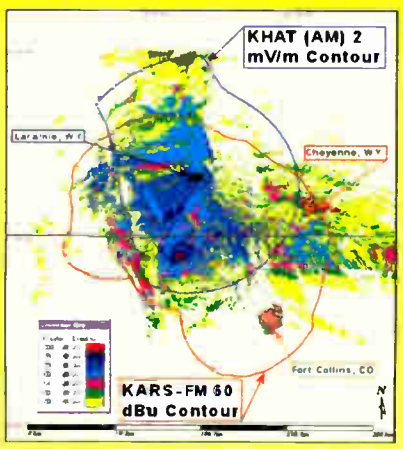

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Processing Guide

by Mike Erickson

Audemat Brings RDS and Audio Processing Together

About five years ago, I was demonstrating an audio processor from an upstart company with my friend and colleague Russ Skadl when he turned to me and said he thought it would be so cool if an audio processor could incorporate an RDS encoder in the actual processor itself, not just via outboard gear.

I thought it was a good idea, too, and we both included our suggestion in a response back to the processor manufacturer. The idea never went any further than that and we never really thought about it again.

A WISH FULFILLED

Flash forward to April 2007. At the NAB show in Las Vegas was a new offering from Audemat-Aztec (now just Audemat), known to me in the past as the "RDS people."

But this was more than an RDS encoder, it was an RDS encoder *with an audio processor attached* (and a few other bells and whistles that we will get to in a moment). I called Russ and sent him the link. We both thought it was so cool that our idea ended up somewhere – see, we were not so dumb, after all!

I had to know more. On sheer nerve, I telephoned Audemat and asked for information on this new product, the Digiplexer 214, which at the time sported not only a two-band processor (OK, two bands can do *some* cool things), but the RDS encoder *and* a remote control with eight relay outputs *and* an 80 GB hard drive for audio backup – in case your audio path to the transmitter should fail, the box will start playing out from the internal hard drive.

The Audemat Digiplexer

I spoke with Christophe Poulain and expressed an interest in evaluating the box. With the price tag too rich for my budget as an individual, I knew of a couple of educational stations where I could try this box if he wanted some unbiased feedback on what it can and cannot do. He seemed very interested, and took my information, promising to contact me when the box was ready for human consumption.

CHECKING IT OUT

That date came in late November. I received an email from Chris asking if he could fly to New York to place the audio processor on the air at one of the stations I had mentioned. That was the first bit of good news.

The second piece of news was that the Digiplexer now had a four-band option available to demonstrate. Awesome! We chose WSHR, an educational FM in Lake Ronkonkoma NY at 91.9 MHz; the station plays a little bit of everything.

The audio processor was placed at the transmitter with the radio station's call letters and slogan inserted into the RDS encoding software ahead of time. The audio processor actually hosts the server itself – you can access it via a laptop or PC.

A COMPLETE PACKAGE

Any and all software needed for the operation of the Digiplexer 214 can be downloaded right from the box itself, which turned out to be a really good feature. As it happened, the night we were out there, the radio station's laptop decided to "take the night off."

In a pinch, we called my friend/engineer Zack Wiegand (This digital age is just amazing: "Dude, I am testing an audio processor, do you have a laptop handy?"). He quickly supplied us with his laptop, and we downloaded the software for the RDS encoder and audio processor. The laptop connected right away, and we switched the processor on the air.

My Zune's FM receiver immediately said "WSHR 91.9 FM" – we had RDS. Meanwhile, audio came pouring out of the monitor at the transmitter. We had music – and it sounded very good!

INITIAL LISTENING

There are many schools of thought on audio processing; one man's taste is not for another man's plate. But the processing on the Audemat Digiplexer 214 was very engaging. It got into the audio, worked well with transients and had much better bass than the previous digital processors.

I found that it was very easy to get really deep "hefty" lows that you can feel, but that do not overpower the mix at all. The high sampling rate of 192 kHz actually gave me the impression that I was listening to an analog box with the accuracy of a digital processor.

It was very enjoyable to listen to the Digiplexer sound. It was unlike anything else on the dial, which was a good thing (the worst thing you can say about an audio processor is that it "sounds like brand "X"). This unit had its own sound that allowed you to create your own signature. It took us about 20 minutes to get one of the factory presets to settle in where we wanted it. Then we just sat back and listened for while.

GETTING TO KNOW THE DIGIPLEXER

Then we tested some more and dug deeper into the Digiplexer 214's feature set.

We pulled the audio inputs out of the back of the Digiplexer 214. After ten seconds, the audio switched to the uploaded file. We plugged the audio back into the box and the Digiplexer actually cross-faded the station's audio with the uploaded file, making for a smooth transition.

It should be noted that the Digiplexer 214 runs on a one rack-unit PC. Scary? Not at all. We have had it running for ten weeks as I write this article – and there has not been one failure.

Suppose you must reboot for some reason? What about dead air during a reboot? This turned out not to be a problem. Chris showed us how we can reboot the PC and not have one second of downtime. Voila! He did just that, the PC recycled, and the audio stayed on.

How? All processing work is done on a DSP board that gets its power from the PC slot it is sitting in. Thus, the card just keeps working. If the whole unit loses power? Chris claims three seconds from power on to audio. We counted about one and a half to two seconds.

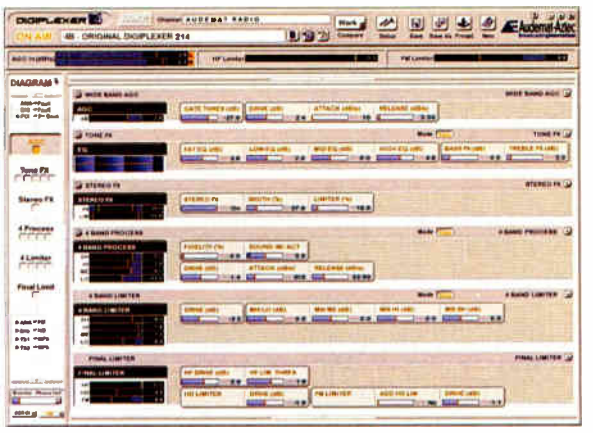
GREAT SOFTWARE INTERFACE

The remote software is virtually flawless. Everything is practically on one page (depending on screen size).

Every parameter you change becomes highlighted. You can also undo multiple changes and go back if you go too far. There are two layers of adjustment for beginners and advanced users. Furthermore, all of the controls can be separately adjusted and then changed with a ganged control so you can adjust everything at once (a feature that is sorely missed on other processors and makes things much more flexible here).

One of the more interesting displays on the Digiplexer 214 is the MPX power meter. This is a quick way to actually see the efficiency of your audio. Using the MPX power meter with your regular modulation monitor will help set just the right loudness level for your station and format.

All of the presets and changes you make are saved and grouped by month created. That way you can go back at any time and see what changes you made that were so hot last summer.



With the Digiplexer 214 software it is easy to see exactly what the unit is doing.

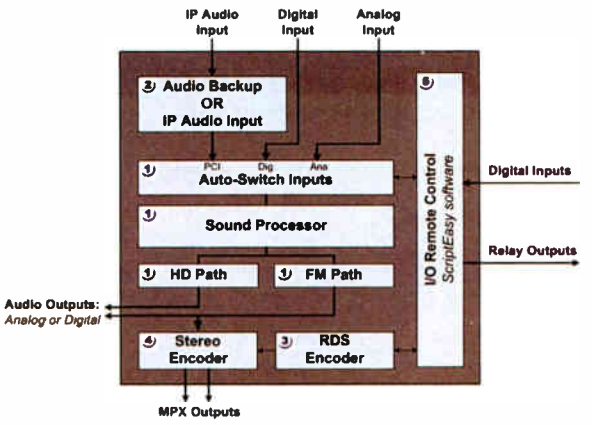
The Digiplexer 214 can be configured in many ways. You can order the basic two-band version with a basic RDS encoder and Scripteasy remote software for around $5,000. Or, you can go for the Full Monty and essentially throw the heart of your radio station into one easily programmable one rack-unit box for around $8,000, which includes the four-band processor, advanced RDS, Scripteasy with 16 digital inputs and 8 relay outputs, and an 80 GB hard drive.

The four-band parametric equalizer includes a display of the EQ setting.

There are even more options, including a Local IP backup (you could actually have the box switch to an IP address during an audio failure and put your stream on the air).

OVERALL IMPRESSIONS

I walked away from the demonstration thinking that this unit has a very impressive processing algorithm. There have been some fresh new ideas out there in the last couple of years and this is one of them.



A functional diagram of the Digiplexer 214

While there are a lot of pluses, there are some drawbacks, the biggest being that there is no built-in delay for HD. While there is a separate audio path for a digital output, you would have to use the built-in delay in your exciter. Navigating up and down in the remote software could be a little easier; I am told that is being addressed. Also being addressed are requests for the addition of some basic processing controls on the front panel of the box.

The best part of working with Audemat on this project has been their attention to detail and their willingness to listen to end-user feedback and incorporate it in updates. For example, at the Spring NAB Audemat introduced the Digiplexer 246, a three rack-unit version with a touch screen on the front panel. The Digiplexer 246 also can be equipped with a 20 or 100 W FM exciter as an option.

Overall, this is a very powerful audio processor, one of the best I have heard in its price class. Everyone who has heard the box has been impressed with how it breaks the mold. It does not sound "packed in" on the high end. Some of the other comments I have heard include "It flows with the music" and "It's punchy but not exaggerated."

Audemat is the leader in RDS and the processing backbone comes from Sound 4, which is a group made up of people from IDT, which made some really loud machines in France in the late 1990's. If you are in the market for an audio processor, in this election year the Digiplexer 214 *needs* to be on your list of candidates.

Mike Erickson loves to tinker and play with audio processing of all sorts. He can be reached at wirelessmedia@gmail.com

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Studio Guide

by George Zahn

Do Your Microphones Pass the Screen Test?

It is one of the microphone accessories that stations often take for granted. They are in virtually every studio on every microphone, but are they damaging the quality of your broadcast audio?

Our focus this time out is on microphone windscreens and pop (or blast) filters. We are going to look at the pros and cons of using these screens and filters. We will sample some opinions from engineers and other audio professionals about whether windscreens have more pros or cons, and discuss the differences between a generic windscreen and one custom-made by your microphone's manufacturer.

THE CASE OF THE DISAPPEARING WINDSCREEN

First, an anecdote. Many years ago, I had the opportunity to record a live solo concert by Livingston Taylor for a radio broadcast. I had the "tech rider," or rundown of basic equipment requested by the artist, and I had a relatively simple setup of two piano microphones (nice condensers) for stereo and a dynamic vocal microphone.

Long before Mr. Taylor arrived, I had the stage set, including a Sennheiser 421 with windscreen for the vocal microphone. After setting up, I had ample time, and the stage area was secure, so I grabbed a bite to eat at a café in the same building.

When I arrived back at the stage less than 30 minutes later, the stage was set as before with one exception – the windscreen had apparently fallen off the microphone and must have been placed on the piano by one of the theater stage crew. I dutifully replaced the windscreen and returned to the wings where I was speaking with the theater director.

MR. LIVINGSTON, I PRESUME?

Ten minutes later, I returned to the stage to find the windscreen again placed on the piano. "Audio poltergeists," I thought, or at least a really strong breeze that could blow this windscreen off twice. Shaking my head, I replaced the microphone muff and went back to my mixing position in the darkness of the wings.

Within minutes, Livingston Taylor came on stage from the opposite wings near the dressing room. He shook *his* head this time, walked over to the piano, and promptly removed the windscreen, placing it back on the piano again. He had arrived well ahead of schedule and, unbeknownst to me, was clearly expressing his dislike for windscreens.

DIFFERENT

I learned a lesson that day, and my sensitivity was raised.

Having been in broadcast situations for more than ten years at the time, I assumed that windscreens were a given, even in stage applications. Even to this day, I cringe when hearing popped "P's" from handheld microphones in otherwise perfectly good stage productions.

However, when voicing my concern, I have been "reminded" by some PA operators that they believe there is a vast difference between radio and PA audio. Having done both in my career, I can say from experience that it really is not that vast, although there is a definite art to solid PA technique.

LOSING THE NATURAL HIGH

So what is the real issue? Quite simply, performers – and in some cases, the program hosts at our own stations – make the argument that windscreens will muffle the sound entering the microphone, notably high frequencies which might be absorbed or deflected by the foam of the windscreen.

"It absolutely colors the audio," says veteran radio engineer Jay Crawford, who cut his teeth on PA work at a young age as well. "You naturally will lose some highs, but not a major amount. A good windscreen has very little effect, but it does cause a slight change in high frequency response." Crawford quickly points out that the windscreens are still necessary in most applications, and that the advantages outweigh the problems.

As a rule, Crawford uses windscreens *indoors and out* when someone is speaking closer than three feet into a microphone. There is an easy solution to the response issue: "If you're mixing on a multi-channel console, you just brighten the highs slightly on the console EQ," he says. Stations using standard broadcast consoles might choose to adjust the microphone processing a bit if they feel there is a slight high-end attenuation.

Ben Escobedo of Sennheiser USA concurs, allowing that "windscreens could have a slight affect on high frequencies entering the capsule."

I had to ask why there would be a difference between an external windscreen and the internal pop filter, which often sits inconspicuously under the mesh grill of many microphones. Crawford was quick to point out that microphone performance is adjusted to allow for the internal pop filter. "The frequency response of the microphone reflects the pop filter," he says. "It doesn't show the effect of an external windscreen."

AVOIDING THE RUSH

The main advantage of using the windscreen is obviously to eliminate or minimize plosives, or sudden bursts of air from our lips as we say certain consonant sounds. In outdoor settings, they might be used to also protect the microphone from the constant rumble of wind noise hitting the microphone element.

What happens is that the foam disperses the rush of air and prevents a concussion on the diaphragm of the microphone. The plosive, or "popping P" sounds, generate a sudden bass spike in the audio, which can greatly detract from a performance and hurt intelligibility of the performer. As our studio announcers lean in more to take advantage of the warmness of "proximity effect" on microphones, the chances for plosives increase.

Unscreened condensers can be particularly problematic. Crawford points out that some condensers are so sensitive on lower frequencies that even the relatively modest output of the air handling vents in a venue can create low level rumbling on a microphone without a windscreen. In this instance, you might even consider windscreens on instrument microphones in a music broadcast or recording. They are a must if you are miking anything outdoors.

THE RIGHT TOOL

So if we choose to use windscreens, do we buy the cheap model from the local guitar store or buy the custom-made muff from the microphone manufacturer. Opinions will vary, as will prices in many cases.

The custom-fit models often are more aesthetically pleasing, and are designed to work with a specific microphone model or line. Ben Escobedo of Sennheiser USA explains that the density of the foam by the manufacturer is often chosen to complement the microphone performance. The drawback is that each windscreen may cost significantly more than for the generic windscreens on the market.

It is a very subjective choice. If a manager or engineer could get four generic windscreens for the price of one specifically manufactured one, it might be a good trade off, but it might result in some mildly popping P's getting through. A good practice is to try one of each on the same microphones and determine how critical it is to your ear to have the higher priced windscreen.

An assortment of original manufacturer's spec windscreens and pop filters, plus miscellaneous hardware for the Shure SM-5B.

PAYING LIP SERVICE

Engineer Jeff Johnson, when working at WPAY radio, had a different "cosmetic" concern every Sunday evening at his station.

"We had a woman who came in to do an evangelical program. She was so excited and leaned in so close to the microphone that, by the end of the show, there was lipstick all over the windscreen – big red smooch marks!" Johnson claims he had to wash out the windscreen every week and let it dry before using it again in the studio.

Escobedo has even removed the mesh grill of some microphones to get food particles out of non-windscreened microphones, "Make sure the basket is off the microphone before doing this, but I've gently used a small amount mouthwash and a toothbrush to clean up the basket. Let it dry, put the basket back on, and it's clean and actually minty fresh!"

GERM PATROL

In that same vein, what about those on our staffs who are worried about windscreens being the breeding ground for germs?

True, it is probably best not to get too close to a windscreen after the jock with bronchitis got through virtually swallowing the microphone. Liberally spraying the windscreen with Lysol is not the right solution either. Residue – dust, saliva, bits of lunch, lipstick, etc. – should not be soaked into the microphone.

Crawford pointed out that at one point in his career at WEBN the station bought each on-air personality their own windscreen to allay their fears. They could use their own or the "community" windscreen in the air studio or in production. "They had options," he adds, "but the only stipulation was that they had to use a windscreen."

If you find yourself in a situation where the windscreen is eschewed (ahem, Mr. Taylor), what microphones have the best internal pop filter? "The Shure SM 58 is particularly good," says Crawford, "the SM 57 is also an option. Many of the "highball" style microphones will have a slightly better pop filter. RE 20's or RE 27's perform pretty well without windscreens indoors."

You will notice that the models Crawford mentioned here are dynamics. If you are using a condenser for close vocal work, you will more than likely need a windscreen.

"FOAM HERE TO ETERNITY"

Will we see some new "space age" technological improvement coming along for windscreens and filters in the future? Crawford summed up the general consensus: "There's not much left for to improve, but who's to say that some guy trying to make a toothpaste might not come up with a new foam." I guess we will have to brush up more on that then!

Next time around, we will follow up on the issue of popped P's – and how to correct them in post-production. Also we will have some more microphone war stories to share, some maintenance tips, and we will tell you how we got "hammered" with responses to our EV dynamic microphone article!

Station Director for WMKV-FM, Cincinnati, Ohio, George Zahn is still seeking a microphone filter that will stop hot air. Share your experiences and comments with him at: GZahn@lifesphere.org

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From the Transmitter Shack

by Dennis Baldrige

Field Testing Power MOSFETs

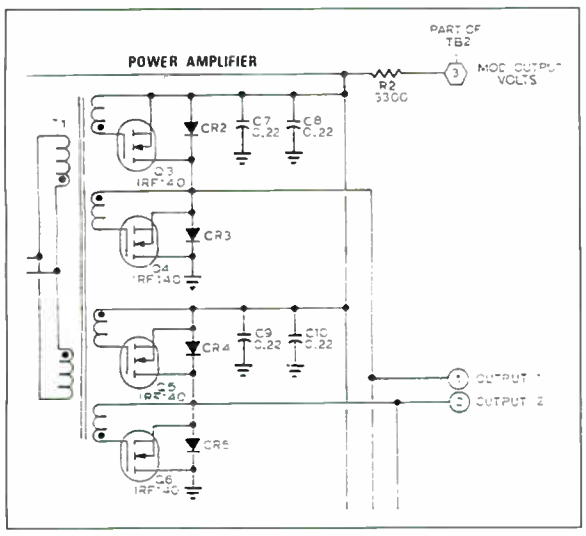
The broadcast engineer is often called upon to make emergency repairs on a moment's notice. He or she must be able to accurately diagnose the problem, propose a solution, and implement the desired changes.

Unfortunately, the ability to diagnose and replace individual components on a circuit board is increasingly becoming a skill of the past. Modern production techniques and advancements often mandate that engineers replace the entire unit or circuit board rather than evaluating individual components.

"OLD" SKILLS STILL NECESSARY

Nevertheless, many times we still are called in to fix older gear where component troubleshooting is the only option. And often there is pressure to solve the problem quickly.

