

2024 New Mexico TechFest Speaker Bios and Presentation Abstracts (Rev. 09 Feb 2024)

Presentations

We Communicate by Ionospheric Reflection – Not Refraction by Mike Hasselbeck WB2FKO (of High Springs, Florida)

Presentation Abstract:

In some amateur radio literature and particularly in online video tutorials, the concepts of radio wave refraction versus reflection by the ionosphere are misunderstood. In this presentation, I will describe the classical, plasma physics model of the ionosphere and how it affects the path of electromagnetic waves.

Speaker Bio:

Mike Hasselbeck, WB2FKO, was first licensed as WN2FKO in 1976 in Tonawanda, NY, a suburb of Buffalo. He obtained a BS and MS from the University of Buffalo and a PhD from the University of Central Florida, all in Electrical Engineering. His career includes positions in the aerospace-defense industry, domestic and European research labs, startups, consulting, and academia. He retired from the Department of Physics and Astronomy at UNM in 2019 and relocated to High Springs, FL where he has a startup company that is developing sensor technology for the Internet of Things. His amateur radio interests are VHF weak signal communication and contesting.

SignalSnagger: An Open-Source 80-meter Radio Orienteering DF and QRP Receiver

by Jerry Boyd W8WFK (of Albuquerque, New Mexico) and Charles Scharlau NZØI (of Cary, North Carolina)

Presentation Abstract:

SignalSnagger is an open source 80-meter radio direction finding receiver that is being designed to solve the lack of low-cost receiving equipment with the necessary features for conducting radio orienteering events on the 80-meter band. In addition, if the DF loop antenna assembly is replaced with a standard antenna connector, front-end preselector and necessary software changes SignalSnagger can also be used as an 80 or 40-meter QRP receiver.

To avoid supply chain issues related to end-of-life components such as the popular Philips SA612 mixer, 455 kHz ceramic IF filters that are often found in older QRP like receiver designs.

This receiver is based on a quadrature sampling detector. Because of this approach the project provides the necessary hardware hooks and processor resources for experimenting with DSP functions. A prototype has been built and testing is in process.

This is a companion project for the now complete SignalSlinger transmitter that was presented at last year's ARRL Rocky Mountain Division Convention in Albuquerque.

Speaker Bio:

Jerry Boyd WB8WFK has been an active pioneer in the development of Radio Direction Finding (RDF) equipment and techniques. He has experience in Direction Finding (DF) ranging from VLF all the way to the 5 GHz microwave bands. Jerry has represented the United States by attending three Amateur Radio Directing finding (ARDF) championships, as a member of the very elite USA ARDF team. He has designed custom RDF receivers and directional antennas for both ARDF competitions, the life-and-death searches for locating downed aircraft using Emergency Location Transmitter (ELT). RDF gear is also used to locate man-made and natural interference to any government, commercial, or amateur radio service. To help others sharpen their skills, Jerry has designed ARDF transmitters, using FPGA based Software Defined Radio (SDR) designs, to simple Continuous Wave (CW) Morse Code transmitters. Jerry currently holds an Extra Class license and has worked professionally in the electronics industry for over 41 years and has three patents. Jerry is also the ARRL ARDF Co-Coordinator.

Charles E. Scharlau, NZØI, received his first Amateur Radio license in 1974 as WN5MIY, and currently serves as an USA ARDF Co-coordinator. He has been active in Amateur Radio Direction Finding for over two decades. His primary ARDF goals are to develop domestic sources of quality ARDF equipment and establish a curriculum for teaching the sport to American youth. Charles spent 26 years working in both hardware and software positions in aerospace, commercial aviation, maritime, and cellular communications industries. He holds a BS Physics Degree from the University of Arkansas at Fayetteville, and an MSEE Degree from the University of Colorado at Boulder.

Evolution and Design of an HF Mobile Antenna for QSO Party County Activations by Jim Duffey KK6MC (of Cedar Crest, New Mexico)

Presentation Abstract:

This presentation discusses an HF mobile antenna that is optimized to be competitive for mobile operations in state QSO parties. Over the past 15 years I have competed as a mobile in many state QSO parties. Always striving to be more competitive, it quickly becomes apparent that the mobile antenna is the place to focus one's attention.

There are several requirements and constraints for a competitive contest mobile antenna, both from electrical and contest points of view. It must be electrically efficient, the top of the antenna must be less than 13'6" from the road surface (in most states), it must be easy to QSY

from one band to another as well as from the CW to the SSB portion of the band, and the vehicle must be capable of motion with the antenna deployed as it is in operation.

