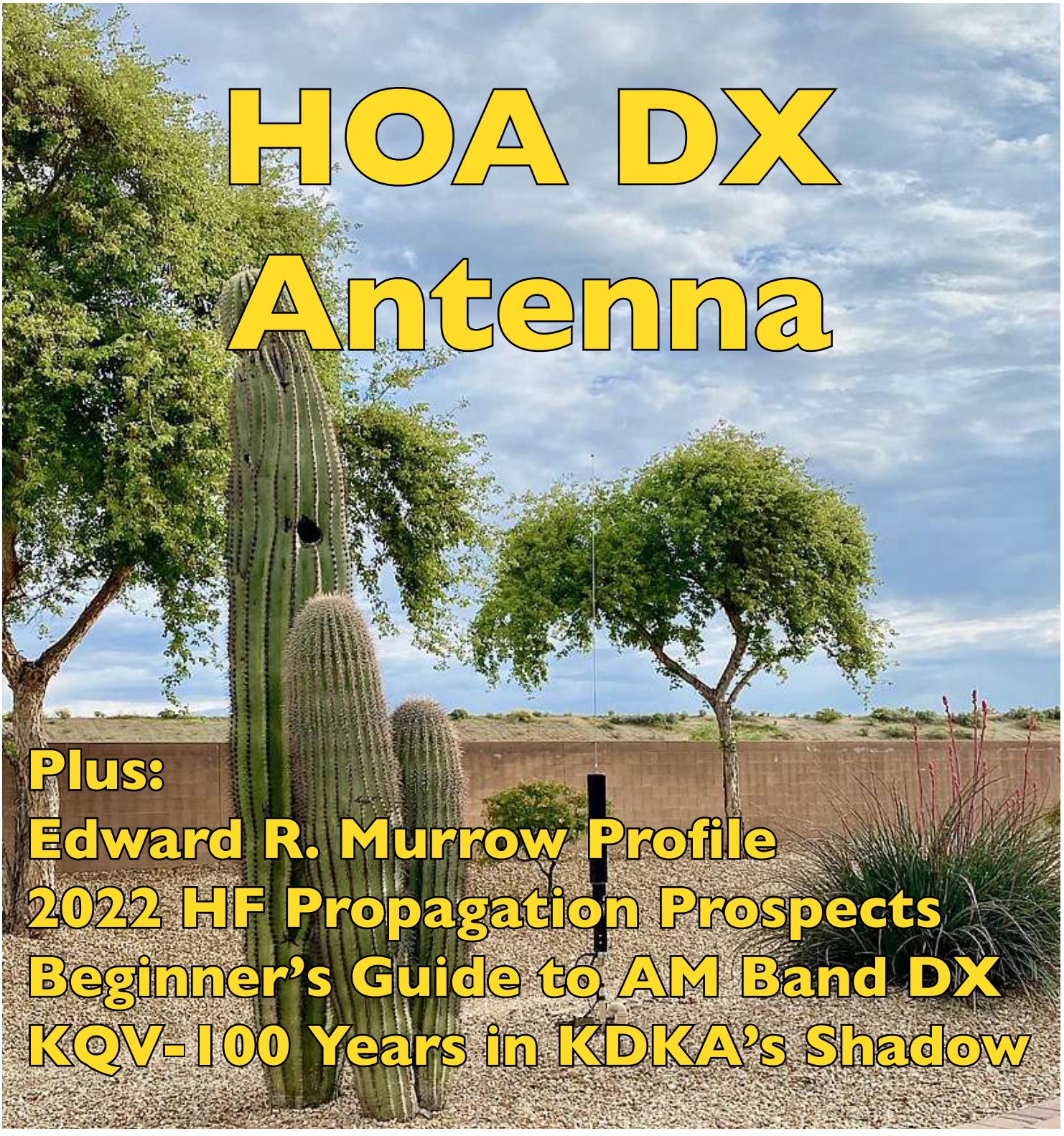
The Spectrum Monitor®

Amateur, Shortwave, AM/FM/TV, WiFi, Scanning, Satellites, Vintage Radio and More

Volume 9 Number 1 January 2022



HOA DX Antenna

Plus:

Edward R. Murrow Profile

2022 HF Propagation Prospects

Beginner's Guide to AM Band DX

KQV-100 Years in KDKA's Shadow

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On the Cover:

Scorpion Antenna base station installation by Mark Heroux N1MAE. Mark was the first ham in our HOA to experiment with ground mounted Scorpion Antennas. He has since worked 144 Countries with this antenna. (Photo courtesy by Mark Heroux N1MAE)

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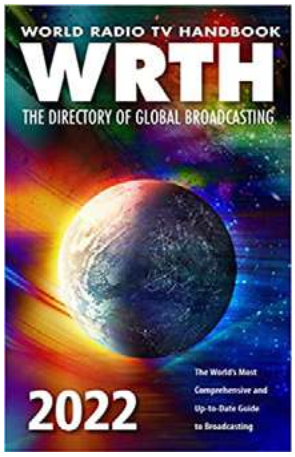
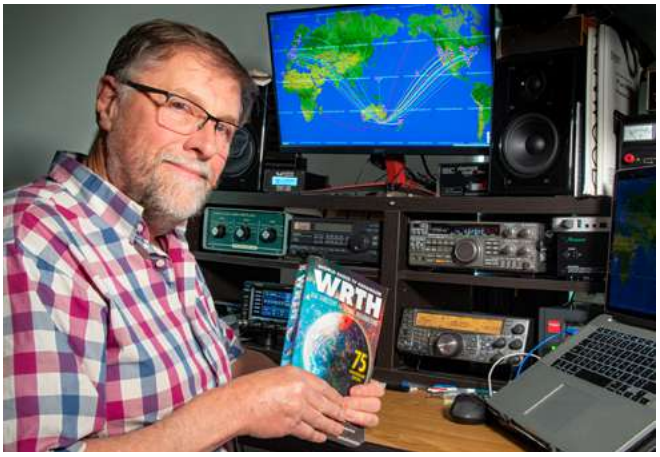
RF Current

