



# RADIOWORLD

OCTOBER 23, 2019 | The News Source for Radio Managers and Engineers | \$5.00 | RADIOWORLD.COM

## Is There an Afterlife for “Franken FMs?”

Low-power TV advocates embrace Channel 6 and want to keep audio broadcasts on 87.7 MHz

BY RANDY J. STINE

Is there an afterlife for “Franken FMs?”

VHF low-power analog television stations that present themselves as radio stations — airing audio on TV Channel 6 spectrum just below the U.S. FM band — face an approaching sunset date for LPTV analog service that could spell their doom.

Advocates argue that many FM6 stations provide important audio services to supplement their video signals and that “millions” of Americans tune to 87.7 FM to listen to programming not available anywhere else, particularly in ethnic and minority communities that are underserved. The very term Franken FM, they add, is a pejorative one coined by radio stations that fear additional legitimate competition.

But once LPTVs transition to digital in 2021, listeners will no longer be able to receive audio from Channel 6 stations on 87.7 MHz.

Their advocates say the industry has developed a technical solution to protect these services but that the FCC has left their future in doubt.

### OPPORTUNISTIC

The audio carrier for TV Channel 6 can be heard on many car and tabletop FM receivers. Opportunistic low-power licensees use their TV transmitters to air separate audio and video content, according to those familiar with the practice. FM6 stations are programmed as radio stations, though they are still required to transmit a TV signal, sometimes merely travelogues or nature scenes, in other cases more useful

*(continued on page 5)*

**Big Capacity,  
Simple Interface** **Page 3**

Find out how radio and audio are presented to a driver in the North American Utility Vehicle of the Year.

## The Time Has Come to Talk of Many Things

Of reels and carts and carousels, of automation things!

BY TOM VERNON

Here in the 21st century, it's difficult to imagine broadcast automation without thinking of computers; you can't have one without the other. But it wasn't always this way.

Computers and automation systems have both been

*(continued on page 13)*

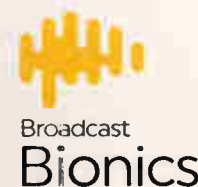


248-158L 000005370  
 TUCSON AZ 85710-7905 80002  
 2033 S AUGUSTA PL  
 KOHN  
 ASSISTANT CHIEF ENGINEER  
 TOM MILLER  
 \*\*\*\*\*AUI0\*\*3-DIGIT 857  
 #0009383 1# RDM# 0009383 E1901

Listening, watching,  
reacting, learning...

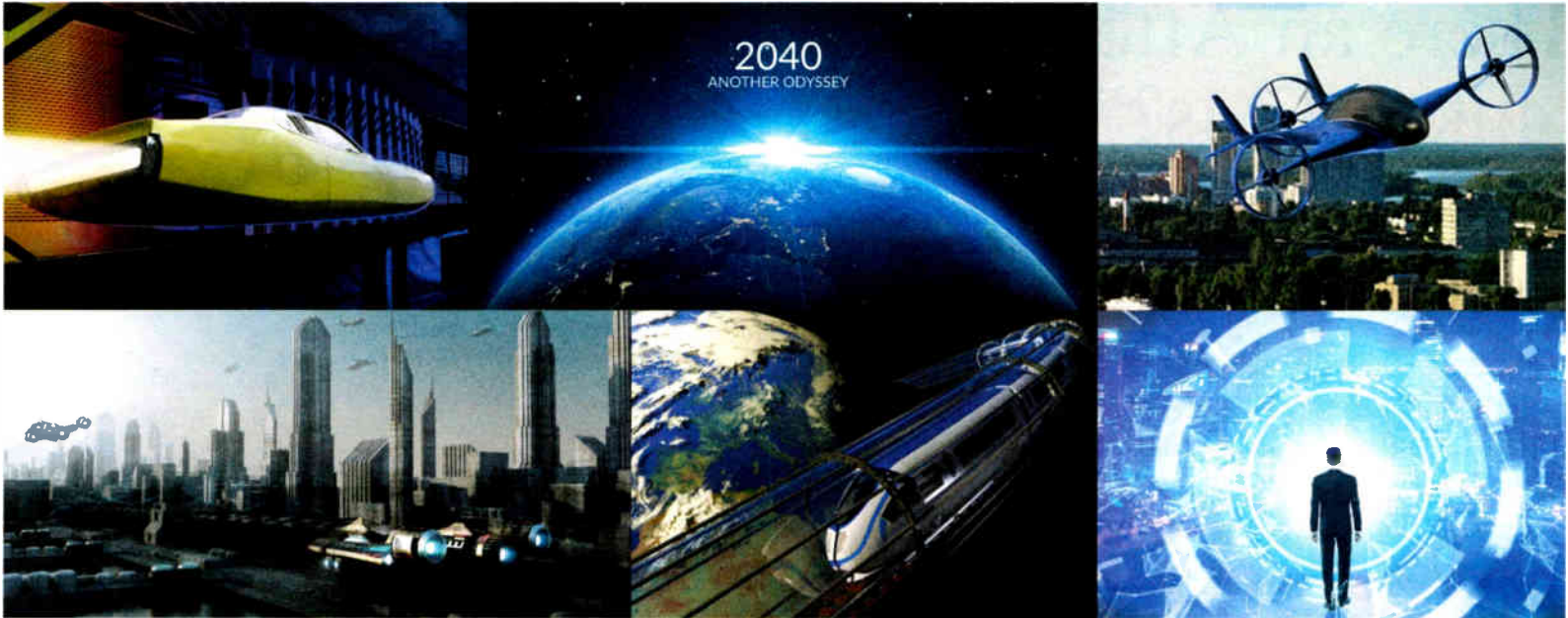
The **Bionic Studio** is here.

Discover it for yourself at [bionic.radio](http://bionic.radio)





## THE FUTURE CAN BRING ANYTHING LXE IS READY FOR EVERYTHING



Virtually every button, knob, and display is configurable to your workflow at any time. Built to last in every way. Whether it's 2020, 2040, or 2080, your LXE will adapt to your needs.



### LXE: YOUR FOREVER CONSOLE

[wheatstone.com/lxe-forever-rw](http://wheatstone.com/lxe-forever-rw)



1.252.638-7000 | [wheatstone.com](http://wheatstone.com) | [sales@wheatstone.com](mailto:sales@wheatstone.com)

[www.radioworld.com](http://www.radioworld.com)

**FOLLOW US**  
[www.twitter.com/radioworld\\_news](https://www.twitter.com/radioworld_news)  
[www.facebook.com/RadioWorldMagazine](https://www.facebook.com/RadioWorldMagazine)

**CONTENT**

**Managing Director, Content** Paul J. McLane,  
[paul.mclane@futurenet.com](mailto:paul.mclane@futurenet.com), 845-414-6105

**Senior Content Producer — Technology** Brett Moss, [brett.moss@futurenet.com](mailto:brett.moss@futurenet.com)

**Content Manager** Emily M. Reigart, [emily.reigart@futurenet.com](mailto:emily.reigart@futurenet.com)

**Technical Advisors** Thomas R. McGinley, Doug Irwin

**Technical Editor, RWE W.C. "Cris" Alexander**

**Content Director — International** Marguerite Clark

**Contributors:** Susan Ashworth, John Bisset, James Careless, Ken Deutsch, Mark Durenberger, Charles Fitch, Travis Gilmour, Donna Halper, Craig Johnston, Alan Jurison, Paul Kaminski, John Kean, Peter King, Larry Langford, Mark Lapidus, Jim Peck, Mark Persons, Stephen M. Poole, James O'Neal, Rich Rarey, Jeremy Ruck, John Schneider, Randy Stine, Tom Vernon, Jennifer Waits, Chris Wygal

**Production Manager** Nicole Schilling

**Managing Design Director** Nicole Cobban

**Senior Design Director** Karen Lee

**ADVERTISING SALES**

**Senior Business Director & Publisher, Radio World**

John Casey, [john.casey@futurenet.com](mailto:john.casey@futurenet.com), 845-678-3839

**Publisher, Radio World International**

Raffaella Calabrese, [raffaella.calabrese@futurenet.com](mailto:raffaella.calabrese@futurenet.com), +39-320-891-1938

**SUBSCRIBER CUSTOMER SERVICE**

To subscribe, change your address, or check on your current account status, go to [www.radioworld.com](http://www.radioworld.com) and click on **Subscribe**, email [futurepic@computerfulfillment.com](mailto:futurepic@computerfulfillment.com), call 888-266-5828, or write P.O. Box 282, Lowell, MA 01853.

**LICENSING/REPRINTS/PERMISSIONS**

Radio World is available for licensing. Contact the Licensing team to discuss partnership opportunities.

**Head of Print Licensing** Rachel Shaw [licensing@futurenet.com](mailto:licensing@futurenet.com)

**MANAGEMENT**

**Senior Vice President, Content** Chris Convey

**Group Publisher** Carmel King

**Vice President, Sales** John Bubello

**Head of Production US & UK** Mark Constance

**Head of Design** Rodney Dive

**FUTURE US, INC.**

11 West 42nd Street, 15th Floor, New York, NY 10036



All contents ©Future US, Inc. or published under licence. All rights reserved. No part of this magazine may be used, stored, transmitted or reproduced in any way without the prior written permission of the publisher. Future Publishing Limited (company number 02008885) is registered in England and Wales. Registered office: Quay House, The Ambury, Bath BA1 1UA. All information contained in this publication is for information only and is, as far as we are aware, correct at the time of going to press. Future cannot accept any responsibility for errors or inaccuracies in such information. You are advised to contact manufacturers and retailers directly with regard to the price of products/services referred to in this publication. Apps and websites mentioned in this publication are not under our control. We are not responsible for their contents or any other changes or updates to them. This magazine is fully independent and not affiliated in any way with the companies mentioned herein.

If you submit material to us, you warrant that you own the material and/or have the necessary rights/permissions to supply the material and you automatically grant Future and its licensees a licence to publish your submission in whole or in part in any/all issues and/or editions of publications, in any format published worldwide and on associated websites, social media channels and associated products. Any material you submit is sent at your own risk and, although every care is taken, neither Future nor its employees, agents, subcontractors or licensees shall be liable for loss or damage. We assume all unsolicited material is for publication unless otherwise stated, and reserve the right to edit, amend, adapt all submissions.



Future plc is a public company quoted on the London Stock Exchange (symbol: FUTR)  
[www.futurepic.com](http://www.futurepic.com)  
 Chief executive Zillah Byng-Thorne  
 Non-executive chairman Richard Huntingford  
 Chief financial officer Penny Larkin-Brand  
 Tel +44 (0)1225 442 244



Please Recycle. We are committed to only using magazine paper which is derived from responsibly managed, certified forestry and chlorine-free manufacture. The paper in this magazine was sourced and produced from sustainable managed forests, conforming to strict environmental and socioeconomic standards. The manufacturing paper mill and printer hold full FSC and PEFC certification and accreditation.



Photo by Paul Kaminski

# Hyundai Kona Offers Big Capability and a Simple Interface

Here's a look at the dashboard of the North American Utility Vehicle of the Year

## CONNECTED CAR

BY PAUL KAMINSKI

We wrote about Hyundai's infotainment systems in November 2016. My recent test of the North American Utility Vehicle of the Year for 2019, Hyundai's Kona, included its top-of-the-line infotainment system.

Pictures of the center stack of the dashboard show a simple interface used to access all the features. The user experience interface is simple by design.

Cason Grover is senior group manager, vehicle technology planning for Hyundai Motors America. He is responsible for the developments in multimedia infotainment audio, connected car (BlueLink) and active safety technical features.

When I asked him about the simplicity of the interface, he said, "Ultimately, we are all about ease of use; we don't want to change things for the sake of change. We want to keep ease of use high, frustration low and keep as much familiarity as we can while continuing to adopt the latest features."

That interface includes voice activation and control, touchscreens, buttons and knobs.

"Almost every vehicle on the road has some redundancy in terms of controls, by which I mean you have volume on the steering wheel, modes on the steering wheel and buttons or knobs or touch sliders for volume," said Grover. "We've got a nice labeled radio button that

will cycle through the bands and mixed presets."

### INSIDE AUDIO

Hyundai was the first manufacturer to incorporate Android Auto connectivity, in the 2015 Sonata, and in 2016 it added Apple Car Play connections. HD Radio reception capability is standard on more than half of Hyundai's models including those with navigation. Besides the multicast capability, Hyundai is using HD Radio as a data pipeline for traffic information.

Unlike some manufacturers that have deprecated or deleted AM radio reception in audio systems in hybrid or full electric vehicles, Hyundai offers AM radio reception as a standard feature. "We don't have plans to change that in the near future," Grover said.

In-car internet (Wi-Fi) is still being studied, but with no announcement on the horizon. As for native, preloaded apps like Spotify, Grover says streaming



is best handled by the driver or passenger connecting their Android or Apple device, or streaming through Bluetooth connections.

One issue that's important — to the National Highway Traffic Safety Administration and to car manufacturers — is that of driver distraction. Grover says Hyundai develops its interfaces based upon NHTSA guidelines and that the introduction of Android Auto and Apple CarPlay gave users access to phone functions "with

(continued on page 4)

# KONA

(continued from page 3)

voice and screen capability that has been developed within the NHTSA guidelines. We consider that a critical element in reducing driver distraction.”

In a 2019 J.D. Power Initial Quality Study, Hyundai ranked first as a brand with the fewest audio, communication, entertainment and navigation problems. J.D. Power defines a problem as a design defect or malfunction.

Radio seems to be an important part of Hyundai’s entertainment offerings. Their vehicles provide a simple-to-use

platform for driver and passengers to listen to the radio and other devices.

As always, whether drivers keep the radio button pushed will depend too on what’s being transmitted (compelling content) and how it’s being transmitted (signal quality and reliability).

The 2020 Hyundai KONA carries an MSRP of between approximately \$20,000 and \$28,000 depending on model.

*Paul Kaminski is the host of msrp.com’s “Radio-Road-Test” program. He has been a Radio World contributor since 1997. Twitter: msrp\_kom Facebook: PKaminski2468.*



Here is what awaits a user who powers up the top-of-the-line Hyundai infotainment system.



An HD2 signal being broadcast. Note the mix of knobs, touchscreen and buttons for control.



The SiriusXM screen allows the user to replay a song by touching the fast forward symbol on the touchscreen.

Photos by Paul Kaminski

## Powerful Remote Control - Easy!

ARC Solo has the power you need, with advanced features like Jet™ Active Flowcharts, the Recordable Speech Interface and a broadcast-friendly calendar all packed into a compact package that's easy to install and configure.

### Year End Special – Even Easier!

Now you can buy an ARC Solo with AutoPilot® and BTU-4D for the special package price of **\$2,995.00**. Call your favorite dealer today to take advantage of this limited time offer.

Offer valid through December 31, 2019



**THIS ISSUE**

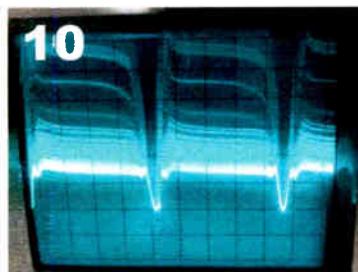
OCTOBER 23, 2019

**NEWS**

- Is There an Afterlife for "Franken FMs?" ..... 1
- Hyundai Kona Offers Big Capability and a Simple Interface ..... 3



8



10

**FEATURES**

- The Time Has Come to Talk of Many Things ..... 1
- Go on the Road With a Nomad ..... 8
- A Very Odd Case of Studio RFI ..... 10

**BUYER'S GUIDE**

- Burk Arc Plus Touch Flexes Its Muscles ..... 18
- Tech Updates ..... 18, 20, 22, 25, 26
- WorldCast Manager Sees the Big Picture ..... 24

18



**OPINION**

- Buffer Compromise Would Boost FM Class C4 ..... 27
- Reader's Forum ..... 29
- Seeing Sounds: How to Create a World-Class Audio Brand in Five Steps ..... 30

Radio World (ISSN: 0274-8541) is published bi-weekly with additional issues in February, April, June, August, October and December by Future US, Inc., 11 West 42nd Street, 15th Floor, New York, NY 10036-8002. Phone: (703) 852-4600, Fax: (703) 852-4583. Periodicals postage rates are paid at New York, NY and additional mailing offices. POSTMASTER: Send address changes to Radio World, P.O. Box 282, Lowell, MA 01853.

**FM6**

(continued from page 1)

information like visual traffic and weather. The TV signal is analog, "so no one is watching them," according to one observer.

The stations can operate this way thanks to a loophole opened when the FCC created the LPTV rules, as Radio World has reported. FM6 stations operate in a number of major cities; there are approximately 30 presenting themselves as FM stations in the United States. They were nicknamed Franken FMs by broadcast engineers who were aware of the practice early and considered the signals to be, like Frankenstein's monster, an unnatural mashup.

As controversial as the practice might appear, legal analysts say the LPTV licensees are working within FCC regulations, though critics feel the practice was not what the FCC had planned when crafting LPTV rules.

Until the 2009 digital transition, full-power TV stations could be heard on that part of the dial; but most audio signals at 87.7 FM have since disappeared.

FM6 operators want to continue to provide analog carriers in order to reach FM radios after the LPTV analog sunset date. That sunset has been extended several times, giving FM6s a longer life than expected. However, the FCC is not believed to be considering another extension.

