



2019 WBA Broadcasters Clinic



SBE National Meeting



October 15-17, 2019

Madison Marriott West

#WBABC19

Voted Best Regional Conference



2019 DEDICATIONS AND DISTINCTIONS



The 2019 WBA Broadcasters Clinic is dedicated to Gary Mach for his 35 years of service. Gary is retiring from the Clinic Committee and we thank him for his commitment.

Gary Mach's career spans nearly six decades and has put him in every level of support from staff engineer to corporate engineer. Gary successfully completed several facilities upgrades during his career, in addition to countless engineering accomplishments, like rebuilding transmitters and studio systems. During his time working with Wisconsin Public Broadcasting and PBS, Gary's facilities and staff produced many award-winning television programs. He designed the telecommunications facilities for the Weidner Center for the Performing Arts and the Center for Television Production, both on the University of Wisconsin-Green Bay campus. Gary shared his skills and talents with the technical college system, the Catholic Diocese of Green Bay, Cellcom Communications, and many others. He continues consulting long after his retirement.

"Gary's management style is more like that of a teacher. Gary would more often say 'come let me show you how' rather than 'just go do it' when directing the inexperienced under his charge," said Leonard Charles. "The word 'mentor' only begins to demonstrate how he carried himself throughout his career."

Gary served on the WBA Clinic Committee 35 years. His commitment to broadcast engineering and dedication to sharing his knowledge will leave their marks on the industry.



WBA Clinic Committee member Bill Hubbard has been named the 2019 James C. Wulliman Educator of the Year by the Society of Broadcast Engineers.

Hubbard recently retired from a long career in broadcast engineering. He is one of the charter members of Chapter 80. Along with his service with the University of Wisconsin-Green Bay, Hubbard spent much of his time volunteering with the WBA Clinic Committee. In that role, he assisted in putting together two educational seminars each year. Since 2013 Bill has also contributed to the Media Technology Institute, a seminar to train new graduates in the basics of broadcast engineering. MTI was founded by Terry Baun who, in 2018, tapped Hubbard to head the Institute.

In 2019, Hubbard also developed and helped implement an incentive plan for Chapter 80 members to become SBE certified. The plan allows for Chapter 80 fundraising proceeds to be used to reimburse members for SBE certification exams and study materials.

We look forward to seeing you at the 2020 Broadcasters Clinic and Upper Midwest SBE meeting, Oct. 13-15



Wisconsin Broadcasters Association



Clinic Facebook Group: [tinyurl.com/j8YWKEV](https://www.facebook.com/j8YWKEV)