News from the World of Communications by Ken Reitz KS4ZR





Left: 2022 cover of the last World Radio Television Handbook. (Courtesy: WRTH) Right: TSM shortwave columnist and 50-year veteran shortwave listener, Rob Wagner VK3BVW, in his radio shack with his copy of the 2021 World Radio Television Handbook. (VK3BVW photo)

2022 WRTH to be the Last

The 2022 edition of the World Radio Television Handbook (WRTH), the "directory of global broadcasting," is the 75th edition of this title. Unfortunately, it will be the last, according to an email received from WRTH publisher, Nicholas Hardyman: "I'm sorry to say that WRTH 2022 will be the last edition of World Radio TV Handbook that we'll publish. This was a hard decision and we only made it after a lot of discussion. There are many reasons for it, some of which have been going on for years, but I know the news will be a surprise and I am also aware that many people will be upset by this. I hope someone else will come forward to continue producing the book." I asked *TSM* shortwave contributors to comment on the demise of WRTH and what the publication meant to them personally. Here are their replies.

Regular *TSM* contributor and longtime SWL blogger, Thomas Witherspoon K4SWL: "I've always felt that the strength of the WRTH was the team of noted DXers from around the world who curate frequencies and broadcaster information by region. It has always impressed me how such a community effort could be so well orchestrated because the end result is truly a symphony of radio information. WRTH felt like the almanac of all that is international broadcasting.

"WRTH also had contact information that simply wasn't available elsewhere. I can't tell you how many times I've gotten a question from one of my blog readers asking for contact info from one of the more obscure international or regional broadcasters. Almost without fail, WRTH had a lead: an address, contact, and/or sometimes direct emails.

"The WRTH has been a reference resource for our DXing community for so many decades. It will be difficult to live without them."

Longtime *Monitoring Times* shortwave columnist and author of Global Radio Guide, Gayle Van Horn W4GVH: "In my early years as a shortwave listener, I found WRTH Handbook, to be a 'must-have' reference guide. It was my number one source. When I became the *Monitoring Times*, Frequency Manager in 1993, the helpful staff was there to answer my endless broadcast questions. In doing so, we developed a friendly working relationship, one I will always be grateful for. I wish them the best in all their future endeavors."

Jeff White, General Manager WRMI, Sec/Treasurer National Association of Shortwave Broadcasters and regular contributor to *The Spectrum Monitor*: "I was very sorry to hear about the end of the World Radio TV Handbook — 'the end of an era' as many have said. I grew up as a shortwave listener using the WRTH as my primary guide to the shortwave bands. Later on, as a broadcaster, I continued to find the WRTH very useful for information about stations in the shortwave spectrum. I remember a nice visit I had once to the WRTH offices in the Netherlands, and I have had a decades-long friendship with Andy Sennitt, one of the longest-serving editors of the book.

"Of course, nowadays you can find most of the shortwave information in the WRTH on the stations' websites or in online publications, and the online sites are often more up to date than any printed book could be. And the shortwave section of the book is a mere fraction of what it used to be when I started listening back in the early 1970s. But still, I love being able to hold a real book in my hands and to look through it for information about all of the stations. And I'll miss that a lot."

Rob Wagner VK3BVW, *TSM* shortwave columnist, veteran shortwave listener and shortwave blogger: "For more than 50 years, WRTH has been a vital resource and reference guide. I value the detailed level of information provided for each broadcaster in the book's international and national sections. WRTH boasts high accuracy in identifying transmitter sites, relay station operation and transmitter power. Even

locations of small broadcasters are covered exceptionally well, and I find myself referring to this information frequently. I often wonder how the editors and contributors have the happy knack of sourcing and printing information that is just not available to even the keenest of DXers. As an enthusiast of domestic and tropical band shortwave stations or as a mediumwave listener chasing rare DX, I appreciate the National Radio section which features a detailed rundown on the internal workings of each country's broadcasting structure and infrastructure. I also appreciate the inclusion of the 'Clandestine and Other Target Broadcasts' sections. The 'Notes' section contains some salient background information on the organizations behind these broadcasts. I thank the publisher, Nicholas Hardyman (and past publishers), and his fantastic editorial team for their hard work, dedication and commitment to 76 editions of this fine publication."

Has the Smart Speaker Peaked?

For years the hottest electronic device was the smart speaker, which set sales records with each passing year. From the pricey Sonos One ($219) to the fourth generation Amazon Echo Dot ($30), many homes have purchased multiple smart speakers. Millions were sold and they were seen as a boon to broadcast radio, helped along by aggressive promotion on America's public radio stations. There are signs though that smart speaker sales may have hit a wall.

Fred Jacobs of Jacob Media Strategies, a media research company, wrote in a blog post in mid-December,

"We've seen this one coming for a while. Like a slow moving ocean liner about to hit an iceberg, the sales of smart speakers have ground to nearly a trickle, confounding many experts who had predicted voice, largely driven by smart speakers, would rapidly replace search on a computer and mobile device keyboards."

Jacobs points to several recent surveys indicating that smart speaker sales have peaked. This, Jacobs argues, is bad news for traditional radio stations because in their 2021 Public Radio Techsurvey, the top use of these devices is to listen to a broadcast radio station. Jacobs wrote, "We were curious about why fewer consumers were willing to bring a smart speaker into their homes and places of work."

Digging deeper here's what they found: The top reason (36 percent) against the smart speaker was "No use for one." The second top reason (32 percent) noted "Privacy concerns." (For details about this issue see my Radio 101 column from August 2019, "The Trouble with Alexa.") Jacobs believes there is still room for growth in the smart speaker sector that will continue to benefit broadcast radio but he takes smart speaker makers to task for not addressing the privacy concerns.

Six Former FCC Chairs Urge 5G Speedup

Bloomberg News reported December 15 that six former FCC chairmen signed a letter critical of the FAA for their belief that 5G mobile services could pose a safety hazard to aircraft. The issue, according to the report, is that 5G signals could interfere with onboard radio altimeters that could cause problems in landings. The report noted that AT&T and Verizon had proposed a reduction in 5G power to minimize such risks. The former FCC chairmen further urged the two agencies to work together. The article noted that both AT&T and Verizon were nearly a year behind T-Mobile's deployment of 5G because T-Mobile used frequencies said not to interfere with aircraft.