This author was called to make emergency repairs to an older model AM solid state transmitter which was off the air. Investigation showed that the power amplifier was at fault. The circuit consisted of multiple pairs of IRF-140 N-Channel Power MOSFETs in parallel to produce the desired RF output.



A PA circuit using IRF-140 MOSFETs.

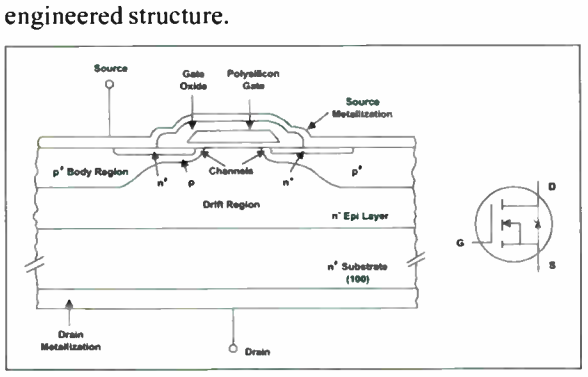
One or more of the MOSFETs had failed resulting in little or no power output.

The options for the repair included sending the entire circuit board to the factory, a process which would have resulted in several more days off air for the station. If the MOSFETs could be replaced in the field, the transmitter would soon be operational.

Scrounging through old parts boxes located a jackpot of used IRF-140s. The obvious challenge was to determine which MOSFETs in the amplifier were faulty and which, if any, of the spare IRF-140s were good.

UNDERSTANDING MOSFETS

MOSFETs are unique devices. They consist of alternating layers of N and P materials similar to the basic transistor but with a more precisely designed and engineered structure.



The mechanical and electrical layout of a MOSFET.

Interestingly, a device similar to the MOSFET was actually proposed and patented independently by Lilienfeld and Heil in 1930, but was not successfully demonstrated until 1960. The main technological difficulty was controlling the reduction of the surfaces at the interface between the oxide and the semiconductor. As manufacturing techniques improved and miniaturization abounded, the process became technically practical. MOSFETs eventually replaced transistors, which replaced tubes in the early days of solid state devices.

The advantages of MOSFETS include high current and voltage gain, high input impedance, and low output impedance. The current gain capability of a Field-Effect-Transistor (FET) is easily explained by the fact that no gate current is required to maintain the inversion layer and the resulting current between drain and source.

Thus, the device theoretically has infinite current gain in DC. MOSFET is an acronym describing how a particular FET is constructed. In this case: *Metal-Oxide-Semiconductor Field-Effect Transistor.* The IRF-140 is actually a variation of the MOSFET called a HEXFET: Hexagonal Metal-Oxide Field-Effect Transistor, this acronym more accurately describes its structure.

A thorough explanation of its properties is beyond the scope of this article, although you can find more information in places like:
http://www.irf.com/technical-info/appnotes/mosfet.pdf

BIPOLAR VS MOSFET

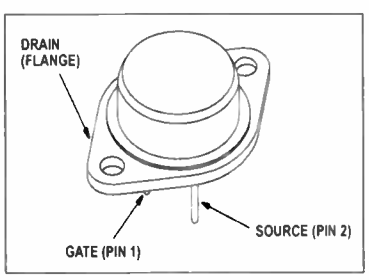
The bipolar power transistor is a current-controlled device. A large base drive current as high as one-fifth of the collector current is required to keep the device in the ON state. Alternately, the MOSFETs design is such that no gate current is required to maintain the inversion layer between the drain and source.

Thus, it is possible to turn the MOSFET on or off and then measure the resulting conduction without the device being in a "test" circuit. This will in no way yield a comprehensive evaluation of the device, but will at least give a glimpse as to its basic function.

TESTING MOSFETS

Upon reviewing the characteristics of power MOSFETs, this author proposed it should be feasible to field test the components to determine their basic operational status. A quick search on the Internet yielded both a schematic and pin-out for the IRF-140.

The idea was to test the ON and OFF condition of each. First, apply a voltage to the gate turning "ON" the MOSFET allowing measurement of the drain to source resistance.

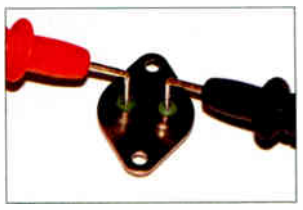


The MOSFET would then be turned "OFF" and the resistance measured again. The two values would be compared. If the anticipated difference between the two measurements were present, then one could be reasonably confident that the IRF-140 was functioning, at least to a large extent.

The tests could be accomplished using any standard Digital Multimeter (DMM) which measures resistance and has a diode measurement setting. In this latter mode, the DMM places a small DC voltage on the leads. This voltage is used to turn the MOSFET "ON" and "OFF." Alternately, this could be accomplished by using a 1.5 Volt battery with a 1k resistor in series.

TAKING THE MEASUREMENTS

Placing the DMM in the diode measuring mode, the ground (–) lead is touched to the source of the IRF-140 while simultaneously touching the red (+) to the gate. This turns the MOSFET "ON."



Now switch the DMM to resistance and measure between the source (lead) and drain (case). If the MOSFET has turned "ON", the measurement should be low: approximately one to two Ohms, or less.

Next, turn the DMM back to the diode mode and repeat the procedure, only this time, reverse the leads of the DMM on the MOSFET; the ground lead (–) to the gate and the red (+) lead to the source. This turns the MOSFET "OFF." Again switch the DMM back to resistance and once again measure between the source lead and the drain. If the MOSFET has turned "OFF," the measurement should be more than several Meg-Ohms.

A MOSFET that is turned on.

If the impedance measurements do not change or stay low, then the MOSFET under test may be shorted or non-functional. Low impedance measurements between any leads, other than the source and drain when the MOSFET has been switched "ON," indicate a possible shorted condition. That part should not be used.

A MOSFET that is turned off.

FALSE INDICATIONS

Note: Care must be taken when measuring high resistances, especially in the Mega-Ohm range. If the engineer inadvertantly touches the meter probes while attempting to measure the device in question, then the meter may very well indicate the resistance of the person's body rather than that of the MOSFET. Reading in the upper kilo-Ohm or lower Mega-Ohm range would be typical of this situation.

Remember, our bodies do allow electrons to flow, which is why we always need to be careful when working around electrical devices!

A suspicious reading.

BACK ON THE AIR

This troubleshooting process was followed for the repairs of the AM transmitter power amplifier in question. All wire leads going to and from the MOSFETs mounted on the circuit board were disconnected to eliminate stray resistance from interfering with the tests. The used MOSFETs were tested on the bench.

Tests identified two IRF-140's faulty on the amplifier board. Several shorted or non-functional MOSFETs from the parts box were also discovered and discarded. The faulty amplifier parts were replaced and the transmitter returned to operation; it was found to be fully functional.

Field testing of components is a valuable skill. Today's broadcast engineer can still be proficient at evaluating individual circuit elements. This will enable one to diagnose problems and quickly resolve off air conditions.

A 30 year broadcast engineering veteran, Dennis Baldridge (CPBE, AMD, CBNT), is a Contract Engineer in Wisconsin. He also serves as an Inspector for the Wisconsin Broadcasters Association Alternate FCC Inspection Program. He can be contacted at info@7db.net.

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Construction Guide

by Mario Hieb, P.E.

Project Management 101 for Radio Engineers

"You cannot plan too much. Nothing will speed up the process, simplify the work, save you money, get you on budget and in on time, and allow you to sleep at night as good planning. Planning is the virtual installation, the installation in your brain, and the brains of those around you, before the work begins." – Stephen Lampen, Audio/Video Cable Installers Pocket Guide

Systems integration project management is common in large-scale, high-dollar broadcasting projects, typically video systems, but is not as common in radio projects.

Nevertheless, by adapting some of the time-tested techniques used in project management, we can help radio engineers develop higher performance systems, become more organized, work more efficiently, and meet deadlines and budgets.

Systems integration techniques can also help the radio engineer with difficult projects, such as moving a station while staying on the air or the transition to HD radio.

PROJECT MANAGEMENT

Project Management is a complete subject unto itself. In its fullest implementation, there are tools used by professional project managers such as Gantt Charts, Critical Path Analysis, etc. that, although useful, are typically not necessary for smaller broadcast projects.

For the purposes of this article, Project Management will be defined as the role the radio engineer plays in systematically executing the project. Also in this discussion, your boss, manager, client, etc. will all be referred to herein as "the client."

Project management techniques include:

- "Scoping" the project.
- Developing and maintaining systems documentation.
- Systematic design, construction and testing of audio, RF, communications, control, data and other systems.
- Systems integration standards.
- Design approvals.
- Estimates and budgets.
- Managing expectations.
- Managing sub-contractors.
- Managing "your client."

"SCOPING" THE PROJECT

The first step in any project is to define or "scope" the project. The following questions need to be asked and answered:

- What is the project?
- Where is the project?
- Who is involved in the project?
- What is the time frame of the project?
- What is the budget for the project?
- What are the needs of the client?

All this may sound trivial, but the person requesting the project and the person managing the project need to be in complete agreement on these points, and this "scope" needs to be documented.

"Scope creep" happens when a project is scoped, yet the parameters somehow change *as the project progresses*. Scope creep usually results in significant additional costs in time and money. One of the most important jobs of a project manager is to manage this scope creep.

It is important that once the project is "scoped," changes will occur only if they are defined in writing or on drawings, and are approved by the client. Other people, such as architects, engineers and contractors, may also be involved in the project. Work with them early to define the project scope.

SYSTEMS DESIGN AND DOCUMENTATION

The single most important aspect of project management and systems integration is documentation. This documentation locks in the scope of the project and defines the deliverables. For success in any but the simplest tasks, the project needs to be "built on paper" before any other task can occur.

Building the project on paper also helps you avoid costly mistakes when you actually build the project. It forces you to think the project through and address the details.

This documentation package usually consists of:

1. Architectural drawings, including floor plans, elevation drawings, etc.
2. Engineering drawings, including electrical drawings, mechanical drawings, etc.
3. Broadcast systems drawings. Including:
   a. Audio signal flow drawings.
   b. RF signal flow drawings.
   c. Control signal flow drawings.
   d. Communications signal flow drawings.
   e. Computer network signal flow drawings.
   f. Power system drawings.
   g. Rack/cabinet elevation drawings.
4. Custom design, including:
   a. Panels.
   b. Cabinets.
   c. Special fixtures.
5. Equipment spreadsheets.
6. Wire-run spreadsheets.
7. Systems test documentation.
8. Project timelines.
9. Contracts.
10. Permits.
11. System integration standards.
12. Equipment data sheets.
13. Labels.
14. Change order form.
15. Punchlists.

VISUAL DOCUMENTATION

A complete documentation package locks in the project scope and is critical in the next stages of systems integration.

Drawings can be created on AutoCAD or equivalent software. The drawings can be created for any size paper; personally I find 11" X 17" the most manageable size.

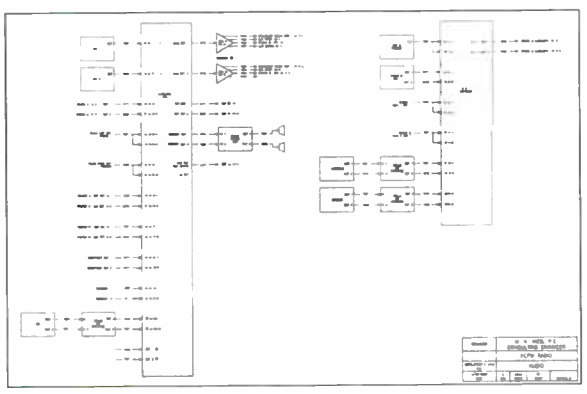
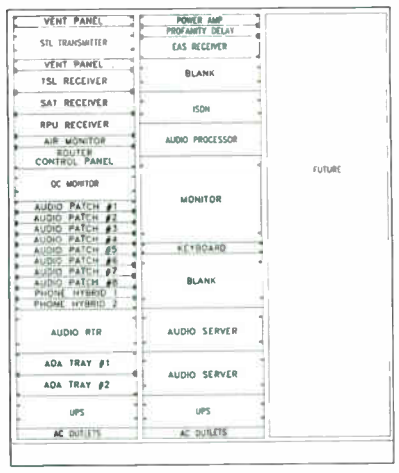


Figure 1: An Audio Flow Diagram

If you do not know how to use drafting software, you can often find a freelance or student CAD operator to help you out. **Figure 1** is an example of an audio flow diagram created with AutoCAD.

Signal flow drawings, sometimes called "one-line" drawings, do not need to show every detail of the installation, but should communicate the essentials. All equipment should be shown as blocks on the flows, with interconnect wiring and wire numbers. The signal flows should read from left to right and from top to bottom.

Rack elevations show where the equipment is located in a cabinet or metal rack and should be drawn to scale. Here is an example of a rack elevation drawing, again created with AutoCAD.



Rack Elevation Drawing

After the system is assembled, these drawings can serve as a document to track testing of the system. Once system testing is complete, the amended drawings, or "as-builts" will serve as the final documentation.

A COMPLETE LIST

Every equipment item involved in the project should be included in an equipment list, including any existing equipment that is to be integrated.

Do not forget equipment racks, plug strips, blank panels, rack screws, connectors, rack shelves and other associated hardware. A typical equipment list includes item, quantity, location, system, make, model, vendor, part number, price each and price total.

Wire run spreadsheets provide the detailed information that the flow drawings do not provide. This information can consist of cable source and destination, wire number, cable type, cable length, connector type, pin-out, etc.

Each cable should be labeled with a unique wire number that is shown on the system flows and wire list. The label can also include the source and destination of the cable; the label can be generated from the data in the wire list.

SYSTEMS INTEGRATION STANDARDS

Defining standards is useful when more than one person is doing the installation. Specific details of the project should be included in the project documentation such as:

- Audio level standards: i.e. 0 VU = + 4 dBu
- Connector wiring standards: i.e. XLR pin 2 = +
- Signal grounding standards: i.e. telescopic ground, etc.
- Power grounding standards: i.e. star ground, isolated ground outlets, etc.
- Patch panel wiring: i.e. half-normalled, etc.
- Cable types: 9451, RG-8, etc.
- Acoustical ratings.

DESIGN APPROVALS AND ESTIMATES

I like to involve station personnel, including program directors, air staff, etc., in the design process. They can help you with equipment layout, room design, color choices, and so on.

Your client should approve your design drawings before they are let out for bid.

Because you have already built the project "on paper," estimating the cost of the project is fairly straightforward. Contractors can prepare a bid from the drawing package you provide them. Your equipment list can be given to several vendors for competitive bidding and package discounts. Do not forget that some items require longer lead times than others.

(Continued on Page 26)

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Construction Guide

by Mario Hieb, P.E.

– Continued from Page 24 –

MANAGING EXPECTATIONS

Often, a project manager is expected to do the impossible, such as meeting unreasonable deadlines or working with a budget that does not match the scope of the project. A well-prepared documentation package can help communicate the cost or complexity of a project.

Too many engineers are asked by their client, "What does a studio cost?" or "Give me a ballpark estimate." I usually do not answer these questions directly because, unless I have done a complete design, whatever number I come up with will most likely be wrong.

Instead, I may answer with something like "when WXYZ built their facility, it cost them $500,000." The best thing is to design the facility to a budget number, or to give an accurate estimate based on the predetermined "scope" of the project.

If the project scope exceeds the budget, work with your client to eliminate items, or relegate them to future status. Include a contingency amount in your estimates; 5 to 10 percent is typical. It is generally better to bring a project in under budget rather than over budget.

IS IT READY YET?

"When will it be done?" is another question that is usually brought up. A realistic timeline is a good document to show management; it helps communicate the complexity of the project. Here is an example of a project timeline.

A Basic Project Timeline

TASK	Apr	May	Jun	Jul	Aug
Architectural Design	x x x				
Permits	x				
Systems Design	x	x x x x			
Bidding		x x			
Purchasing			x x		
Remodeling		x x	x x x x	x x x x	
Systems Wiring				x x x	
Test					x
Move-In					x

The most important thing is to communicate the project to your client. Showing them the drawings, equipment lists, time lines, etc. shows that you are organized and in control of the project.

If you have planned well, construction should be smooth and uneventful.

MANAGING CONTRACTORS

Unscrupulous contractors can spot an amateur project manager a mile away. The more professional you are in your preparations, the less the likelihood they will take advantage of you. Insist that their bid be based on your drawing package, and including in your bid package language stating that any changes to the project will require a change order signed by the client.

Contractors can also promise one completion date, yet deliver another. If timing is an issue, put the completion date in the contract. Another tactic is to ask for completion a week or two before you really need it. Having a timeline on paper also shows that you are serious about timely completion, especially when it is made a part of the contract.

Keep a close eye on the progress of the project. Before you sign off on the construction, go through the construction drawings and make a "punch list" of any items not completed, or not completed satisfactorily. Insist that these items be completed before final payment is issued.

SYSTEMS INSTALLATION

Systems installation consists of mounting the equipment, running the appropriate wiring or transmission line, and terminating the wiring to punch blocks, patch panels, connectors, etc.

One often overlooked aspect of systems wiring is cable labeling. Each cable in a system should have a unique wire number label (on both cable ends) that correlates with the flow drawings and wire run list. Other information can be included on the wire label, such as source, destination, etc. Labels can be printed on most inkjet or laser printers. Some installers prefer printed heat-shrink labels.

Patch panel labels and button legends can be created with AutoCAD and can be printed on paper or Mylar.

Occasionally, a system will be constructed where the majority of equipment is currently in use. In this case, a "phantom" installation is done, where the wiring is run to a rack or cabinet location before the equipment is installed. Then at a selected time, often in the middle of the night, the old equipment is moved to the new facility, mounted in the racks or cabinetry, and connected to the previously installed and tested cabling.

Doing a professional job of installation (including clean, neat wiring) communicates your competence to your client. They may not understand what the equipment does, but if the build looks nice, they will feel better about the money they are spending and their decision to hire you

MANAGING SYSTEMS INSTALLERS

Sometimes the engineer installs the systems, but in other cases it is quicker and more cost effective to hire an install team.

When installers are used, it is important to have all of the documentation in order and that everyone have the same set of plans. The installer should not need to make decisions about cable type, connector wiring, etc.; this should all be pre-determined by the systems designer.

Good free-lance broadcast installers can be found in most major cities, and they will often travel to a jobsite. Individuals with no radio background but good soldering and cabling skills can be employed with proper supervision. An unskilled individual I once hired for a radio station build-out is now the installation supervisor for a major video systems integration firm.

SYSTEMS TESTING AND DOCUMENTATION

Every cable in a new facility should be tested. Wiring errors like a lifted leg in a balanced line or lead reversal can create phase and level issues. Find and eliminate them before putting the system into service.

First, configure any pertinent equipment and set audio levels. Next, analog balanced-audio cabling should be tested for level and phase. This is easy to do, just take your "as-built" system flow drawings and highlight each wire as it is checked, working from one end of the facility to other in the direction of signal flow. If half-normalled patch panels are used, the top row can be used to bridge signals with a test set. An "end-to-end" test is useful to determine signal noise floor, aggregate distortion level, etc.

RF cables can be tested with an RF source, dummy load and VSWR meter or TDR. Network cables can be checked with a test set.

Any changes made during the system installation should be documented, with changes written in red ink on the flow drawing. Later, these changes should be made to the master software copy and marked as "as-built."

As-built copies should be given to your client as one of the deliverables.