**"NO TECHNICAL BARRIER"**

According to the LPTV Spectrum Rights Coalition, operators are continuing to work on technical solutions to provide maximum performance without causing impermissible interference.

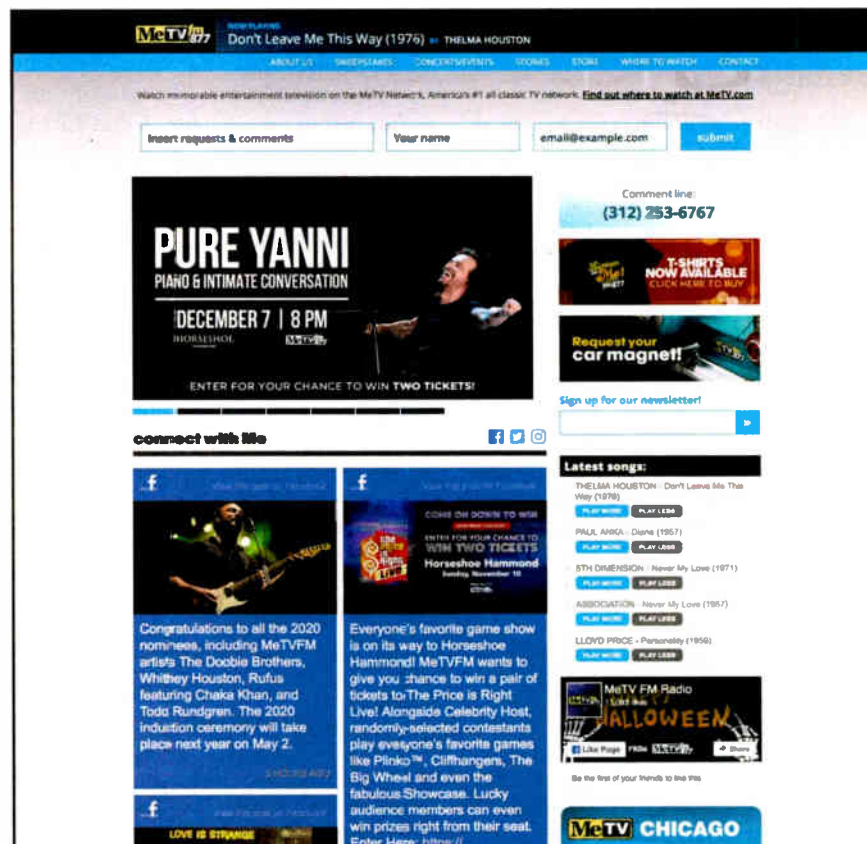
"There is no technical barrier to allowing TV Channel 6 FM operators to continue after the July 13, 2021, LPTV analog sunset date," said Mike Gravino, director of the Washington-based group.

"Remember, it is all about highest and best use of spectrum; and 87.7 FM is available in all markets, can be heard by most car radios and should be used as much as possible."

The Preserve Community Programming Coalition (PCPC), a group of FM6 broadcasters, has asked the FCC to permit LPTV and TV translator stations on analog Channel 6 to supplement their future digital LPTV operations with a small analog audio carrier.

"This will allow listeners to continue receiving analog audio programming on 87.7 FM without disrupting the ATSC-compatible digital transmission using the majority of the 6 MHz channel," said Ari Meltzer, a communications attorney with Wiley Rein LLP, representing PCPC and spearheading talks with the FCC.

(continued on page 6)



WRME(LP) in Chicago broadcasts the MeTVFM format as a music companion to the MeTV network, which airs classic television programming. The LPTV station is owned by Venture Technologies Group and operated via an LMA with Weigel Broadcasting. It has received press attention for its success in attracting listeners.

**Radio World Is Wherever You Are**



# FM6

(continued from page 5)

The goal of the group is not to extend the analog deadline, Meltzer said, but to allow existing Channel 6 FM broadcasters to continue delivering valuable and diverse audio programming that can be received on 87.7 FM following the digital transition.

PCPC estimates that approximately 50 LPTV and TV translator stations are authorized to broadcast an analog signal on Channel 6, more than half of which provide a separate audio stream for reception on 87.7 FM.

The group says analog Channel 6 LPTV radio stations on the air include KRPE(LP) in San Diego, WNYZ(LP) in New York City, WRME(LP) in Chicago and KZFW(LP) in Dallas.

It says that WRME in Chicago has outperformed several traditional AM and FM stations in several ratings categories; that Guadalupe Radio in southern California is an important Christian voice; that WDCN is the second largest Hispanic radio station in the D.C./Maryland/Virginia area; and that KXDP is the only station in Denver that broadcasts live news, traffic and weather reports in Spanish.

Audio from an analog carrier on 87.7 FM and Channel 6 DTV can coexist on the same channel, according to the PCPC presentation to the commission. "An 87.7 MHz audio signal can coexist on the same 6 MHz channel as a digital Channel 6 LPTV station without harming TV or FM reception."

The group's ex parte filing stated that "a television station typically utilizes 5.38 MHz of its 6 MHz channel to broadcast a digital signal. The unused 0.62 MHz can be used to transmit a supplementary audio signal."

A chart from the group indicates that by "slightly narrowing the bandwidth used for the DTV broadcast on Channel 6, it is possible to insert an FM audio carrier at 87.76 MHz without degrading the DTV signal or derogating the ability of ATSC tuners to receive it."

Meltzer said the PCPC is not proposing a shift in analog audio from 87.75 to 87.76 MHz. The exact placement of the audio carrier is less important than the fact that this is a proven concept consistent with the FCC's rules, which do not require full compliance with the

ATSC standard for digital LPTV stations, Meltzer said.

"Procedurally, the FCC already has a full record on allowing digital LPTV stations operating on Channel 6 to add an analog audio carrier. The PCPC is merely asking the commission to clarify that the analog sunset rules do not prohibit the broadcast of a supplemental analog audio carrier when existing Channel 6 FM stations transition to digital," Meltzer said.

According to the FCC, its records indicate there are no digital LPTV Channel 6 stations operating with an analog audio carrier at 87.75 MHz.

## UNCERTAINTY

LPTV Channel 6 advocates say the commission's "failure to address questions raised by its 2014 NPRM raises uncertainty about the future of these stations."

In 2014, the Media Bureau released an NPRM seeking comment on whether digital LPTV stations should be allowed to operate analog FM radio type services on an ancillary or supplementary basis. At the time National Public Radio voiced opposition to the changes.

The FM6 advocates say there is no evidence that a Channel 6 TV station, operating within lawful parameters of its license, causes harmful interference to an FM radio station.

LPTV stations do not have codified rules to protect FM facilities in the reserved band (87.9-91.9 MHz), according to legal observers. And LPFMs are required to protect LPTV (and thus FM6) stations. In addition, FM translators must protect Channel 6 stations.

Since TV Channel 6 is adjacent to the noncommercial portion of the FM band, which runs from 88.1 to 91.9 MHz, there are interference concerns for some observers.

"If the FCC legitimizes Franken FMs, the TV6 radio operators need to follow the same rules applicable to radio, and protect adjacent NCE stations from incoming interference," said Melodie Virtue, a communications attorney with Foster Garvey.

There currently are no interservice (TV-FM) protection requirements, Virtue said.

"LPTV, as secondary, needs to protect full-power NCEs. There should be protection in favor of the NCE full-power radio stations from FM6 audio stations if those are allowed to continue to exist after the LPTV digital transition deadline."

## PROTECTED CONTOURS

Data collected by REC Networks, an LPFM advocate, appears to support FM6 broadcasters' argument that interference between FM6s and noncommercial broadcasters is not a concern.

## 28 Analog Channel 6 LPTV Stations Branded as 87.7 FM, Most Serving Ethnic Minorities

### Alaska - Colorado

KNIK-LP - ANCHORAGE, AK  
W06BH - PHENIX CITY, ETC., AL  
KCIO-LP - VICTORVILLE, CA\*  
KZNO-LP - BIG BEAR LAKE, CA\*  
KBKF-LP - SAN JOSE, CA  
KEFM-LP - SACRAMENTO, CA  
KRPE-LP - SAN DIEGO, CA\*  
KXDP-LP - DENVER, CO

### Florida - New York

WHDY-LP - PANAMA CITY, FL\*  
WEYS-LP - MIAMI, FL\*  
WDDA-LP - DALTON, GA  
WRME-LP - CHICAGO, IL  
KXKW-LP - LAFAYETTE, LA\*  
WOWZ-LP - SALISBURY, MD  
WJMF-LP - JACKSON, MS  
KGHD-LP - LAS VEGAS, NV\*  
WXXW-LP - BINGHAMTON, NY\*  
WVOA-LP - WESTVALE, NY  
WNYZ-LP - NEW YORK, NY

### Ohio - Wyoming

WLFM-LP - CLEVELAND, OH\*  
WPGF-LP - MEMPHIS, TN  
KBFW-LP - ARLINGTON, TX\*  
KBEX-LP - AMARILLO, TX\*  
K06QA - ODESSA, TX\*  
KFLZ-LP - SAN ANTONIO, TX\*  
KZFW-LP - DALLAS, TX\*  
WDCN-LP - FAIRFAX, VA\*  
WMTO-LP - NORFOLK, VA\*

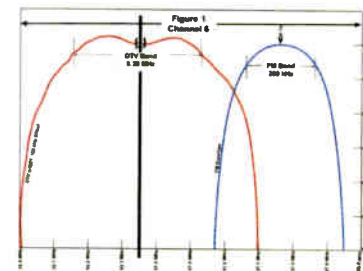
\*These stations broadcast a programming format specifically designed to serve ethnic minorities.

Slides: PCPC/Wiley Rein

A slide from a presentation to FCC officials given by FM6 broadcasters. They urged the commission to preserve the capability of LPTV stations operating on Channel 6 to continue broadcasting an aural signal that can be received on 87.7 MHz following the LPTV digital transition.

## 87.7 FM Audio and Channel 6 DTV can Co-Exist in the same 6 MHz Channel

- ▶ A television station typically utilizes 5.38 MHz of its 6 MHz channel to broadcast a digital signal.
- ▶ The unused 0.62 MHz can be used to transmit a supplementary audio signal.
- ▶ By slightly narrowing the bandwidth used for the DTV broadcast on channel 6, it is possible to insert an FM audio carrier at 87.76 MHz without degrading the DTV signal or derogating the ability of ATSC tuners to receive it.



Advocates believe that by narrowing the bandwidth used for the DTV broadcast on Channel 6, it is possible to insert an FM audio carrier at 87.76 MHz without degrading the DTV signal.

REC told Radio World it has evaluated the service contours of all of the FM6 stations mentioned in PCPC's ex parte comments. "We found that most of the service contours where those FM6 stations are, there is already a protected contour of a NCE FM station on 88.1 or 88.3 MHz," said Michi Bradley, founder of REC Networks. "If there is any actual interference from a FM6 station to full-service broadcasters, existing NCE FM stations would already know about it."

In a related matter, the FCC this year released a Notice of Proposed Rulemaking (MB docket 19-193) that could affect the LPTV FM6 stations. The NPRM, based on a petition from REC Networks, proposes to improve technical rules that primarily affect LPFM stations.

In it the FCC reaffirms the sunset date for LPTV analog transmissions.

But the NPRM also states: "REC concludes (in its petition) that the LPFM rules significantly over-protect TV6 stations and could be reduced with little impact ... REC supports but is not proposing a complete repeal of TV protection requirements."

The FCC further proposes "to provide LPFM stations relief from television 6 protection rules and to eliminate TV6 protections entirely on July 13, 2021, and propose to institute a waiver process in the interim, i.e., as of the effective date of any new rule adopted in this proceeding and before July 13, 2021."

Industry voices, like NAB, have long been guarded in comments about FM6 stations. NAB declined comment for this story.

*Comment on this or any story. Email radioworld@futurenet.com with "Letter to the Editor" in the subject field.*

**UPGRADE to a Nautel SOLID STATE**  
and we'll **BUY BACK** your **LAST TUBE**  
Get up to **\$10,000\***  
\*conditions apply  
Learn more at [nautel.com/tube](http://nautel.com/tube) nautel

# ACCESS NX

**A sleek portable IP audio codec  
designed with the user in mind**



**Unparalleled reliability for remote broadcasts!**



Contact Us Today to Learn More

1-800-237-1776 | [www.comrex.com](http://www.comrex.com)

**COMREX**

World Radio History

# Go on the Road With a Nomad

Engineering firm aims for a faster, simpler way to measure FM/HDR antenna performance

BY JAMES CARELESS

Field-measuring an FM or HD Radio propagation pattern is a time-consuming, mind-numbing task. It's not quite up there with watching paint dry but it can be close.

The reason: Even with the latest in computerized data collection equipment, conventional measurements require an engineer to drive inside the antenna's expected coverage area to collect real-time signal strength readings. This is a task that is repetitive, and can take hours to execute.

The collected FM/HDR measurements are then taken back to the station to create an accurate propagation/coverage map. If this map shows certain areas where signal strength is lower than expected — or that the antenna itself is not performing to specifications — then surprise! It's time to send the engineer back out to take more measurements to verify the anomalies. (Only afterwards, when an accurate coverage map has been compiled, can work

be done at the antenna/transmission site to remedy the problem.)

A piece of equipment called the HDR/FM Nomad Analyze promises to substantially reduce the amount of time associated with measuring and tuning HDR/FM antenna performance. It is made by Octave Communications,



a Canadian engineering consulting firm that specializes in radio broadcasting, telecommunications and RF analysis measurement software.

Octave says the Nomad speeds up the field measurement process by having engineers create a "pre-simulation" model of the coverage site before conducting field readings using Nomad's computer-based measurement system.

### READY-TO-USE MAPS

"The presimulation incorporates the expected signal strength across the antenna's coverage area, creating a predictive model ready to be tested before you hit the road," said Francois Gauthier, Octave's president. "Once you are driving through the coverage area, Nomad compares actual signal reception points using its onboard radio receivers, and compares that data against the pre-simulation. If there are problems, the unit tells you, allowing you to take extra measurements right then," he said.

"In this way, your field time is spent verifying the pre-simulation — including detecting and investigating

*(continued on page 12)*



## SERIES C@RTEX

Take Your Remote Site Intelligence to the Next Level

Monitor, Control and Automate Your transmitter Site

- Completely Customizable HTML 5 GUI
- Powerful SNMP Manager & Modbus Master
- Smartphone Application Dav2You



[cortex.davicom.com](http://cortex.davicom.com)



T. 1 877 282-3380 | [dvsales@davicom.com](mailto:dvsales@davicom.com)





# ViA The Remote Codec of Choice...

## The ViA now supports 7 IP interfaces:

- Internal module supports 2 SIM cards for Telco diversity (coming soon)
- Supports built-in Wi-Fi (no USB modem required)
- Connect 2 air cards and 2 Ethernet connections
- Rock solid IP connections with primary and redundant streams using SmartStream PLUS.
- Control remotely from anywhere with the new Cloud Codec Controller (sold separately). Watch the video.



<https://youtu.be/S1WZ6TacYDI>

ViA



Wi-Fi  
Built-in

**Tieline** ✓  
The Codec Company

317-845-8000 | sales@tieline.com | tieline.com

# A Very Odd Case of Studio RFI

Remember, electrolytics are everywhere — even in wall warts

## WORKBENCH

by John Bisset

Email [Workbench tips to johnpbisset@gmail.com](mailto:Workbench_tips_to_johnpbisset@gmail.com)

Stephanie Donnell is an engineer with New Hampshire Public Radio, based in Concord, N.H., where she recently experienced an unusual problem with RFI noise appearing on the computer video screens in the studios.

The video for the affected monitors is source selected through an Avocent KVM (keyboard/video/mouse) system, shown in Fig. 1, with its central switch in the station's technical operations center. With some toroids and snap-on ferrite beads applied to the Cat-6 cable feeding video into the Avocent converter boxes for the studio monitors, the noise was reduced to a manageable degree. However, this didn't address the underlying source of the noise.

Several theories were considered. Perhaps the noise was from cellular or wireless IP equipment shared on the rooftop directly above the studios. Another possibility was interference from one of the medical offices on the floor directly below the NHPR suite. Would rerouting the cable that fed the video monitors reduce the level of noise? A couple of attempts failed to produce any improvements.

Another thought was that the noise was somehow related to the AC power in the studios and offices. The noise problem had started following some

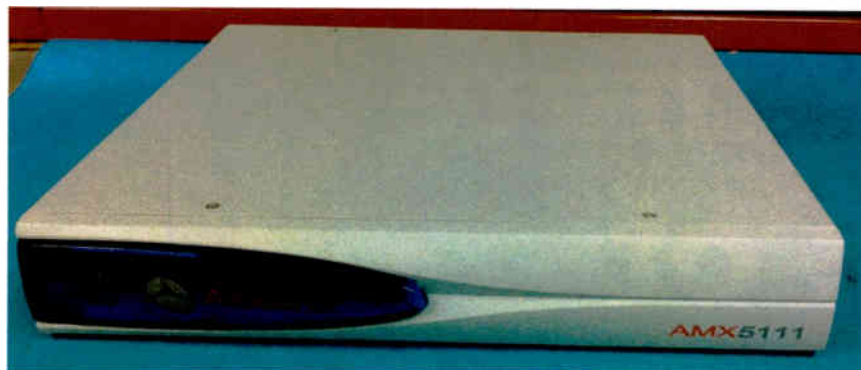


Fig. 1: The interference appeared to be related to the Avocent KVM.