Amazon Echo Dot ($30). (Courtesy: Amazon)

Publisher's Note

As we begin our ninth year of publication, I would like to thank every subscriber for making this publication possible. As you know, *TSM* is almost 100 percent reader supported—and most of our subscribers have been with us since the magazine was founded in the fall of 2013.

All subscriptions begin with the January issue and end with the December issue regardless of when the subscription is purchased. It's unusual, but the content of this magazine is not time sensitive. In fact, each year new subscribers discover the timeless and interesting content from previous years and purchase those years for additional reading. All previous years, except for the one just passed, are available for $12 (that comes to $12 for about 1,000 pages of radio information and entertainment).

The number of subscribers who sign up each year determines the number of articles and columns that appear each month and the amount that we can afford to pay our writers.

A note too to remind readers that your privacy is important. We don't sell or in any way distribute our subscriber email list—never have, never will. And the only time you will hear from us is when we send the link to the new issue.

Remember too that if you have a question about your subscription or need a replacement issue for one accidentally deleted, just send an email to editor@thespectrummonitor.com and I'll get right on it. We look forward to a better year for all in 2022.

TSM

Scorpion Antenna base station installation by Mark Heroux N1MAE. Mark was the first ham in our HOA to experiment with ground mounted Scorpion Antennas. He has since worked 144 Countries with this antenna. (N1MAE photo)

The Scorpion Antenna: An All-Band Antenna for Space or HOA Restricted Hams

By Gordon Bousman NW7D

If you are one of the many hams who have moved into a Home Owner's Association (HOA) community with antenna restrictions, you probably think that your ham career is over. The answer is: maybe not! There is an excellent choice for an all-band antenna with a low visibility appearance that may be acceptable to the HOA police and HOA architectural regulators as well for hams who have space restrictions.

A group of hams living in a 10,000-home community in Surprise, Arizona, collectively campaigned with the HOA Board of Directors to achieve permission to install limited types of amateur radio antennas. It took nearly a year of discussions to convince the HOA that certain types of antennas would not be visually detrimental to the appearance of the ham homes or be offensive to neighboring homes. The compromise reached with the HOA was that we are limited to wire antennas and verticals that do not exceed 5-feet above the peak of the home, and that all antenna installations needed to be pre-approved by the HOA and inspected afterwards. We are allowed a total of two antennas each and therefore most of our club members have also installed 2M/440 antennas especially since we hold a weekly net on several Phoenix, Arizona, area repeaters.

One member of our group, Mark Heroux N1MAE, experimented with a screwdriver type antenna locally manufactured in Phoenix called the Scorpion Antenna. After installation, he happily began to work the world on all bands (80-10 meters) soon achieving the equivalent of DXCC in about four months (he has since worked 144 countries to date with his Scorpion using FT8). Many others in our ham club took notice of the success that he was having and followed suit in applying to the HOA for permission to install

The author used yellow split-loom tubing to protect the coax and signal cables in our Arizona rock lawns. The trench is about 4-5" deep. Others have run 1-1/2-inch or 2-inch PVC conduits for the cable run to the shack. The wire mesh radial field has already been covered up in this photo. Note the steel water pipe where the Scorpion will be mounted. (NW7D photo)

Photo showing the snap-on ferrite cores used on the control cable to prevent RF from going back to the shack via the cable. (KW4H photo)

the Scorpion Antenna, this author being one of them. At this writing, seven hams in our HOA have installed the Scorpion Antenna and three more are in the planning stage to install the same antenna. We also know of several hams outside of our local area who have also installed the Scorpion and are happy users.

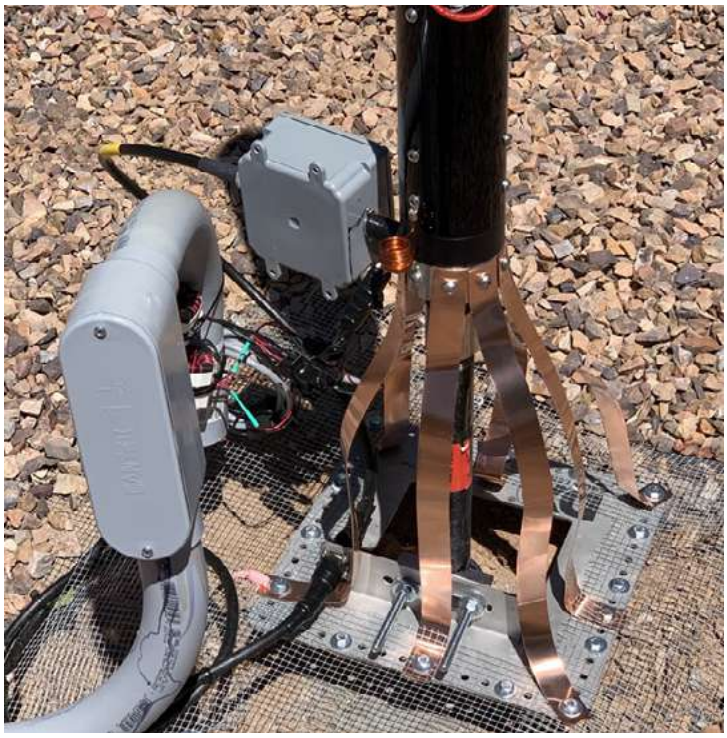
You may ask, how can a screwdriver antenna designed for mobile use be all that effective (being a permanent ground mounted antenna in our case) in working DX on multiple modes with good signal reports? We were all initially as skeptical as you. However, the track record of those of us who have installed the antenna shows users that are quite thrilled with the performance and that we have one single HF antenna that can work on all the HF bands using all modes such as CW, FT8, RTTY, and SSB. Since the antenna tunes continuously, it can be also used in SWL mode to monitor transmissions outside the ham bands such as shortwave broadcasts and utility monitoring. The antenna has a very low take-off angle and that is the main reason why it is such a good DX antenna.