CONCLUSIONS

Systems integration techniques may seem like a great deal of work, but in the end they save time and money.

The resulting systems are better planned, better built, more reliable and easier to troubleshoot.

More importantly, the engineer has better control of the project and is viewed by the client as more competent, effective, and professional.

Mario Hieb, PE, is a consulting engineer based in Salt Lake City, UT. You can contact him by email at: mario@xmission.com

attached a picture in white contact me for more info. big_plans #221542

STEADY SEEKING LADY

I am looking for a male partner (38-50)who is willing to be exclusive with me for a long term relationship. Not asking for marriage. I am of average build, dark hair, brown eyes and am an Indian female. I have a wonderful job and attend some classes a couple of nights a week. I have two kids who stay at home with me. They are very precious to me. And they are not going to be a hindrance to our dating. I have a full and busy life. Therefore, the expectation is to see each other on a steady basis, and at the same time, being flexible. precious_me #331252

I LOVE MUSIC. YOU LOVE ME

I'm an indie/hipster girl who adores music and going to clubs and shows. Some of the bands that I'm into are Interpol, The Arcade Fire, Blonde Redhead, Bauhaus, The Smiths, Morrissey, etc. I'm into indie rock, electronica, punk, pretty much anything. I drink and smoke occasionally. I'm 21, 5'8", light-skin, dark brown hair/eyes. I work, am well-educated, funny, spontaneous, nice. #2215234

299685

HANDSOME RAKE

Out of work leaf raker/bagger seeks whimsical beauty with un-kempt auburn or chestnut hair, cool coarse hands and a penchant for whistling. mellow_mo, 28, #101318

LET'S CONNECT

Radio engineer seeks stable long distance relationship. Need to connect immediately. Everywhere I go, I see broadband internet, but I just never hook-up. I need to meet that special someone that will plug me in so I can be heard. Must be reliable, connect easily, forgive errors and adapt to change. Should come from a good family. easy_going #101352

SIMPLICITY HERE

Simply put, I'm looking for a fun, casual relationship with only one person. That means one person for me and one person for you. :-) Every woman wants to feel safe with a partner, whether it's serious or not. It's key to her feeling comfortable to express her more intimate nature. I don't ask for much other than to hang out, enjoy your time with me and be available to chill.

MR. RIGHT

I'm actually posting this on behalf of a friend. Since she's been single she hasn't found the right guy and I'm doing this in hopes of helping her find Mr.Right. After you and I talk, if you are chosen then you will get to go on a date with her and who knows, it could be the perfect date and start of a new

for women

IN LOVE

Visiting LA to meet a must be ea Please ser response

CALL M

Hah are y

Station Stories

by Scott Fybush

KSL: Inside One Of The West's Biggest Voices

"From the Crossroads of the West, we welcome you to a program of inspirational music and spoken word..."

Since 1929, those words have heralded the start of *"Music and the Spoken Word,"* the weekly Mormon Tabernacle Choir broadcast that is the longest-running network radio program in the US.

But there is much more history, and much more present-day innovation, at the flagship station of *"Music and the Spoken Word:"* KSL in Salt Lake City. Not only is KSL one of just two former Class I-A clear channels west of the Rockies, it is also at the vanguard of a move to bring news/talk programming to a younger FM audience. And its huge AM signal boasts a fascinating (and surprisingly succinct) transmitter history.

WESTERN POWERHOUSE

It was 86 years ago this spring that the *Deseret News*, Salt Lake City's Mormon Church-owned daily newspaper, obtained a license for a new radio station. While the license for KZN (the calls were said to stand for "ZioN") was issued April 21, 1922, the first KZN broadcast took place a few weeks later, on May 6, 1922.

KZN was the state's first radio station, though only by a few days; Utah's second station, KDYL, now KFNZ 1320, was licensed on May 8, 1922.

For the era, KZN's 500-Watt power output on 360 meters already made the station a powerhouse. From the beginning, KZN served as a voice for the LDS Church, offering the first broadcast of the Tabernacle Choir 85 years ago, on June 26, 1923.

WANDERING AROUND

A year later, KZN found itself under new ownership, as the *Deseret News* sold the license to the Radio Service Company of Utah, owned by F.W. and John N. Cope. (John Cope had earlier operated another short-lived Salt Lake radio station, KDYV, which operated briefly in 1922 and 1923 from Cope's parents' house.)

The Copes renamed their new station KFPT, embarking on an ambitious program to improve the station's facilities. As with so many stations of the time, KFPT moved all over the dial in search of a permanent home. Within the space of four years, the station operated on 1000, 1150, 990 and finally 1130 kilocycles.

Meanwhile, the Copes tried to improve its studios and increase its transmitter power, a process that drew the station back into the orbit of the LDS Church – then as now a dominant force in Utah politics and commerce. By 1925, KFPT had traded out studio space in exchange for broadcasting Sunday church services. It had also acquired a 1,000-Watt transmitter with the help of a loan from the Church, which put up $5,000 for the transmitter – and included a clause (which it quickly exercised) allowing it to acquire 51% of Radio Service Company for an additional $2,500.

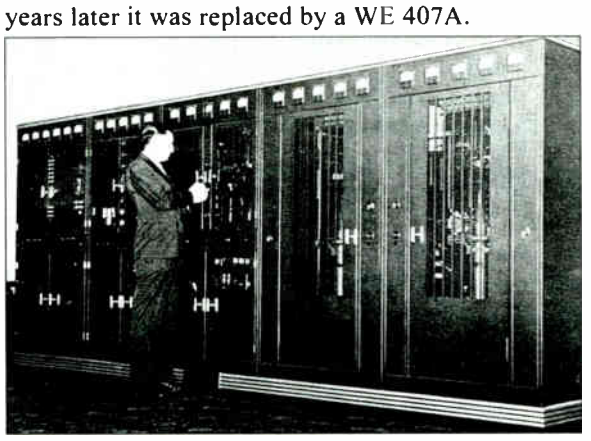
The new year 1925 brought a new identity for the station as well, as the short-lived KFPT calls flipped to the distinctive KSL in March. Those calls had earlier been assigned sequentially to a station in San Francisco that signed on in March 1922, but lasted only 16 months.

RAPID GROWTH

With a stable new identity and stable new ownership, and with the help of a manager – Earl J. Glade, a holdover from the Copes' time with the station – KSL quickly became the dominant force in Utah radio. KSL increased power to 5,000 Watts early in 1925, and later that year the station joined the NBC Red Network.

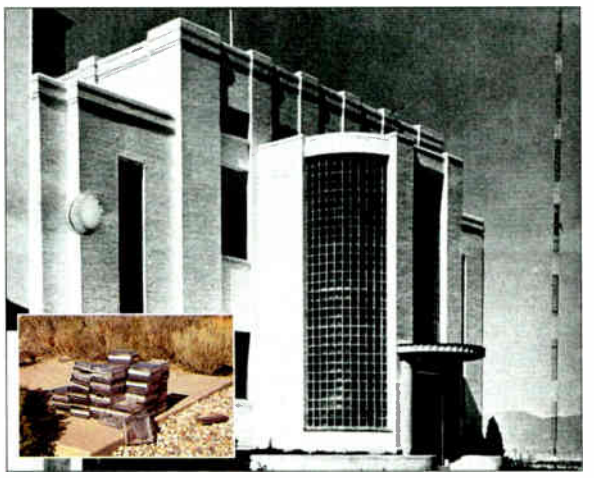
It was on a hot summer Sunday, July 15, 1929, that KSL fed the first *"Music and the Spoken Word"* broadcast to a national network audience, perching the announcer on a ladder near the sole microphone in the Tabernacle. More than 4,100 Sundays later, the broadcast remains a weekly radio staple, now on the CBS Radio Network.

Under Glade's leadership, KSL increased its reach and influence. On 10/22/32, KSL inaugurated a new 50,000-Watt transmitter, a Western Electric 7A. Six years later it was replaced by a WE 407A.



KSL's WE 407A fed 50 kW to the antenna.

The massive transmitter was housed in a majestic Art Deco building – the impressive sort of building that most major stations of the time had – at the station's new transmitter site west of Salt Lake City, along the southern shore of the Great Salt Lake. At night, lights from the transmitter room illuminated the curved glass-block façade of the building, creating a dramatic vista for travelers heading west along the route of present-day Interstate 80.



KSL's transmitter building in 1940.
Sadly, all that is left of this majestic building is a pile of glass blocks.

GOING VERTICAL

In 1939, KSL replaced the dipole antenna at the new transmitter site with a new 455-foot (193 electrical degrees) Blaw-Knox vertical tower. That tower still stands and is still KSL's primary tower, backed up by one of the two 1932 support towers for the dipole antenna, refitted as a series-fed tower. The center tuning house for the 1932 dipole antenna still stands as well, though long since disused.

In 1941, the NARBA frequency realignment moved KSL from 1130 to 1160 kc. There its clear channel signal continued to afford the station nearly coast-to-coast coverage at night – at least after Chicago's WJJD signed off at Utah sunset.

One of the 1932 towers used to take KSL to 50 kW. It is now used as an auxiliary tower. The old tuning house still stands nearby.

OVERNIGHT PIONEER

Despite KSL's mighty reach after dark, the station continued to sign off at midnight, Salt Lake time, as late as 1964.

Then, a new KSL disc jockey, Herb Jepko, hired initially to do mid-days and then mornings, launched a new all-night talk show called *"The Other Side of the Day."* Listeners soon came up with a new name for the show – *"Nitecaps"* – and thus was born a new genre of radio, the late-night talk show that avoided any serious talk of politics or world affairs, simply providing insomniacs and other "night owls" a chance for some small talk in the wee hours.

With KSL's reach Herb Jepko was listened to and became well known all over the country.

The *Nitecaps* spawned conventions, a newsletter (*"The Wick"*) and local service clubs ("Nitestands") all over the country, and the show soon took on a network. By 1968, the Nitecap Radio Network was airing in a separate local version on KSL's sister station, WRFM in New York, while Jepko's own Nitecap show aired in Phoenix and Los Angeles as well as on KSL.

While those stations soon dropped the show, it aired for several years on KVOO in Tulsa, then on WHAS in Louisville. It was even picked up from 1975-1977 on the Mutual Broadcasting System, setting the stage for Larry King's eventual triumph in the same timeslot. At its peak, Jepko's show had more than 300,000 card-carrying Nitecaps in its audience, with a staff of 26 employees fulfilling listener orders and answering fan mail.

The fall was as swift as the rise – KSL cancelled the show in 1978 and, despite several efforts to resuscitate the show, the magic was gone. (Jepko died in Salt Lake City in 1995.)

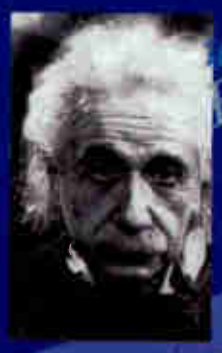
A LONG -SERVING TRANSMITTER

So what transmitter carried Jepko's show – and the rest of the station's programming – over KSL all those years? Surely, one would imagine, the venerable Western Electric 407A had long since been replaced by an RCA or a Westinghouse or a newer box from Continental or Harris?

Remarkably, the answer is none of those. In fact, the transmitter that powered KSL through the Jepko years – and for another decade beyond them – was still the Western Electric 407A that had been powering KSL for 47 years. KSL's current Chief Engineer, John Dehnel, reports that the old transmitter even passed Kahn AM stereo for several years toward the end of its amazingly long life.

(Continued on Page 30)

It doesn't take a genius to know that being off the air will cost you...



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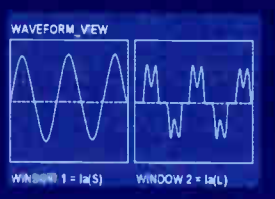

Waveform after correction

Waveform before correction

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Station Stories

Continued From Page 28

KSL: Inside One Of The West's Biggest Voices

In 1986, KSL finally retired the venerable Western Electric. After more than half a century on the air, it was replaced by a Nautel AMPFET 50 kW transmitter, later relegated to auxiliary duty with the installation of a Nautel XL60 that is currently KSL's primary transmitter.

CE John Dehnel with the Nautel XL60 main transmitter.

KSL takes pride in keeping their transmissions as reliable as possible. In addition to the two solid station transmitters, there are three power sources. Two separate power feeds come in from Rocky Mountain Power. In addition to the original 46 kV to 480 V substation, a second feed was brought in at 12 kV. In the event both power lines fail, a 235 kW generator is ready to take the load.

The 1932 transmitter building, which was constructed around the Western Electric transmitter, also was replaced in the 1980s, by a functional concrete building next door.

The new transmitter building is utilitarian, rather than an architectural statement.

Today, the only remnants of the old KSL transmitter building are a pile of glass blocks stacked neatly next to the new transmitter building – and the nameplate from the old Western, perched proudly in Dehnel's office window at the KSL Broadcast House near downtown Salt Lake City.

BACK AT THE STUDIO

The current Broadcast House, a spacious glass-fronted cube, is also a 1980s replacement for a venerable original. The previous Broadcast House dated from the 1950s, when KSL radio and its new sister station, KSL-TV (which signed on in 1949 as Utah's second television station) built a new broadcast facility on Social Hall Avenue just south of Temple Square at the heart of Salt Lake City.

The Western Electric 407A is gone now, but definitely not forgotten.

From the 1950s until the 1970s, Social Hall Avenue was the undisputed center of Salt Lake broadcasting, with its one short block serving as home to all three of the city's commercial TV stations and three of its most prominent radio stations, KSL, KDYL/KCPX and KLUB. (The block was later wiped out by urban redevelopment, giving way to the ZCMI Center shopping mall that is now itself being redeveloped.)

KSL Broadcast House today.

KSL was the last of the stations to leave Social Hall Avenue, moving a few blocks west in 1983 to the new Triad Center development, adjacent to the city's convention center and to the arena where the Utah Jazz play basketball. The Triad Center is also home to KSL's current parent company, Bonneville International Corporation, which was created in 1964 as a successor to the Radio Service Company, growing to encompass stations in New York, Los Angeles, Chicago, Seattle, Phoenix, Washington, Kansas City, St. Louis and San Francisco.

Along the way, KSL added sister stations in Salt Lake City. Its original FM station, KSL-FM 100.3, was sold to the Simmons family in 1970, becoming KSFI (but retaining, to this day, a statewide network of translators piggybacked on the KSL-TV translator network.) KSFI rejoined the Bonneville family in 2003, as part of a four-station purchase from Simmons.

NEW PROGRAM IDEAS BUILDING NEW LISTENERS

KSL's mighty AM signal had no reception issues; indeed, the low-rise landscape of Salt Lake City meant that even the office-building challenges that plague even the biggest AM signals in places such as Chicago and New York were nonexistent. The problem, instead, was one of perception – in a market as heavily dominated by FM as Salt Lake City, Bonneville believed younger listeners were failing even to sample AM radio.

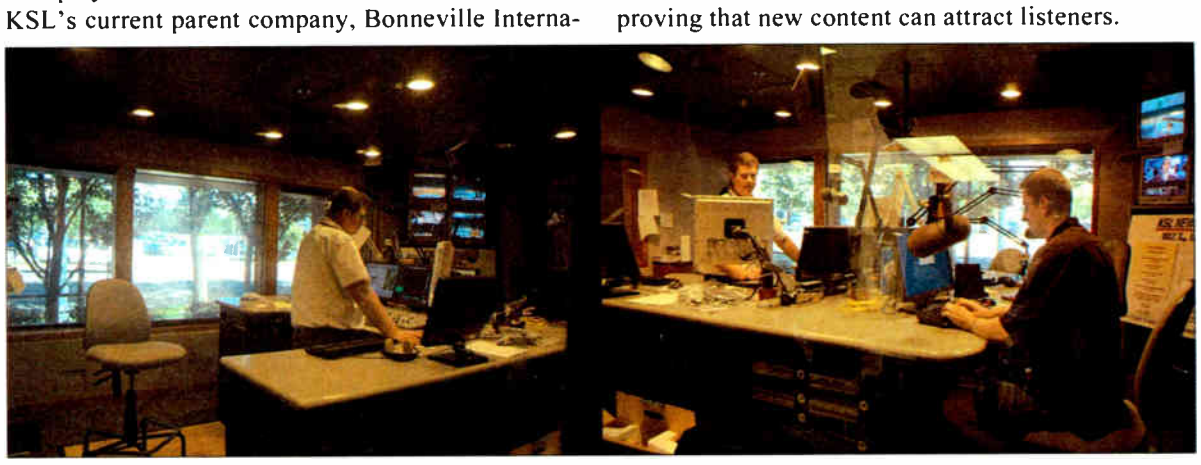
In 2005, one of those stations, KQMB 102.7, took back the KSL-FM call letters as part of an experiment to broaden the appeal of KSL's programming, by then a mix of news and talk under the banner "KSL Newsradio." Bonneville had already tried simulcasting its AM programming on FM at Washington's All-News WTOP, augmenting that station's directionally-challenged AM signal with several suburban FM outlets, and eventually moving it to FM entirely.

Today, "KSL Newsradio" brands itself as both "102.7 FM" and "1160 AM," with promos touting the FM signal's reach in the Salt Lake Valley and the statewide coverage of the AM. But KSL's outreach to younger listeners extends beyond simply simulcasting its existing AM programming on FM.

Since 2006, KSL's evening hours have been home to *"The Nightside Project,"* a "next-generation" talk show whose hosts and producers are mostly in their twenties and thirties, making heavy use of podcasts, YouTube videos and a MySpace page to reach an audience that traditionally pays little attention to talk radio.

The *Nightside Project* studio, from which KSL actively courts younger listeners with an innovative talk show.

Despite a 2007 financial crunch that led to cutbacks in the show's staff, including the departure of founding host Michael Castner, *"Nightside"* has found a loyal audience on KSL. Simulcasts on Bonneville stations in Phoenix, Seattle and Washington are also proving that new content can attract listeners.

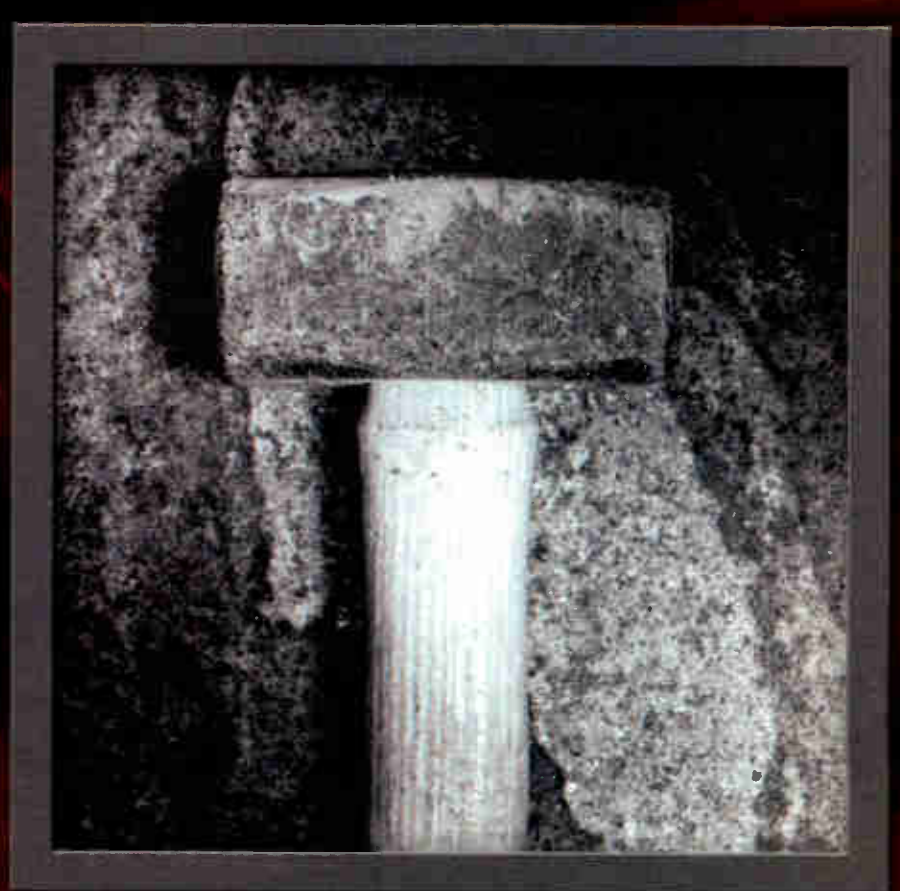


KSL's Master Control and Main Studio

Not many stations could serve as home to both *"Nightside"* and *"Music and the Spoken Word,"* but KSL pulls it off, combining more than eight decades of history with cutting-edge programming from "The Crossroads of the West."