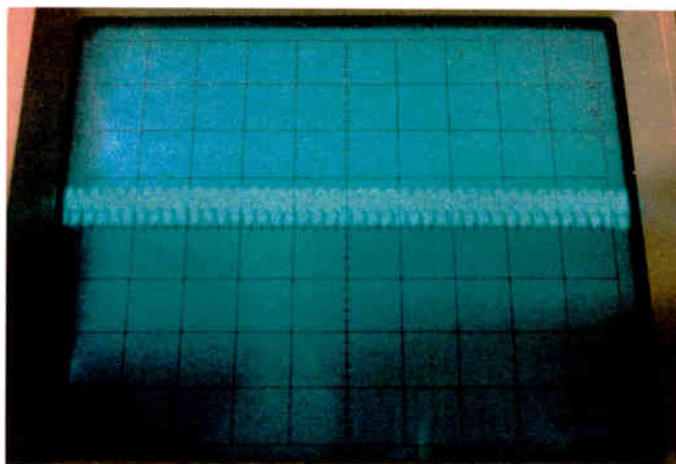


Fig. 2: Very low ripple from the "good" power supply.

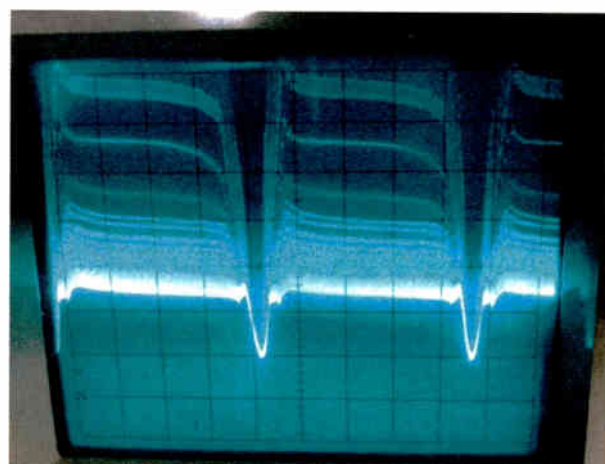


Fig. 3: The AC ripple seen on the bad power supply.

kind of disturbance on the AC utilities across the entire city, as noted on the maintenance log. The log showed a momentary dip in the TPO of the 20 kW FM transmitter just a few miles away.

One thing that they initially tried was to isolate the entire facility from the local power grid by switching over to emergency generator power. In another test, they bypassed a fairly new central

UPS, used to power several of offices. Neither of these resulted in any noticeable reduction in the noise.

In addition to the studio monitors, the noise showed up on a monitor that used one of the same KVM units in a recently vacated office. This proved to be helpful; Stephanie could work on the issue there, without worrying about disrupting operations in the studios that had the same issue.

Her troubleshooting began by trying to make sure the space was as electrically "quiet" as possible. She unplugged everything except the power to the video monitor and the KVM box; she unplugged a printer and a couple of small AC (switching) wall warts, which did not result in any changes. When she

unplugged a slightly larger wall wart; the monitor screen suddenly became completely clear of the noise. When that wall wart was plugged back in, the noise returned. This larger AC power pack provided 12 volts DC for a desktop SAS intercom terminal in the office.

There were several of these intercoms around, including two in the studio where the problem was the worst. When they powered down one of the studio SAS intercoms, there was no change in the noise on the screens. But when the second SAS intercom was powered off, all of the monitor screens — not just in the studio but in all adjacent studios — became totally clear.

To determine that the actual RFI issue was due to the AC power pack, not something else with the SAS intercom terminals, Stephanie located a new power pack with identical voltage and current ratings. She connected it to the suspect SAS terminal in the studio. The results were the same as when the SAS was powered off. All of the computer monitors remained clear of noise.

Digging a bit deeper, and having isolated the culprit, Stephanie decided to see what the noise level on the 12 volt output of the good and bad AC power packs looked like with the help

(continued on page 12)

## YOUR ULTIMATE SUPPLY & SERVICE SOLUTION

www.LightnerElectronics.com

From our Facility to yours

Design & Integration

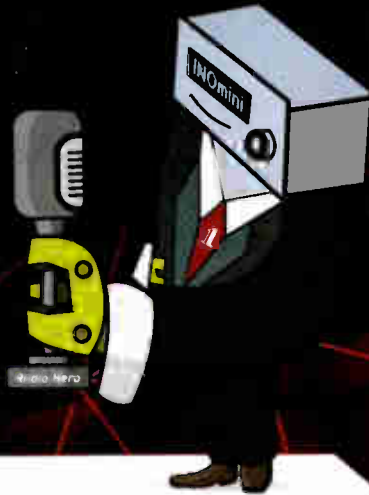
Repairs & On-Site Service Calls

**LIGHTNER ELECTRONICS** www.lightnerelectronics.com

Toll Free 1-866-239-3888 Shop online www.broadcastavsales.com

# INO *mini*

CELEBRATES ITS  
**10TH**  
ANNIVERSARY



Small in size, but packed with  
**MONITORING  
MUSCLE**

**SAVE MORE  
CALL TODAY**

Contact your preferred Inovonics dealer today for a special offer on a customized RackPack solution. Choose from a growing family of INOminis and other small form factor products to create your own RackPack monitoring solution.



MODEL 223  
Multimode Audio Processor



MODEL 676  
**NEW** NOAA Weather Receiver

Remote Off-Air Monitoring with Web-Enabled **SiteStreamers™**



MODEL 637  
AM SiteStreamer™



MODEL 635  
FM/RDS SiteStreamer™



MODEL 638  
HD/FM/RDS SiteStreamer™



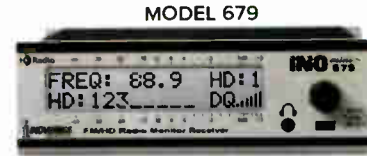
MODEL 662  
DAB+ SiteStreamer™



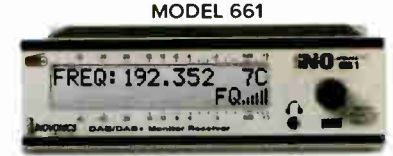
MODEL 674  
**NEW** AM Monitor Receiver



MODEL 673  
**NEW** FM/RDS Monitor Receiver



MODEL 679  
**NEW** FM/HD Monitor Receiver



MODEL 661  
**NEW** DAB+ Monitor Receiver



MODEL 514  
FM Multiplex Decoder



MODEL 300  
AES Distribution Amp Plus!



MODEL 703  
RDS Encoder



MODEL 402  
RDS Sign Driver

**Powerful Remote Monitoring / Web-Enabled**

**NEW** THE ELITE  
SOFIA 568 FM/HD SiteStreamer™

Displays HD Radio Artist Experience, Streaming to 10 listeners, Adjustable Outputs, Dante AoP

**INO**  
**INOVONICS**  
BROADCAST

[www.inovonicsbroadcast.com](http://www.inovonicsbroadcast.com)  
sales@inovonicsbroadcast.com | 831-458-0552



**WHY INOVONICS?** Quality Solutions. Competitive Prices. | Quick to install. Easy to Program. | Quality after sales service. | Three-year Factory Warranty.

World Radio History

## NOMAD

(continued from page 8)

anomalies — rather than collecting measurements to build a coverage map after the event,” Gauthier said. “The result is a time-saving, properly documented field measurement map ready to use back at the station, rather than raw data that still has to be compiled.”

Gauthier is a former DAB research engineer at the Communications Research Center in Ottawa and former director of broadcast systems and frequency engineering at Radio-Canada, among other professional credits.

### NITTY-GRITTY

According to Octave Communications’ website, the Nomad measures the RF level of HD Radio sideband ratios to analog and interferer carriers along with analog FM RF level recording of each station along the entire FM band. The measured signals are marked on the pre-simulation’s map using WAAS/EGNOS satellites to access and record GPS locational data.

HD Radio metrics recorded by the Nomad (during field measurements) include:

- HD signal acquired
- HD digital audio acquired
- Digital quality
- PAD info (HD Artist, HD Title)
- Artist Experience graphics logging
- CD/NO
- Realtime audio recording (right channel analog and left channel digital) and geotagging for later analysis

FM/RBDS metrics recorded by the Nomad include:

- Analog RF level
- Multipath
- RDS loss
- RDS PI
- SNR
- Stereo indicator
- Realtime audio recording and geotagging for later analysis

The system is capable of logging up to five HDR/FM (analog) channels at a time. Nomad’s pre-simulation model can provide in-car engineers with real-time reports of unexpected RF drops, interfering channels and HD Radio

sideband power ratio mismatches, among others. The measurement-loaded pre-simulation model can be downloaded in Excel-friendly CSV and/or Google Earth KML format reports.

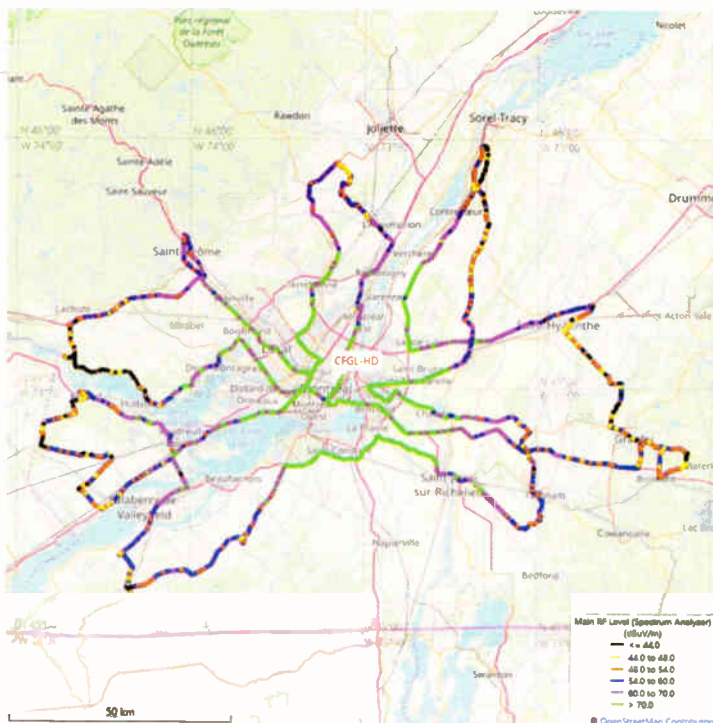
Nomad’s pre-simulation is created by modelling the measurement area’s “spectrum picture” using propagation files uploaded from the Octave Propagation Model Cloud Service, which is based upon data the FCC, ISED (Canada) and Mexico broadcasting databases.

When problems are detected field measurements, the Nomad emits audible alarms to warn the driver. This allows them to take additional measurements on the spot, eliminating the need to return to the site afterwards.

“The actual Nomad unit is housed in a portable four-rack rigid case,” said Gauthier. “It comes with a built-in USB spectrum analyzer, a distribution amplifier to share signals received on the unit’s external antenna to the radio receivers in the box, and up to five HDR/FM Inovonics receivers. The software is loaded on the user’s laptop, which connects to the Nomad via a USB cable.”

### USER RESULTS

When this article was written, Octave Communications had built four Nomads. Those have been getting serious usage and the results have been impressive.



Map showing the differences between the received signal level and the modeled signal level.

The Canadian Broadcasting Corp. has been using an HDR/FM Nomad Analyzer after doing FM antenna rebuilds, to verify that actual propagation results match what the engineers had in mind.

“We’ve been using the Nomad for six months, and it is saving us a lot of time,” said Charles Rousseau, chief engineer of CBC/Radio-Canada’s Spectrum Group. “You can compare, in real time, what you’re measuring against the realistic simulation of field strength. Then, as an example, there’s an alarm that will ring if you’re 10 dB down your simulation. You can stop and see what may be wrong. Is that drop always happening in a certain azimuth? Was the antenna not properly installed?”

“In the old way of doing things, we

would only find out about a transmission problem once we were back in the office or at the hotel at night, and we would have to go back,” Rousseau added. “Since Canada is a large country, finding out about issues in the field after the fact cost us a lot of time and effort.”

GeoBroadcast Solutions is another user. The firm helps radio broadcasters maximize signal coverage and robustness through a number of transmission hardware solutions.

“We’ve been using the Nomad both in the lab and in the field,” said Bill Hieatt, the company’s CTO. “In the lab, the Nomad helps us gather measurements associated with the in-vehicle

radio transmission test units we operate on behalf of our broadcast clients, where we can literally simulate signal fading and the impact of vehicle speeds without actually driving. In the field, the Nomad is useful in detecting problems like second adjacent channel interference, which is a growing issue as more HD subchannels are being turned on, and transmitter power is being boosted to cut through interference.”

Like the CBC, GeoBroadcast Solutions is happy with the Nomad’s performance, portability and time-saving capabilities. “The fact that the Nomad automatically measures second adjacent channels is a real advantage for us,” Hieatt said. “This unit helps us detect and discover problems that we might otherwise have missed.”

## WORKBENCH

(continued from page 10)

of a scope. The “good” supply had around 40–50 mV of noise, as seen in Fig. 2. However the “bad” power pack had nearly 3 volts of some nasty looking noise, pictured in Fig. 3. Stephanie reasoned that much of that same noise was present on the Cat-6 cables going from the SAS terminals, back to the SAS mainframe, located adjacent to the TOC. The SAS cables also shared much of the same route as the Cat-6 cables connecting the different Avocent KVM boxes.

Using a large bench vise she cracked open the bad AC power pack. It didn’t take long to find what she was checking for: a pair of electrolytic capacitors with bulging tops, seen in Fig. 4. This was a typical sign that they were “open” and no longer functioning as filters for the DC output.

It is interesting that this issue with the SAS intercoms had no noticeable effect on their operation but rather affected an entirely different studio system. It also demonstrates that even capacitors in wall warts can be suspect.

Your contributions to Workbench help other engineers and qualify for SBE recertification credit. Send Workbench tips and high-resolution photos to johnpbisset@gmail.com.

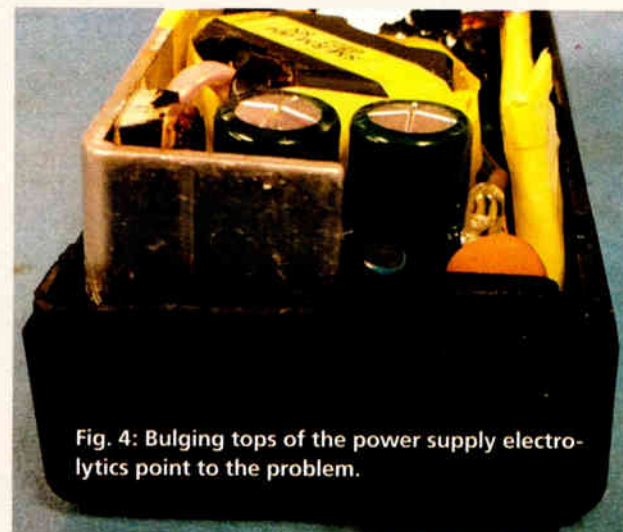


Fig. 4: Bulging tops of the power supply electrolytics point to the problem.

John Bisset has spent 50 years in the broadcasting industry and is still learning. He handles western U.S. radio sales for the Telos Alliance. He holds CPBE certification with the Society of Broadcast Engineers and is a past recipient of the SBE’s Educator of the Year Award.

**REAL TIME BUILT-IN INSTRUMENTATION**

Comprehensive Monitoring & Control

100% Remote Access

[nautel.com/AUI](http://nautel.com/AUI) **nautel**

# AUTOMATION

(continued from page 1)

around for a long time but the two worlds didn't begin to merge in a big way until the mid-1970s, when IGM introduced the 750 system with a DEC PDP-8.

Most of the hardware, playback media and terminology of these earlier analog systems is long gone and forgotten. That means it's time for a '70s flashback.

## FLASHBACK

Let us don our wide-lapeled, burgundy, three-piece polyester suits, set the date for April 1974 and dive headlong into the time machine.

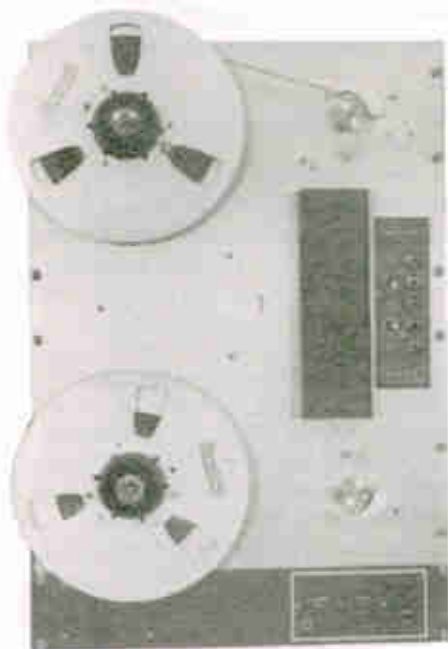
*We emerge just in time for the opening of the NAB show of 45 years ago, and we visit the Sparta booth to see what's new in broadcast automation systems.*

*At first glance the three racks of equipment look intimidating. But when we break it down, we see that it's just audio tape reproducers, a controller or some sort, and ancillary devices such as silence sensors and logging equipment.*

*The first thing we'll look at are playback systems.*

Unlike the digital audio files of today, there were different tape media for different lengths of content. Most of the music, especially for the popular beautiful music and easy listening formats of the day, was recorded on larger 14 -inch NAB reels of 1/4-inch tape.