Over the course of my ham career, I have previously owned two towers with KT-34a Yagis as well as three hex-beams. I know from experience the kind of superior HF performance is possible with good antennas. When I moved to our Arizona HOA from Seattle (where I had erected a reasonable antenna farm on two acres), I was fairly certain that my ham career was about over. Now, two years after installing my Scorpion antenna, I feel that I'm as competitive as I ever was with the earlier antennas. I routinely work Australia, Japan, China, and Indonesia as well as Africa, eastern and western EU with excellent signal reports on FT8.

I'm also a RTTY contester and I usually can work 90-95 percent of the RTTY contest stations that I can decode using my Icom 7610 and the Scorpion Antenna. Other Scorpion owners in our community will occasionally work a DX station on FT8 and look up his/her QRZ web page to see what kind of antennas/towers are being used at the DX station. We get a chuckle when we receive a signal report that is better than what we sent to the DX station and when we see pictures of big towers and Yagi's on the QRZ page of the DX station.

The Scorpion Antenna is a screwdriver type antenna that you may already be familiar with if you've ever seen such an antenna mounted on a vehicle (since it was designed to be a mobile antenna). We learned that with a good radial ground plane, the antenna can be permanently ground-mounted in a relatively small space and provide excellent performance with very low SWRS at legal limit SSB power. Lower power (about on-third of legal limit power or less) is recommended for key-down modes such as FT8 or RTTY to avoid overheating the main coil. The main coil is spiral wound using #10 copper wire and has a "Q" of 400, something that no other screwdriver antenna manufacturer can match.

The Scorpion antenna body is four inches in diameter and ranges from 38 to about 48 inches in height depending on what band it is tuned to. With an 8-foot whip attached; the total maximum height of the antenna is about 12-feet. An 18-volt motor drives the antenna coil to resonance for the specific frequency in use. However, most of us drive the antenna motor with 12-volts and it performs very well at the lower voltage. There is a choice of whips that can be con-



Scorpion installation of Steve Reed KW4H showing square balun, copper grounding straps, and DX Engineering radial plate. Wire mesh acts as the radial ground field. The small copper coil in the center is called a shunt coil (between hot and ground side of antenna). Ideally, the wire mesh radial field should equal the height of the antenna (about 12 feet with the Scorpion). (KW4H photo)

nected to the top of the antenna including eight feet, six feet, and 56 inches. In my experience, the eight-foot whip works well from 80 meters to 17 meters. To achieve resonance on the high bands (15, 12, and 10), I usually switch to the six-foot or 56-inch whip. I also have a collapsible 17-foot whip (from MFJ Enterprises) that I sometimes use for 40, 60, and 80 meters to get another dB or so of gain.

A magnet attached to the motor spins against a reed switch which then sends pulses back to the controller in the shack to determine the position of the antenna, which can then tune the antenna to previously memorized frequencies.

Scorpion Antennas are available in several different colors; many of our Arizona Scorpion owners have chosen light tan to match our Arizona rock lawns. It's also available in silver and black.

There are several types of controllers that you can use to drive the antenna motor to resonance:

TuneMatic: You choose your type of rig when ordering the TuneMatic and it will arrive with the appropriate connectors to attach to your transceiver. The TuneMatic, when connected to your rig, will sense the chosen frequency, and then drive the Scorpion coil motor to achieve the lowest SWR. There is an optional feature sold for the TuneMatic that will block your HF amplifier from keying up while the TuneMatic is driving the Scorpion to resonance. Sold by Ham Radio Outlet and other vendors with a $265 list price.

MFJ: Model MFJ-1922B, $160 list price; Model MFJ-1924, 10 memories, $190 list price; Model MFJ-1927,

We have found the model 1115U from Balun Designs ($72) to work the best with the Scorpion. It is rated at 3-kW. (Courtesy: Balun Designs)

transceiver specific (Elecraft, Kenwood, Icom, and Yaesu) $200 list price, senses transceiver frequency, automatically tunes to that frequency; Model MFJ-1928, 8 settings per band, 160-6 Meters $270 list price

Ameritron SDC-102, 10 memories, $170 list price Ameritron SDC-105, 8 memories per band $260 list price

It's wise to add about four snap-on ferrite chokes on the motor controller cable at the antenna end to prevent RF from getting back into the shack. The control cable is four-conductor, two for the motor power and two for the reed switch sensor. Locally, we have found that 16-gauge four-conductor audio cable with a good outer jacket has worked well for the control cable for our Scorpion Antenna installations.

If you feel the need to reduce the cost of your Scorpion antenna installation, you could in theory, tune the antenna motor (at low transmit power) using a DPDT (center off) toggle switch by watching your SWR meter dip as you drive the coil motor up or down with 12 volts DC.

The Ground Plane

As with all vertical antennas, a good ground plane is required to make the antenna work effectively since the ground plane acts as one-half of the entire antenna. Here in Arizona where most of us have rock lawns, we temporarily raked the rocks aside and laid down two-foot-wide lengths of galvanized wire mesh (Home Depot or Lowes), about 12 feet in 4 directions. This wire mesh sells in 50-foot lengths and thus it is easy to cut it into four equal pieces for a 12-foot radial field in four directions. In other areas of the country, laying or burying radial wires in a grass lawn will suffice (the more the better). We connected our wire mesh radial field to the DX Engineering Radial Plate (DXE-RADP-3, list $80).

We mounted our Scorpion antennas to the threaded end of a 1-inch diameter, 4-foot-long water pipe which was driven into the ground about 3-1/2 feet. Actually, here in Arizona, we had to painfully drill or dig a hole 3-1/2 deep since the Arizona ground is so hard that it is almost the equivalent of concrete (a local joke). We left 6-8 inches of the water pipe remaining above ground level and mounted the Scorpi-

Finished Scorpion Antenna installation of Steve Reed KW4D. It visually blends in very well in his neighborhood. (KW4H photo)

on on the pipe using the optional threaded water pipe adaptor sold by Scorpion. You will want to purchase the DX Engineer Saddle Clamp DXE-SSVC-2P ($13) or equivalent in order to mount the radial plate to the water pipe.