Scott Fybush brings his love of radio history and facilities - especially towers - to ***Radio Guide****. You can contact him at scott@fybush.com*

Omnia 6EXi is:



AND EVERYTHING IN BETWEEN

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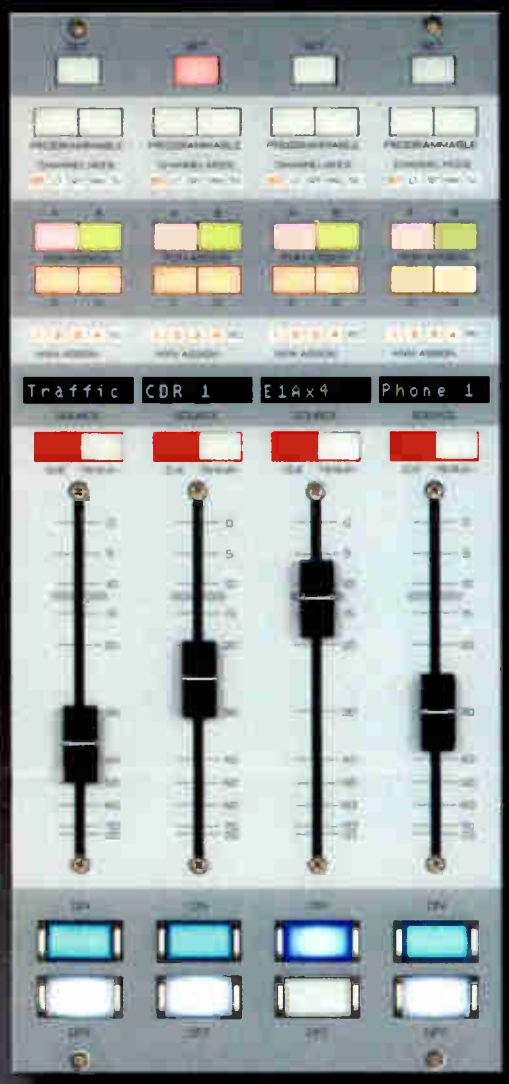
EVOLUTION-6

The E-6 is a powerful, compact and cost-efficient networked audio control surface with buil
and a powerful set of PRODUCTION TOOLS for each input channel, allowing a single surfa
reconfigured for different talent, studio and format requirements.



E-6 INPUT CHANNELS can access networked audio sources with the press of a button. All sources are displayed right above the fader. Each fader has its own mix-minus output (in addition to the console's own 4 MXM busses). SET buttons at the top of each channel can access a powerful array of production tools individually tailored for each input strip. These include four bands of parametric EQ, compressor/limiter, expander, pan, mode, HPF, LPF and phase reverse. These EQ /DYNAMIC functions allow powerful per channel mic processing. The console has four output busses (can include 5.1 surround), 4 mix-minus busses and 4 aux mixes (all with TB). Each input channel also has two programmable buttons for customized functions, as well as ON/OFF switches with built-in machine control (logic follows source).

The Wheatstone Evolution-6 Digital Audio Control Surface

in EVENT RECALL
e to be instantly

THE REALTIME HI-RES GRAPHIC DISPLAY keeps operators up to date and completely informed concerning all surface functions. Metering, bus assignment, channel status and sources, event recall, monitors, EQ and dynamics—all appear here via the mouse/trackpad driven GUI. Note the surface drives the VGA monitor with built-in circuitry (no external PC required).

THE MONITOR/SET PANEL (right) has Control Room, Headphone, and two independent Studio outputs. It also allows the operator to program input channels via the SET function: aux mix and mix-minus assign (4 each; all with talkback), input source select, and pan. The panel also has fourteen programmable buttons which can initiate custom functions like remote setups, intercom, machine commands and salvos.

Available in 4, 8, 12, 16, 20, or 24 channel mainframes

The E-6 audio control surface interfaces directly with Wheatstone's E-Series network switch and associated studio satellite I/O cages. Wiring between components is via single CAT-5 cables, eliminating point-to-point multi-pair runs. **Each studio surface operates independently, yet can share all network sources and mixes with others.**

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Digital Guide

by Dana Puopolo

Audio Over IP

Part 3 – More Barix Tips and Tricks

Sometimes you find a product that really excites you. Remember the guy who bought the razor company? Dana Puopolo did not buy Barix, but he has been such an evangelizer for the products that he was recently hired to do tech support here in North America. Now he really gets to play with them, and share some of what he has learned.

This time I am going to show you how to use some of the more esoteric features of the Barix units, and also show you how to hook up the units for use as a switchable digital link such as an STL.

CONSIDERING INPUTS

The Instreamer 100 has both analog and digital inputs, though only one can be used at a time. The digital inputs are not professional – instead they comply with the consumer SP/DIF standards. Both RCA and optical digital inputs are available. The three inputs are selected in the web interface.

If you use either digital input, you are forced to use MPEG-1, layer 3 (MP3) coding. Additionally, the sample rate of the input sets the sample rate of the stream; however, the quality and bandwidth are still set by the 0-7 settings. The headphone output will still work when you use a digital input, and I have used this feature to use the Instreamer 1000 as a digital/analog converter in a pinch.

My recommendation for using the Instreamer as a digital device is to use the optical input. This way, there are no ground loops. That said, I have used both the unit's digital inputs successfully.

ADAPTING FOR PRO DIGITAL

To interface the Barix units with a professional AES/EBU digital input requires an adapter. For the Instreamer 100, this might be as simple as a digital matching transformer. Several companies, including Neutrik make these.

They match the 110 Ohm balanced impedance of AES/EBU to the 75 Ohm lower level unbalanced SP/DIF coaxial connection. A caveat is that they do not always work because the bit mapping between the two input formats is slightly different. The best way to match these levels is with an active device.

My personal favorite is the Behringer Ultramatch Pro Model SRC2496. This unit is available from most broadcast equipment stores and most larger music stores (such as Guitar Center and Musician's Friend). One of these units should be at every radio facility, because of all the cool things they can do.

COST-EFFECTIVE CONVERSIONS

First off, they interface both SP/DIF formats (optical and coax) to AES/EBU perfectly. They also match the other way (AES/EBU-SP/DIF). They do bi-directional sample rate conversion with rates from 32 kHz to 96 kHz. Finally, they have 24-bit A/D and D/A converters with balanced inputs, outputs, and a powerful headphone amplifier. All this for under 140 dollars!

I used one of these units to interface a digital processor's AES/EBU output to the Instreamer using both the optical and coax digital inputs and it worked flawlessly. Using a quality level of "7" (the highest) produced an MP3 stream with about 192 kbps. The decoded quality was superb; several "golden ears" listened to it and agreed it was far better then necessary for FM audio. Indeed, some could not tell the difference between the decoded audio and CD's.

I also used the sample rate converter in the unit to try different rates. The only one that reduced quality was the 32 kHz one; although the quality was still excellent there was a noticeable "softness" to the decoded audio. Now, please remember that this softness could only be heard in direct comparison to non-decoded CD audio – most listeners would not know the difference.

For audio playback I was using FLAC-encoded CD audio files played through an M Audio Delta 192 sound card. We used both the analog and coaxial SP/DIF digital outputs of the card in our tests. Some of the tests were handled by connecting the SP/DIF coax output of the sound card directly to the coax digital input of the Instreamer 100, bypassing the Behringer unit completely.

FOCUS ON THE RECEIVE SIDE

Now let me describe for you how I set up an Exstreamer 200 to receive the stream.

The Exstreamer 200 is an interesting unit in that it has a built-in 25 Watt per channel stereo power amplifier. The audio level of the unit can be controlled two ways: by the web interface and by a wireless infrared remote control unit. (There is a built-in infrared sensor on the front of the unit.)

The Exstreamer 200 even comes with audiophile grade banana-type speaker connectors! The reason I wanted this unit to test, however, was its built-in optical digital output. I was eager to try this unit in combination with a second Behringer box, to set up the digital AES STL over IP system.

Hooking the optical output to the second Behringer was a snap. I used a Radio Shack "gold connection" (how gold can help an optical connection is beyond me) six-foot optical cable, and upon selecting the optical input on its front panel the Behringer immediately locked to the digital stream.

Then I saw something strange: The Behringer showed a sample rate of 48 kHz while my input stream was 44.1 kHz. In fact, the sample rate remained at 48 kHz no matter what the input sample rate was. An email to the Exstreamer's design engineer in Switzerland confirmed my suspicions: the Exstreamer 200 has a built-in sample rate converter, that converts *all* inputs into a 48 kHz WAV stream.

This sample rate converter is of extremely high quality with less than 1/2 a dB of overshoot and 6 dB of headroom. Nonetheless, if you want maximum quality, you should use 48 kHz sampling with your input stream – that way no sample rate conversion will take place.

As I mentioned above, the quality of this setup was superb, and it had the advantage of simultaneous analog and digital outputs – not to mention a 50 Watt stereo speaker output! This is an ideal setup for a radio station that employs a digital processor. My one caveat would be that, ideally, the audio processor should be located at the transmitter, because perceptual coding (MP3) works best with unprocessed audio.

TURNING THE SYSTEM AROUND

There are some other ways that the Barix units can be used.

Most of you know how you can use HTTP streaming (also known as Internet Radio streaming in the units), and we also talked about BRTP streaming for STL use. Both of these use a static public IP address with the Instreamer and a dynamic one with the Exstreamer.

However, suppose you want to use the units for remotes with the Instreamer located at the remote site and the Exstreamer located at the transmitter. It is very difficult to find static IP addresses out in the field; most locations use dynamic service. What if you could use a dynamic IP address on your Instreamer and "push" the stream to your Exstreamer back at the studio (with a static IP address)? Well, you can and it is easy to set up.

All you do is select RTP coding on one of the streaming tabs of the Instreamer, and then put in the public static IP address of the (studio located) Exstreamer. We use port 2020 as a convention for RTP, so put 2020 in the port number (though in theory you can use any valid unused port number).

Then, using the Exstreamer's stock firmware, set up the Exstreamer with a static public IP address (or a LAN address with port 2020 or other selected port open in your firewall and forwarded to the Exstreamer). The unit is used in Mode 4 (streaming receiver; selected in the streaming tab) and you put 2020 (or whatever port you selected in the Instreamer) into the RTP Receive Port field. That is all it takes!

The Exstreamer will now continuously listen to the port you selected (2020) for an RTP stream. When it sees one pushed to it, it will decode it and pass on the audio. Instant remote setup!

HANDLING MULTIPLE REMOTES

But what if you have two remotes in a row and there is no one at the studio to change them over. Or better, there is no one at one remote site at all to disconnect its stream. Or perhaps you have two studio sites and want to be able to switch the transmitter feed remotely and, to make it interesting, you want to do it automatically?

As they say in "Wah, Wah, Wubsy" (Now you know I still have small children), "No Problemo!" The Barix unit can easily accommodate this. Here is how:

In the Instreamer(s) select "Raw UDP" for your protocol, then type in the Exstreamer's IP address. For a port number, put 2020 on the one you want to be the "normal" remote unit (at the unmanned site). The other Instreamer gets set up the same way, except you use port 2000 as its port number.

Set up the Exstreamer (with its stock firmware) as a streaming receiver and put 2020 in the UDP Streaming Listen Port field. Put 2000 in the UDP Priority Streaming Listen Port field. Now the Exstreamer will listen to *both* ports 2020 and 2000 and if it sees a stream on 2000 it will *automatically switch* that stream to its output. There is even a separate volume control for the Priority port. Finally, when it is receiving a Priority stream, the Exstreamer's red status light will blink on and off as a sort of alarm.

The UDP protocol is preferred because of its lower latency. However, if your Network is not set up to pass UDP packets, you can use TCP streaming as well; simply use the "Raw TCP" dropdown in the Instreamer(s) and then use the TCP fields in the Exstreamer. The TCP Streaming Listen Port even has 2020 entered into it by default.

ALL SORTS OF POSSIBILITIES

I hope these articles have given you a taste of just how versatile these amazing devices are. I have only scratched the surface of their capabilities; I encourage you to buy a pair and experiment yourselves.

Barix has other products that are just as unique. For example, how about a full-featured, web-based remote control with four channels of telemetry for $250.00? It even can be programmed with VBasic to do timed events (pattern changes anyone?). Or perhaps you might find a use for a mono, two way unit that has a contact closure in each direction.

Check out the Barionet and Ammunicom equipment at the Barix web site: www.barix.com

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Dana Puopolo is a long-time radio and television engineer who recently has take on North American Technical Support for Barix. Contact him at dana@barix.com

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Support

Tech Tips

by Bob Henry

Stopping the RF from Blowing Away

These days, for whatever reason, it seems the practice of regular maintenance of radio station facilities often has become a thing of the past.

I saw this problem recently, while doing work for a local radio station that was in need of a lot of attention. Regular maintenance had not been done in a long time. The former engineer had passed away and the owner was not able to do the needed maintenance. I no doubt had my work cut out for me.

WIND POWER

During one windy night, I noticed an unusual phenomenon was occurring at the AM transmitter site – the antenna ammeter readings were, mysteriously, gradually changing.

I briefly cut the modulation to observe the symptom more carefully. As the wind blew harder, the ammeter reading would vary up and down with the wind variations. Obviously, wind is not supposed to have any effect on RF – that is, unless the wind is causing something to move to produce the effect.

This is exactly what was happening, albeit, I did not know how it was happening at the time.

AN OPEN AND SHUT CASE

The next day, I decided to completely examine the transmitter facility to find the probable cause of this phenomenon. After walking out to the tower (located some 100-feet away from the transmitter), there it was, the source of the problem – the door of the ATU was wide open!

This ATU opened the door to problems.

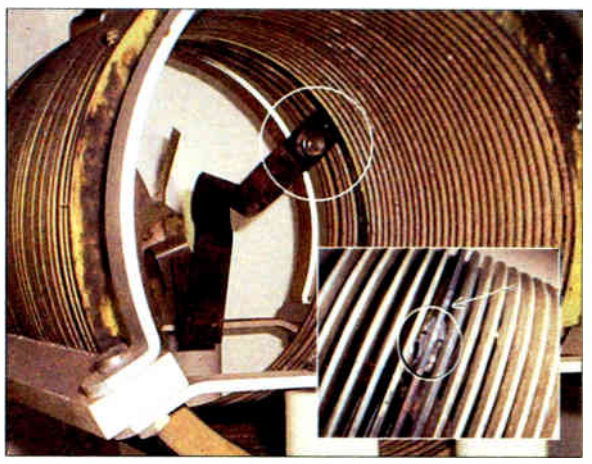
Evidently, this door had been blowing back and forth in the wind, thus causing the tuning to vary with the blowing of the wind. I wondered how it opened as it did. After some more investigation, I noticed that the lock hasp had been cut by someone to open the ATU door for access, but it was never repaired.

It was obvious that it had been this way for a long time, allowing the elements of the weather and the environment to enter the ATU housing.

FIXING THE COLLATERAL DAMAGE

After closer investigation of the inside of the tuning unit, I noticed heat emanating from one of the tuning coils. Looking closer, I noticed visual signs of charring caused from excessive heat at the coil tap. This was an obvious indication of a bad connection, causing some power to be lost in heat.

With buying a new coil not an option at the time, I was able to fix the problem, rotating the damaged coil 180 degrees horizontally so that the other end of it could be used, as it was not charred. After burnishing it with an emery board, the tap was then placed back on the coil at the proper tap point.



The coil was obviously charred at the tap point.

I then powered up the transmitter and checked tuning and operating parameters. Now, meter readings were very close to those originally logged and posted on the transmitter. No more fluctuations were noticed with the antenna current readings.

By using the other end of the coil, the damaged section was bypassed.

No matter how new and modern (or old) they are, transmitter sites still require some routine maintenance to avoid such problems.

Bob Henry is a studio engineer at KNME-5, and contract engineer in Albuquerque, New Mexico. Contact Bob at bob4analog@yahoo.com

Seek and Ye Shall Receive

DSC-32/64 Dual Satellite Remote Control

The DSC-32/64 allows the remote control of any combination of TWO X-Digital Systems XDS, StarGuide II / III, Wegener Unity 4000 or ComStream receivers. A front panel encoder control with a 16 x 2 backlit LCD display provides local control and program descriptions, while external control may be in the form of RS-232 (USB) serial or 32 contact closures.

PS-99 Programmable Scheduler-99

The Programmable Scheduler can store and control up to 99 events. Events may be programmed with Hour/Minutes/Seconds and Day/Month/Year or Day of Week.

TimeSync Plus

The tiny TOOLS Time Sync Plus provides four separate GPS time referenced outputs. The Time Sync Plus would be a great companion for the PS-99.

COA-37 XDS Connect 'O Adapter

Here's another problem solver from Broadcast Tools for the X-Digital Systems XDS, StarGuide II / III satellite receiver! The Connect O' Adapter 37 XDS provides an effective way to convert the DB-37 connector to the euroblock removable screw terminals.

COA-9 XDS/MAX

The Connect O'Adapter-9 allows you to convert the DB-9 connector on your X-Digital Systems XDS,IDC "MAX" and StarGuide II / III receiver to the euroblock removable screw terminals.

COA-15 MAX

Need to convert the DB-15 connector to the euroblock removable screw terminals? The Connect O'Adapter 15 MAX will do the job. The COA-15 MAX is designed to plug into the male 15-pin D-Sub connector on the IDC "MAX", StarGuide II / III.

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Tech Tips

by Chuck Conrad

Taming the Sangean HDT-1

Regardless of your viewpoint on HD broadcasting, one good thing has come from it: Better tuner design.

The Sangean HDT-1 (and the upgraded version HDT-1X) are good examples. They are excellent analog FM receivers. What you will find to be most amazing is their sensitivity and selectivity. Adjacent channel interference and strong nearby RF fields do not significantly affect these tuners, making them useful in several broadcast applications.

Because these tuners are essentially one big DSP chip coupled with a LG digital tuner module, they probably will not find a home in your Control Room for off-air monitoring purposes. This creates a built-in time delay that is guaranteed to befuddle even the most experienced air talent. Still they have a variety of uses, including casual monitoring, EAS and even emergency back-up translator service.