Sparta's Corinthian was one such machine. With 1 mil tape rolling at 7.5 inches per second, six hours of content were stored. Foil leader at each end



Beautiful music and easy listening stations usually relied on playback decks that could handle the larger 14-inch NAB reels, such as the Sparta Corinthian.



Master clock and network join functions were performed by the Sparta DC-24.

of the tape would reverse the machine at the end of three hours and switch tracks. Stereo decks were available in half- and quarter-track configurations.

The capstan was direct drive with a synchronous motor, giving a timing accuracy of 99.8%.

While Sparta built their own 14-inch

playback machines, other automation system manufacturers used the popular Scully Model 270.

(continued on page 14)

## Replace your 'Old' Automation with 'New' for only \$125 per month

For the cost of most support contracts you can have a complete APEX Radio automation system. For the one low monthly price you get 'APEX' on air software (Live, hard disk automation, satellite automation, Ball games and more), 'Tools' software (Library management, Production, Scheduling, Voice tracking from anywhere, Reporting, and more), and 'Bridge' hardware (sound cards, sat switcher, sat logic), plus customer support, and all software updates and upgrades. Just add a Windows 10 PC and you are on air. Need another 'Tools' studio just add software for \$250 and another Windows 10 PC. No contract to buy, APEX is month to month. Like it then keep it. Join the thousands who have chosen Arrakis automation since 1991.



It's not magic !

[www.arrakis-systems.com](http://www.arrakis-systems.com)

870-461-0730

# AUTOMATION

(continued from page 13)

With other formats, some stations preferred to have reels with music from different categories, and conventional playback-only recorders with 10-inch reels and auto-reverse were employed. Again, Sparta manufactured their own machines, while other companies used a variety of recorders, from Revox A-77s on the economy end to Ampex 440s on the premium side.

Commercials, PSAs and jingles usually were recorded on NAB "A" size carts, which could hold about 10 minutes of tape. Several commercials could be recorded on each cart, so they could be played in rotation. Carts were loaded into Sparta RS-224 carousels, which held 24 carts each. Depending on the size of the station, format and commercial load, there could be as many as four carousels in an automation system. Automation often had a separate rack-mounted cart machine that could handle A, B and C carts, dedicated to top-of-the-hour station IDs.

## MAKE IT SOUND LIVE

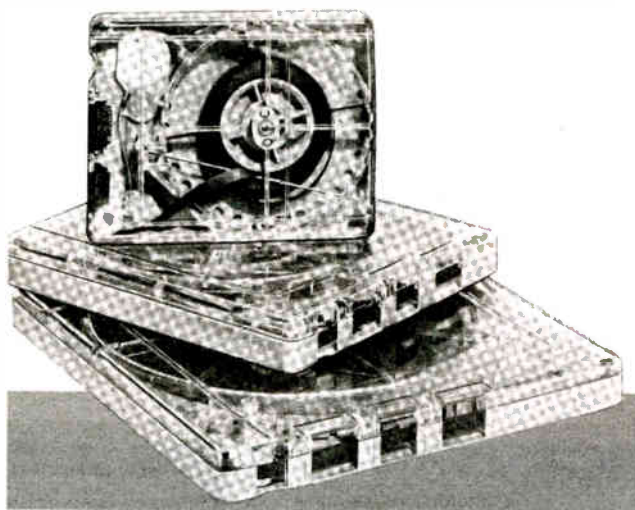
One of the criticisms of early automation systems is that they lacked a "live" sound. But:

*Here at the 1974 NAB, we see that problem being addressed.*

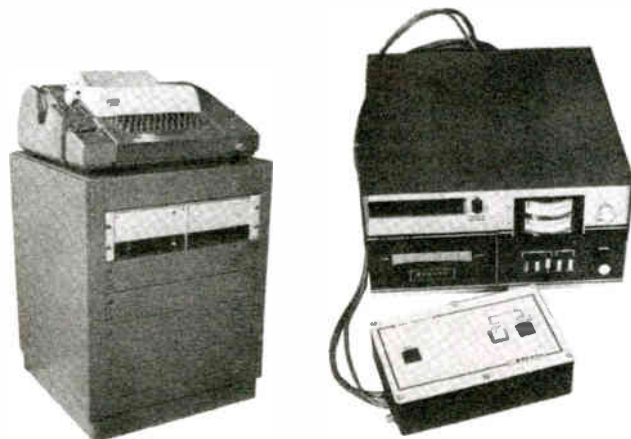
*There in the rack of Sparta's demo automation system is a TA-581 time announcer. And what an amazing piece of equipment it is. When the salesman slides it out on the drawer, we see two C-size carts that hold the time announcements, one for odd minutes, the other for even. Time checks can be programmed as events. We're told that we can purchase pre-recorded carts with the time announcements, or make up our own, for a more localized feel.*

*The clock is controlled by a crystal oscillator, making it super accurate, according to the salesman. The only reference time signals available to us in 1974 are from the National Bureau of Standard's WWV, and the network tone at the top of the hour. That oscillator may drift slowly, so once a month, the salesman explains, it's good to check it against the network.*

*The geek in us wonders though: What happens to that clock after a*



In addition to the standard NAB "A" carts, automation systems used "B" and "C" carts for station IDs and time announcements.



Carts were encoded for logging with the Century series record/playback machine and encoder (right). The teletype printer (left) would print out the time stamp from the digital clock, along with the five-digit code that was recorded on the cart.

*power failure? Won't it give inaccurate time announcements, ruining the illusion that we're a live operation?*

*No worries, explains the salesman. The time announcer is disabled after a power failure until reset, so inaccurate time checks are never aired.*

*A fairly new arrival in automation systems is a net join, enabling automated stations to join the network for news, then break away for the next event. Sparta's DC-24 has an LED display for 12- or 24-hour time, driven from a clock that is almost identical to the one found in the time announcer. Plug-in time cards or thumbwheel switches are available for selecting program fade, network join and break times. The DC-24 can control up to four timed events per hour. It also provides timing signals for program time correction. And just in case something goes horribly wrong, pushbuttons on the front panel can manually do the network join functions. Although we don't see one on*

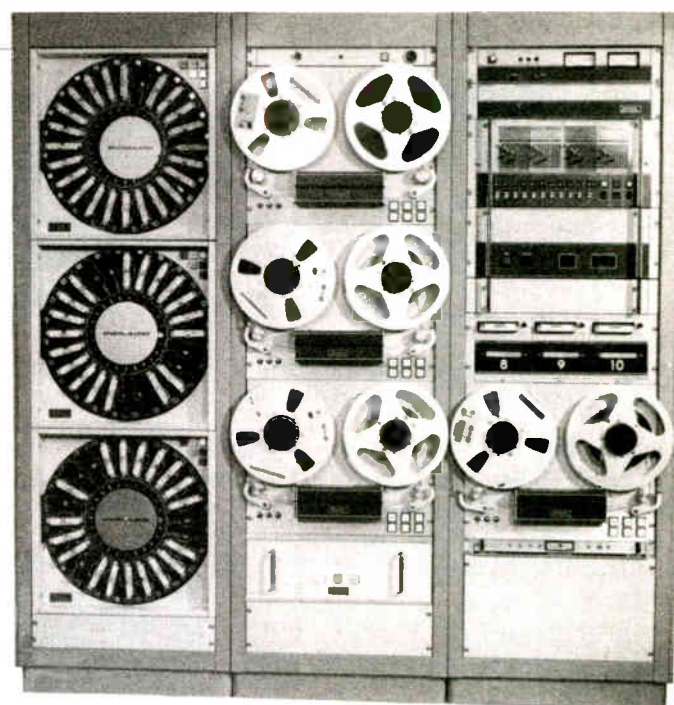
*the show floor, there are other network join devices that work off the tones sent by the network just before the newscast begins, and immediately after it ends.*

*Every station's requirements for automation are different, depending on format, commercial load and market size. Each Spartamation system is custom-built to customer requirements using the aforementioned components.*

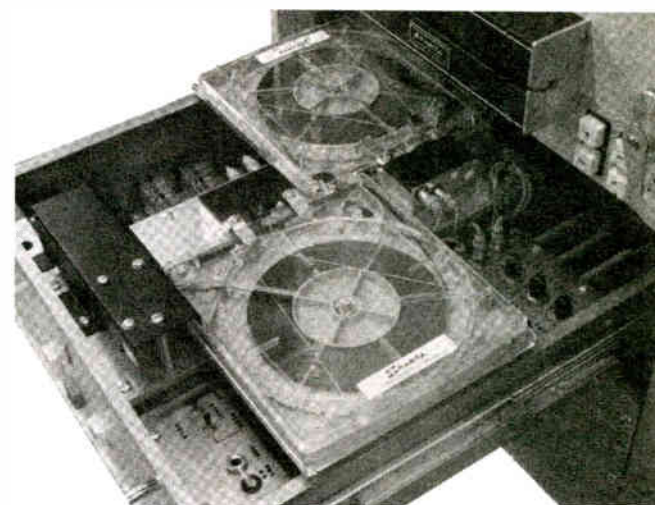
That just leaves one question. How did automation systems do all of this, and more, without the use of computers?

The short answer is that it was fairly easy, albeit without much of the flexibility that we take for granted today.

The brains of Spartamation (also spelled as Sparta-Mation) was the 1052 automatic program controller. It delivered automatic start/stop control and overlap audio switching for 10 sources, plus two special channels for network and fill music. The basic model had a 52-event format capability, with an



Three or four racks of equipment were typical for a mid-sized automation system.



The Sparta TA-581 time announcer had two "C" carts for even- and odd-minute time announcements, as well as a quartz-controlled clock.

11 x 52 matrix board for the format information.

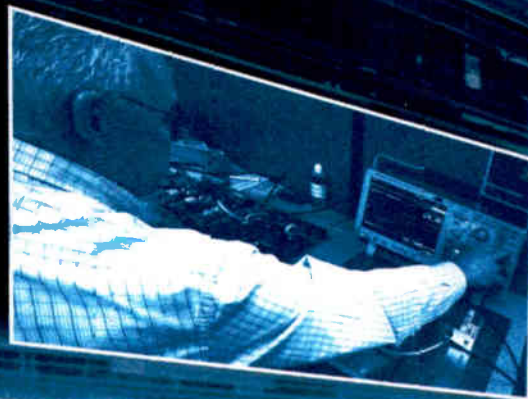
For greater flexibility with carousels, the RS-250 Random Access could be purchased, as it acted as a sub-programmer for the 1052 controller. Once it was installed, two carousels (48 carts) appeared as a single source to the 1052. The 250 determined which carts would be played, which skipped and in what order. When there was no commercial scheduled for an availability programmed into the 1052, the "skip" setting on the 250 would cause the controller to ignore the play command.

The 250 also featured "search-ahead cueing," which insured that the other carousel had the correct cart loaded ahead of time, so carousels could play back to back with no dead air. An LED readout displayed carousel and tray number to play next. Event position was programmed via a series of slide switches located in a slide-out drawer. This

(continued on page 16)



# AUDIO. IT'S WHAT WE DO.



On your broadcast audio journey, we've been with you every step of the way. From analog to digital to AoIP to your entire networked ecosystem.

### Let Us Be Your Trusted Partner

We're not just manufacturers and software developers, we're your partner in standards-based AoIP broadcast solutions and processing built on award-winning technology, trusted by the biggest names in the media landscape.

### Audio Is Our Thing

We deliver innovative, intuitive broadcast audio solutions that meet the challenges you face head-on, so that you can spend less time solving problems and more time creating the most exciting and engaging audio experiences imaginable for your audience.

### We're Up for Any Challenge

Together, no audio challenge is too big, no technology is beyond reach. And no solution—large or small—is unobtainable. Partner with the Telos Alliance to hear your future.

#### AOIP CONSOLES



#### Axia® iQx

Surface + Mix Engine in One!

#### AOIP INTERFACES



#### Omnia® MPX Node

Extending the Power of AoIP from the Studio to the Transmitter

#### IP COMMUNICATIONS



#### Telos VX®

The VoIP Phone System That Pays for Itself

#### ROUTING CONTROL



#### Axia® Pathfinder Core™ PRO

See More. Do More. Control More.

SHAPING THE FUTURE OF BROADCAST AUDIO

THE TELOS ALLIANCE®

## AUTOMATION

(continued from page 14)

was the 1970s equivalent of non-volatile memory; event programming would be preserved during power outages.

Carts that were produced for automation made use of the secondary and tertiary cue tones. The 150 Hz secondary tone was added at the end of the audio, and it was the signal to the controller to start the next event. Also, a logging encoder was used to record the five-digit code on the cue track that was used for identification. Selection of the correct digits for encoding was usually made via rotary switches on the encoder.

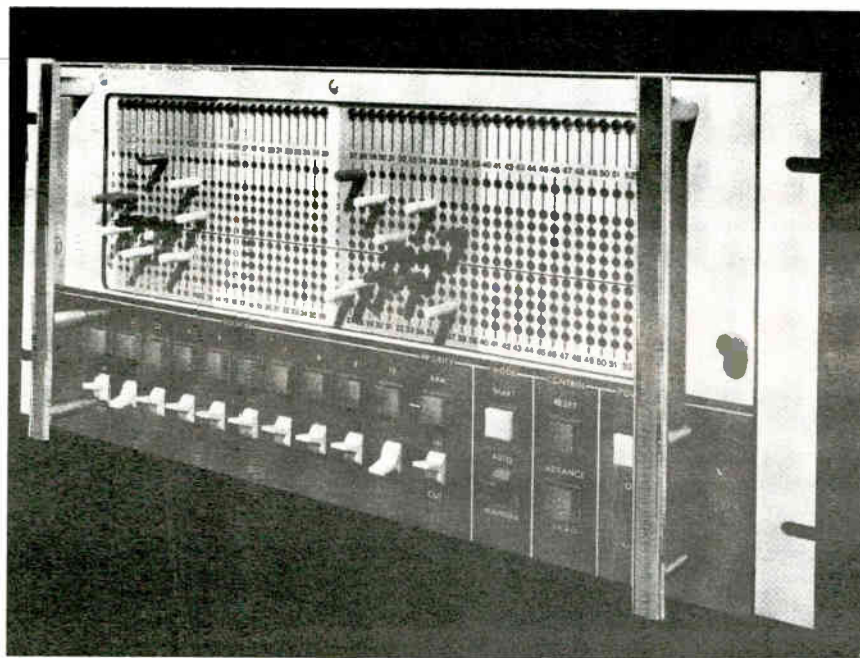
### WARNINGS & LOGGING

While a number of syndication companies, such as Bonneville Beautiful Music, TM Programming, Drake-Chenault and Century 21, distributed pre-recorded music tapes, some stations preferred to create their own. In addition to the usual production facilities, making your own music tapes for automation required additional items. Stations recording 15-inch reels needed a recorder that would handle the larger reels. Also necessary would be an EOM generator to record a 25 Hz tone at 5 dB below reference level for 1.5 seconds on the left channel.

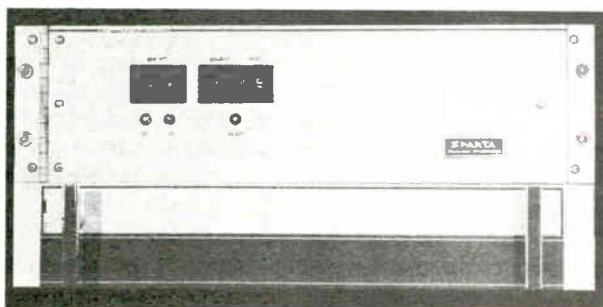
The right combination of cart and tape playback systems, along with a controller and random access, could give a smooth-running automation system. Other essentials included a silence sensor, line amp, 25 Hz filter and program logging.

In Sparta systems, the AP-2 alarm panel would beep and flash a warning light whenever the auto restart function of the automation system had been triggered. Auto restart would advance the program controller by one event when a silent period was sensed. This could be the result of brief power outages or tape/equipment failures. In any event, the operator on duty needed to check the tapes and reset the clock if necessary.

The LAM-1 line amp provided VU meter monitoring of both program and cue levels in addition to the traditional line amp function. Optional plug-in 8-watt monitor amplifiers were available for loudspeakers. Also optional was the HP-40 40 Hz high-pass filter. It would remove the 25 Hz EOM tones



**Sparta's 1052 Automatic Program Controller used a diode pin matrix board for a 52-event capacity. An FX-52 Format Expander could be added to the system to handle an additional 52 events.**



**Greater flexibility with tape cartridges was possible by using a random access such as the Sparta RS-250. It would combine two carousels as a single source to the 1052 Automatic Program Controller.**

from the program output. Otherwise, they could be quite audible over the air.

The demo system at our Sparta booth would have had a CBS Audimax connected to the output to ensure a reasonably consistent level between sources. This was a fairly common practice. Gates systems of the same era usually came with two Sta-Level amps.

The FCC regulations for maintaining program logs applied to automated stations in the same way they did for live operations. Just because a commercial was scheduled to run on automation was no proof that it did run.