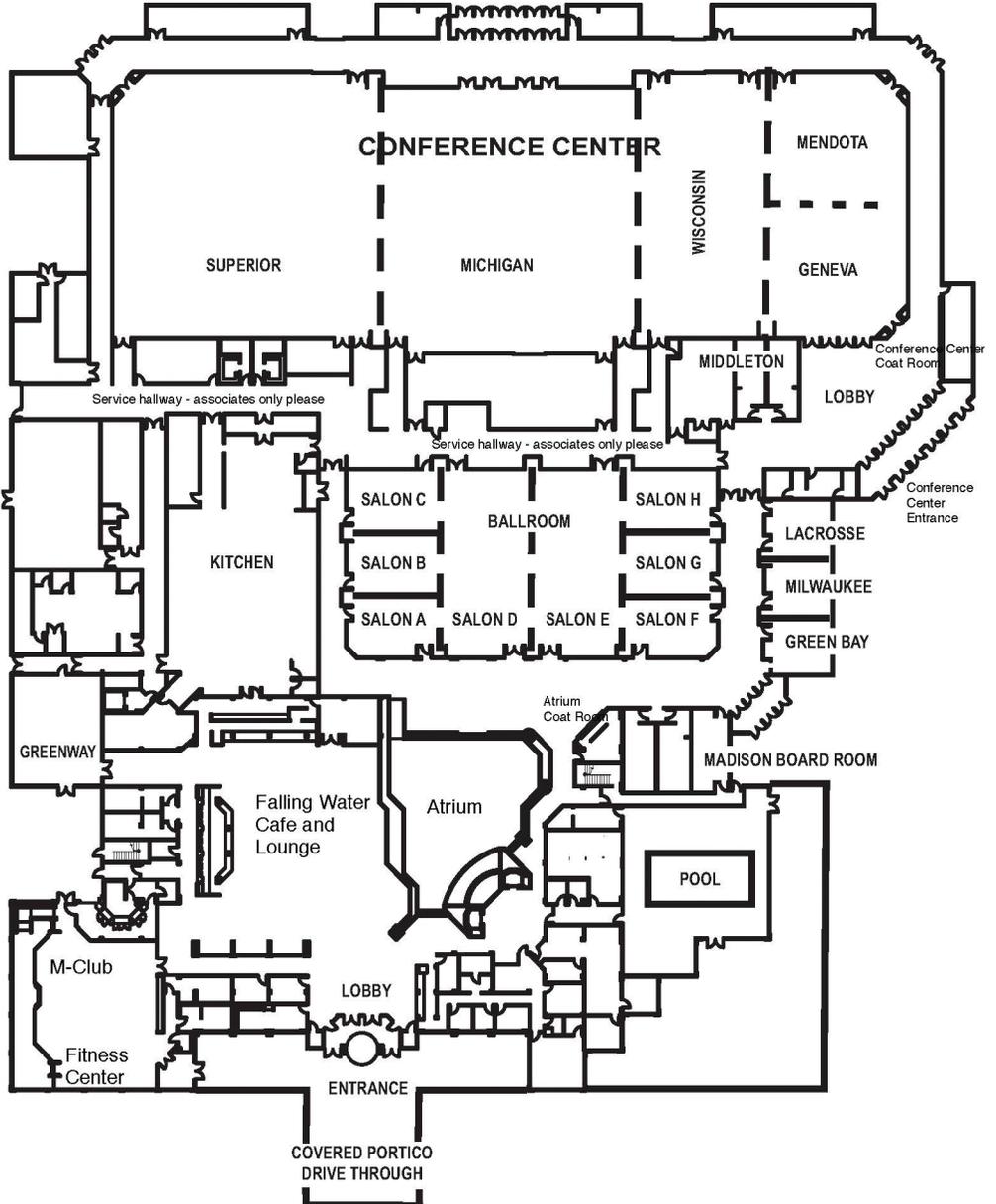
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Tuesday, October 15

8:30 a.m. **War Stories: Tales from the Trenches**

Jeff Welton, Nautel

If you've seen any of Jeff's presentations you will have noticed that he occasionally makes use of a "shouldn't have done it that way" photo—a picture taken demonstrating something that is done in a less-than-ideal manner. This presentation will highlight some of those photos, discussing what was done wrong and what could be done to prevent such an occurrence. Remembering that the photos will highlight situations every broadcast professional encounters, simply taken to the extreme, there will be a lot that applies to even the best run stations. Names of stations shown will be withheld to protect the innocent.

9:15 a.m. **Possible Applications for Use of AM Broadcast Tower Space**

Tom F. King, President and CEO, Kintronic Labs Inc.

This session will address innovative solutions for utilizing AM tower space for cellular telephone sites, broadband provider data services, LPTV antenna co-location for TV repack, and other applications.

10 a.m. **Interactive – Troubleshooting Scenarios**

Led by Clinic Committee member Greg Dahl and John Bisset, Telos Alliance

10:15 a.m. **Break**

10:30 a.m. **Faster, Cheaper, Better: Combining Today's Lower-Cost Technology for Perfect Audio Now**

Kirk Harnack, Senior Solutions Consultant, The Telos Alliance

Dean Kamen, inventor of the Segway, has said, "Every once in a while, a new technology, an old problem, and a big idea turn into an innovation." This observation could not be truer of introducing standardized IP networking into broadcast facilities. While we've witnessed individual broadcast systems turn to networking for lower cost and better utilization, we're now at the point where everything is connected with the same technology. This topic highlights the latest implementations of networked audio and control—innovations that truly bring perfect digital signals from talent to listeners with no intervening conversions. From human voice turned directly into packets, and packets turned directly into digital broadcast and webcast, with no geographical limitations and no loss of quality. We know something about VoIP and AoIP, but we'll learn about MoIP and IoIP. Plus we'll see how the IT industry keeps building upon existing and trusted protocols to bring reliability and cost-savings to broadcasters. If you think you're already up-to-speed on using IP networking for broadcast operations, you're about to discover how this big idea is bringing you yet more innovation where everything is, indeed, faster, cheaper, and BETTER!