AN UNWANTED "FEATURE"

On the downside, they have one very annoying feature. If they ever lose power, they revert to the "standby" position when the AC power returns. That can be very inconvenient. Driving 20 miles in the dark of night to push the "power" button is not my idea of fun.

The good news is you can modify one of these tuners for about $20 so it will turn itself back on. The HDT-1 has a conventional transformer and bridge rectifier power supply. It is always on when the unit is plugged into the wall socket. A simple timer circuit to push the "on" button is all it takes.

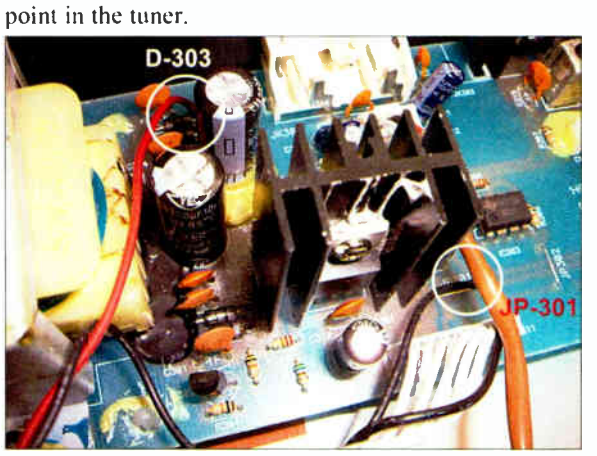
You could probably make one for a few bucks with a 555 chip and a relay from Radio Shack, but I discovered a pre-built module from a company called Altronics (www.altronix.com). Called a ""6062 Multi-Purpose Timer"

I found them at William B. Allen Supply in New Orleans for less than twenty bucks. They do phone orders at 800-535-9593. You may also be able to find one from your local security alarm parts distributor. Their primary use seems to be for delay circuits in alarm systems.

AN EASY FIX

The HDT-1 has lots of vacant real estate inside, so mounting is easy. I used four nylon stand-off legs to mount it, but the timer board comes with a piece of double-stick foam adhesive, which is even easier.

The timer is designed for either 12 Volt or 24 Volt DC operation. You can pull off 18 VDC from the Sangean's power supply, and the timer board seems to work fine at that voltage when switched to the 24 Volt mode. To power things, connect the negative terminal of the timer to the power supply board at an area marked "JP 301." That is a bare jumper wire that is actually the common ground point in the tuner.



The positive voltage comes from the cathode (banded) lead of diode "D-303, which is located toward the receiver's back panel near the power transformer. It is shown in the picture above.

Only two other connections are needed. Run two wires from the receiver's "power" button to the timer board's common and "NC" terminals. The terminals for the front panel power button are very obvious. Just look at the picture.

The timer card has a DIP switch on it. Set it as follows:

Dip #	Position
1	Off
2	On
3	On (24 VDC operation)
4	On (actually, it doesn't matter)

That is about all there is to it. You will need to adjust the time delay. I found that turning the pot all the way counter-clockwise and then back just a hair, worked fine. The front-mounted power button still functions – and the tuner turns itself back on.

Chuck Conrad is the General Manager of KZQX in Chalk Hill, TX. You can contact him at ChuxGarage@aol.com

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Heavy Metal

by J.S. Sellmeyer, P.E.

RCA's Transition to Design & Manufacturing

Part 1 - The RCA 50D

Until the breakup under the government's Consent Decree of 1932, RCA was essentially a marketer of equipment designed and built by AT&T, GE, and Westinghouse. As they began selling products under their own label, RCA had to come up with a new strategy. Jack Sellmeyer takes us back to those interesting days.

It was in the latter half of the 1930's decade that RCA came into its own and began designing and manufacturing its own equipment.

This was true across the spectrum from consumer radios and phonographs to commercial sound reinforcement and motion picture sound equipment, both recording and playback, and commercial broadcasting transmitters and studio equipment. Once the transition began, RCA moved quickly to dominance of most targeted industries. One area was the high power broadcast transmitter market – the fifty kilowatt level for the domestic market.

GETTING ON THE AIR

Early RCA transmitters manufactured by Westinghouse and General Electric had a relatively "crude" industrial look with no significant thought given to styling.

During this period radio was king with most of the country listening in the evening hours and most of the farmers and ranchers relying on radio for education, weather and market information. (Television was only a dream in David Sarnoff's mind during the years of the Depression.) The local radio station was a respected business and curiosity with studio and transmitter tours enjoyed by many of the populace.

That began to make a selling point, along with higher AC to RF efficiency to lower the tremendous power costs of the inefficient linear amplifiers of the early years.

MOVING PAST FORMER PARTNERS

In the late 1930's RCA was competing actively with Western Electric (WECO), the equipment manufacturing arm of the Bell Telephone System.

Western Electric had the advantage of being associated with Bell Telephone Laboratories, which performed everything from fundamental research to detailed research and design of audio and RF circuitry. WECO had pioneered broadcasting at all power levels, gaining a hefty market share in the late 1920's and 1930's.

At the 50 kilowatt level the earlier transmitters sold under the RCA name were all physically realized as a relatively low power transmitter followed by one or more linear amplifiers. Typically these were in the one to five kilowatt range with a 50 kilowatt power amplifier behind it. The higher power stages were usually operated in Class B resulting in power demands on the order of 250 to 300 kilowatts from the AC mains.

Most used multiple high power tubes in the final amplifier, all of them triodes. These were water cooled and most used motor generator sets for the filament and bias power supplies – and some for high voltage power supplies, since suitable rectifiers had not yet been developed for high voltage or high current applications.

The filaments were usually operated with DC power due to the power requirements for the filaments and due to carrier hum considerations. The filaments were mostly fabricated from pure tungsten strands, which made them relatively inefficient as electron emitters and resulted in very high filament power requirements. The filaments were also quite brittle and easy to destroy if the tubes were not handled properly.

IMPROVED EFFICIENCY

Western Electric had developed a linear amplifier in 1936 which effectively doubled the overall efficiency of transmitters at the 50 kilowatt level and was making major inroads in the broadcast market at that power level. The 407-A transmitter was the first application of the Doherty amplifier to a 50 kilowatt AM transmitter and the first installation took place at WHAS, Louisville, Kentucky in 1938.

RCA had not yet applied any of its high level, plate modulated technology at the fifty kilowatt level and followed with the model 50D about the same time. It was a modern design with a highly efficient linear power amplifier called the "RCA Class B-C High Efficiency Linear Amplifier" which resembled the Western Electric 407A in all except one detail. This would not go unnoticed.

The 50D transmitter was the first RCA 50 kilowatt transmitter to use all mercury vapor rectifier tubes for the DC power supplies at all levels. This completely eliminated rotating machinery from the transmitter, improving overall efficiency and greatly reducing maintenance requirements. It was a major step forward in reducing power demand but not without attracting the attention of the giant Western Electric Company.

(Continued on Page 42)

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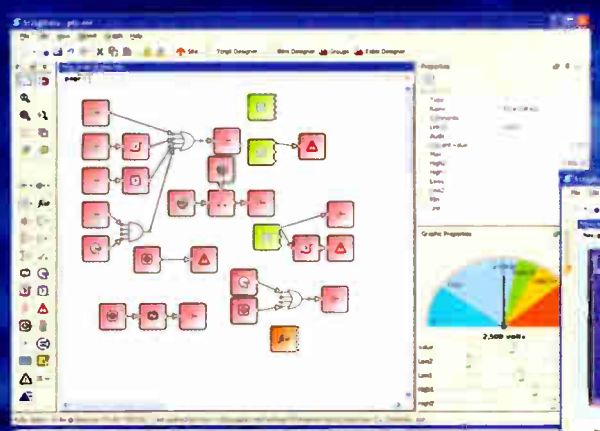

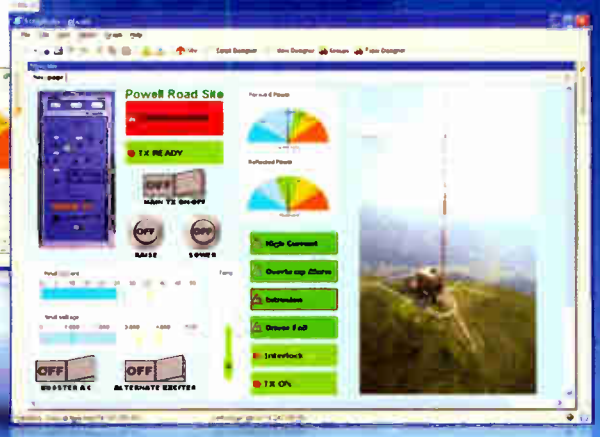

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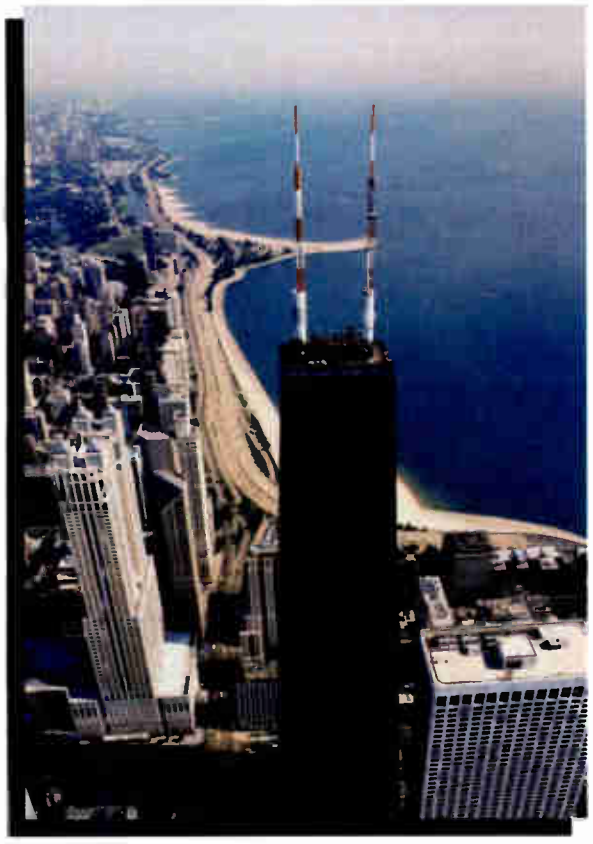

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HD READY

Heavy Metal

by J.S. Sellmeyer, P.E.

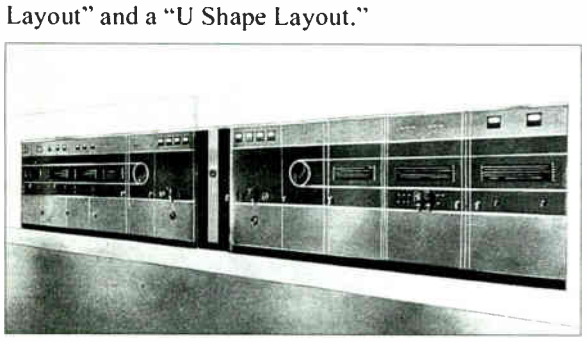
– Continued from Page 40 –

A CHANGE OF DESIGN

About 1937 a new and more modern transmitter design was unveiled – one which would influence the RCA radio transmitter line for the next twenty years in one area or another. As we shall see, RCA became a creature of habit, re-using circuits which appeared to work well and innovating in other areas, some successful, others not so successful!

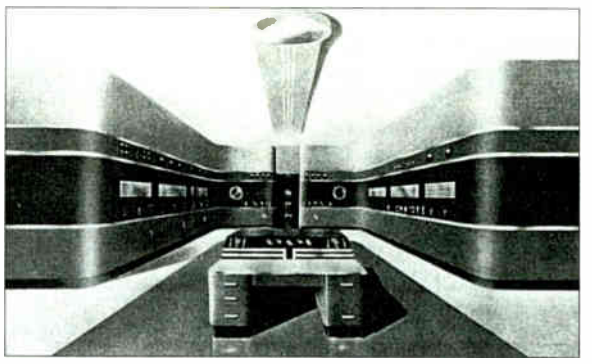
The 50D was a radical departure from previous designs, both in appearance and performance. The styling was representative of the Art Deco period with chrome trim streaming toward the round center windows to accent the power amplifier tubes.

There were two basic physical arrangements that were offered by RCA for the 50D. A "Straight Line Layout" and a "U Shape Layout."



The Straight Line layout for the 50D.

Since the linear space needed for these large transmitters was approximately 50 fifty feet, the designers created a "wrap-around" model in a "U Shape Layout." This model, which could be installed in a more compact area, folded the outer cabinets, from the center section, forward toward the operator to form a cozy cove for the operator.

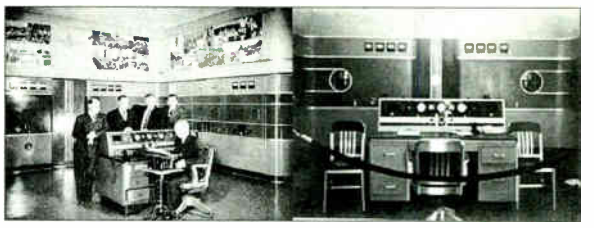


The U-shaped layout.

The first 50D transmitter was believed to have been installed at the then new KNX Torrance, California transmitter site. The installation used a "Modified Straight Line" layout, where the sides were set at an angle. Combined with the round architecture of the transmitter building, it was quite an impressive site, as shown here.

The 50D as installed at KNX (circa 1938).

Besides KNX, 50D transmitters were delivered to WENR/WLS, Chicago, Illinois, WCKY, Cincinnati, Ohio, WWL, New Orleans, Louisiana, WWVA, Wheeling, West Virginia and CBA, Sackville, New Brunswick. The size and clean lines made for an impressive display to engineers and tour guests alike.



A U-shaped model was installed at WENR/WLS with the engineers surrounding the control console.

Being surrounded at WWL by one of these 50Ds would certainly make for an impressive place to work.

1930s STATE-OF-THE-ART

The RF Exciter was a standard RCA 250F, 250 Watt transmitter, without the audio and modulator components. The open frame exciter stage was placed behind the newly styled 50D front panel.

The exciter employed a pair of the RCA standard UL-4292 crystal controlled oscillators. These were the RCA standard frequency control module in all of the RCA AM transmitters from the mid-thirties until the mid-fifties. The RF power amplifiers in the 250 Watt stage were a pair of 805's in push-pull mode, driven by a single 805. The control circuits and power supplies of the 250F were integrated with the 50D control system.

The RF Driver and Modulator were newly designed for this transmitter. The RF power amplifier is an 892R, an air-cooled medium mu triode used in most of the five and ten kilowatt transmitters of the late 1930's and 1940's. This stage, producing approximately four kilowatts, was operated in Class C as the modulated amplifier. The modulator was a pair of 891R's operated in Class A in parallel as a Heising modulator.

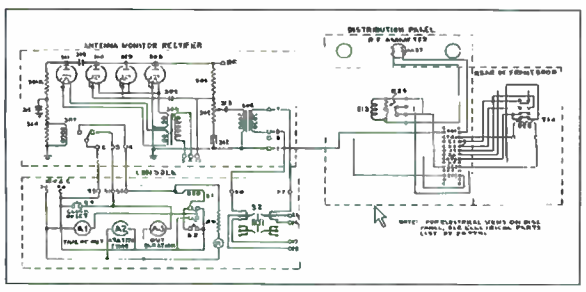
A LOOK INSIDE THE 50D

The audio driver consisted of three single-ended Class A stages each using a pair of tubes in parallel to drive the pair of 891R modulators. Overall feedback was taken from a feedback rectifier connected to the output terminals of the transmitter. *(Continued on Page 44)*

Heavy Metal

by J.S. Sellmeyer, P.E.

– Continued from Page 42 –



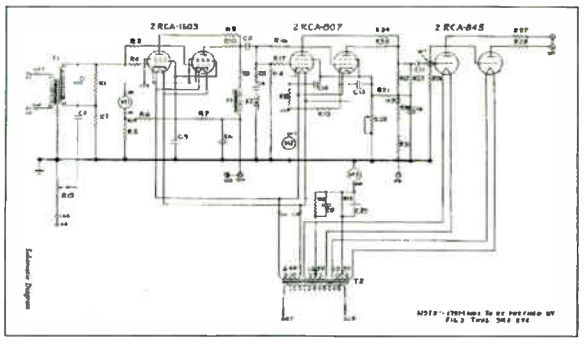
The Feedback Rectifier circuit from the 50D.

This rectifier served as a demodulator for the RF envelope. Its output was connected to the first stage of the audio driver through Feedback Control R-15 and resulted in approximately fifteen to 20 dB of audio feedback around the entire system. Forward path gain and phase shaping was used in the audio driver stages to avoid the possibility of oscillation within the loop.

The feedback rectifier was a brute-force unit also used for sensing carrier failures. The relay in the unit dropped out when the carrier failed, stopping a clock on the supervisory console and starting an "outage clock" to measure the length of the outage. This also rang a bell within the control cabinet. This feature would be carried forward to future RCA 50 kilowatt transmitters.

THE AUDIO SECTION

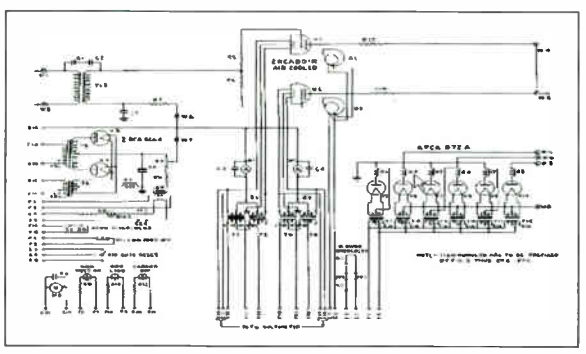
A similar monitor rectifier was installed at the antenna coupler for aural monitoring purposes. This unit also drove the remote antenna current meter in the transmitter.



The Audio Driver stage in the 50D.

The output of the 845 stage was transformer coupled to the grids of the parallel 891R's used in the modulator stage via transformer T-13.

The modulator operated with the full 10,000 Volts on its anode. The PA dropping resistors were bypassed at audio frequencies by 4C-8 and 4C-9 to allow the full plate swing of the Class A modulator stage to be applied across the RF PA. In this manner full envelope modulation to plus and minus 100 percent was possible. It is believed that this was the first application of air-cooled tubes as RF drivers and modulators in a 50 kilowatt transmitter.

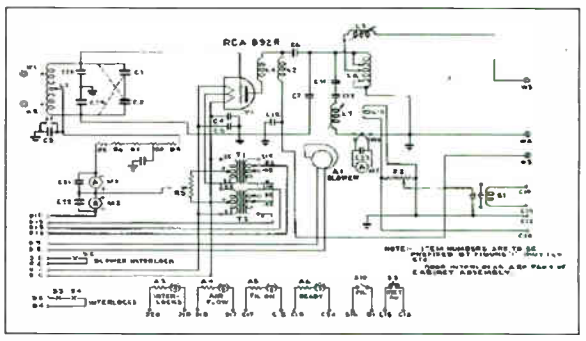


The modulator stage.