A logging system would "listen" to what was played, and create an FCC-compliant program log. For carts and tapes, information encoded on the cue track was coupled with a timestamp in 2400 format from the digital clock. We note that these logs follow the letter of the law, if not the spirit.

A typical log printout might include an entry such as "1317 05218." To figure it out, we would need the encoder directory, usually maintained by the sales department when commercials were recorded. In this case, we discover that at 1:17 p.m. (i.e. at 1317), the automation played a McDonald's :60 (because the encoder had assigned the cart for

the McDonald's spot a five-digit code of 05218).

Logging systems in later years would be advertised as English language, meaning that the tedious task of looking up five-digit codes had been eliminated, and the logs could be easily read by someone who didn't speak binary.

Dot-matrix printers would not be readily available for a few years, and the program log was usually printed out on a teletype machine, similar to the one used at stations for the AP or UPI news service. Some systems used a printer that used a 2-inch roll of paper and

looked similar to an adding machine.

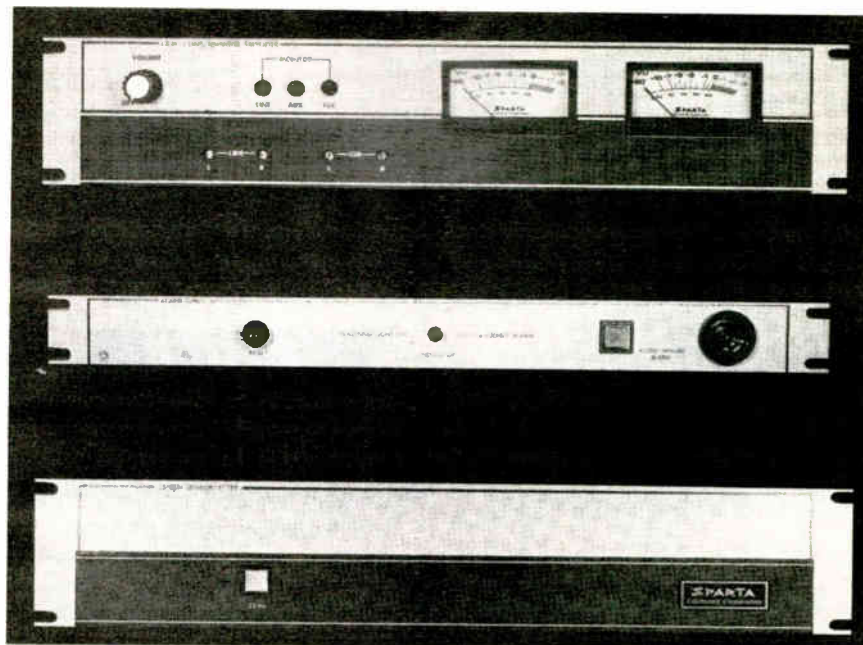
*As we head back up the aisle toward the time tunnel and our return to the 21<sup>st</sup> century, we marvel at all the things that were possible with broadcast automation before the integration of computers. We also wonder: Whatever happened to Spartamation systems, since Sparta isn't recalled as a major player in the automation market? And for that matter, what happened to Sparta itself?*

In 1976, just two years after our visit to the NAB, Sparta had become part of the Cetec Broadcast Group, which was a union of five California-based companies.

Cetec Jampro manufactured TV and FM antennas, Cetec Vega made wireless microphone systems, while Cetec Audio continued with Sparta's line of consoles, including its Series 10 quad boards. Cetec purchased Schafer automation, and it became Cetec Schafer.

Cetec Sparta dropped its automation product lines and focused primarily on transmitters. Sparta had been doing pioneering work on solid-state AM and FM transmitters during the early 1970s, and their SS1000A was the first solid-state AM transmitter type accepted by the FCC. The Sparta AM line featured 1, 2.5 and 5 kW units, while their FM transmitters were solid-state at 250 and 500 watts, and solid-state up to the final tubes at higher power levels. The company also continued to manufacture its Century II modular cart machines, available as triple deck (one motor) desktop and rack-mount units.

*Tom Vernon is a longtime Radio World contributor. He wrote here in the previous issue about the history of transmitter remote controls.*



**Some of the important automation accessories for 1974 Sparta automation include the LAM-1 line amp/monitor panel (top), AP-2 alarm panel (middle) and 25-SEN sensor/filter (bottom).**







## ADVANCED PROCESSING: BEHIND THE SCREENS

X5 is the most advanced, finest sounding broadcast audio processor ever designed. It's loaded with inventive technology that dramatically improves your sound AND delivery all while letting you be counted by every PPM out there.

### PPMport INSERT LOOP FOR PEOPLE METERS

An insert loop to interface your ratings encoder AFTER the processing delivers a signal with greatly reduced audible artifacts, which ensures you'll be moving all those meters out there.

### FM/HD LIVELOCK FM/HD SIGNAL SYNC

Integrated HD and FM analog signal alignment keeps listeners tuned in to your station even during extreme blending conditions. No more "dip and skip" in reception that can cause tune out, affecting TSL.

### UP UNIFIED PROCESSING®

Each X5 function in the chain interacts closely with other functions to deliver just the right amount and type of processing needed, creating a sound that's as close to the original as possible.

### LIVE LOGGER LIKE THE NSA FOR YOUR X5

Live Logger keeps track of everything happening on your X5. Preset takes? Remote login? Audio failover? Every event is date and time stamped so you can review it.

### LIMITLESS CLIPPER INTELLIGENCE KNOWS ITS PLACE

Proprietary high-frequency distortion canceling technology passes the highs, but not the overshoot. No more "spitty" highs or pops from clipping; no IM distortion whatsoever. Takes all the highs you can give it and never gives you back IMD.

### MPX SYNCLINK STUDIO-TRANSMITTER LINK

Extends HD/FM alignment from your studio to your transmitter site. Keeps the HD and FM packets in sync so time alignment done at the studio goes straight to the receiver.

BETTER SOUND  
MORE LISTENERS **X5**

[wheatstone.com/X5-rw](http://wheatstone.com/X5-rw)

**Wheatstone**  
BROADCAST AUDIO PERFECT ONISTS®

1.252.638-7000 | [wheatstone.com](http://wheatstone.com) | [sales@wheatstone.com](mailto:sales@wheatstone.com)

World Radio History

# Burk Arc Plus Touch Flexes Its Muscles

Features and flexibility of remote system earn praise from BBN



## USERREPORT

BY ROY BECKER  
Senior Engineer  
Bible Broadcasting Network

**CHARLOTTE, N.C.** — Here at the Bible Broadcasting Network we have 46 stations using the Burk Arc Plus Touch for our remote control and monitoring. We upgraded from the VRC2500; therefore we are using the Plus-X GSC adapter as our physical interface for the wiring for metering, status and control. This eliminates a total rewire at our existing stations. This system was a positive upgrade because of its versatility and flexibility.

The value of any product is more important than just the cost. All technology has a price tag, and sometimes price will exceed value. With advances in the technical features and flexibility of the ARC Plus Touch and the Plus-X line of I/O adapters, the price is fair because of the value.

The direct internet connectivity of the product has been a great feature since any notifications can be sent over the internet. As you would expect, you can program each channel however your application needs to be set. In today's world of smartphones and other portable devices with internet access, it is great to get an alarm notification without having to have a telephone ring during in a business meeting. However,

It is good to have calls from the Touch as a dual notification system.

we did add the optional voice interface.

It is good to have calls from the Touch as a dual notification system. A great feature when adding the voice interface is the vocabulary of words the unit has available. These words are audio files of a person speaking, not a crude text-to-speech interface. In addition to the built-in library, you

can create your own custom library and incorporate both libraries. Also, if the internet is down and the phone lines are working you will still get notified of any problems at the station.

There is an option for using SNMP interface with your transmitter or other equipment. We have added this option at two of our stations because of the

other equipment. However, when we did, we also added more data information from the transmitter than we would normally have because of the number of channels we could use with hard wiring options.

When I began at BBN, we were still using Gentner VRC2000 products. The Burk VRC2500 was a tremendous step up in technology. The one feature that the VRC2500 had that I miss in the Touch is the ability to program it offline. With the Touch you need to make an internet, or local network, connection to the unit and use the Autoload Plus software while connected. You can then save the unit configuration onto your computer without making the changes in the Touch itself; of course the changes can be saved to the unit also.

In addition, we often change who will get the notifications because of the regular person taking vacation. This means connecting, editing and then saving. However, once that is done the new configuration can be saved with a different file name and uploaded when necessary.

Burk is very responsive to suggestions in the addition of features. There have been several that I have suggested that have been incorporated.

For information, contact Matt Leland at Burk Technology in Massachusetts at 1-978-486-0086 or visit [www.burk.com](http://www.burk.com).

## TECHUPDATE

### INOVONICS 568 SOFIA MONITORS FM/HD RADIO

The Sofia 568 FM/HD Radio SiteStreamer+ is the first of a new series of remote off-air monitoring receivers from Inovonics, with advanced features for critical monitoring situations.

The web-enabled Sofia 568 is to be installed at the transmitter site or any remote location with good reception and an internet connection. Streamed audio is accessible from any web-enabled device.

The Sofia 568 provides analog, AES3 digital and AES67 AoIP outputs, along with remote streaming for up to 10 listeners simultaneously. It collects histograms of signal parameters and displays HD Radio album artwork, station logos and similar visuals via web interface. Multiple stations can be sequentially monitored using the programmable StationRotation feature.

The unit allows you to remotely monitor full-time off-air FM and HD Radio signals. It displays HD Radio graphics and related text data on the web interface. Adjustable off-air output levels for L/R analog, AES3 digital along with Dante/AES67 AoIP are provided.

Features also include: internet listening stream for up to 10 listeners simultaneously; monitor multiple transmissions sequentially with StationRotation; alarms and notifications sent via email and SMS messaging; enhanced alarm logging with no limit to the number of alarms that can be logged; and easy setup and operations, with full SNMP support.

For information, contact Inovonics in the United States at +1-831-458-0552 or visit [www.inovonicsbroadcast.com](http://www.inovonicsbroadcast.com).





## NEWS DESK IN UNDER 1 SQ FT



With ScreenBuilder™ 2.0, YOU decide what to put behind your glass. Smart virtual tools. Buttons. Faders. Knobs. Meters. Clocks and timers. Salvos. Hardware control and interaction. Complete signal chains. YOU determine exactly how they function and interact via the Intelligent Network with a simple scripting wizard. Adapt as your needs change. Get the idea?

**BUILT WITH  
SCREENBUILDER**

[wheatstone.com/glass-screenbuilder2-news-rw](http://wheatstone.com/glass-screenbuilder2-news-rw)

**Wheatstone**  
BROADCAST AUDIO PERFECTICONISTS®

1.252.638-7000 | [wheatstone.com](http://wheatstone.com) | [sales@wheatstone.com](mailto:sales@wheatstone.com)

Signal Monitoring, Remote Control, Test &amp; EAS

## TECHUPDATES

## WHEATSTONE APP METERS WHEATNET

Wheatstone notes that AoIP networks give unprecedented access to signal monitoring throughout the studio facility. The company points to the WheatNet-IP audio networked studio as an example.



A metering app for the WheatNet-IP audio network called IP Meters can display a "wall of meters" onscreen for ongoing monitoring of audio peak levels, average levels and various other parameters at selected points in the network. Through a software interface, broadcasters can set up signal density meters, FFT graphs and more. They can set up two or 60 or more cells in one "wall" as horizontal, vertical or eyebrow bargraph meters.

They determine where and what to meter console inputs, mic outputs, the satellite receiver, studios, webstreams, etc. A separate analysis window shows one audio stream in a variety of informative ways including FFT, 3D plot, oscilloscope, energy vs. frequency, spectral dynamic range and more. Each meter, or cell, in this wall of meters can be set up with silence detection, so broadcasters can see at a glance if an audio stream has gone down, and where.

For information, contact Wheatstone in North Carolina at 1-252-638-7000 or visit [www.wheatstone.com](http://www.wheatstone.com).

## BROADCAST DEVICES ADDS ACCESSORIES TO SWP-300 REMOTE CONTROL LINE

The Broadcast Devices SWP-300 remote control is an SNMP web-based transmitter site remote control with direct interface for up to two motorized RF switches and direct connection to BDI DPS-100D series power meters where no separate RF switch controller is needed. BDI also offers premade and tested RF switch interface cables for all popular RF switches made.

It occupies only one rack unit. Other features include 16 onboard control outputs, eight status inputs and four analog inputs.

Now available is the 2RU IOX-24 expansion panel; it provides an additional 24 status inputs, control outputs and an additional eight analog inputs. The IOX-24



panel can be ordered with a new system or added later as requirements grow. It can be placed anywhere in the transmitter plant with a Cat-5 connection utilizing BDI Bus.

Other accessories for the SWP-300 include the new TX I/O module kit which provides essential connection of TX On/Off, external interlock input and TX On/Off status by Cat-5 cable runs. Install this board inside the transmitter and the command/status connections can be made with running additional cables.

The SWP-300 can act as a standalone remote control or interfaced to other SNMP remote control systems or SNMP software packages. The SWP-300 includes the BDI Stack Graphical User interface for remote monitor and control via Windows 7,8 and 10 and Android operating systems.

Broadcast Devices describes the SWP-300 and its family of accessories as a cost-effective plug and play remote control system.

For information, contact Broadcast Devices in New York at 1-914-737-5032 or visit [www.broadcast-devices.com](http://www.broadcast-devices.com).

## 25-SEVEN TVC-15 PROVIDES LISTENER CREDIT

25-Seven says that a station can have a great signal, with programming finely tuned for the target demo; but will it get credit for all of its listeners?

Watermark encoding can be hit or miss, depending on audio content and the listener's environment. But market ratings are serious business; any detraction from those numbers means a loss in revenue.



The Telos Alliance says that is why the 25-Seven TVC-15 was developed: to make sure stations get the credit they deserve, every minute of the day.

Every 400 milliseconds — 150 times per minute — TVC-15's tone verification codec analyzes the actual code symbols in any audio fed to it. 25-Seven says that is fast enough to track individual program elements, style changes in a song or even the difference between a host and a call-in guest. The TVC-15 can be connected anywhere in an air chain, or listen over the air, and will demonstrate when the watermarking is effective or if there is a problem.

Though the TVC-15 can operate alone, connecting it with the 25-Seven Voltair provides more power. The TVC-15's Intelligent Adaptive Enhancement closes the feedback loop, letting users control Voltair processing based on moment-by-moment analysis of the air signal.

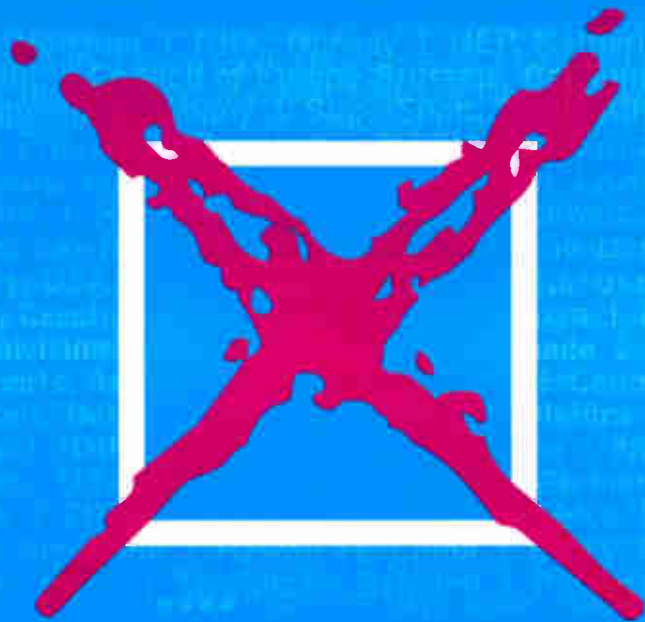
This, according to 25-Seven, allows users to take coding enhancement beyond simplistic "set and forget" or daypart setting strategies. The TVC and Voltair can work together like a continuous, intelligent automatic gain control on hidden watermarks, automatically giving users more or less emphasis to watermarking, but only as needed.

For information, contact 25-Seven/The Telos Alliance in Ohio at 1-216-241-7225 or visit [www.telosalliance.com](http://www.telosalliance.com).

NETWORK. AUDIO. VIDEO. CONTROL.



70+ REASONS TO SAY ...



YES.  
SHIFT.

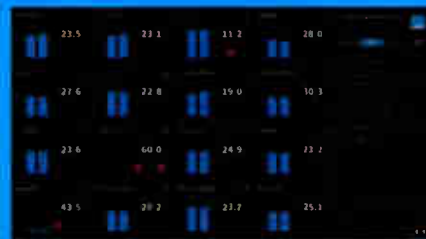
SHIFT PERSPECTIVE.  
SHIFT GEARS.  
SHIFT ALTITUDE.



**NEW**

### VisTool SOLO

Touchscreen Talent Panel Software for building custom tablet-based graphical control panels.



**NEW**

### AES67 Stream Monitor

Monitoring & Inspection Tool. Tracks loudness compliance and stream health over time.



**NEW**

### Power Core MAX

AES67 Mixing Engine & I/O Gateway. Supports up to four independent Lawo ruby mixing surfaces.