Balun

You will need to add a good choke at the antenna to prevent RF from traveling back to the shack on the shield of your coax. We have found the model 1115U from Balun Designs ($72) to work the best with the Scorpion. It is rated at 3-kW.

There is considerable RF current that flows between the antenna ground side and the radial field. In our early Scorpion installations, we only ran three #10 wires from the antenna base to the radial plate and believed that was sufficient as our SWR's seemed reasonable (1:1.5 approximately).

Later when we ran eight wires to the radial plate (to which our radial field was connected), the SWR's had crept downwards. After that, a fellow Scorpion owner in Tucson (Steve KW4H) shared with us, his installation of using 1-inch wide 0.22" thick copper straps (available from Georgia Copper) between the base of the antenna and the radial plate. This provided even lower SWR's (1:1.2) since the copper straps provided very low impedance to the ground current flow. Most of us have installed two or more ground rods to our Scorpion installations, one at the antenna site (connected to the radial plate) and one or more near the cable entrance to the house. Many have a installed a cable entrance box in which lightning arrestors are installed.

	56" Whip	6'Whip	8' Whip	17' Whip
80M		NA	1.3	1.3
60M		1	1	1
40M		1.4	1.1	1.1
30M		1.6	1.3	1.1
20M		1.5	1.2	NA
17M		1.4	1	NA
15M		1.3	NA	NA
12M	1.3	1.3	NA	NA
10M	1.3	NA	NA	NA

SWR readings for the author's ground-mounted Scorpion Antenna.

Performance

As mentioned earlier, those of us who have permanently installed the Scorpion Model 680 antenna have been thrilled with performance of the antenna, especially those of us who were previously spoiled by having owned big towers and Yagis in the past. The low take-off angles of the Scorpion antenna have allowed us to work considerable DX and be more competitive in contests while keeping a low profile in our HOA community. In my situation, I have three large palm trees within six to ten feet of the antenna and lying in the azimuth path to Japan and Western Russia, yet I get numerous good signal reports from both locations as well as New Zealand, Australia, and Indonesia. A four-foot metal fence within 15 feet seems to have no impact on performance either.

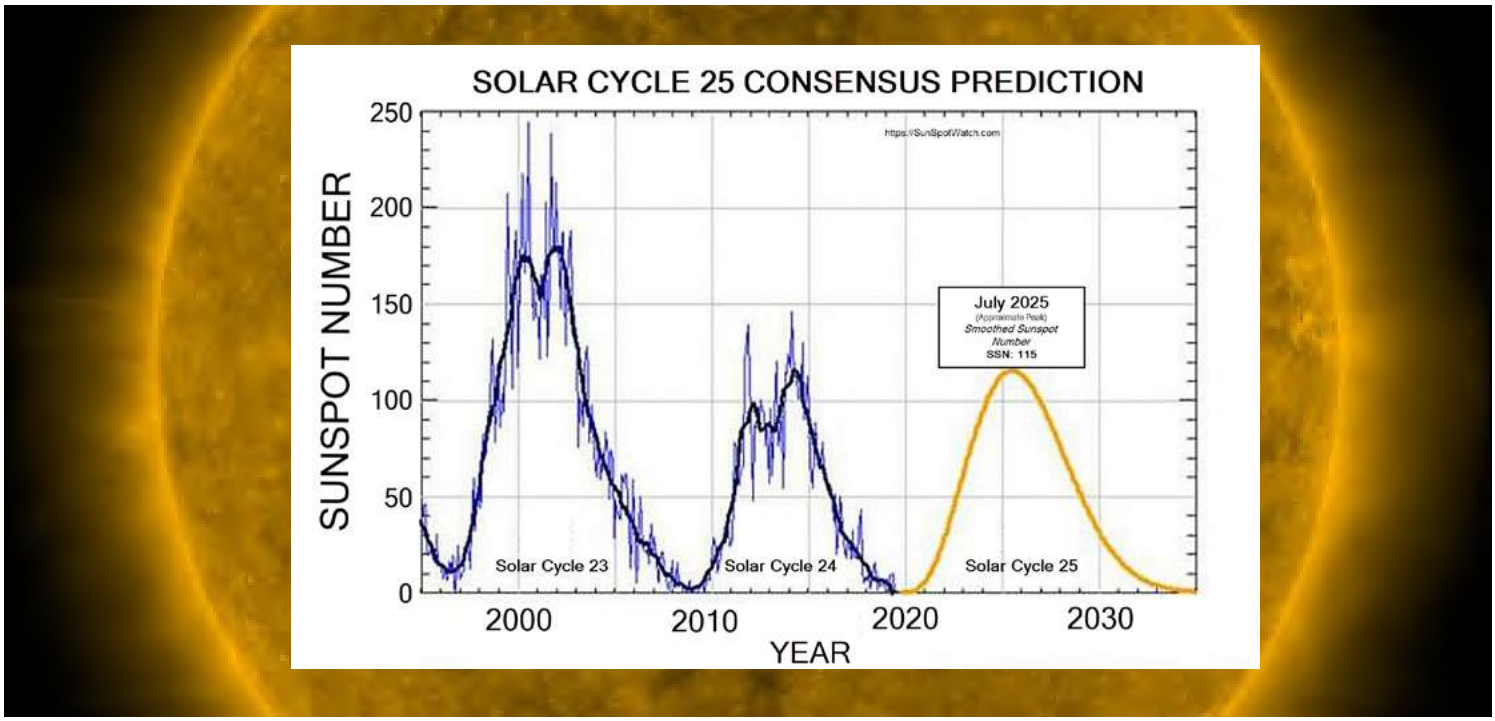
Conclusion

The Scorpion screwdriver antenna affords a way for HOA-restricted hams to work worldwide DX on all bands at full legal power (lower for key-down FT8, RTTY, etc.), enjoying very low SWR, while maintaining acceptable visual appearance on your property. I have worked 138 countries in the two years of operation with my Scorpion Antenna and have participated in many RTTY contests with rewarding results.