11:15 a.m. **Under the Hood, How AM HD Radio Works**

E. Glynn Walden, retired Senior VP of Engineering, CBS Radio

This will be a brief introduction as to how we ended up with IBOC rather than Eureka 147 as our digital broadcasting system. After we learn where we came from, a full technical description of the Xperi AM HD radio system will be presented beginning with the basics of OFDM and the elements needed to make AM HD radio work, including interleaving, error correction, reference carriers, the low latency backup channel, and instant tuning. Walden will also provide an explanation of the performance in the presence of grounded conductive structures and the presence of interference.

Noon

Lunch

1 p.m.

Maximizing Your Content ROI with Podcasting

Craig Bowman, Director R&D and Innovation, Futuri Media

The podcast space is growing at a tremendous rate, and it poses huge opportunities for those who know how to create great audio — like us in the radio industry. What's the best way to take advantage of these opportunities while keeping your eye on the ratings ball? This session will be packed with insights on how to use podcasting and on-demand platforms to improve the ROI on the content you're already creating while growing your audience with original content.

1:45 p.m.

Hybrid and Digital Radio: What Every Broadcaster Should Know

David Layer, Vice President, Advance Engineering, National Association of Broadcasters

While the majority of radio listening still takes place on analog radios, broadcasters should be focusing on digital and hybrid (over-the-air plus internet) radio technologies as these represent radio's future. Much of the radio technology work at the National Association of Broadcasters (NAB) deals with digital and hybrid radio, for the near term, making sure that broadcasters, manufacturers, and service providers are all working together, and for the long term, helping to foster advances that will ensure radio's prominence in autos for decades to come.

2:30 p.m.

Break

2:45 p.m.

Troubleshooting Interactive Scenario/Heavy Duty Workbench

Facilitators: John Bisset, Telos Alliance Radio Products Sales Manager for the Western U.S. and author of Radio World's Workbench; Greg Dahl, Second Opinion Communications

This interactive presentation will troubleshoot common and uncommon problems at a broadcast facility. Attendees will participate in small groups, learning and contributing during a condition of equipment failure and the scenario surrounding the failure. The session will expand knowledge of troubleshooting and introduce other's experiences in handling equipment failures. John Bisset will also share information of additional scenarios from Radio World's Workbench archives to improve an engineer's efficiency.

3:45 p.m.

Taking Your HD Signal to the Next Level Using Generation 4 Exporter and Importer Technology

Kevin Haider, Product Line Manager, GatesAir

This session is a complete walkthrough to better understand the differences between the generation 3, and the latest generation 4 HD Radio technology. Kevin will address important features such as the advantages of running a combined importer and exporter and we will discover tools to help time alignment of the FM analog and digital audio. Enhance your station's HD Radio listening experience with the GatesAir FMXi Importer/Exporter.

4:15 p.m.

Exclusive Exhibit Time

Tuesday, October 15

7 p.m. **Nuts and Bolts Session: Building the Perfect Pi**

Tim Wright, Cumulus Chicago

Recent advances in technology have provided inexpensive and reliable digital tools that can be leveraged to fill the needs and desires of the eclectic radio engineer. One such item is the popular Raspberry Pi microcomputer. We will explore several projects Tim has developed or adapted to solve specific needs for the Cumulus Chicago facility. Projects include: Environmental monitoring, Axia Livewire routing control, making an older series XDS satellite receiver SNMP compatible, STL/TSL backups, and a programmable studio clock/status display. Opportunity to interact “hands on” with the hardware will be provided. Attendees are encouraged to bring laptops and work with one of the units available for this session. Bring your “what if” wish list and let’s brainstorm on how a slice of Raspberry Pi could just be the solution.