Signal Monitoring, Remote Control, Test &amp; EAS

**TECHUPDATES****REMOTE NETWORK  
CONTROLLER OPTIONS  
FROM AEQ**

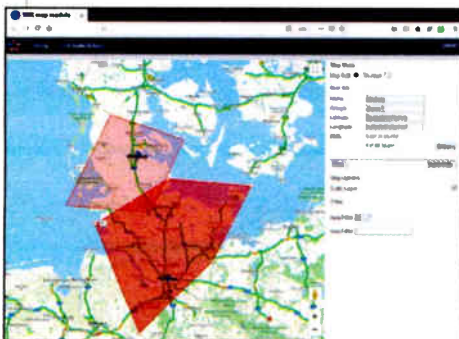
AEQ is known as a manufacturer of broadcast equipment but it is less well-known as a developer of control and management applications. These are designed to allow among other things, the creation of radio broadcast networks.

For instance the Tele Server 3.1 program was recently updated and adapted for Radio Popular de Madrid in Spain. It creates four satellite broadcast feeds, to which hundreds of remote stations are subscribing. It allows the stations to broadcast the contents of any of these four programs and switch between them using a scheduler. Further, it allows for the creation of customized contents for each station or group of stations.

The application enables the insertion of advertisement, news and other regional and local contents within the national or general programs. It also provides the necessary tools to switch the active signal to each station depending on desired schedule or to prepare programs with specific contents depending on for example, season and fixtures.

Xal Control, implemented in la Xarxa in Barcelona was created to replace an obsolete, unidirectional satellite radio network with a full duplex network using AEQ Phoenix audio codecs. The system server does not provide network commands but directly controls all the codecs at the network headquarters and remote stations. It also controls the audio routing matrix at the main station, creating the required cross-points for the routing of the required audio between the codecs and the studio consoles.

For information, AEQ in Florida at 1-800-728-0536 or visit [www.aeq-broadcast.com](http://www.aeq-broadcast.com).

**2WCOM SIRC IMPROVES REGIONALIZED  
REMOTE MANAGEMENT**

The new Google Maps feature of 2wcom's Satellite In-band Remote Control (SIRC) browser lets broadcasters carry out commands and reports per region.

Using the SIRC web interface, users can define any number of locations and associated regions ("shapes") for a country on Google Maps. The interface allows operators to select an entire view or a specific location by filter.

In addition, the Google Maps feature offers the ability to create commands such as traffic announcements and to send them to the specific region's encoders. For a traffic announcement command, the operator feeds SIRC's google maps web interface with the GPS coordinates and a radius of approximately 50 km to detect the affected encoder locations. A switch PID command is then generated and the addressed MPEG encoder receives the announcement for further distribution to all receivers in the defined area. SIRC can also receive messages via IP of for example local health reports from all satellite receivers in the field.

This provides remote management of all encoders and satellite receivers of a DVB-S/S2 network. Technicians will have access to all system devices via a web interface from any computer within the network.

As a result, the company says, centralized management is possible for switching of relays and presets or for uploading files such as firmware updates, audio or RDS, reports and configuration.

For information, contact 2wcom in Germany at +49-461-662830-0 or visit [www.2wcom.com](http://www.2wcom.com).

**DEVA BROADCAST DB4005  
PROMISES PRECISION**

DB4005 is the latest monitoring product from DEVA Broadcast.

The company says that the unit makes use of sophisticated DSP algorithms and provides SDR FM tuner-based signal processing. "Its powerful digital filters are a guarantee of precision and enable the FM signal to be accurately and repeatedly analyzed with each device," it adds.



A notable feature of the DB4005 is the MPX input, which allows users to monitor external composite signals, regardless of whether they are from a composite STL receiver/stereo FM encoder or from an off-air source. In addition, the loudness meter allows for measurements to be shown as defined by ITU BS.1770-4 and EBU R128 recommendations — the DB4005 supports both standards.

DB4005 is easy to use and packs a host of features. These include TCP/IP connectivity, audio streaming and automatic alerts for operation outside of pre-defined ITU-R ranges, as well as GSM connectivity.

For information, contact DEVA Broadcast in Bulgaria at +359-56-820027 or visit [www.devabroadcast.com](http://www.devabroadcast.com).

**DAVICOM PRESENTS CORTEX FOR  
SMALL-BUDGET REQUIREMENTS**

The Cortex 320 is Davicom's new baby in its intelligent remote-control family. Although built on the same platform as the Cortex 360, the 320 has been optimized for small-budget requirements, the company says.

Small-market and noncommercial stations can take advantage of the core benefits provided by larger, and more costly, remote controls.



The unit comes with 12 versatile inputs that can be used as metering or status inputs. Coupled with the 320's four dedicated status inputs, it can be configured for the right mix of GPIO.

The Cortex 320's 128 virtual logic gates can be used to program smart actions, depending on input conditions. Davicom units include advanced broadcast-related functions such as an automatic sunrise-sunset flag, direct VSWR indications, hysteresis to reduce false alarms and advanced math for logarithm and decibel calculations.

A notable design aspect of the 320 is its use of standard protocols and interfaces such as MODBUS and SNMP. Users can buy their own, low-cost/less intelligent devices and use the 320 to make everything work together smartly. They can also interface directly with gensets and transmitters without needing to buy extra hardware.

Like other Davicom products, the Cortex 320 is designed for electromagnetic compatibility in extreme environments. The company has an in-house EMC lab with full-sized TEM cell and 3-meter emissions test range.

Though the 320 is at home in an IP and networking environment, it can operate on dial-up lines or over narrow-band serial communications links down to 2400 baud.

This ensures the Cortex can be used and accessed at those sites where IP is not available or reliable.

For information, contact Davicom in Quebec at 1-418-682-3380 or visit <http://cortex.davicom.com>.

# Open the door to *your* possibilities!



ON THE AIR

Powerful, state-of-the-art automation with the flexibility to grow with you...

- The power of OPX in one stand-alone computer
- Easy to learn
- The power to handle the largest audio libraries
- Satellite and live programming
- Additional stations
- Remote voicetracking
- Remote control

## OPX ONE

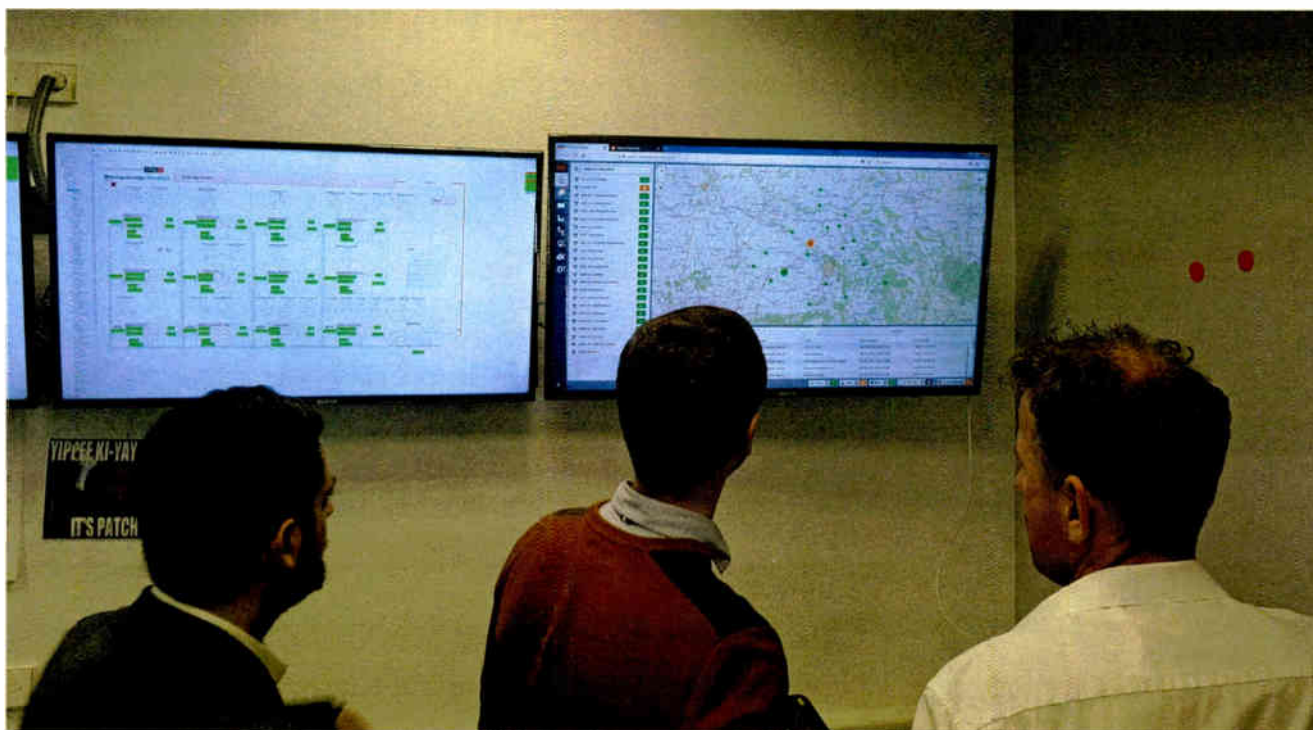


**Call (888) 274-8721**

(888) BSI-USA-1

or email us at [sales@bsiusa.com](mailto:sales@bsiusa.com)

Signal Monitoring, Remote Control, Test &amp; EAS



## WorldCast Manager Sees the Big Picture

ams-Radio and MediaSolutions relies on current information provided for operations

### SPECIAL REPORT

BY CHANTAL FOURGEAUD

**BIELEFELD, GERMANY** — ams-Radio and MediaSolutions is a radio solution provider for seven local radio stations around Bielefeld, Germany, as well as a technical support provider to 12 area radio stations. ams-Radio and MediaSolutions is one of the WorldCast Manager's early adopters and a user since 2017.

Mario Schoemitz, IT business manager, responsible for the broadcast technology area, shared his company's experience using the WorldCast Manager

platform.

As a solutions provider for radio broadcasters, ams-Radio and MediaSolutions is entrusted to oversee, across multiple sites, FM broadcast equipment from different vendors for applications such as IP transport, media processing and FM transmission.

In 2017, the company was looking for a new, reliable, and easy-to-use monitoring solution which would provide them real-time status, alarms, and other advanced modules to optimize their workflow, maximize equipment uptime, and provide overall support in delivering the best service to their customers, at the level expected of a reputable solutions provider.

#### UNIFIED, END-TO-END MONITORING

The WorldCast Manager is an enterprise, end-to-end and multivendor monitoring and control software for broadcast and media. It enables users to oversee their entire ecosystem across a single unified view, to centralize data, and to streamline the management of IP-enabled gear and technology. The scalable WorldCast Manager plugs in to any third-party or in-house technology with open protocols and APIs, and functions on an open-driver policy.

Its combination of modules enables users to:

- Maximize their equipment uptime thanks to real-time alarms, notifications, time-based reporting and root cause analysis;
- Save time for operations with time management features, event resolu-

tion tracking, and advanced control for remote actions over connected equipment with industry standard protocols;

- Make intelligent decisions by aggregating data from multiple units and locations, then transforming that data into comprehensible, visual insights and reports.

ams-Radio and MediaSolutions primarily uses the WorldCast Manager for monitoring, reporting, and analyzing events for their customers. It directly informs their technicians in the case of major events, enabling fast intervention.

**The WorldCast Manager has "significantly improved" the team's workflow.**

The WorldCast Manager has, according to Schoemitz, significantly improved his team's workflow. Thanks to the platform's user friendliness and range of functions, it makes it easy for everyone at the company to oversee all events at each transmitter site, across one, single view.

"We've recently upgraded to the newest version and we are very excited about the new modules. The best aspect for us is the analytics. We can compare all events in the timeline and see the relationships between events."

The new reporting module is designed to save time and quickly generate updates for customers.

"I recommend the WorldCast Manager as a very powerful tool for all broadcasters; it is very easy to use and gives users all the information that they need for monitoring multiple sites," he said.

For information, contact Tony Peterle at WorldCast Systems in Florida at 1-305-249-3110 or visit [www.worldcastsystems.com](http://www.worldcastsystems.com).

 <p><b>Studio Items Inc.</b></p>   <p>Mic Booms On-Air Lights Speaker Mounts <a href="http://www.studioitems.com">www.studioitems.com</a></p>	<p><b>TORPEY TIME</b> (The Good Time People)</p>   <p>Clocks Up/Down Timers <a href="http://www.ram68.com">www.ram68.com</a></p>	<p><b>Dixon Systems</b></p>   <p>News Mixers Line Matchers USB Audio Codecs <a href="http://www.ram68.com">www.ram68.com</a></p>	<p><b>RAM Systems</b></p>   <p>Broadcast Furniture Systems Integration Sound Absorption Panels <a href="http://www.ram68.com">www.ram68.com</a></p>
--	--	--	---

More than 50% of new vehicles ship with HD Radio technology



**NAUTEL HAS YOU COVERED**

[nautel.com/HDradio](http://nautel.com/HDradio) 



**TECHUPDATE**

**V-SOFT RELEASES UPGRADED PROBE**

V-Soft Communication's RF signal propagation measurement program Probe has been upgraded to major version 5.

Probe 5 is now a 64-bit program, with significantly more processing power, V-Soft says. The program offers the ability to accept signal measurement files from any of the major mobile signal analyzer brands. Probe 5 will combine Longley-Rice mapping with "snail trail" measurements to produce masterful maps using a unique algorithm that extrapolates the real world in a blend with predicted measurements.

The program now includes the "industry standard" NSMA OHLOSS propagation algorithm.

Other propagation methods include standard FCC, Longley-Rice, Okumura/Hata/Davidson and COST-231/Hata, point-to-point path profile analysis, line of sight/shadow, the FCC's PTP and PTP2 methods and ILLR Satellite Home Viewers Act.

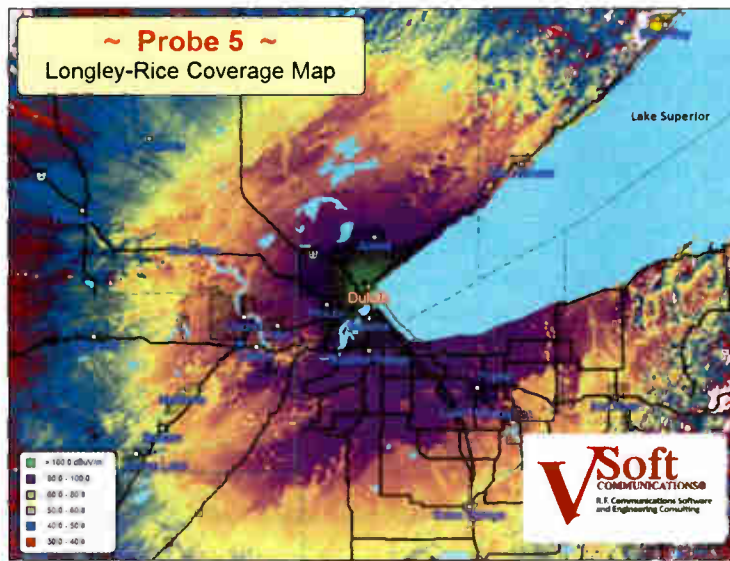
According to the company, Probe 5 produces spectacular "atlas" type maps, now with authentic U.S. topographic map backgrounds. The program integrates a high-resolution population database with V-Soft's polygon mapping.

Users can carry out single or multiple station communications radio or broadcast coverage studies, incoming or outgoing interference studies, highest signal two-way coverage and others. For broadcast-related interference studies, Probe automatically identifies the stations to which interference is caused, as well as those stations which cause interference to the user's reference station facilities.

Available as an option is the ITU propagation model (P. 1546), based on International Telecommunications Union rules and regulations. V-Soft says this is a significant propagation breakthrough that allows Probe 5 to be used in tandem with the global SRTM 03 arc-second digital terrain elevation database to predict signal coverage and interference in accordance with the ITU standards, anywhere in the world.

Probe 5 includes an interactive profile tool that will graph the elevation and signal profile between a transmitter and a desired receive point at a user selected Earth curvature.

For information, contact V-Soft Communications in Kansas at 1-800-743-3684 or visit [www.v-soft.com](http://www.v-soft.com).



Omnia

# Abracadabra!

And just like that!  
It goes from AM to FM to HD/DAB/DRM  
to Streaming to Stereo Generator.

[TelosAlliance.com/Omnia-VOLT](http://TelosAlliance.com/Omnia-VOLT)

SHAPING THE FUTURE OF AUDIO  
THE TELOS ALLIANCE

## Got Blending Issues?

Analog FM & HD1 Perfectly In Sync  
**JUSTIN 808**  
HD Radio

GETTING FROM HERE TO HERE

**INOVONICS**  
BROADCAST

Everything you need. **The iXm bundle.**  
Get the iXm along with first-class accessories. For an unbeatable price.

+

iXm Windscreen Keeps the noise away.

+

Get the ultimate protection for your iXm

+

iXm Uplink Transfer your interview via iPhone

[www.yellowtec.com](http://www.yellowtec.com) **YELLOWTEC**

**iQx** AXIA

# Look below the surface

[TelosAlliance.com/iQx](http://TelosAlliance.com/iQx)

SHAPING THE FUTURE OF AUDIO  
THE TELOS ALLIANCE

Broadcasters General Store  
*Family Owned & Operated Since 1979*

Your source for broadcast  
equipment and services.