The modulator was coupled to the RF driver stage through a reactor connected to the 10,000 Volt power supply. The other end of the reactor was connected to the plates of the 891R's then through a resistor bank bypassed by a pair of audio bypass capacitors to the DC feed choke and RF bypass capacitor of the RF driver stage.

THE RF SIDE

The 892R RF power amplifier was operated at 8,500 Volts through a set of voltage dropping resistors, 4R-11 through 4R-22, from the 10,000 Volt power supply for the RF driver.



The RF Driver stage.

The "one detail," mentioned earlier, was the presence of a 180-degree network in the grid circuit of the peak tube of the RF amplifier which resulted in a net 270-degree phase shift between the carrier and peak tube grids – the equivalent of ninety degrees in the Doherty design.

A 180-degree passive network merely repeats the load present at its output to the input just as a one-half wavelength transmission line of the same impedance would do.

Other than that minor detail, the 50 kilowatt amplifier stage operated in the same manner as the Western Electric Doherty amplifier which had been introduced in 1936. It is reported that a court battle ensued and RCA replaced the 50D with the 50E in 1939 after delivering only six of the transmitters, a very successful rate of delivery for that time period.

(Continued on Page 46)

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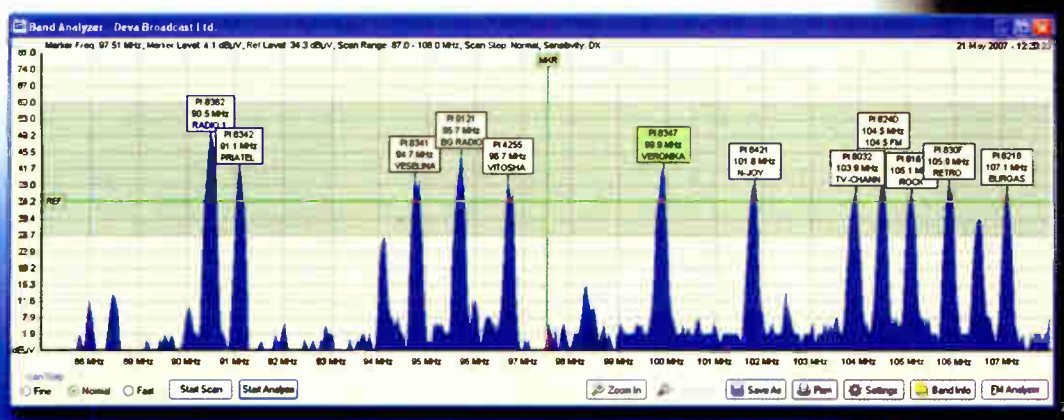

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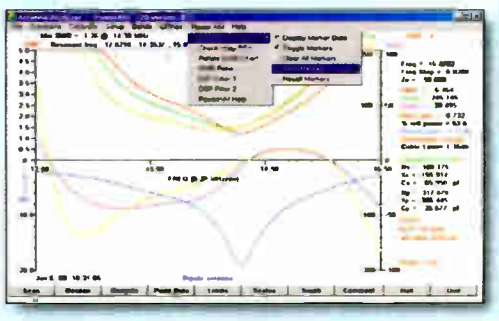

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Heavy Metal

by J.S. Sellmeyer, P.E.

– Continued from Page 44 –

THE 50 KW FINAL PA

The 50 kilowatt power amplifier stage used two Type 898 water-cooled triodes in the Final Amplifier stage.

These tubes were similar to the UV-862 triodes used in most of the previous 50 kilowatt transmitters. The main difference was the use of three-phase filaments to achieve better control of the hum induced by operating with AC on the filaments. The filaments were still made of bright tungsten strands.

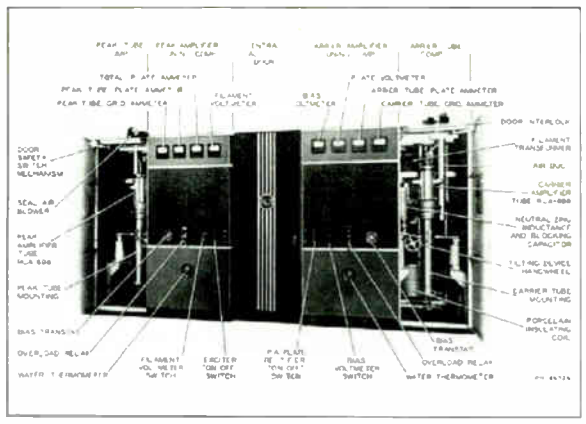
The cooling method was by water cooling using moderate pressure to circulate about 20 gallons per minute through the water jacket of each tube. A water-cooled test load was included in the cabinet. The heat exchanger was an evaporative design manufactured by Trane. Some of the heated exhaust air was mixed with the intake air to assure the water would never freeze in cold weather.

The photograph of the power amplifier cabinet shows the peak tube compartment on the left and the carrier tube compartment on the right with the doors open for servicing.

EASY TUBE CHANGE – WITH TWO MEN

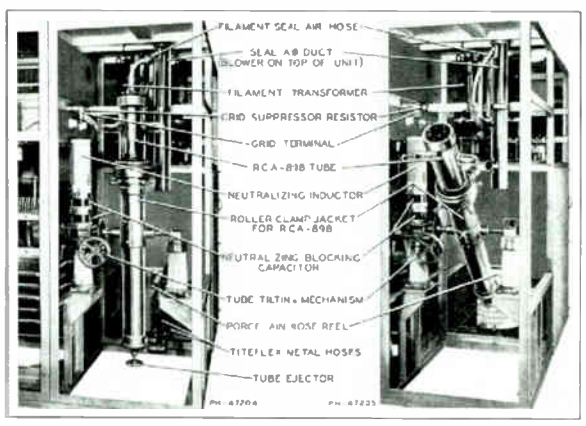
The power amplifier tubes could be removed for servicing from the front by:

- shutting off the water pumps.
- disconnecting all electrical and water connections from the tube.
- tilting the upper part (glass envelope) of the tube forward by use of the "Tilting Device Handwheel" inside the cabinet.



The 50D's 50 kilowatt Power Amplifier cabinet.

This permitted easy removal of the tube from the water jacket. However, this was best accomplished by two men as the tube was nearly five feet in length including the anode cooler and the glass envelope.



The Carrier Tube is shown tilted forward, ready for removal.

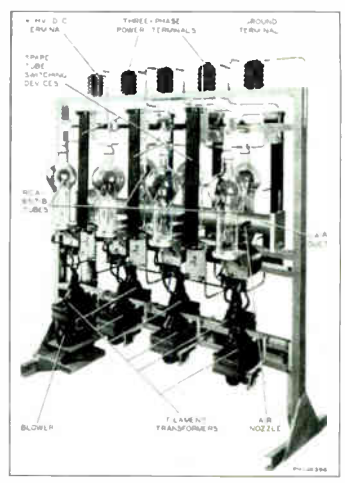
The 50 kilowatt transmitters of this era were physically large, complex, and expensive devices. For these reasons, most stations did not have backup transmitters, as is common practice today. To compensate, certain features were designed into the equipment, aimed at providing rapid restoration of service in the event of a fault. Many of these features would be carried forward into later models of transmitters.

Among such features of the RCA 50D was the ability to bypass the 50 kilowatt power amplifier in its entirety by switching the RF driver directly to the input of the harmonic filter. This feature shut off the amplifier high voltage and bias supplies and bypassed the cabinet interlocks to permit tube replacement and other repairs to take place in relative safety while remaining on the air at reduced power.

A LOOK AT THE POWER SUPPLY

The 18,000-Volt High Voltage power supply employed six 857B mercury vapor rectifier tubes in a three-phase, full-wave bridge circuit. These tubes were troublesome when subjected to abnormally low or excessively high temperatures. Arcbacks were common at temperature extremes.

Furthermore, as with all mercury vapor rectifiers, the filaments had to be warmed up for several minutes to attain proper operating temperature before high voltage was applied. When a failure occurred, one could not simply pull a replacement off the spare tube rack, stuff it in a socket and get back on the air in a short time. There was no socket, and the mercury pool could not be disturbed without inducing an internal arc in the tube.



The Rectifer section for the 50D included an extra tube to reduce downtime.

(Continued on Page 48)

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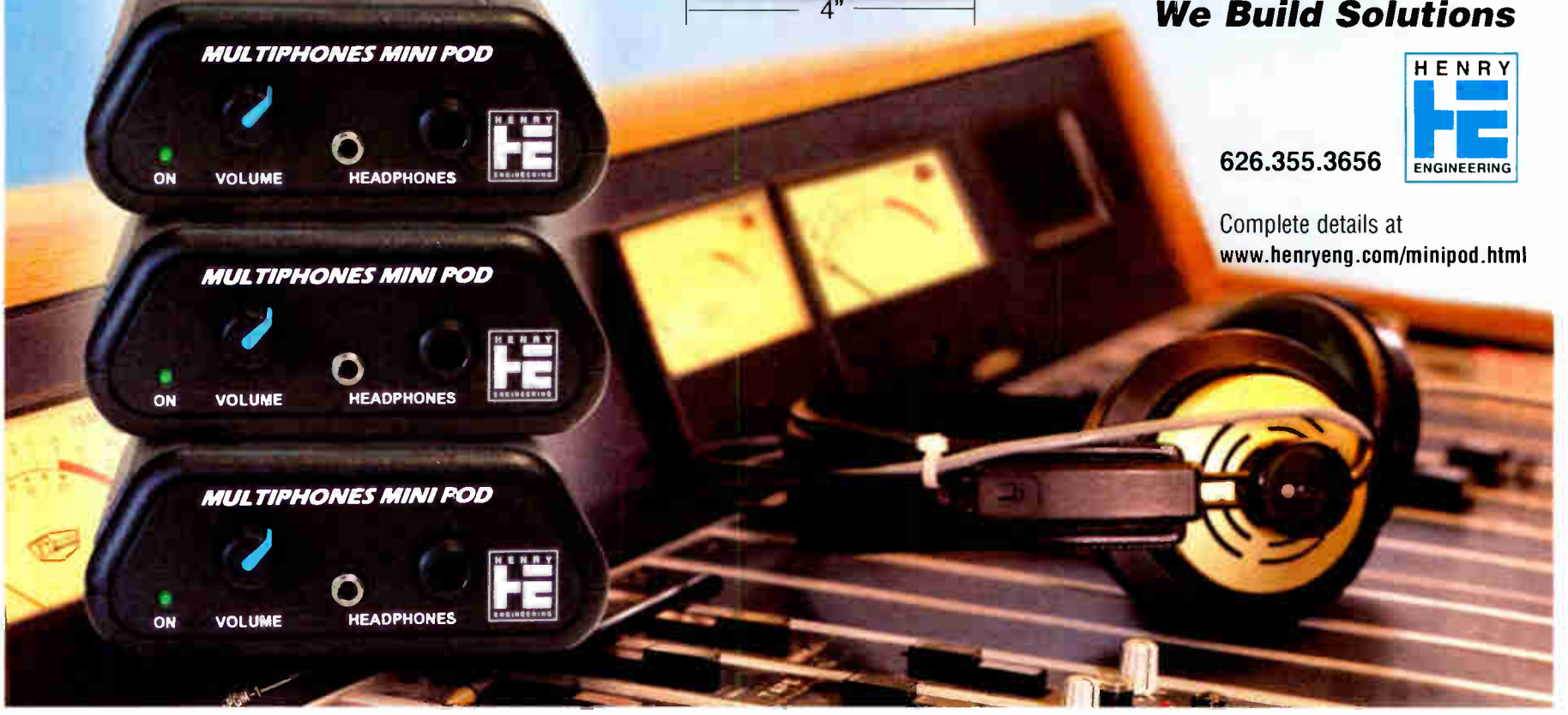

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Heavy Metal

Continued from Page 46

RCA's Transition to Design & Manufacturing

To get the transmitter back to full power quickly, RCA provided a seventh 857B tube with its own filament transformer on one end of the rectifier frame designated as an in-place spare tube.

In the event of an in-service failure of one tube, a bakelite panel with a horizontal rod on each end was moved from the usual top position downward about three inches to patch in the spare tube, which normally had its filament at operating temperature ready to operate. Then it was possible to restart the 50 kilowatt power amplifier.

This feature would be carried forward through at least three generations of 50 kilowatt AM transmitters and several generations of 25 and 50 kilowatt television transmitters.

TECHIE STATS

The RCA instruction manual for the 50D transmitter lists the power demand for the transmitter at 140 kilowatts at carrier and 175 kilowatts at 100 percent modulation. This is a significant improvement over the nearly 300 kilowatts required by popular 50B transmitter, of which many were built.

Frequency response was "uniform within 1 dB from 30 to 10,000 cycles' measured at 60 percent modulation. The envelope distortion was specified at three percent (rms) maximum for the "second harmonic" from 50 to 7,500 cycles at 90 percent modulation. Hum and noise was specified at 60 dB below one hundred percent modulation.

It is likely that the radio suffered from load bandwidth issues which may have required reduction in the overall feedback to maintain stability, the high frequency response and distortion suffering from this reduction when operating into a bad load. Proper load orientation was not recognized in this era as being necessary or desirable. It would be more than a decade later when Bill Doherty studied the issue and produced his paper titled *"Operation of AM Broadcast Transmitters into Sharply Tuned Antenna Systems."*

Nonetheless, the specifications were quite good for the era and the power consumption and required maintenance were significantly reduced from previous designs.

The transmitter contained a total of fifty tubes, forty-nine of which were operational with one in-place spare. Thirty-three of the tubes were rectifiers of one form or another and twenty-five of those were mercury vapor tubes of three different types. Of the active devices (operational amplifier tubes) there were a total of seventeen tubes comprised of eight types. The RF section used nine tubes and the audio section eight. Two of the thermionic devices (tubes to you and me) were water cooled. The others were cooled by radiation or forced air in the case of the RF driver and Modulators.

GONE BUT NOT FORGOTTEN

Several of the RCA 50D transmitters moved on to other stations following retirement from their original stations. Unfortunately, none of the six are known to be in service today, the last being scrapped in the late 1960's or early 1970's.

Stay tuned as Heavy Metal will trace the RCA 50 kilowatt AM line forward noting the techniques – and whole sections – which were carried forward from one series to the next, some of which were to live and provide service for more than thirty years.

Till then, just count your blessings that you do not have to maintain one of these behemoths in addition to a dozen or more studios and eight or nine transmitter sites!

Jack Sellmeyer has been designing, constructing and maintaining broadcast equipment and stations for over five decades. Jack can be contacted at jack@sellmeyereng.com

IT Guide

by Chris Tarr

Windows XP, SP3 – Is It for You?

To update or not to update, that is the question! When it comes to your computer, Chris Tarr has the answer.

Microsoft has just released Service Pack 3 for Windows XP. As always, whenever a big update such as this is released, the big question everyone is asking seems to be: "Should I go for it?" Here is how we approach it.

First of all, understand something about updates: There are three kinds.

- The "bug fix" which fixes known issues.
- The "security update" takes care of patching known security holes.
- The "upgrade" which adds new features and functionality.

XP, SP3 contains some of each of these categories. The real question is: So the real question is: "Do you really need them?"

BE PATIENT

Before doing anything, stop. When it comes to updates the primary rule is to be patient.

Unless I am having a major problem with a piece of software, I prefer to let others "beta test" the updates before doing anything. A great example of why is punctuated by the release of Service Pack 3 for XP. First, Microsoft released it. Then they pulled it. Then they released it again. Then came reports of systems being corrupted by the Service Pack.

Having waited a few days gave me the insight on how to proceed and minimize down time. Imagine if all of your station computers loaded up SP3 on the day of release and got stuck with the "reboot loop" issue!

IS IT NECESSARY?

My other rule is simply the old adage: "if it ain't broke, don't fix it!" Unless an update fixes a security issue (and even then, if the computer cannot see the Internet, there is usually no reason to do that kind of update) there really is no need to update software that is working well. We have all heard the stories about an update that caused more problems than it fixed; why bring that pain upon yourself if you do not have to?

Bug fixes should really only be applied if the fix solves a problem that you are having. There is no benefit to applying it otherwise, and you risk creating problems on a stable system.

My feelings are similar for upgrades. Unless you are going to use the new bells and whistles, or it fixes certain functionality issues, it is best to leave well enough alone. There will come a time that you will probably need to apply the upgrade, since often support will run out for older software versions, but in most cases that will be long after the bugs get worked out in the upgraded version.

KNOWING WHEN TO UPDATE

So, having said all that, when should you update? Obviously, good judgment is key when determining when to do so.

Consider security updates. A flaw with VNC software a year or two ago easily allowed remote access into a computer without a password. That is the type of problem you want to resolve immediately. Other, less important updates can wait a few days to see how things pan out.

It is wise to have a "test bed" computer running what you are using in the office. Then you can apply patches and upgrades to the test computer first, just to see how everything behaves. When you are satisfied that the patches are stable, then you can roll out the updates to the other computers with some confidence.

AVOID AUTOMATIC UPDATES

I never rely on "auto-installers" or automatic updates to do my homework for me. How many times have you seen a patch released from Microsoft simply labeled "Windows Update KB857746" or something non-descriptive like that? I want to know a little more about what that file is going to do to my computers.

By using a test-bed computer, you can see what updates are available and what they affect. Google is a great resource to search for any ill-effects that may be caused by program updates. Again, it is just good practice to take a cautious approach when it comes to applying updates.

A note about traffic and A/R software: if you work for a publicly held company, be sure to keep up-to-date with change policies as they apply to Sarbanes-Oxley compliance. Often, an audit is required before and after an upgrade, and you will need to document a plan to back out of the upgrade if it fails. Honestly, it is a good policy, whether or not you are required to do so. Those systems hold customer and business data – and one failed upgrade without a safety net can really put a dent in business!

The bottom line is that it is better to be safe than sorry. A well-running system will generally not have a problem if you take your time when it comes to rolling out updates. Resist the urge to keep up with the "latest and greatest." A little caution and a bit of extra diligence and you will keep your computers running smoothly.

Chris "Doc" Tarr, CBRE, CBNT, is the Director of Engineering for Entercom in Milwaukee and Madison, WI. You can contact Chris at ctarr@entercom.com

The Worst I've Ever Seen

A Visual Display of the Good, the Bad, and the Plain Hard-to-Believe

They Got it Done But Never Finished the Job

A few months back, we shared some pictures of "temporary fixes," quick solutions that got things running, but then gathered more dust than effort to finish them. Here are a few more.

There can be a lot of pressure to get a station built and on the air. Especially in the middle of the night, when there are no parts houses open, the engineer may be forced to become inventive in order to and find a way to get the job done.

Perhaps that is what happened at this station – a temporary lash-up or two, that never got finished.

THE TRANSMITTER GROUND

We do not know for sure if it just got real late, or they ran out of welding tools, or just forgot, but behind the transmitter, the station ground is just a little suspect.

One might suppose that you could say at least there is a ground. Many stations have featured a low level "hum" or buzz - sometimes for years – wondering why they have parts blow up all the time, before they get around to making sure the transmitter is attached to the station ground.

RF SAFETY MISSES MARK

On the other side of the same transmitter is the RF contactor, to switch the desired transmitter to the antenna. Just do not raise your arms too high, too fast, especially if you are a tall person.

One might argue that in a locked transmitter building, inside a locked fence, the danger is minimal. Unfortunately, the studio was co-located, just a window away. Maybe they had a rule that no one but the engineer was allowed in the transmitter room; no tours – even on weekends.