Wednesday, October 16

8 a.m. **Broadcasting: What is Coming Next**

Steve Lampen, Consultant

The world is changing, and not just the audio, video, and broadcast worlds. Everything is changing. The real question is where are we going? What will it all look like in ten years? Twenty years? This presentation will depress some and excite others. I would love to hear your opinion on my predictions. Will we look back and laugh?

8:45 a.m. **Develop a COBO Plan for Your Station**

Manny Centeno, Project Manager, National Public Warning System (NPWS)

This presentation will provide a framework and best practices for developing a solid Continuity of Broadcast Operations (COBO) Plan for your company, cluster, or single station to be prepared for major disasters. Mass media plays a critical role both in the pre-disaster preparation and warning phase, as well as during and after the emergency. However, at times, broadcasters are directly affected by these disasters. Learn how you should plan in advance to manage any emergency, be prepared to assess the situation, and use common sense and available resources to take care of yourself, your co-workers, and your station’s operation.

9:30 a.m. **Networking for ATSC 3.0**

Wayne M. Pecena, Assistant Director of Educational Broadcast Services at Texas A&M University, Director of Engineering for public broadcast stations KAMU FM and KAMU-TV

ATSC 3.0 promises to revolutionize the television broadcast industry with integration of traditional over-the-air (OTA) signals and broadband delivered IP content. A key attribute of the ATSC 3.0 standard is the use of the Internet Protocol (IP) as the transport platform. The use of IP as a core transport platform creates the need for the broadcast engineer to have a high competency in networking technology. This presentation will provide a summary of the core competencies required of the broadcast engineer to successfully design, build, and support the ATSC 3.0 infrastructure.

10:15 a.m. **Exclusive Exhibit Time, Lunch, and Door Prizes**

1:30 p.m. **IT Security**

Moderator Jeff Welton, Nautel | Panelists: Alex Hartman, Optimized Media Group; Chris Tarr, Entercom Milwaukee; and Wayne Pecena, Texas A&M University

More and more we’re seeing reports of broadcast facilities or groups becoming the

2019 BROADCASTERS CLINIC | PROGRAM AGENDA

targets of hacking or ransomware attacks. Jeff Welton moderates this panel of professionals in the areas of both broadcast and IT security. Jeff will facilitate the discussion as we dig into various lines of defense, from budget oriented to most comprehensive, talking with engineers who have been there and done that on a daily basis.

2:15 p.m. Checklist for a Successful Repack Transition

Jeremy Ruck, Principal Engineer, Ruck & Associates

As phase 6 of TV repack is here for the Madison, Milwaukee, and Chicago broadcasters, the scope of work to make it happen has a long checklist for a successful transition. Chicago TV RF mainly radiates off of three buildings downtown which causes issues not just for TV but all the FM broadcasters. Ruck will review the process of permits, iron work, planning the timelines, interference studies, and filtering.

3 p.m. SBE Annual Membership Meeting

4 p.m. Emergency Preparedness: From Tabletop to Action Plan

Tom Kujawa, recently retired Chief of Police for UW-Green Bay

Running a tabletop exercise at your facility helps you gain experience by learning where the gaps are, identifying solutions, and refining your disaster planning in realistic ways. This interactive session will teach you how to use a tabletop exercise effectively by taking you through a real time, realistic event.

5-6 p.m. SBE National Awards Reception

Requires Separate Registration with SBE

6-8 p.m. SBE National Awards Dinner

Requires Separate Registration with SBE

Thursday, October 17

8:30 a.m. Real Time Monitoring of RF System Performance

Dan Glavin, Dielectric

Broadcast RF transmission systems are expensive and require annual maintenance to alleviate catastrophic failure, particularly for older systems. There are many monitoring systems that effectively measure VSWR and other performance issues in real time, however, fault location is not provided and requires additional resources. In this session we will discuss an IP-connected system providing broadcasters a way to monitor the RF system in real-time, under full power with fault location. Theoretical aspects of fault location, arc detection, FCC emissions, processing speed, and unique coupled line technology are discussed.