Scorpion Antennas also make several other types of antennas, however we found that ground mounting the Scorpion Mobile antenna ($889) has served us well with the antenna restrictions in our HOA community.

There are several other manufacturers of HF screwdriver antennas such as Tarheel antennas, which you may also enjoy using as a permanent home-based, ground-mounted antenna as well. Still another known supplier is Hi-Q Antennas. However, to best of our knowledge, the Scorpion Antenna is the only antenna with a "Q'" of 400 and which uses #10 copper wire for the main coil with outstanding DX performance.

TSM



The new Solar Cycle 25 is represented as the golden plot starting roughly at the start of 2020. In this chart we track the sunspot number. The black line represents the monthly averaged data, and the purple line represents a 13-month smoothed version of the monthly averaged data. The current NOAA/NASA consensus is that the new Solar Cycle 25 will peak around July 2025 with a smoothed sunspot number of 115, making it about the same as Cycle 24. There are others who have a different forecast, including one that expects that this cycle may be one of the biggest in recent centuries. (Credit: NASA/SWPC)

Forecasting Space Weather: A Complex Challenge

By Tomas Hood NW7US

It is a new year. Solar Cycle 25 is spinning up, with an ever-increasing number of sunspots. What is the state of propagation on shortwave frequencies through this new year? And why are we tracking space weather, if we are mostly interested in the conditions directly involved in our transmission and reception of radio waves (primarily in the shortwave spectrum, from 3 MHz through 30 MHz)?

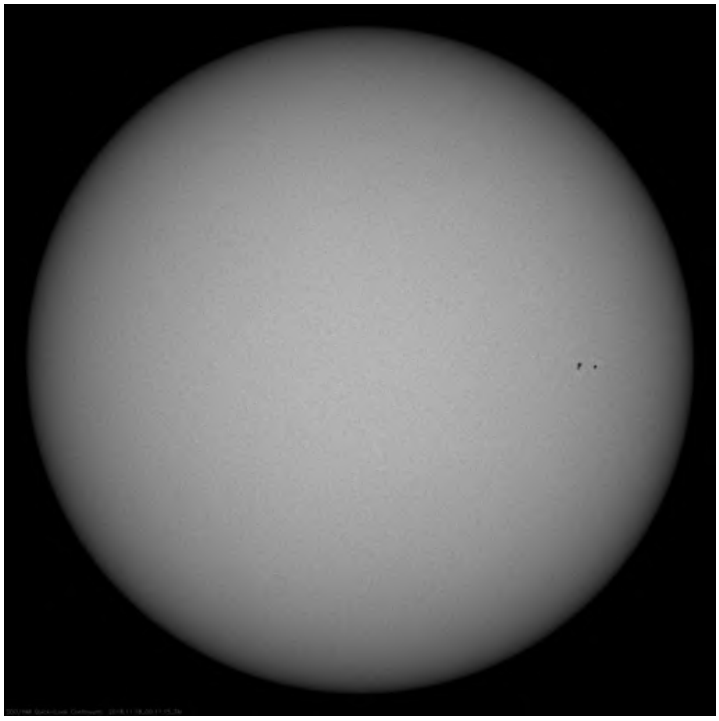
Long-time readers remember what we've explored in past editions: space weather refers to the ever dynamic and variable conditions on the sun, in the solar wind that streams away from the sun, as well as conditions in the magnetosphere, ionosphere, and the thermosphere—all the conditions which influence the performance of and reliability of radio systems.

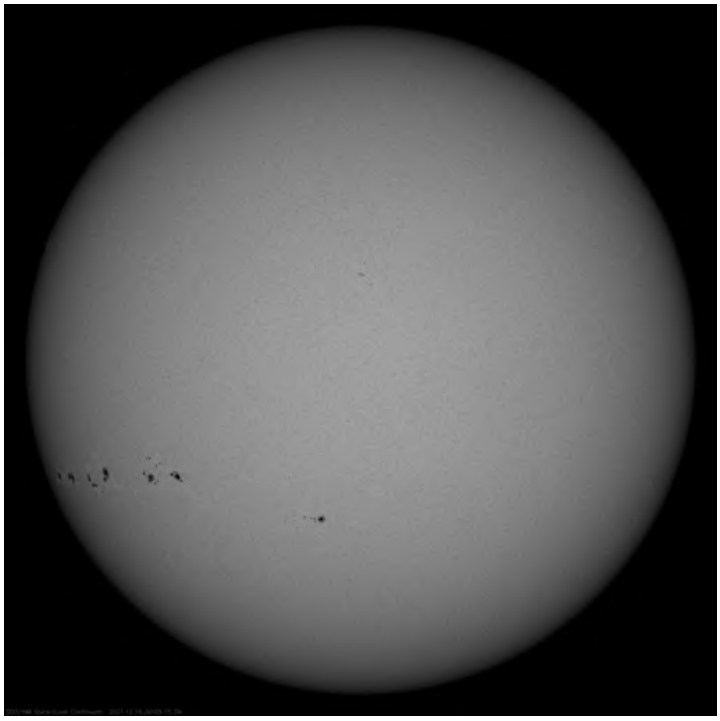
Adverse conditions in the space environment can disrupt satellite operations, ground, and air-borne communications, as well as navigation and power grid operations (just to name a few). Because space weather directly interacts with our complex infrastructures, we need to know as much as we can about upcoming space weather events (which include sunspot X-ray flares, and coronal mass ejections—CMEs) before they cause dire outcomes. These predictions are complex, though!

Space weather involves plasma physics. Plasma is quasi-neutral ionized gas containing enough free charges to make collective electromagnetic effects important for its physical behavior. But this is only one aspect of the complexity of space weather prediction.