*Contact us for a quote today!*

**352-622-7700** [www.BGS.cc](http://www.BGS.cc)

Signal Monitoring, Remote Control, Test &amp; EAS

**TECHUPDATE****COAXIAL DYNAMICS WEB WATTCHMAN EYES THE WATTS**

The Model 81096 from Coaxial Dynamics is the latest in a series of internet/intranet accessible Wattchman Wattmeter/alarm systems that will monitor both forward and reflected power in two transmission lines with only one controller.

Coaxial Dynamics says that unlike most systems that need one controller for each transmission line, the Web Wattchman will monitor two lines (four ports). The front-panel display shows power on both systems simultaneously. Operating conditions may also be displayed on a PC from any location on the internet/intranet.

The Model 81096 is designed to work with a series of specialized line sections from 7/8-inch to 6-1/8-inch and Coaxial Dynamics elements for either analog or



digital applications. Elements are available from 1 W to 250 kW and from 2 MHz to 1800 MHz.

For information, contact Coaxial Dynamics in Ohio at 1-800-262-9425 or 1-440-243-1100 or visit [www.coaxial.com](http://www.coaxial.com).

**PRODUCTS & SERVICES SHOWCASE**



**RF Specialties®  
Group**

The most trusted Nautel  
dealer for 35 years

Contact your local RF Specialties  
office for more information

[rfspecialties.com](http://rfspecialties.com)

A Great Place to Advertise!

**RADIOWORLD**

Radio World's **Products  
and Services Showcase**  
provides a perfect medium for  
marketing your products and services.

For more information contact  
[john.casey@futurenet.com](mailto:john.casey@futurenet.com)  
**1-845-678-3839**  
to request a media kit.

*Thanks for Reading Radio World!*

**SPACE IS  
AVAILABLE!**

To advertise, call

**1-845-  
678-3839**

**WEATHER RADIO**

Model CRW-S With Same Decoding

Price \$740



Sensitivity .28 microvolts for 12 dB quieting. All seven frequencies. SAME decoding demutes receiver, closes relay and gates audio to 600 ohm rear terminals. Another set of rear terminals has continuous 600 ohm audio output. Double conversion crystal controlled, crystal filter in first I.F., ceramic filter in second I.F. Dual gate MOS FET front end. 50 ohm coaxial input. Adjacent channel ( $\pm 25$  kHz) down to 70 dB. 19" rack mount, 1.75" H, all metal enclosure. In stock — available for immediate delivery. THE WEATHER RADIO WILL NOW DRIVE A REMOTE SIGN BOARD

**GORMAN REDLICH MANUFACTURING CO**

257 W. Union Street Athens, Ohio 45701

Phone: 740-593-3150 [jjmg@gorman-redlich.com](mailto:jjmg@gorman-redlich.com)

[www.gorman-redlich.com](http://www.gorman-redlich.com)

# Buffer Compromise Would Boost FM Class C4

Idea would create a protective bubble around underbuilt FM stations

## COMMENTARY

BY MATTHEW WESOLOWSKI

*The author is CEO of SSR Communications, owner of WYAB(FM) in central Mississippi.*

A proceeding currently before the Federal Communications Commission to provide eligible Zone II Class A commercial FM broadcasters an opportunity to upgrade from 6 kilowatts to 12 kilowatts has not attracted a great number of headlines this year, but that has not prevented the FM Class C4 proposal from making some significant strides as of late.

Most noteworthy, the Class C4 FM idea has attracted some powerful allies. In January, the proposal won the backing of Sen. Roger Wicker of Mississippi, sitting chairman of the U.S. Senate Committee on Commerce, Science, and Transportation, the congressional body that maintains direct oversight over the FCC.

Sen. Wicker noted that the power increase could be of particular benefit

to "small and rural radio stations" in a letter to FCC Chairman Ajit Pai. In his February 2019 reply, Chairman Pai agreed by saying that the FM Class C4 option "could be especially important for small, minority-owned stations that currently cannot serve their entire communities."

### TURF WAR

Sen. Wicker now joins the list of approximately 130 small broadcasters who filed comments in full support during the FM Class C4 Notice of Inquiry (MB 18-184, FCC 18-69) filing windows in September, 2018.

Several years prior, FCC Chairman Ajit Pai first advocated for the new station class in September, 2016 at the NAB/RAB Radio Show in Nashville, Tenn., and going back further, the Multicultural Media,

Telecom and Internet Council (MMTC) supported the effort in 2013 when it helped author the original proposal.

Predictably, a turf war has erupted between the small broadcasters that the FM Class C4 proposal would benefit, and larger license holders who generally control the biggest signals in any given market.

The National Association of Broadcasters did not support the introduction of a new station class, which is unsurprising, as that same organization vehemently opposed the creation of the FM Class C0 allotment type some 20 years earlier. Although larger companies stopped short of endorsing the idea fully, some nationwide broadcasters did come out in support of the FM Class C4 concept,



Matthew Wesolowski has told the FCC that hundreds of FM Class A stations would be able to double in power thanks to a Class C4, "and would gladly do so if given such an opportunity."

including Educational Media Foundation, while iHeartMedia did not oppose the new station class in its comments.

The current sticking point in the FM Class C4 proceeding appears to stem from a component of the proposal that would give certain underbuilt Section 73.207-licensed stations a Section 73.215 designation, provided that the affected station has operated under its maximum antenna height, power level or equivalent thereof, for a period of 10 years or more.

Under the current FCC rules, a neighboring station looking to upgrade that is adjacent to an underbuilt Section 73.207-licensed station must treat that station as if it were fully built out, whereas a Section 73.215 station can be protected assuming its actual antenna height and power level.

The practice of treating underbuilt stations as if they were fully constructed can have large implications for smaller adjacent stations wanting to upgrade in power or situate their antenna sites more favorably. For example, a full FM Class C1 station is able to broadcast with 100 kilowatts of power from an antenna height above average terrain of 299 meters. If that station were to have

(continued on page 29)

## BROADCAST EQUIPMENT EXCHANGE

### ANTENNAS/TOWERS/CABLES

#### WANT TO SELL

CCA FM8000G Trans 107.9, great cond; 4-Bay Jampro antenna w/deicers; 3-bay Shively antenna FM. D Brockman, 606-965-3436.

### AUDIO PROCESSING (INCLUDES ON-AIR)

#### WANT TO BUY

Teletronix LA-2A's, UREI LA-3A's & LA-4's, Fairchild 660's & 670's, any Pultec EQ's & any other old tube compressor/limiters, call after 3PM CST - 214 738-7873 or sixtiesradio@yahoo.com.

Wanted: real plate reverb. abgrun@gmail.com.

### MICROPHONES/HEADPHONES/SPEAKERS/AMPS

#### WANT TO SELL

1934 RCA 77A double ribbon microphone, originally used by Arthur Godfrey at WFBR Baltimore. 100% perfect condition. Contact Bill Cook, 719-684-6010.

#### WANT TO BUY

RCA 77-DX's & 44-BX's, any other RCA ribbon mics, on-air lights, call after 3PM CST, 214 738-7873 or sixtiesradio@yahoo.com.

### MISCELLANEOUS

#### WANT TO SELL

UPGRADE consoles to international specs with world

standard Weston 30B illuminated 4" vu meters. 4 in like-new condition. Gramophone@earthlink.net

I'm selling between 150 and 200 cassette tapes that consist of old-time radio shows, sports shows, some local New York radio talk shows, etc... Must take entire collection and the price is negotiable. Please call me for details and, my phone number is 925-284-5428.

Radio broadcasts of Major League Baseball, NFL, and some college football games that are on cassette tapes, approx 100 to 125 games, time period of entire collection os from the 1950's - 1970's, BO. Must purchase entire collection. Contact Ron, 925-284-5428 or ronwtamm@yahoo.com

## CONSULTANTS

Without advertising a terrible thing happens...

...NOTHING

For information call John 1-845-678-3839

**Doug Vernier**  
Telecommunication Consultants

Broadcast Engineering Consulting  
AM/FM/TV/LPTV/DTV  
Custom mapping service  
Frequency searches  
Propagation prediction  
FCC application preparation

**VSoft**  
SOFTWARE FOR YOUR PC

(800) 743-3684  
www.v-soft.com

WYBG 1050, Messina, NY, now off the air is selling: 250' tower w/building on 4 acres; 12' satellite dish on concrete base; prices drastically slashed or make offer. 315-287-1753 or 315-528-6040

#### WANT TO BUY

Collector wants to buy: old vintage pro gears, compressor/limiter, microphone, mixing consoles, amplifiers, mic preamps, speakers, turntables, EQ working or

not, working transformers (UTC Western Electric), Fairchild, Western Electric, Langevin, RCA, Gates, Urei, Altec, Pultec, Collins. Cash - pick up 773-339-9035 or ilg821@aol.com.

2" plastic "spot" reels 6.5 or 8" diameter, as used for quad video. Wayne, Audio Village, 760-320-0728 or audiovlg@gte.net.

Equipment Wanted: obsolete, or out of service broadcast and recording gear, ampli-

fiers, processing, radio or mixing consoles, microphones, etc. Large lots preferred. Pickup or shipping can be discussed. 443-854-0725 or ajkivi@gmail.com.

I'm looking for KFRC radio special of Elvis Presley which aired on January 8, 1978. I'd be willing to pay for a digital copy. Ron, 925-284-5428.

I'm looking for KTIM, AM,FM radio shows from 1971-1988. The stations were located in San Rafael, Ca. Ron, 925-284-5428.



Se Habla Español

## Rebuilt Power Tubes 1/2 the cost of New!

# ECONCO

Se Habla Español

Tel: 800-532-6626 Web: [www.econco.com](http://www.econco.com)  
 Intl +1-530-662-7553 Fax: +1-530-666-7760



**Looking for a good deal?**  
 You've come to the right place.

**To advertise call John**  
**at 845-678-3839**  
**or email**  
**[john.casey@futurenet.com](mailto:john.casey@futurenet.com)**

### MISCELLANEOUS

#### WANT TO BUY

I'm looking for the Ed Brady radio show in which he did a tribute to Duke Ellington, the station was KNBR, I'd be willing to pay for a digital copy. Ron, 925-284-5428.

I'm looking for San Francisco radio recordings from the 1920's through the 1980's. For example news-cast, talk shows, music shows, live band remotes, etc. Stations like KGO, KFRC, KSFO, KTAB, KDIA, KWBR, KSF, KOB, KCBS, KQW, KRE, KTIM, KYA, etc, I will pay for copies... Feel

free to call me at 925-284-5428 or you can email me at [ronwtamm@yahoo.com](mailto:ronwtamm@yahoo.com).

Looking for a broadcast excerpt of a San Francisco Giant's taped off of KSFO radio from 1959, interviews with Willie Mays, Dusty Rhodes & some play by play excerpts, also features a homerun by Willie Mays and Felipe Alou stealing second base, running time is 18:02, also looking for SF Giants games and/or highlights from 1958-1978 also taped off KSFO Radio. Ron, 925-284-5428 or [ronwtamm@yahoo.com](mailto:ronwtamm@yahoo.com).

Looking for KFRC signoff radio broadcast from 1930 Andy Potter, running time is 0:22 & also the KLX kitchen the program guest is Susanne Caygill, a discussion of women's affairs with a long promotion for Caygill's appearance at a local store. Anne Truax, Susanne Caygill, running time is 13:44. Ron, 925-284-5428 or email [ronwtamm@yahoo.com](mailto:ronwtamm@yahoo.com).

Looking for KSF radio shows, Disco 104 FM, 1975-1978. R Tamm, 925-284-5428.

Looking for KTIM FM radio shows from 1981-1984 if possible unscoped. R Tamm, 925-284-5428 or [ronwtamm@yahoo.com](mailto:ronwtamm@yahoo.com).

### RECEIVERS/ TRANSCEIVERS

#### WANT TO SELL

Johnson Electronic SCA880 module, 67/92 Khz, 417-881-1846.

### WANT TO BUY

AM Stereo radio. Call 417-881-1846.

### RECORDING & PLAYBACK HARDWARE

#### WANT TO BUY

1960s-vintage MacKenzie Repeater machines, magazines, spare parts and manuals, complete or "parts" machines considered, James, 870-777-4653.

Schnader telecriptions 16 mm musical films produced in the early 50s. Bill Cook, 719-684-6010.

Large or small collections of 16" transcriptions or 12" transcriptions, not commercial LPs. Bill Cook, 719-684-6010.

Standard Short-tune series. Bill Cook, 719-684-6010.

(2) LPFM radio stations for sale, located in the NW part of central Florida on the gulf coast, covers the county, get out of the cold weather, come to Florida, call or write for particulars, 352-613-2289 or email [boceey@hotmail.com](mailto:boceey@hotmail.com) or Bob, PO Box 1121, Crystal River, FL 34423.

**RADIOWORLD**  
 Equipment Exchange

### RF CONNECTORS

#### WANT TO SELL

RF CONNECTORS & GADGETS - Parts, Products & More!  
[www.W5SWL.com](http://www.W5SWL.com)

### TAX DEDUCTIBLE EQUIPMENT

Donate your broadcast facility; IRS approved 501(c)(3) non-profit charitable organization. Fair market value. License (AM/FM/FV), land, building, tower, equipment, etc. The Augustus Foundation, Inc., 2902 Main Street, La Marque, Texas 77568. (409) 359-3435. Contact Dr. M. Augustus

### TRANSMITTERS/ EXCITERS/TRANSLATORS

#### WANT TO SELL

BE-25T 25KW FM transmitter 2007 frequency agile tube transmitter in good working condition on 90.7 (all its life) when

pulled from service. Approx. 6 mos. on rebuilt tube and a newly rebuilt fan motor, also spare optical modules, manuals and maintenance logbook. \$17,500/OBO. As-is, where-is: Hayward, CA, Jeff Cotton, 530-279-6262 or [info@kdup.org](mailto:info@kdup.org).

BE 35kW FM, and QEI 3.5kW FM. Make an offer on either or both. All working when removed. Steve Tuzeneu 704-973-0438 (9 a.m. to 4 p.m., Monday-Friday) or [stuzeneu@bbnmedia.org](mailto:stuzeneu@bbnmedia.org)

**SPACE IS  
AVAILABLE!**

## DISTRIBUTOR DIRECTORY

The following distributors serving the broadcast industry would be glad to help you with any of your requirements.

CORNELL-DUBILIER  
MICA CAPACITORS

FROM STOCK

JENNINGS VACUUM  
CAPACITORS

FROM STOCK

HIGH ENERGY CERAMIC  
CAPACITORS

**SURCOM ASSOCIATES**

5674 El Camino Real, Suite K  
 Carlsbad, California 92008  
 (760) 438-4420 Fax: (760) 438-4759  
 e-mail: [link@surcom.com](mailto:link@surcom.com) web: [www.surcom.com](http://www.surcom.com)

## TUNWALL RADIO

SWITCH AND TRANSMITTER CONTROLLERS



AM/FM/MULTI-SWITCH AND CUSTOM DESIGNS

330.995.9642

[www.tunwallradio.com](http://www.tunwallradio.com)

# EMPLOYMENT

### POSITIONS WANTED

Are you a small market station needing a good nuts & bolts engineer in the Los Angeles area? I will make your station shine! CET, fully FCC Licensed. Available for Full/Part-time/Contract work. Available immediately. Mitchell Rakoff, 909-446-6820, [mitchellrakoff@yahoo.com](mailto:mitchellrakoff@yahoo.com).

### SITUATIONS WANTED

Manager-engineer with multiple decades of experience in many areas, seeks full-time executive level position (G.M.) or higher with CCM, modern Inspo, or G-rated family-friendly secular format(s). Prefer warm climates. Send complete details to: [radioigm@hotmail.com](mailto:radioigm@hotmail.com)

## CLASS C4

(continued from page 27)

an antenna height of only 200 meters above average terrain, then its primary service contour would be about 5 miles short of what a fully built FM Class C1 facility could reach. Any competing neighboring station looking to upgrade is compelled to protect that underbuilt station for five extra miles of coverage that it does not (or if underbuilt for more than 10 years, likely will not ever) serve.

### BUFFER ZONE

In August 2019, SSR Communications Inc., which co-authored the FM Class C4 petition with MMTC, presented a revised version of the Section 73.215 aspect of the proposal to the FCC's Audio Division.

The amended plan would still call for redesignation of certain underbuilt Section 73.207 licensed stations as Section 73.215 authorizations, but would also provide a 3 dB protective "buffer zone" to allow the affected stations an opportunity to relocate or build out more fully in the future. The buffer zone would create a protective bubble around underbuilt stations, usually amounting to anywhere from 3 to 7 miles, depending on how severely underpowered or under-height the affected station may be.

This 3 dB buffer zone "compromise" would resolve the controversial aspects of the FM Class C4 proposal and should allow the proposal to advance.

The buffer eliminates almost all scenarios in which an affected reclassified Section 73.215 facility could be hemmed

in and blocked from making future service improvements or tower relocations. It would also disincentivize the Section 73.215 conference procedure for stations seeking such towards neighboring underbuilt Section 73.207 facilities in almost all cases, except for those involving Section 73.207 stations that are the most decidedly underbuilt with respect to their class. Indirectly, the buffer prevents almost any scenario in which a secondary service could be affected by the Section 73.215 component of the FM Class C4 idea.