9:15 a.m. ATSC 3.0 Overview

Mark Corl, SVP of Emergent Technology Development at Triveni Digital and ATSC Board member

This presentation provides an overview of the ATSC 3.0 system and a snapshot of the progress toward deployment. The session will explore the necessary steps to prepare a TV station for launch of 3.0 services, including channel sharing arrangements and how business use cases drive technical configurations of an ATSC 3.0 service signal.

Thursday continues on next page

Thursday, October 17

10 a.m. **Interactive Tabletop Scenario — Losing your ISP**

Led by Clinic Committee members Kent Aschenbrenner and Mark Burg

10:15 a.m. **Break**

10:30 a.m. **TV Transmitter Technology: Past, Present and Future**

Martyn Horspool, Product Manager, Television Transmission, GatesAir

High power TV transmitters of old were massive, inefficient, and often required substantial maintenance. Over the years, newer technology allowed designers to introduce more stable, efficient, and reliable products along with dramatic savings in ownership costs. Today's transmitters are very different from those of only a few years ago. Newer RF devices, along with more powerful RF correction techniques, highly-efficient power supplies, and other improvements have made a huge impact to the transmission system. This session will cover some of the most important technology advances that have affected TV transmitter design over the years, look at today's technology, and look at where this may be heading as we move into a more IP-centric future. In addition, there will be a few tips on what to look for in a new exciter.

11:15 a.m. **The Case to Caption Everything**

Bill Bennett, Media Solutions Account Manager, ENCO Systems, Inc.

This presentation will illustrate the importance of captioning all of your media, from regulatory compliance needs to an improved consumer experience and greater monetization of your assets.

Noon **Lunch**

1 p.m. **5G: The Fourth Industrial Revolution**

Todd Waldo, Client Partner, Verizon Business Group

The eight currencies of 5G, building blocks of 5G, 5G Ultra-Wideband use cases, and a five year outlook.

1:45 p.m. **Interactive/Follow-up**

2:30 p.m. **ATSC 3.0 Implementation**

Michael Guthrie, Technology Specialist, Harmonic

The transition from ATSC 1.0 to 3.0 will involve several stages. The need to retain 1.0 service and the transition from current formats (SD, HD 720, and 1080i) to newer, higher quality formats including 1080p, HDR, and UHD will complicate the management of transmission resources. The new formats and other new ATSC 3.0 features and services are likely to appear piecemeal. Efficient use of bandwidth will require flexible utilization of both the ATSC 3.0 and ATSC 1.0 bandwidth managed across multiple business entities and across multiple transmission paths. New types of sources will need to be included in the transmission at any time and may originate from any station within the community. Some may be transitory: a special UHD transmission of a major sporting event for example. OTT delivery may be necessary for some of these events and/or dynamic management of the transmission system. We will discuss the likely course of this evolution and some possible solutions for achieving efficiency and flexibility in shared transmission systems.



Kent Aschenbrenner

Kent Aschenbrenner has been a TV and radio broadcast professional for 41 years. Based at WTMJ in his hometown of Milwaukee, he currently oversees Scripps spectrum repack at

17 stations and nine LP displaced stations. His responsibility for 34 radio stations is winding down due to the sale of Scripps' radio assets. Aschenbrenner earned his A.A.S. in Electronic Communications from Milwaukee Area Technical College, and a B.S. in Business and Management Systems from the Milwaukee School of Engineering. He serves on the NAB TV Technology Committee.



Bill Bennett

Bill Bennett joined ENCO Systems in early 2019 after a sales engineering position with the German manufacturer Lawo. Previous to that, he was a long-time remote broadcast-

ing engineer, consultant, and project manager overseeing venue technical setup and operations for five Olympics and countless U.S. broadcasts spanning the NBA, NHL, NFL, and more. He exercised the right-brain as an executive producer and new media business development executive at QVC, and owned a laser display production company (where he got to play with really big lasers).