Another challenging aspect is the range of space weather scales. Consider the relevant time scales which vary from approximately 10-9 seconds (plasma fluctuations in the solar atmosphere) to about 108 seconds (the full solar cycle, which is two cycles that each span approximately 11 years; the full cycle sees a magnetic pole flip in the sun such that every other 11-year cycle has a reversed polarity). Also consider the spatial scales of the structures involved in space weather. These vary from approximately one meter (ionospheric plasma structures) to roughly 108 meters (large-scale interplanetary plasma structures).

Solar scientists study the sun and the sun-Earth connection so we can better forecast events that present hazards to humans and our infrastructure. Radio communicators rely





These two images, the white-light images displaying the sun at a wavelength we can see (in white light), are from two different years. The left image shows a very quiet sun during November 2018, at the end of the last solar cycle, Cycle 24. The image on the right is from December 2021. Note the lack of sunspots in 2018. But, in December 2021, sunspots were more common, because the new Solar Cycle 25 is waking up, becoming much more active. The peak of the new cycle is a few years away, and we will see more and more solar activity (sunspots and flares, and so on) as we move toward the solar cycle peak. (Credit: NASA/SDO)

on these forecasts, as well as the flow of data coming from the different solar monitoring assets deployed by the space weather and space agencies of various countries, including the US.

In this article I'll explore current space weather conditions and forecasts, simplifying the complexity in hope that this serves the radio community through applied physics as well as by contemporary analytics of daily, monthly, seasonal, and yearly conditions. Stay tuned more reports of recent space weather and radio propagation, as well as a look at radio propagation, especially of HF radio signals in the allocated amateur radio frequency bands.

Solar Cycle 25 Predictions

Solar Cycle 25 began in December 2019 and is expected to peak in 2025, according to the Solar Cycle 25 Prediction Panel, an international group of experts co-sponsored by NASA and NOAA. Specifically, December 2019 was the solar minimum or period of least solar activity between the approximate 11-year solar cycles of the sun between Solar Cycle 24 and Cycle 25.

The previous solar cycle, the 24th cycle observed since the start of daily observations of the Sun in 1755, lasted 11 years (December 2008 to 2019), which is the average length of a cycle. Cycle 24 was the weakest cycle in terms of solar activity in 100 years. The solar maximum–the peak of Cycle 24–was in April 2014 with the sunspot count (averaged and smoothed) peaking at 114.

Now that we are witnessing the start of a new Solar Cycle–Cycle 25—we are seeing increasing space weather activity and expect more sunspots to appear in greater number daily until roughly mid-2025.

However, the long-range prediction is that Solar Cycle 25 will be below average, quiet, and cool. This is very similar to the Cycle 24, the weakest solar cycle since record-keeping began in 1755.

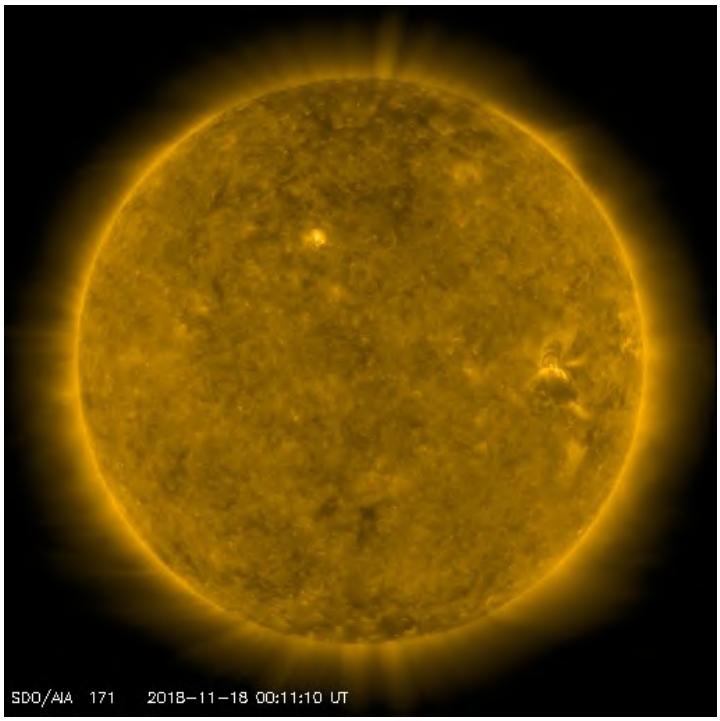
NOAA, NASA, and international experts released an official prediction (see https://www.weather.gov/news/190504-sun-activity-in-solar-cycle for more details), which expects that Cycle 25 will be similar in size to Cycle 24, preceded by a long, deep minimum (this, the deep minimum, does not appear to be holding true).

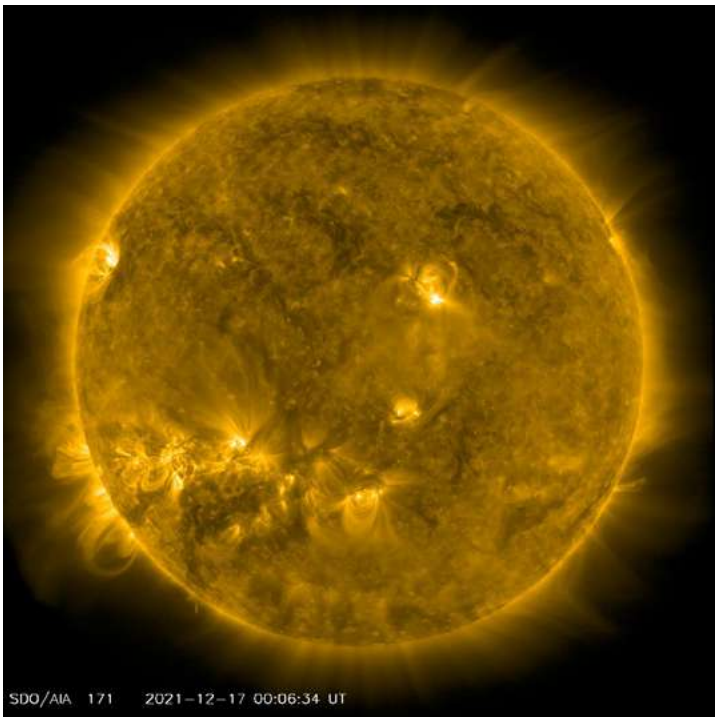
They state that Solar Cycle 25 may have a slow start but anticipate a peak solar maximum occurring between 2023 and 2026, with a sunspot range of 95 to 130. This is well below the average peak number of sunspots, which typically ranges from 140 to 220 sunspots per solar cycle.