I began my QSO Party operations with an 8 ft antenna mounted on the car roof loaded about a third of the way up, then moved on to a screwdriver antenna mounted near the bumper, then to various iterations of a top loaded vertical, the final one which I will discuss here.

I used the W9UCW 1, 2, 3 field strength measurements on actual short monopole antennas to design this antenna. His significant findings include: top loading a short monopole results in the highest field strength, the longer the mast length under the resonator, the higher the field strength, the field strength of the loaded and shortened monopole is pretty much independent of the Quality Factor, or Q, of the resonator, and matching at the antenna is much better than matching at the rig.

Using these results and being driven by the constraints and requirements above I ended up with an antenna that has a 12 feet mast with 40M and 20M Hustler [™] resonators horizontally mounted at the top for loading. The antenna is approximately matched at the base with a shunt inductor4. This results in an antenna that is top loaded on 40M and 20M, and full length on 15M. QSYing between bands is done with no switching or retuning, as is QSYing between the CW and Phone portions on 20M and 15M. On 40M the antenna is optimally matched in the CW portion of the band and can be operated with some loss in the lower phone portion. This antenna has proven effective in the NM, KS, OK, IA, and Seventh Call Area QSO Parties. I am currently in the process of adding 10M to the antenna.

- 1. Boothe, W9UCW, "Actual Measured Performance of Short, Loaded Antennas Part 1", QEX January/February 2014
- 2. Boothe, W9UCW, "Actual Measured Performance of Short, Loaded Antennas Part 2", QEX March/April 2014
- 3. Boothe, W9UCW, Flying Saucer Resonators for the HF Bands ", QST May 2017
- 4. Applegate, K0BG, <http://www.k0bg.com/match.html> (see Inductive Matching), <http://www.k0bg.com/coil.html > (see Coil Adjustment)

Speaker Bio:

James Duffey, KK6MC, was first licensed in 1965 as WNØMWN, later upgrading to WAØMWN and has also held the call N7ATB. His primary interests in amateur radio include VHF/UHF weak signal work, contesting, and QRP. Jim is an active rover and mobile in both HF State QSO Parties and in VHF/UHF contests with several top ten finishes. He is primarily a CW operator but also enjoys the weak signal advantage the various digital modes offer. KK6MC is the author of the ARRL January VHF Contest final results He is a member of the QRP Hall of Fame and was named New Mexico Amateur of the Year.

Jim takes an active part in promoting various amateur radio activities, giving talks on various subjects at hamfests throughout the country. He is the author of the on-line ARRL January VHF Contest results and a contributor to the ARRL Handbook and ARRL Antenna Book. KK6MC is a member of the ARCI QRP Hall of Fame, sits on the Central States VHF Society Board of

Directors, is a member of the ARRL VHF/UHF Contest Advisory Committee, and was a founding member of the New Mexico VHF Society (NMVHF), serving as the contest coordinator.

Professionally, Dr. Duffey received his BSc in Engineering Physics from South Dakota State University, and a MSc and PhD in Physics from the University of Nebraska. He has worked in the areas of spectroscopy, thin film processing, microelectronics, infrared detectors, radiation effects in electronics, space-based electronics and high-power microwaves.

Why the New 2.8 kHz Transmit Bandwidth Limitation Ruling is Better than the Old 300 Baud Limitation by Jim Frazier KC5RUO (of Albuquerque, New Mexico)

Presentation Abstract:

This topic presents how the new ruling came about, how it relates to our most popular HF digital communication modes and explains easy-to-understand relationships between data rate, symbol rate, baud rate, and digital occupied bandwidth in such a way that the attendee will quickly grasp the advantage of the new FCC ruling over the old.

Speaker Bio:

Jim Frazier, KC5RUO, is a retired USAF communications engineering officer and Honeywell Avionics project engineer. Jim holds an Extra class license and spends most of his time as the Bernalillo County ARES Emergency Coordinator and Air Force MARS radio operator. Jim's favorite amateur radio recreational modes are FT8, FT4, and the Winlink digital emergency communication modes.

On Final Approach to Max: Sunspot Cycle 25 Forecasting – Where are We, and What Have We Learned? by Dr. Scott W McIntosh (of Boulder, Colorado)

Presentation Abstract:

Sunspot Cycle 25 is now almost 3 years old. How has it performed compared to what was forecast? We'll explore some of the ups and downs of sunspot cycle forecasting and what we have learned in the process. Also, we'll discuss what may come over the next couple of years as we move through solar maximum and why does it matter.