### BREAKTHROUGH NEAR?

Meanwhile, an alternative waiver-based path towards a FM Class C4 equivalent facility may also soon exist. In July 2018, WRTM(FM) 100.5 MHz asked the Federal Communications Commission to consider allowing the station to double in power from 6 kilowatts to 12 kilowatts. If granted, the WRTM waiver application would establish new precedent and provide certain Class A FM stations an opportunity to enjoy an improvement in coverage.

Unlike the FM Class C4 proposal, the WRTM application (BPH-20180716AAC) suggests that, in order to double in power, a Class A FM licensee should guarantee that its upgraded signal would not impact vital LPFM and

FM translator services. Also departing from the Class C4 FM proceeding is the idea that a neighboring Section 73.207-licensed station could still be reclassified as a Section 73.215 facility if it is not built out fully, but only if that station has been operating below its antenna height or maximum power level for a period of 30 years (the FM Class C4 proposal states that a 10-year window is appropriate). The WRTM filing backs this argument by saying, "No zoning problem, FAA issue, or cost consideration could not be resolved within 30 years if the desire is truly there to build out fully."

Whether moving forward "as is," as an amended proposal with a 3 dB buffer zone consideration, as a waiver-based procedure for eligible stations, or something else altogether, what will happen next in the FM Class C4 proceeding is anyone's guess.

What is clear is, however, that hundreds of FM Class A stations would be able to double in power and would gladly do so if given such an opportunity. With support in high places, it seems as if a breakthrough is just around the corner, and it could be sooner than later that the FM Class C4 idea moves from concept to reality.

*Comment on this or any story. Write to radioworld@futurenet.com.*

## READER'S FORUM

### IT'S NOT ALL GLASS

I just got to read the Sept. 25 issue and would like to add a comment on the article "Seeking Enlightenment on Lightning Protection?" by Jeff Welton as it pertains to fiber optic lightning immunity.

I live and work in Iowa where, like most flat states, if you stick a 10 penny nail in the ground, it will probably take a direct lightning hit in the next storm.

Four years ago, my telephone provider switched from copper pair and DSL to homes and businesses to direct fiber. This was a great thing for my internet, when went from 5 meg down and 1 meg up to 100 meg both ways. And all was well until the next summer.

A fairly active thunderstorm came through and there was a strike near the end of our driveway about 1/4 mile from our home. I knew it was close because there are two light fixtures out there, and the bulbs were both blown and melted into their sockets.

Well, after the strike, we had no phone and no internet; also the television, Apple TV box and two computers wouldn't turn on. It wiped the phone company's fiber-to-copper modem mounted on the outside of the house, wiped the router, both computers, the Apple box and the input board on the television where the HDMI cable from the Apple box was plugged in.

After the phone company fixed their problems and I got the TV fixed by Apple (and fixed the television myself and threw out the computers), we were back to normal.

I thought maybe it had hit the lights and come back through the AC line, or hit my ham tower. I checked all the grounds and let it go, figuring the fiber is glass, it couldn't possibly come through there.

A year later almost to the day, same exact thing. This time it didn't damage the outside lights — just the modem, router, Apple TV, television and another computer.

Now I was suspicious. I told the telephone repairman, "It seems like we never had trouble when we had copper pairs; but now since you guys went to fiber, we are having lightning damage to anything connected to the fiber."

Well, the guy was on the ball. He said, "You know, the fiber is in a copper shield to protect it from crushing; maybe it's coming in on the copper shield."

The shield was bonded to the modem, which had the usual four-foot ground rod driven. Next day, they sent a crew that terminated the copper shielded cable outside and ran just a piece of fiber, one strand into the house and moved their modem to the basement.

Now there is a length of 15 feet of pure glass between the incoming cable and the modem. Since that was done two years ago, we have had no trouble, though the storms are as potent as ever.

Watch out for buried fiber, it can be destructive. It's not all glass.

Ron Schacht  
Kensett Iowa



**Strategize your audio branding and imaging by defining its boundaries and style. Create a vision that fits all the core values you have identified through research.**

## SEEING SOUNDS

(continued from page 30)

successfully and reinforce the brand.

Don't forget to consider all the non-linear touch points your audio branding has with your audience, including online, on demand, and at events.

*Step #5: Create a world-class audio brand!*

Strategize your audio branding and

imaging by defining its boundaries and style, and creating a vision that fits all the core values you have identified through research. The more thought you put into it, the more successful you will be in creating a great audio brand that listeners love, remember and choose to spend time with.

*Benttown is a radio imaging, production library, programming, jingles and voiceover services company. See benttown.com.*

# Seeing Sounds: How to Create a World-Class Audio Brand in Five Steps

## COMMENTARY

BY ANDREAS SANNEMANN

*The author is CEO of Benztown.*

Every great audio brand tells a story, and makes listening to a radio station an experience far beyond just accessing a format. In this age of countless choices in entertainment and audio jukeboxes in the form of digital and on-demand music services, radio imaging is more critical than ever to creating an experience and world that listeners want to spend as much time with as possible.

Audio branding and imaging reinforce a station's story with detail, nuance and frequency, identifying and differentiating the brand from its competitors in a strategic and engaging way. Imaging is the character or vibe of a radio station



Andreas Sannemann

that everything else is built upon, the nucleus of the brand that communicates brand personality with the audience more often than when the mic's open.

That said, audio branding, radio imaging and sound design are highly abstract, artistic and subjective areas. So how do we evaluate such a complex, intangible medium? What is the difference between a good audio brand and a

great audio brand? Would it help if we could see sound?

## VISUALIZATION

"Seeing Sound" is a blueprint for Benztown's creative team. It is a five-step process developed over the years to deconstruct, understand and create world-class audio brands and to transform good audio brands into great audio brands.

This process is characterized by the visualization of sounds, and allows imaging directors to visualize their brand and define it for their program directors, general managers, and production team.

It is not a one-size-fits-all recipe for sound design. Every station has a unique market, format, positioning against web competition and other differentiating factors that need to be evaluated individually and as a whole. But it all starts here and helps drive the tremendous success we have building great audio brands that listeners love with our station clients and partners.

*Step #1: Know who you are, what you do and for whom you are doing it.*

Define the core values of your program and brand characteristics by developing an on-air positioning statement. Are you optimistic or informative? Is your goal to be an opinion leader or a friendly neighbor? Great audio brands are useful to the listener, as well as being entertaining and fun. Audio branding has your station's values at heart, and those values drive every audio expression of the brand.

Once you know who you are as a brand, develop a core listener profile by identifying who is currently listening and whom you wish to reach. That is where reliable research comes into play and informs the

process and your brand strategy.

You also need to know the competition and market dynamics. Be as specific and detailed as possible in your descriptions to draw a clear visual picture of your brand and the listener landscape. The clearer you are, the better your brand will be. This step is essential to creating an audio brand that hits the mark and resonates with listeners.

*Step #2: Translate these values into sounds.*

Use sounds to effectively tell your brand's story, creating a visual image in the listener's mind. This is where the art of sound design comes in. It is key to not only understand the music, but the demo and lifestyle of listeners; to speak to them directly through jingles, custom imaging and promos that tell the story through effective and original use of sound; and build upon that story, week after week.

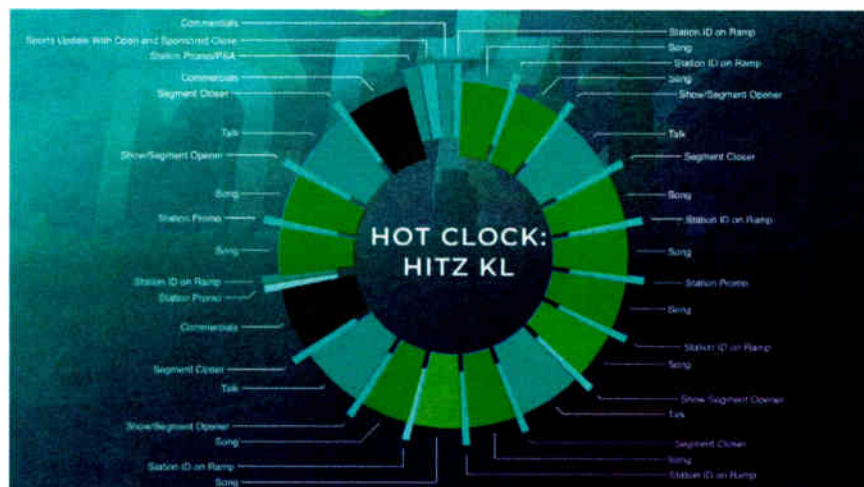
*Step #3: Compile all these values into a world-class audio brand identity and an outstanding sound logo.*

Deconstruct and define how your sound will be produced in relation to genre, instrumentation, mood, rhythm and tempo (it never hurts to do research to guide your decisions). These choices should be reflected in all station-related audio, including jingles and voiceover artists.

*Step #4: Identify your station's touch points with listeners through audio branding. Every interaction is an opportunity to make an emotional connection with your listeners and create affinity for your brand.*

For example, our client Hitz Malaysia has 20 interactions with the listener in an average hour on air (see graphic). Those 20 interactions are 20 distinct opportunities to connect, cut through the noise, get the message delivered

*(continued on page 29)*



Hitz Malaysia has 20 interactions with the listener in an average hour on air — 20 distinct opportunities to connect and reinforce the brand.

## ADVERTISER INDEX

This listing is provided for the convenience of our readers. Radio World assumes no liability for accuracy.

PAGE	ADVERTISER	WEBSITE/URL
20	Acoustics First Corp	www.acousticsfirst.com
13	Arrakis Systems Inc.	www.arrakis-systems.com
1	Broadcast Bionics	www.bionic.radio
25	Broadcasters General Store	www.bgs.cc
23	BSI	www.bsiusa.com
4	Burk Technology	www.burk.com
7	Comrex Corporation	www.comrex.com
8	Davicom, a Div. of Comlab	www.davicom.com
32	Elenos Group	www.elenosgroup.com
1	ENCO	www.enco.com
26	Gorman Redlich Mfg	www.gorman-redlich.com
11	Inovonics Inc	www.inovonicsbroadcast.com
21	Lawo	www.lawo.de
10	Lightner Electronics	www.lightnerelectronics.com
6, 12, 14, 16, 18, 24, 26	Nautel Ltd.	www.nautel.com
31	Radio Systems Inc	www.radiosystems.com
24	Ram Broadcast Systems	www.ram68.com
26	RF Specialties	www.rfspecialties.com
15	Telos - The Telos Alliance	www.telosalliance.com/telos
9	Tieline Technology	www.tieline.com
2, 17, 19	Wheatstone Corporation	www.wheatstone.com

## ADVERTISING CONTACTS

### THE AMERICAS:

JOHN CASEY  
845-678-3839  
john.casey@futurenet.com

### EUROPE, MIDDLE EAST & AFRICA:

RAFFAELLA CALABRESE  
+39-320-891-1938  
Fax: +39-02-700-436-999  
raffaella.calabrese@futurenet.com

### SEND MATERIALS TO:

NICOLE SCHILLING nicole.schilling@futurenet.com

meet

# RUBY



### **Fantastic Lawo Broadcast Consoles**

are now widely available and fully supported by a name you know and trust in the USA.

Ruby, Sapphire, Crystal, and R3LAY (virtual) console systems offer simply the best in performance, dependability and sophistication because they are designed by Lawo and built in Germany for the ultimate in engineering and durability. And Radio Systems provides local sales, service and support for your perfect international combination.

Overall, Lawo consoles are simply the most BEAUTIFUL, SOPHISTICATED, and FLEXIBLE consoles in the world—yet now available at prices below their able competition. Contact Radio Systems today for more information or to arrange for your personal interactive video demonstration.

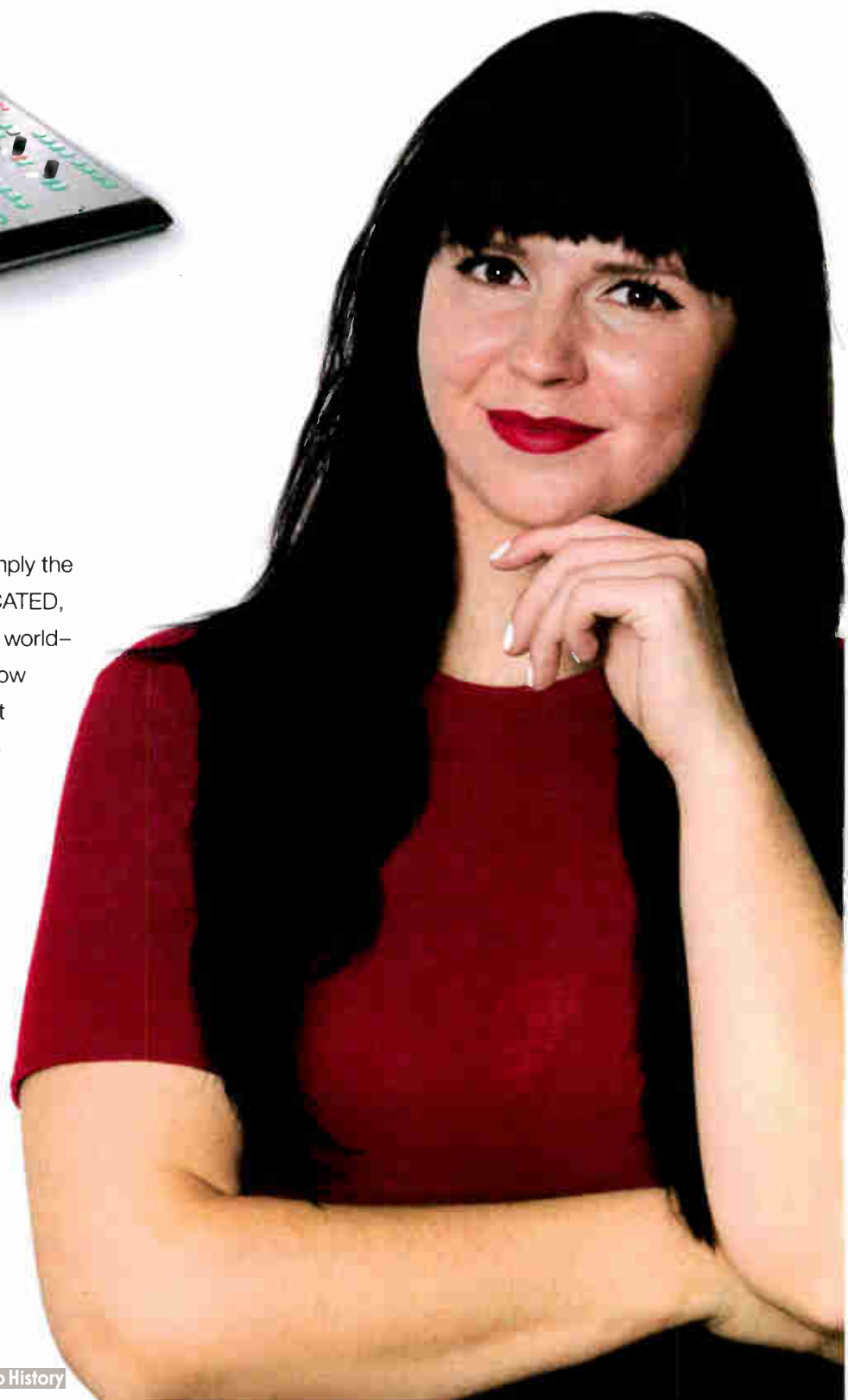


Radio Systems, Inc.  
601 Heron Drive, Suite A, Logan Township, NJ 08085  
856.467.8000 Fax: 856.467.3044  
[www.radiosystems.com](http://www.radiosystems.com)

Hi, I'm Ruby Carr. And yes,  
my name really is Ruby. Get it?  
Ruby Carr/Ruby Consoles?

Anyway, I'm a radio host in Toronto  
and I truly think these Lawo consoles  
look great. With a name like Ruby,  
they've got to be good!

*Ruby*



ELENOS GROUP



# WEBINAR

## Engage Everybody

October 29th, 2019 12 noon EDT

Indium High Efficiency FM transmitters  
from 150 watts to 60kW

Peter Conlon and Antonello Giovanelli

November 5th, 2019 12 noon EST

Meet the BE Customer Service Team

Andy Berry

November 19th, 2019 12 noon EST

ATSC-3 the Big Picture

Perry Priestley

December 3rd, 2019 12 noon EST

AudioVault updates and innovation

Bob Demuth

December 17th, 2019 12 noon EST

FM Single Frequency Networks  
theory and practice

Morten Simonsen

January 14th, 2020 12 noon EST

The RF Supercomputer

Morten Simonsen



Broadcast Electronics and ELENOS GROUP have released their Fall/Winter webinar schedule, and there's a lot to see and learn.

These webinars are hosted by Chuck Kelly and have been approved by the Society of Broadcast Engineers for 1/2 recertification credit in Category I for re-certification.

There is no cost to register for these informative webinars which will last about 45 minutes, with time for questions.

We look forward to  
seeing you at **our webinars!**  
Register today online at

[www.eleosgroup.com/webinar](http://www.eleosgroup.com/webinar)

CHOOSE ELENOS GROUP  
WITH A COMBINED 40,000  
INSTALLATIONS WORLDWIDE



PRO TELEVISION