John Bisset

John Bisset got into broadcasting after hooking up two turntables to a Lafayette mike mixer and a wireless mike transmitter and playing DJ. He's worked as a jock, operations manager, chief

engineer, and contract engineer for 50 years. He has also worked for a number of companies in various sales positions. Probably best known for his Workbench Column in Radio World, John is SBE Certified, serves on the SBE Education Committee, and represents the Telos Alliance as Western Regional Sales Manager for Studio Products. A big believer in educating engineers, he's a popular speaker at both state broadcast conventions and SBE meetings, and is the recipient of the SBE's Educator of the Year award.



Craig Bowman

Craig Bowman is Futuri Media's Director of R&D and Innovation. An award winning engineer, Craig's career spans more than 35 years providing his expertise that has led to tremendous ad-

vancement in the technology, broadcasting, and engineering sectors. His broadcast industry accolades include receiving the Carl E. Lee Broadcast Engineering Excellence Award in 2017. He has engineered complex media operations for multiple public and private broadcast companies including Liggett Media, Krol Communications, and Synergy Broadcasting in addition to owning his own engineering consultancy.



Manny Centeno

Manny Centeno began serving as a Project Manager at the Federal Emergency Management Agency (FEMA) in June 2010. As a FEMA IPAWS Project Manager, he leads sustainment, modernization, con-

struction, and operations of the National Public Warning System (NPWS), Nationwide Emergency Alert System (EAS), and Primary Entry Point (PEP) network. Manny designed and deployed a highly-capable emergency satellite communications network, developed and managed the IPAWS Laboratory at the Joint Interoperability Test Command component of the Defense Information Systems Agency, and designed the new NPWS all-hazards communications shelters to support modernization and enhancements of national emergency broadcast capabilities. Manny successfully planned and conducted the first-ever nationwide test of the EAS in 2011.



Mark Corl

Mark Corl is the SVP of Emergent Technology Development at Triveni Digital focusing on strategies to address the disruptive changes in TV technology caused by the continuing exponential

advances in computing and networking. Mark is an ATSC board member and contributes extensively to the ATSC efforts as the chair of the S38 Specialist Group (SG) on Interactive Environment, the chair of S39 AHG on the Regional Service Availability Table (RSAT) supporting the

transition to ATSC 3.0, the vice-chair of the Personalization and Interactivity Implementation Team, and as a contributing author to multiple other groups within ATSC.



Dan Glavin

Dan Glavin joined Dielectric in 2018 as an electrical engineer with an emphasis on systems design, data analysis, and R&D. Dan's diverse technical background brings a unique

perspective to Dielectric's operations and engineering departments. His experience with modern software-based design aligns with Dielectric's rapid production pace and the broadcast industry's acceleration to automated workflows and environments.



Michael Guthrie

Michael Guthrie is a Technology Specialist with Harmonic for more than 20 years. He has more than 35 years of experience in the broadcast industry in engineering, product management, sales, and marketing in numerous

companies including ABC Television, Solid State Logic, McCurdy Radio, Telex Communications, DiviCom, and Harmonic. Michael joined Divi-Com (DiviCom was acquired by Harmonic in 2000) as an ATSC evangelist. Since then he has worked with customers on broadcast, satellite distribution, direct to home satellite, Telco IPTV, and over the top internet video projects.



Kevin Haider

Kevin Haider has been a product line manager of radio transmission products at GatesAir since February 2013. Since starting at GatesAir, Kevin has been involved in the rollout of the high efficiency Flexiva line of FM transmitters, including the FLX Liquid cooled FM transmitters. Prior to GatesAir, Kevin was employed at Broadcast Electronics for more than 20 years where he worked in various positions including National Accounts Manager, Regional Sales Manager, and Customer Service Engineer for both RF and studio automation products. Kevin also spent two years working as a contract engineer in Hawaii and the

Pacific Rim where he both maintained and assisted in building studio and transmitter facilities. Kevin holds a Bachelor's Degree in Electronics Engineering Technology from DeVry Institute of Technology in Kansas City.