Bottom line, these exposed RF connections should have been covered, or moved somewhere away from where it presents a danger to workers and others.

Oh, while we are here, take note of the condition of the fluorescent lighting in the ceiling. Well, it was daytime when the pictures were taken. Maybe it is a daytime station and does not need lights?

JUST SHORT OF PERFECT

Of course, we are certain you want to see the quality of wiring in the transmitter room. We were almost impressed with the hook on the ceiling – at least it qualifies for some credit for inventiveness.

But then we looked in the back of the rack. Apparently the station was able to broadcast. Nevertheless, it is rather obvious the engineer never quite got around to cleaning, dressing, or labeling the wires. Well, maybe the engineer has the documentation in his head.

While most of us have had to ad lib some lash-up at one time or another to get something done quickly, the trick is to make sure we go back and finish each job! At least we can tell you management finally hired someone to come in and clear up this one.

As usual, the exact station and location remain unknown to protect the silly. Please share with us some of your pictures of the strange things you run into out your way. Just send them to: editor@radio-guide.com

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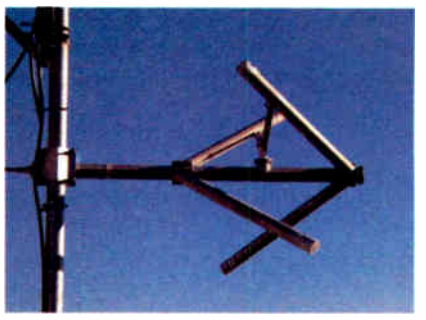

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"Designing receivers that broadcasters can rely on"

Shively Labs Meets the Very Windy Mountain

by Alan Kirschner and Paul Strater

The assignment seemed simple enough, even routine. Build a multi-station transmitter site on a mountain. On the other hand, we should have known this one would be interesting from the start.

A COUPLE OF COMPLICATIONS

We were brought in by BMB Communications Management, who had taken the project over from another party. There were just a few complications.

First, the final 600 feet to the site is at an incline so steep that it is almost impossible to walk up it. The only vehicles that can get up the last incline have four-wheel drives with dual wheels and tire chains. Second, the site had no telephone or power service, so we needed to get a generator and fuel tank installed.

Third, we had to fit *four* Class C FM stations, a combiner, and all support equipment into a 10 x 12 building. Yes, you read that right, four class C FM stations in a 10 x 12 building.

Finally, we had a hard deadline that was only 16 weeks away.

STEPPING UP TO THE CHALLENGE

This is our specialty: tackling difficult projects that no one else can complete – generally under extreme conditions. Needing the impossible on short notice, we called Edd Forke of Shively Labs in Bridgton, Maine.

We asked him for a multi-station panel antenna with a massive amount of gain – almost 12 dB worth – because the transmitters could be no more than 10 kilowatts, due to the space limitations. The panel antenna had to be omnidirectional and fit onto a short tower with a four-foot face, while meeting RFR limitations. It had to accommodate up to eight stations with a very wide frequency swing. And it had to be affordable for the new site owner.

We also needed a four-station balanced combiner that had to fit into the smallest footprint possible – and we needed it in half their quoted production time.

Not surprisingly, Edd sent us right back to dial tone.

NO KIDDING!

We called back and convinced Edd that we were not kidding, had not been drinking, and that Alan Funt was not behind the window at the end of the room. After the requisite rolling of eyes and justifiable teasing back and forth, he set to work gathering the troops at Shively Labs for the project.

Shively divided the project into two working groups – one working the antenna and one working the combiner. Both of them, we suspect, were equipped with voodoo dolls in our likenesses and proceeded to vaccinate them liberally with sharp office implements. Edd continued to take our calls for reasons that none of us can explain.

A unique combiner design solved the space issue.

A UNIQUE COMBINER

Alan Plummer's team set to work on a clever way to get the required combiners into only a quarter of the available room space. Alan created a rather unique implementation of the 2640-06 combiner. By arranging the modules in a "stairstep" vertical-diagonal configuration, he fitted the available space with only a foot to spare.

The 11-foot-tall combiner mounting-frame fit perfectly into the building design, so we got the combiner into fabrication after sweet-talking the Shively production people. The building manufacturer was advised of this very tall single-story building requirement, and began production. The combiner would ship after the antenna because the production capacity had to be devoted to the antenna until it was completed.

THE ANTENNA

The 10-bay, broadband panel antenna was quickly modeled on the Shively pattern test range. The mounting and mechanical specs were then signed off on by World Tower, the tower vendor. The tower design was finalized and the steel went into production.

The Shively Team started the antenna that should have taken 16 weeks to fabricate, but completed it in only eight weeks, and did so during the span of three major holidays – Thanksgiving, Christmas, and New Years. More sweet-talking was done, the magic word ("overtime") was used, and we sweated out the next eight weeks until the delivery was finalized.

The only quick way to get all this equipment to the Nevada site was to use a dedicated truck. Shively also arranged for near-real-time tracking of the shipment. The antenna arrived in a 40-foot tractor-trailer, after a straight-through, three-day drive.

We now only had ten days remaining until one of the station's construction permit expired. Plenty of time to get it all built, right? Remember, the combiner had not shipped yet because Shively production capacity had been committed to the antenna.

JUST A LITTLE BREEZE

The tower site is several thousand feet above Mesquite, Nevada on government-owned land. As noted, access was a challenge, even in good weather. However, late January winter conditions were to make themselves known in a big way.

The first custom building that had been assembled on-site (a prefab building would never have gotten up to the site) was completely destroyed in a windstorm with gusts that exceeded 75 MPH. As a temporary shelter while a replacement building was manufactured, we sourced a "Tuff Shed" lawn building (yes, the ones you can buy at Home Depot).

We arrived on-site for the big push to get this all on the air. The tower crew had been on-site for weeks, building a tower in this hellish, windy environment with a picture window view. It took us two days to assemble the antenna bays, once we got them from a staging area near Mesquite, to the site.

The Shively Panel antenna mounted on the tower.

We were now fairly comfortable that we would get the first station on the air before the CP expired. However, the night after we got the last antenna panels assembled, we had another violent windstorm that prevented site access for two more days. When we got back to the site, we found that despite our having lashed the antenna panels down, two of the 30 panels broke loose, were blown off the mountaintop and completely destroyed.

The on-air deadline was now only two days away and we were missing two very important assemblies that had been turned into modern art.

SHIVELY SAVES THE DAY

We immediately called Edd and Bob Surette at Shively, and explained what had happened. Although it was not possible to re-fabricate those panels and ship them three time zones away in 48 hours, we *had* to have this thing on at full power, or lose the CP. The FCC does not give extensions except for very specific circumstances.

Shively's antenna team, headed by Dennis Butterfield, studied the problem and found a way to leave two radiators off the panel array and still have the required gain toward the city of license. Shively overnighted high-powered dummy loads and jumper cables, to put in place of the damaged panels, until replacements could be built.

The loads and jumpers arrived on site with less than 15 hours to go until the CP expired. The tower crew worked into the night wrestling the feedline into place. We had to use five-inch high-powered feedline because the Bureau of Land Management requires jacketed cable, so rigid line was not an option. Imagine the size of a cable reel that has 220 feet of five-inch line on it!

Meanwhile, the combiner had arrived, even though its destination was currently a pile of rubble at the bottom of the mountain. We had to put the first station on the air solo, into an antenna completed with dummy loads and jumpers. The first station went on the air, at 3:00 AM, only two hours and five minutes before the CP expired!

NO TIME TO RELAX

Once we satisfied the terms of the CP and the replacement building was assembled, we had yet another CP expiring in just a couple of weeks. For this station, we would need to get the combiner in place.

Due to the extreme complexity of the system and the tight deadline looming, Shively sent out two factory technicians to help assemble the cool '57 Chevy Blue combiner and sweep it to make sure that we did not burn everything up under full power. A dozen boxes of parts were hauled up to the site and assembly started, but was almost immediately halted. Two of the structural rails that comprise the combiner's mounting frame were missing – they were received into the local warehouse but somehow never made it up to the mountain.

The Shively guys helped us MacGyver a temporary frame out of left-over tower steel, while we made yet another panicked call to the factory to get two more frame rails produced.

The antenna and combiner were swept by the Shively technicians and found to be right on the specifications obtained during factory testing. This is in itself speaks highly of the Shively construction methods, since the road up the mountain is rough enough to jar your fillings loose. The second station got on the air.

Once the replacement frame rails were fabricated and shipped, Shively sent technicians to help finish the installation and check operating specifications. The system now stands ready for the last two stations to be installed, once their respective CPs are issued.

NOW IT'S MILLER TIME

One thing that we keep telling clients is "If this were easy, everyone would be doing it." Taking these messed-up projects and making them come to life is actually a lot of fun, despite its Maalox moments.

The gang at Shively took ownership of the problems that cropped up and never once said "it can't be done," even though other people involved had serious doubts. The project was a success, as measured by the stations meeting their deadlines and their licensees being happy – or at least as happy as licensees get. We are already working with Shively on our next project, which may require site access by yak and shirpa. For some inexplicable reason, Edd still takes our calls.

For further information: www.shively.com

The RF Team of Alan Kirschner and Paul Strater continues to accept projects largely considered impossible - or at least a really dumb idea. Email contact is at akirsch@sprynet.com or videopaul@aol.com

PSI Gets KPKR On The Air

by Mark Parthe

As a contract engineer in the Prescott and Flagstaff areas of Arizona since 2000, I take care of seven full-time facilities and a host of small translators. These include AM, FM and one TV station with two main transmitters and nine translators. One of my jobs is building new facilities.

One of my bigger clients, Prescott Valley Broadcasting, was fortunate enough to win a C3 License in Parker, Arizona on 97.3 in the 2007 FCC FM Auction. (Parker has a population of 7,500 but during the summer and winter months it can grow to over 100,000.) The site for the antenna was on a Crown Castle site 6.7 miles south from the center of town. This worked out great since the license required the antenna to be 6.5 miles or more from the center of town.

In 2007, the station group remodeled a 2,434 square-foot office addition to its primary studio and purchased the local country station in Prescott. With these changes and growth, several new on-air and recording studios also needed to be built.

YOU WANT IT WHEN?

Then Sanford Cohen, Owner and General Manager, came to me and said "along with all the other projects to do I need to get the new Parker station on the air by Christmas."

"Oh," I said, "Christmas 2008, no problem." "Not quite," he said. "Christmas 2007." Perhaps I should mention that it was already April, 2007!

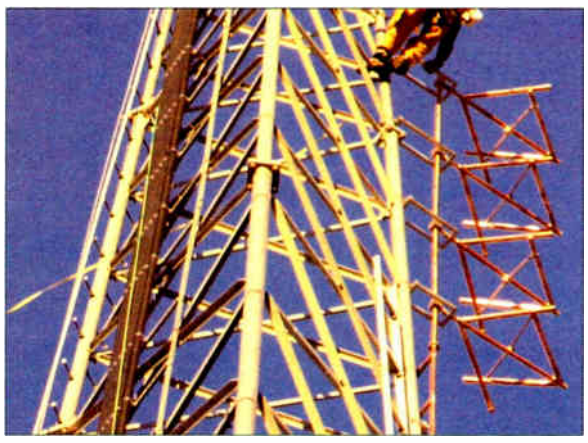
He also said that with all that was going on cost was going to be a major issue, so he needed it done fast and as cheaply as possible. "And, by the way, we will be moving it to a new location and changing frequencies within three years and I don't want to buy a new antenna for the move."

The first person I thought of was Doug Ross over at PSI (Propagation Systems Inc.).

SELECTING AN ANTENNA

I first met up with the folks at PSI during NAB 1999 while looking for a replacement UHF antenna for the Telemundo station in Phoenix. Doug and his group were very helpful and friendly people to work with. Although I was not able to buy the Telemundo antenna from PSI due to other staff making the final recommendation, I did contact them for advice on other projects that came up over the years.

It was decided that the Parker project would need a 4-bay, halfwave-spaced antenna, optimized for 93.9 MHz but tuned for 97.3 MHz. I also recommended, to save time in the future, that it have the ability to be re-matched externally. Several hours were spent in researching the antenna needs and we decided that the PSI FM-4-HWS Slant "V" would suit our purpose best. PSI did a complete bid for the antenna and all the cable, dryer and connectors.



The PSA FM-4-HWS being installed for KPKR

Along with PSI's bid, several other bids were sent to the major antenna companies. Doug and PSI came in respectably below the other bidders. Actually, I would have recommended it anyway since I just enjoy working with PSI and its staff.

DEVELOPING A PLAN

The order was placed in May of 2007. During the weeks to follow, I kept in contact with PSI on how the construction was going. Crown Castle provided detailed drawings of the existing three-sided, 240-foot freestanding tower we were going to use.

Our plan was to leg-mount this antenna on the northern leg and point it in the general direction of Parker. The drawings did not say what the leg diameter was at the top so I ordered it with the standard 1.5 to 4-inch brackets.

While the antenna was being built, an 8 by 20 shipping container was being built up by Mobile Storage Co. of Phoenix. The only major modification was the installation of two 12,000 BTU Bard wall units. The two standard 4,000 BTU window units would never have been able to survive the 120 degree summer days of Parker.

FINDING ALL THE PARTS

One of the local stations where I do contract work had a pair of Harris transmitters (7.5 kW and 3.5 kW) for sale. I purchased them both for a good price; the station agreed to store them until needed.

All the HJ7-50 and LDF4.5 cable, dehydrator, and connectors were purchased on eBay. One 87-series connector was purchased from Nebraska Surplus.

There is no phone or Internet service at this transmitter site, so a traditional 950 MHz link was set up. We had intended to use Bext LC-series equipment purchased for this site, but this equipment was put into service elsewhere and I ended up refurbishing some older fixed-frequency equipment for this project.

ANTENNA READY, THE CLOCK IS RUNNING

The PSI antenna was done on time but the site was not ready for that installation; as usual a few paperwork delays came into the project.

A storage unit was rented and after PSI held the antenna for a few weeks it was shipped. The antenna was well packed in a custom wood case and arrived with no damage. It was now October 2007, but we still did not have all the paper work needed to start the project.

Finally, the paperwork was completed in early December. The station manager reminded me that he really needed it to be up and on the air by January 1st – spots and clients were already booked for January. Talking a deep breath, I assured him: "No problem."

A MINOR SETBACK

The Crown Castle crew also agreed to do it all before Christmas but could not do it afterwards. Although the weather in Parker is pretty nice in December, building a complete transmitter site three days before Christmas was not my idea of fun.

At any rate, on December 22nd the PSI box was ripped open and up it went. Well, maybe.

Down it came. It turned out I had mis-guessed the diameter of the tower leg by half an inch at that height. The V-brackets on the antenna mounts would not fit around the tower leg and the brackets were too small in the back. This was not fault of PSI but a fault of yours truly.

Since there was no going back I had to do something – and do it quickly. It was decided to increase the V on the antenna brackets by cutting the sides of the V with an acetylene torch and a grinder. Each of the holes also had to be elongated a half an inch.

RECOVERY

I went into town and picked up a supply of threaded rod, bolts and washers and custom made some big U-bolts to replace the backside "V" brackets. While all this was being done, the Scala PR950 dish for the STL went up.

The antenna bracket modification proved to work well and the four bays of the PSI antenna went together without a hitch. The tower crew had both antennas up before the sun set.

December 23rd proved too windy to climb so some of the Crown Castle crew did the grounding and the rest of them helped us set the building on its foundation. As you can see from the picture it was quite the show to get an 8,000 pound building around the cable bridge and into position.

A tow truck and a van helped get this building into place.

The tow truck would lift the unit just off the ground and my poor old Dodge Caravan would push it eight or ten inches at a time till it was in place. It took about three hours of this before it was finally set on the foundation.

With the building now set, the Crown Castle crew finished the grounding while I plumbed and wired the transmitter for air.

A SUCCESSFUL INSTALLATION

For once the weather service was right and the winds on the 24th behaved. Crown Castle finished installing the feedlines and I temporarily hooked up the transmitter and got a signal on the air that evening. The antenna performed perfectly. There were only a couple of Watts of standing wave and the new KPKR was on the air.

I quickly packed up the site and headed to my folks in Phoenix for a little R&R and some home cooking, returning the day after Christmas to install the RF patch panel, finish all the loose ends and get the backup transmitter running.

It is May, 2008 now and KPKR in Parker has turned out to be a real gem. The population loves the format. The antenna provides a good signal even to far away Lake Havasu City even though it is only 200 feet above ground.

This proved to be a project with lots of work and a very tight schedule. With Doug and his crew at PSI it made life easier and a difficult project successful.

For further information: www.psibroadcast.com

Mark Parthe is a Contract Engineer in Prescott and Flagstaff, AZ. You can contact Mark at ABS@afaz.net

Dielectric Antennas Help Bring HD Radio, New Listeners to Raleigh Stations

by Fred Pace

Clear Channel Radio operates four radio stations here in Raleigh, North Carolina. We also lease several of our tower sites for use by other broadcasters. As Market Engineering Director for Clear Channel, it is my mission to ensure that the radio transmissions from each of our nine tower sites will broadcast as clear and true as possible.

Recently we took this best-signal-possible mission to heart and jumped at the opportunity to significantly improve the transmissions of Clear Channel's WDCG and WKSL by moving them to a new tower site,.

WDCG 105.1, "G105," is a contemporary hits radio (CHR) station that has operated in this area for over 25 years. With the highest-rated morning show in Raleigh, the station holds a prominent role in the community. WKSL, "93.9 Kiss-FM," is a relatively new, adult hits station, having flipped formats about a year and a half ago. Both have been transmitting from tower sites about 30 miles from our target audience in Raleigh.

A NEED TO GET CLOSER

Because of the distance from this tower site to our audience, we were experiencing some problems with signal interference and degradation.

We were receiving complaint calls from listeners who were able to listen to our station all the way to the parking lot at work, but could not get a clear signal as soon as they were inside and at their desks. This feedback from our audience was a large motivation in our decision to move our broadcasting site.

In addition, setting up shop at a new site would give us a great opportunity for some much-needed upgrades to our equipment. Our antennas were 15 and 25 years old and were beginning to show signs of increased multipath and reduced fringe coverage. Obviously, this all translated into less-than-optimal broadcasting conditions.

NEW SITE OFFERS POTENTIAL SOLUTION

In 2005, we learned that a local TV station was putting their tower site up for sale – in anticipation of the February 2009 FCC digital television deadline when they would halt their analog broadcasts and operate only their digital transmission from a different site.

Because the TV station's tower site was 20 miles closer to our target audience, we knew it had the potential to offer some pretty substantial improvements to our signal quality.

With all the factors weighing in – and an opportunity to upgrade these stations to HD radio broadcasting in the process – we made the decision to purchase the tower site and began taking the necessary steps to bring WDCG and WKSL to their new home.

A CHALLENGING PROJECT

The primary concern in planning the project was the heavily-loaded tower. Until the analog TV was removed there was an 18-inch waveguide running all the way up the center of the tower. We did not want to wait until 2009 when the TV station would remove the waveguide to build out the FM plant. We had to find antennas with extremely low wind resistance to enable them to coexist with the TV for the first year or 18 months.