Speaker Bio:

Scott McIntosh is the Deputy Director of the National Center for Atmospheric Research (NCAR) and the former director of NCAR's High Altitude Observatory (HAO). McIntosh received his First Class Honors Degree in mathematics and physics and his Ph.D. in astrophysics from the University of Glasgow, Scotland. His research in the field of solar physics has focused on three

main areas: the detection and impact of magnetohydrodynamic waves; the detection and understanding of ultraviolet and extreme ultraviolet radiation; and understanding the decadal evolution of the solar plasma.

McIntosh has authored or co-authored over one hundred and fifty articles in peer-reviewed journals, with fifty-two as first author, including twelve high-profile papers in journals like Nature and Science. His current "H-index" of 44 [>8,200 citations] covers subjects in solar physics, space weather research, atomic physics, and instrument development. Recently McIntosh has examined the evolution of ubiquitous emission and magnetic features in the Sun's outer atmosphere that demonstrate a clear link to the processes which drive the quasiperiodic appearance of sunspots. Monitoring the evolution of these features can help us understand how the Sun's radiative, particulate and eruptive output modulate on annual, decadal with a real insight into evolution across weekly, seasonal, decadal to the centennial scales that are pertinent to climate through the detection of magnetized Rossby waves in the sun's interior.

Scanners and Technical Tools for Receiving all the Other MHz by Brian Adams KD7BJF (of Albuquerque, New Mexico)

Presentation Abstract:

The ham radio bands represent just a small portion of the active RF signals flying around us. Scanner radios are one method for effectively discovering and observing these other RF signals outside the Ham bands.

Scanner radios will be introduced and compared to traditional Ham radio transceivers and software defined radios (SDRs). The technical tools, techniques, and approaches for discovering signals outside the ham bands will be discussed. Finally, possible motivations for monitoring and discovering these other signals will be shared.

Speaker Bio:

Brian Adams, KD7BJF, was first introduced to Ham radio as an early teen by his mentor Frank Smith, AHØW. His fascination with radio and communications systems has grown ever since. This interest has been a constant influence as a hobby, enabler of personal adventure, and professional career.

Just like ham radios, he can have too many and never enough scanners at the same time. Discovering all sorts of signals has been a key interest for the past 7 years after the fateful decision to get his first scanner radio.

Posterboards

Winlink VARA HF and VARA FM Received Signal Constellations Explained by Jim Frazier KC5RUO (of Albuquerque, New Mexico)

Presentation Abstract:

VARA HF and VARA FM are two of the many data traffic communications modes Winlink amateur radio uses for emergency communication message transactions. Both VARA HF and VARA FM display received signal constellations that convey useful information to the receiving radio operator, such as the changing quality of the communications link between the transmitter and the receiver, how the signal is being modulated by the digital data stream, and the received Signal-to-Noise Ratio (SNR). This poster board explains how to interpret the signal constellations.

Speaker Bio:

Jim Frazier, KC5RUO, is a retired USAF communications engineering officer and Honeywell Avionics project engineer. Jim holds an Extra class license and spends most of his time as the Bernalillo County ARES Emergency Coordinator and Air Force MARS radio operator. Jim's favorite amateur radio recreational modes are FT8, FT4, and the Winlink digital emergency communication modes.

Demonstrations

3D Printing / Additive Manufacturing by Jon Fox WØAMT (of Albuquerque, New Mexico)

Demonstration:

Jon will setup a small 3D printer (Prusa Mini). He will print some ham radio related items and some general purpose items. He will also bring several pre-printed items.

Speaker Bio:

Jon Fox WØAMT has lived in Albuquerque since moving to New Mexico in 2005. He was first licensed in 2001 in Minnesota. He upgraded to general and extra over the next couple of years. He mostly operates SSB, and the FT-8/FT-4 modes on HF. He has operated rover and portable for the June and September VHF contests from Mount Sedgewick, South Baldy, and other locations around the state. He is a member of Rocky Mountain Ham Radio, the New Mexico VHF Society, and the Albuquerque DX association.

Jon has been an FAA licensed Airframe and Powerplant mechanic since 1981. He also has an FCC General Radiotelephone Operators license. He spent the first 24 years working for airlines, including 20 years with Northwest Airlines. In October of 2005 he accepted a position with Eclipse Aviation (EAC). He was with EAC in various mechanic / tech support positions until the company closed in the spring of 2009. In the fall of 2009, he accepted a position as a service engineer with Eclipse Aerospace (EAI). He worked at EAI until October of 2020 when started working for Resurgent Aviation Solutions. His focus is on after-market support for the 285 aircraft that were built by EAC and EAI.