Kirk Harnack

Kirk Harnack brings more than 35 years of hands-on experience in broadcast engineering and education to his position at Telos. His expertise in putting technology to work in broadcast facilities has driven notable expansion in IP-Audio, VoIP for broadcast, and leading-edge virtualization strategies. Harnack maintains an active, hands-on role in broadcast engineering through his positions as a partner and VP-Engineering of South Seas Broadcasting, Inc., Delta Radio, LLC, and Kaua'i Broadcast Partners, totaling 14 AM and FM radio stations.

ties has driven notable expansion in IP-Audio, VoIP for broadcast, and leading-edge virtualization strategies. Harnack maintains an active, hands-on role in broadcast engineering through his positions as a partner and VP-Engineering of South Seas Broadcasting, Inc., Delta Radio, LLC, and Kaua'i Broadcast Partners, totaling 14 AM and FM radio stations.



Alex Hartman

Alex Hartman is the owner and partner of Optimized Media Group in St. Cloud, Minnesota. He is a 19 year broadcast engineer, and 25 year IT guy. Hartman specializes in the eccentric and bleeding edge, learning all things new and adapting non-traditional items into a broadcast facility.

the Independent Broadcasting Authority in the United Kingdom in 1974 as a transmitter maintenance engineer. His move to Harris Broadcast Division in 1980 was the start of a long career that has paved the way to his current role, including numerous positions in service, engineering, sales support, and product management.



Martyn Horspool

Martyn Horspool is currently Product Manager for Television Transmission at GatesAir, in Mason, Ohio. Horspool has been employed in the broadcast industry for 44 years, starting with

the Independent Broadcasting Authority in the United Kingdom in 1974 as a transmitter maintenance engineer. His move to Harris Broadcast Division in 1980 was the start of a long career that has paved the way to his current role, including numerous positions in service, engineering, sales support, and product management.



Tom F. King

Tom King is President and CEO of Kintronic Labs. Earlier in his career he was a staff engineer at the Naval Weapons Center in China Lake, California and project engineer in infrared countermeasures systems for Navy and Marine Corps aircraft at the Special Warfare Laboratory Division of General Research Corporation in McLean, Virginia. He started his current role in 1983 and is author or co-author of numerous technical papers on the subject of AM broadcast antenna systems and related topics. Tom is an associate member of the Association of Federal Communications Consulting Engineers and a member of IEEE Broadcast Technology Society. He is also a member of the National Radio Standards Committee and the Analog and Digital Radio subcommittees. Tom received the 2015 NAB Radio Engineering Lifetime Achievement Award, which is the highest award presented to a radio broadcast engineer by the US broadcasting industry.



Tom Kujawa

Tom Kujawa has more than 40 years of law enforcement and emergency management career experience. He has served in federal law enforcement, served as a Captain with the Marathon County Sheriff's Department, and recently retired as the Chief of Police and Director of Public Safety for the University of Wisconsin-Green Bay. Tom is a graduate of the FBI Academy and holds a Bachelor of Science degree in public administration and a master's degree in leadership and quality improvement. He has received extensive training including courses and seminars in law enforcement, emergency management, safety/security assessments, and training development. He is also a certified Security Assessment Specialist with the American Crime Prevention Institute.



Steve Lampen

Steve Lampen worked for Belden for more than 26 years. He is now a consultant for Belden. Prior to Belden, Steve had an extensive career in radio broadcast

engineering and installation, film production, and electronic distribution. Steve holds an FCC Lifetime General License (formerly a First Class FCC License) and is an SBE Certified Broadcast Radio Engineer. In 2017, he was elected to the SBE Board of Directors and also sits on the Board of Directors for Energy Transformation Systems (ETS) in Fremont, California. He is past officer and Chairman of the San Francisco chapter of the Audio Engineer Society (AES), and is a manager of the San Francisco Section of the Society of Motion Picture and Television Engineers (SMPTE). On the data side he is a BICSI Registered Communication Distribution Designer (retired). In 2010, he was named "Educator of the Year" by the National System Contractors Association (NSCA) and in 2011 was named "Educator of the Year" by the Society of Broadcast Engineers (SBE). Steve was named an "Industry Innovator" by TV Technology magazine in 2017.