When it came time to develop plans for our new site, we quickly turned to Dielectric Communications. I have been a radio engineer for 19 years, and this was the largest project I have worked on. Facing the unique challenges of this project, I knew we would need to tap into a significant amount of industry expertise in order to get on the air from the new site without a glitch.

Based on their success at other Clear Channel stations, Dielectric was recommended to us by several engineers who had worked with them at their own sites.

The analog TV waveguide made it a challenge to add the two FM antennas and feedlines.

ANTENNA SELECTION

Working closely with the Dielectric team, we selected the DCR-M6 FM directional antenna for WKSL and a DCR-M6 antenna for WDCG. Dielectric also supplied an IBOC high level switcher/combiner for each system, as well as all the transmission line and other components required for connection of the RF to the antennas.

The low wind-loading of these antennas with radomes for ice protection was one of the major factors in our decision. This allowed us to minimize the amount of modifications we needed to perform on the tower to mount the FM antennas while TV was still on the tower.

The DCR-M series is optimized for high-power broadband applications, another reason for our interest. With the DCR-M antennas, we would be able to take a significant step forward by updating our stations to broadcast in HD.

The Dielectric DRC-M5 bays are protected by radomes.

This was a key factor in our antenna choice, since it was important to us that any investment in a new tower site would support the future of HD broadcasting. Our HD signals are now high-level combined in the transmitter plant with the Dielectric combiners.

READY FOR THE FUTURE

The Dielectric switcher/combiner also provides us with the versatility to operate in four modes:

1. both analog and digital transmitters to the antenna.
2. the analog transmitter to the antenna with the digital transmitter to a test load.
3. the analog transmitter to a test load with the digital transmitter to the antenna.
4. both analog and digital transmitters to a test load.

This gives us the redundancy required to stay on the air even when servicing of a transmitter is required.

One of the most impressive aspects of the DCR-M antennas is that they are truly circularly polarized, with a power rating of 18 kW for a single bay. Absolutely crucial to our relocation was the ability to purchase an antenna with a directional pattern, since WKSL needed to broadcast in a directional pattern due to short spacing with other stations and neighboring small towns.

In all of these respects – high-power broadband operation, circular polarization, directional patterns, and low wind load ratings – Dielectric's DCR-M came to the top as the clear winner.

DESIGNING FOR THE SITE

We elected to have Dielectric perform their pattern testing and optimization services to ensure that the antenna would meet the specific needs of our modified tower. This was especially important because of our unique circumstances of sharing the tower with the TV broadcaster in the short term – until February of next year – and then being the sole broadcaster after that date.

To take these circumstances into account, Dielectric created to-scale models of our tower and both antennas and then analyzed the performance at their comprehensive testing facility in Raymond, Maine. They produced two sets of data for us: one with the tower's current configuration, which includes the 18-inch waveguide required for the TV transmission, and the second with the tower's later configuration once the waveguide could be removed.

With both sets of data, Dielectric was able to give us a very good understanding of how the antenna would behave both before and after this significant change.

Based on the test data, we decided to have our directional antenna mounted at 1300 feet and our non-directional antenna at 900 feet. Dielectric also optimized each antenna for its unique position on the tower. I feel this pattern analysis and optimization process was invaluable.

The Dielectric DRC-M5 installed.

Looking now at the actual data from the performance of our antennas on-air and the theoretical data from the test models, it is remarkable. The two maps are almost perfectly aligned. Our expectations from the data Dielectric provided have been met in every respect.

LOOKING FORWARD

Our non-directional antenna for WDCG went live in February, the second one (directional) for WKSL went on-air soon after, in March. The new systems have provided phenomenal coverage and exceptional clarity in our signals.

We are getting calls left and right from people who are impressed with the strength of our signals, and can pick up the radio station inside buildings where they could not get a signal previously. This, of course, is one of the best testaments we can have to an antenna's success.

Most impressive to me is the performance of the directional DCR-M. It provides a truly unbeatable directional pattern. We have also found that it almost completely eliminates the multi-path problem that we suffered from previously.

There is no question that the new transmitter site will expand our business, and we could not have chosen a better manufacturer than Dielectric to help us in this goal. Moving our transmission site may have been our primary goal, but the huge enhancements in our antenna performance have proven to be an equal success. And of course, with the leap into HD, we now feel better prepared to meet the needs of our current – and future – listeners.

Fred Pace is the Market Engineering Director for Clear Channel in Raleigh, NC. His email address is fredpace@clearchannel.com

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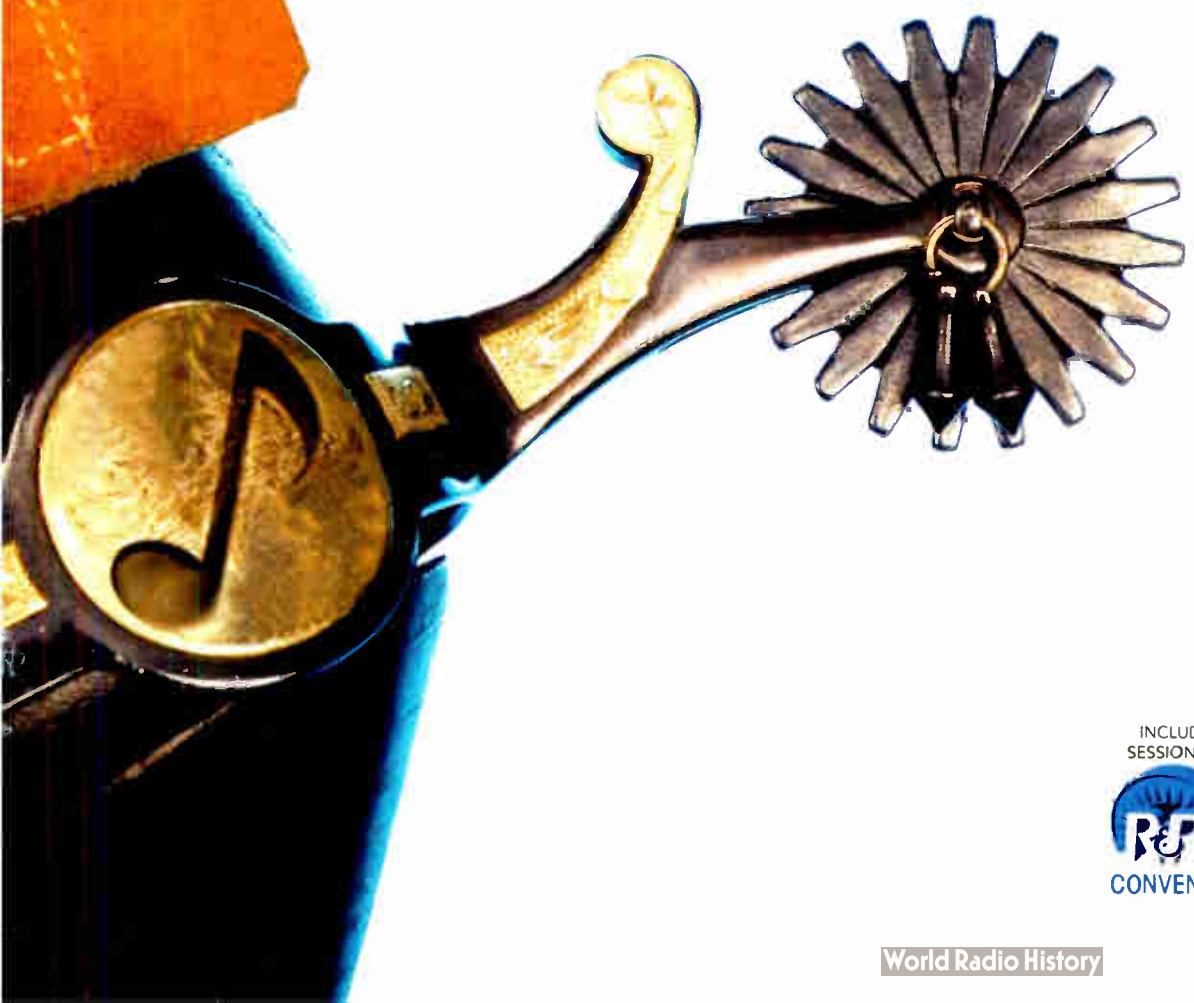
This year's event features sessions devoted to new technologies, such as streaming, video and on-demand audio to enhance your station's reach, brand and revenue.

Additionally, The NAB Radio Show delivers expert-led sessions addressing the hottest industry topics, such as: thriving in a multi-platform world; using new technologies to generate new revenue streams; managing in a challenging environment; developing talent; and cultivating the next generation of listeners.

When it comes to return on investment, The NAB Radio Show delivers high-value information, networking opportunities and an exhibit hall packed with new innovations for HD implementation. Register today and you'll soon say, "Austincredible!"



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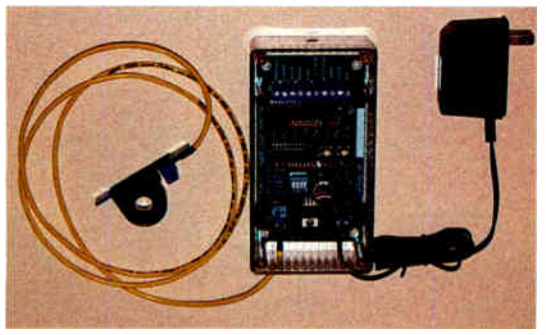
Service Guide Radio Equipment Products and Services

Service Guide Radio Equipment Products and Services

TLM-1 TOWER LIGHT MONITOR

Avoid Costly FCC Fines for Lighting Violations!



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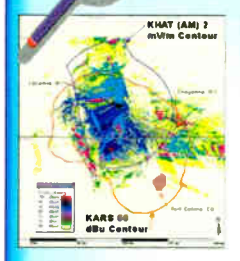

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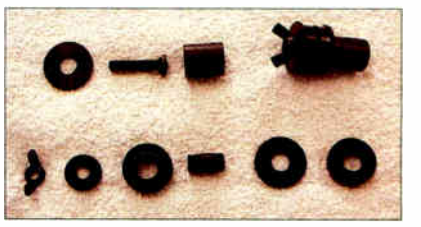
We now have SM-5B hanger hardware as shown in the photo.



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The Band Scanner is a tool to evaluate FM broadcast band congestion and to log station identification parameters. The system is powered by the USB port of any Windows PC. Supplied free of charge Windows software sweeps the receiver across the FM band, logging every carrier and generating a spectrum display of carrier level vs. frequency. It then analyzes each carrier and creates a station list. Stations with an RDS presence are further refined to show all the radio data groups being transmitted. Its interface is like a portable radio: It may be tuned manually through the receiver screen or by double-clicking a point on the spectrum plot or an entry on the station list. Spectrum plots may be saved as jpg or bmp files. The RDS data error level is graphed in a separate window on the receiver screen. The program can be monitored with headphones plugged into a standard 1/8" jack.

Band Scanner

USB FM-Scanning Receiver and RDS Analyzer

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Radio Pipeline

New Equipment

Updates and Modifications

Industry Information

Autogram/CRL- Axia - Barix - Comrex - JK Audio

Axia Audio Becomes First Console Company to Provide Round the Clock Assistance

Clients with Axia consoles and IP-Audio networking gear now receive 24/7, 365-days-a-year support.

"We looked around our industry," explains Michael "Catfish" Dosch, President of Axia Audio, "and realized that no other console companies provided around-the-clock technical support. Why not? The need for a little help doesn't go away just because it's after 5:00 PM.

"So Axia clients can now call us any time of the day or night, any day of the year. Our Support Engineers are going to be available to answer questions, help solve problems and give technical advice about Axia products any time our clients need us," says Dosch.

Clients can reach Axia's new 24-Hour Support Line at +1-216-622-0247.

"Also," says Dosch, "all new Axia products now come with a 5-year warranty – the longest in the industry. Our equipment is engineered for mission-critical operation," says Dosch. "Chances are, most clients will never have problems, but in the unlikely case they do, they are covered by the most comprehensive warranty available."

Axia Audio
216-241-7225 – cnovak@axiaaudio.com
www.AxiaAudio.com

The Autogram/CRL AudioBridge

Orban/CRL has introduced the Autogram/CRL AudioBridge. The AudioBridge features a multi-format audio interface with analog, AES/EBU, USB 2.0 and IP Audio connectivity. Each input can be routed to virtually any output.

The AudioBridge features high resolution 24-bit analog-to-digital and digital-to-analog conversion with selectable conversion rates up to 192k samples per second. CobraNet IP audio allows real-time, high quality digital audio transmission over an Ethernet network. Other IP Audio standards will be available soon.

The AudioBridge's USB port supports streaming audio to or from Windows or Mac PCs. Unlike the many other USB audio implementations that suffer from inter-channel delay, AudioBridge has correct inter-channel clocking that achieves perfect time alignment and phase. It uses the Microsoft Windows XP USB Audio Driver, so there is no extra driver to install. Its AES/EBU output can be synched to an external AES-11 digital audio reference signal or to the AES/EBU input. The AudioBridge offers a high quality integral headphone amp to monitor any source and a simple, intuitive menu interface for configuration and status information, all in a compact 1U rack mountable chassis.

Autogram/CRL
480-403-8300 – drusch@orban.com
www.autogram.net

Barix Announces aacPlus v2 Functionality in New Exstreamer-100 IP Audio Decoder

Barix AG, a pioneer in IP-based audio, intercom, control, and monitoring, announces the availability of aacPlus (v1 and v2) compression in its new Exstreamer-110 IP audio decoder this spring, bringing more cost and quality benefits to radio broadcasters for audio transport over IP.

The introduction of AAC+ decoding improves sound quality for users and reduces network bandwidth required for streaming.

Barix Exstreamer IP audio decoders are the de facto standard for low-cost decoding in the radio broadcast industry, with a large global installation base. aacPlus v2 builds on the success of MPEG-4 aacPlus, or Advanced Audio Coding, to significantly improve compression rates over the initial release as well as MP3. Radio broadcasters distributing content over the Internet to Exstreamer-110 decoders can use aacPlus v2 compression to significantly reduce bandwidth or improve audio quality.

The Exstreamer-110, a bargain at $249, is ideal for radio broadcasters who require point-to-multipoint distribution and wish to take advantage of the reduced bandwidth or higher quality afforded by aacPlus v2. Far less expensive than satellite distribution or other aacPlus-capable decoders on the market, broadcasters can save thousands of dollars distributing program audio over the Internet to Exstreamer-110 decoders at multiple destination points, such as studios or transmitter sites.

"Radio broadcasters can achieve the same quality as MP3 and significantly reduce their transport costs by cutting the required bandwidth in half using aacPlus version 2 in the Exstreamer-110," said Johannes G. Rietschel, CEO and Founder of Barix AG. The alternative is to significantly raise the audio quality by using the same bit rate with aacPlus v2 compression as previously used with MP3. This means broadcasters that upgrade from a 128 kpbs MP3 stream to a 128 kpbs aacPlus v2 stream will experience exceptional audio quality.

The Exstreamer-110 retains all the functionality of the popular Exstreamer-100 IP audio decoder and adds a backlit 2x16 character LCD to display stream metadata or file information, such as station identification and artist/title information. The Exstreamer-110 also includes a built-in relay to trigger an EAS stream, station identification, or local announcement. A built-in remote control receiver enables channel selection from a variety of audio streams, ideal for redundancy protection.

Barix
866-815-0866 - info@barix.com
www.barix.com

Comrex Unveils the DH42 Digital Telephone Hybrid

Comrex Corporation, the leading manufacturer of audio codecs and telephone interface products for broadcast has unveiled its new digital telephone hybrid, designed to adapt to the changing requirements of broadcasters. DH42 accommodates two traditional POTS (Plain Old Telephone System) lines as well as two Voice-over-IP (VoIP) lines in one 19" 1U rackmount enclosure. Essentially a four-line conferencing hybrid, DH42 has been designed to allow callers to be put on-air with separate send and receive paths, filtering, AGC, and control functions.

VoIP telephone lines offer a low-cost alternate to traditional analog POTS lines. VoIP technology is also found in SIP-based PBX telephone systems. DH42 offers broadcaster the ability to interface their Internet-based VoIP lines or VoIP PBX lines with audio consoles and other professional broadcast audio equipment.

Kris Bobo, Marketing Director of Comrex Corporation states that, "DH42 represents the natural evolution of the broadcast telephone interface by blending the technology legacy POTS with Voice-over-IP (VoIP) technology. Our customers have been seeking a professional broadcast solution for interfacing VoIP lines. We're pleased to offer them a solution that bridges both technologies."

Comrex
978-784-1776 – info@comrex.com
www.comrex.com

JK Audio RemoteAmp Two Stereo Headphone Amplifier

JK Audio has built professional audio electronics in a rugged new belt pack design. RemoteAmp Two provides a listen-only connection for mono IFB or full bandwidth stereo music listening. Separate volume controls for the XLR and 3.5 mm line input jacks allow a simple mix of mono and stereo sources. The 1/2 watt, 1/4" stereo headphone jack will cut through any crowd noise. Connect an IFB earpiece to the 3.5 mm earpiece jack for mono operation.

RemoteAmp Two

Features:

Female XLR Line level Input: 20K Ohms, 0dBu
3.5 mm Stereo Line Input Jack: 20K Ohms, -10 dBu
3.5 mm Mono Earpiece Jack: 100 Ohms, 40 mW
1/4" Stereo Headphone Jack: 8 Ohms, 1/2W per ch
Frequency Response: 20Hz - 20 kHz
>20 Hours on one 9 Volt Battery
Size: 4.7" x 3.75" x 1.65" (12 x 9.5 x 4.2 cm)
Weight: 10 ounces

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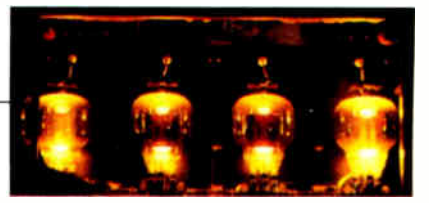
Final Stage



RADIO ROUNDUP

The Radio Guide Event Register

Email your dates and info to: ***radio@rconnect.com***

AM Transmission Seminar *by Radio Guide*
August 5-7, 2009
Austin, Texas
www.radio-guide.com/seminar

TAB Trade Show and SBE 55th Annual Convention
August 6-8, 2008
Austin, Texas
www.tab.org/convention-and-trade-show/

NAB 2008 Radio Show
September 17-19, 2008
Austin, Texas
www.nabradioshow.com

125th AES Convention
October 2-5, 2008
SanFrancisco, California
www.aes.org/events/125

Broadcasters Clinic
October 14-16, 2008
Madison Marriott West Hotel, Madison, Wisconsin
www.wi-broadcasters.org

SBE 22, Broadcast and Technology Expo
October 7-8, 2008
Verona, New York
www.sbe22expo.org

Pittsburgh SBE Chapter 20, 2008 Equipment Expo
October 20-21, 2008
Monroeville, Pennsylvania
www.sbe20.org/expo.html

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Altronic - 43	www.altronic.com
AM Ground Systems - 51	www.amgroundsystems.com
Armstrong Transmitters - 49	www.armstrongtx.com
Arrakis - 21	www.arrakis-systems.com
Array Solutions - 45	www.arraysolutions.com
Audemat - 41	www.audemat-aztec.com
Audion (VoxPro) - 47	www.audionlabs.com
Axia - 35	www.axiaaudio.com
Bay Country - 55	www.baycountry.com
BEXT - 49	www.bext.com
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