David Layer

David Layer is Vice President, Advanced Engineering in NAB's Technology department. David has been with NAB since 1995 and has been active in the radio technology and standards setting area. Layer's current principal responsibilities include serving as a project manager for technology projects being conducted by PILOT (formerly NAB Labs), and as principal administrator of the NAB Radio Technology Committee, a group of technical executives from NAB member companies that advises NAB on technology development and technical regulatory matters.



Wayne M. Pecena

Wayne M. Pecena is the Assistant Director of Educational Broadcast Services at Texas A&M University where he serves as Director of Engineering for public broadcast stations KAMU FM and TV. He holds BS and MS degrees from Texas A&M University and SBE CPBE (with AMD, DRB, and 8-VSB) and CBNE certifications. Wayne serves as the SBE National Board Vice-President, Executive Committee member, and he chairs the Education Committee. He was named the SBE Educator of the Year in 2012, Radio World Engineer of the Year in 2014, named a SBE Fellow in 2016, and an IEEE-BTS Distinguished Lecturer in 2018.



Jeremy Ruck

Jeremy Ruck is Principal Engineer with Jeremy Ruck & Associates in Canton, Illinois. He has worked in broadcasting for nearly 30 years, with the last 25 in RF consulting. He earned

a Bachelor of Science in Electrical Engineering degree from Bradley University, and is a licensed professional engineer in Illinois. He holds membership in the Association of Federal Communications Consulting Engineers (AF-CCE), the Institute of Electrical and Electronics Engineers (IEEE), the Society of Broadcast Engineers (SBE), and the Society of Motion Picture and Television Engineers (SMPTE).



Chris Tarr

Chris "Doc" Tarr, CSRE, AMD, DRB, CBNE, is the Director of Technical Operations for Entercom's radio stations in Milwaukee and Madison, a position he's held since 2003. He works as a

consulting engineer for several stations, and is the Chairman of SBE Chapter 28. In his five minutes a week of spare time he enjoys spending time with his family who, from what he can remember, live in Mukwonago.



E. Glynn Walden

Glynn Walden is the retired Senior VP of Engineering for CBS Radio where he was responsible for new technology rollouts including its conversion to HD radio. In 1991 he helped

found USA Digital Radio, a consortium of broadcasters that developed the In Band on Channel (IBOC) technology, now called HD Radio, which was adopted by the FCC as the digital radio standard for the U.S. He holds four patents covering digital radio and in 1993 received the Westinghouse Signature of Excellence for that work. Previously he was the VP of Engineering for Westinghouse Broadcasting's Group W Radio where he was an active industry voice advocating technical improvements, protections of the FCC allocations, rules, and AM improvement. At the April 2004 NAB Convention, Walden was presented the industry's Lifetime Achievement Award for his

contributions to the industry and its transition to digital radio. He currently consults for Entercom Radio and other projects of interest.



Todd Waldo

Todd Waldo is an enterprise client partner with more than 25 years of experience in sales, consulting, leadership, and business planning. Currently, Todd is a client partner within the Verizon

Business Group responsible for helping media customers leverage 4G, 5G, and the "Internet of Things." Previously he held sales and leadership positions driving growth in the media, professional services, manufacturing, entertainment, and technology vertical markets.



Jeff Welton

Jeff Welton took his training in the Radio College of Canada (RCC) Electronics Engineering Technologist program, finishing in 1984. Welton has performed component level repair, field

installation and service, technical support, and quality assurance roles with various companies and has been with Nautel for almost 28 years, the first 17 of which were spent in field service and technical support positions, as well as assisting Engineering with design review of new products and improvement of existing systems.



Tim Wright

Tim is Senior Engineer at Cumulus Media, Chicago for WLS-AM, WLS-FM, and WKQK-FM. He has more than 40 years of broadcast experience including Send International in Alaska,

CBS/Infinity in Chicago, Clear Channel/iHeartMedia in Chicago, and currently Cumulus. Tim has extensive experience in both analog and AOIP studio equipment, multiple automation systems, high power RF, directional AM, and IT. He is a Lifetime Certified Professional Broadcast Engineer with the SBE and holds an Amateur Extra Class license (AL7DS). When not holding down the fort at the radio ranch, he enjoys restoring antiques ranging from farm tractors, to cars, to old HP and Tektronix test equipment.