Other forecasts make good cases based on other models that strongly correspond to past cycles. Some of these alternative forecasts show that Cycle 25 will be quite a bit stronger than the NASA/NOAA forecast.

One such recent study postulates that Cycle 25 could be one of the strongest since record keeping began. This study was published by the group led by Dr. Scott McIntosh. From the published article's abstract:

"The sun exhibits a well-observed modulation in the number of spots on its disk over a period of about 11 years.





These two images, the artificially golden images displaying the Sun at a wavelength of 171 Angstroms, are from two different years. The left image shows a very quiet Sun during November 2018, at the end of the last solar cycle, Cycle 24. The image on the right is from December 2021. What a difference a few years makes. With the ramping up of the new Solar Cycle 25, we are witnessing an increase in solar activity, and thus the rise of the 10.7-cm Radio Flux readings. And, when the flux rises, higher shortwave (HF) frequencies become useful for long-distance radio communications (DX). (Credit: NASA/SDO)

From the dawn of modern observational astronomy, sunspots have presented a challenge to understanding their quasi-periodic variation in number, first noted 175 years ago, has stimulated community-wide interest to this day.

"A large number of techniques are able to explain the temporal landmarks, (geometric) shape, and amplitude of sunspot 'cycles,' however, forecasting these features accurately in advance remains elusive. Recent observationally motivated studies have illustrated a relationship between the sun's 22-year (Hale) magnetic cycle and the production of the sunspot cycle landmarks and patterns, but not the amplitude of the sunspot cycle.

"Using (discrete) Hilbert transforms on more than 270 years of (monthly) sunspot numbers we robustly identify the so-called 'termination' events that mark the end of the previous 11-year sunspot cycle, the enhancement/acceleration of the present cycle, and the end of 22-year magnetic activity cycles. Using these we extract a relationship between the temporal spacing of terminators and the magnitude of sunspot cycles.

"Given this relationship and our prediction of a terminator event in 2020, we deduce that sunspot Solar Cycle 25 could have a magnitude that rivals the top few since records began. This outcome would be in stark contrast to the community consensus estimate of sunspot Solar Cycle 25 magnitude."

I'm scheduled to interview Dr. McIntosh early this year, for a revised forecast now that we have over a year since the terminator event of 2020. Stay tuned for this important update!

An Outlook Regarding 2022

Here is an overview of expected propagation conditions on each international HF broadcast band, and each amateur (ham) radio band between 10 and 160 meters for 2022.

10, 11, and 12 Meters: These bands are beginning to experience strong, yet short, windows of DX. The exception is the Sporadic-E season during the summer. However, odd moments of propagation happen that involve the F-region, even though solar activity is low. Just because the average solar activity is low, there may be a day or more with spikes of activity that could offer a strong, maybe even worldwide, opening. Expect most DX openings to be on paths between points north and south of the Equator (for example, a station in Texas can communicate with stations in South America on the ten-meter band).

13 Meters: A daytime band, with very few broadcast stations, this band can offer signals in the Asia-Pacific region. During the night, this band will be dead.

15 Meters: This band will be very good at times, with occasional worldwide openings during the daylight hours of all seasons. Most openings, if present, will be short, except for the strong and frequent north/south path openings. Mid-morning and noon-hour propagation can be strong, as during early evening hours. Watch for the surprise night openings, especially during the Sporadic-E Summer season.

16 Meters: Even during sunspot cycle minimum, international broadcast stations with megawatts and highly directional antenna arrays provide great reception both

regionally, and sometimes globally. This is mostly a daytime band, but there could be late evening and early morning openings.

17 Meters: This band should behave much like 15 and 16-meters, but you will find it open more often, remaining open for DX an hour or two longer than 15 meters. Seventeen meters is a great DXing band for amateur radio stations with efficient and high-gain antenna systems married to very quiet receivers (or stations leveraging a mode such as FT8). Propagation follows the sun; openings start early in the morning, fade out during noon hours, and reawaken mid-afternoon to stay open into the evening hours. The morning openings favor stations to the east, while the evening openings favor the west. But, the strongest and most reliable openings will be over north-south paths.

19 Meters: This band is best in the autumn and spring seasons and has life throughout the summer when daylight keeps the ionosphere energized for longer hours than in winter. Nighttime propagation is possible at least some of the year. When the geomagnetic field is quiet, this band offers solid reception of weaker signals.

20 Meters: This band is going to be the main player for daytime DX for radio amateurs during this year of slowly improving solar activity. Expect fair conditions during the daylight hours, with DX openings possible to limited areas throughout the year. DX conditions on this band tend to peak for a few hours after local sunrise and again during the sunset period. Nighttime signals can appear from stations located as far away as the other side of the world, when conditions are very quiet and stable.

22 Meters: This band is substantially utilized in Eurasia and has much the same dynamics as found on the 20-meter band. It is best in the summer season but can be very productive even in spring and autumn. Openings may last longer (start earlier, end later) than those on 20-meters, but shorter than those on the 25-meter band.

25 Meters: Look for signals before sunrise through late morning, and again from early evening through several hours after sunset. Like higher-frequency bands, propagation follows the sun (propagation is over paths that exist mostly in sunlight), so morning openings are to and from the east, and the evening openings favor the west.

30 Meters: This band will offer moderate to excellent openings, especially a few hours before sunset until a few hours after sunrise. In 2022, this band offers exciting possibilities for those low-power digital signals. Winter brings longer nights, providing the right mix for exceptional worldwide DX. This band could play throughout the day and night. The radio amateur should craft an efficient and high-gain antenna system for this band, and spend a lot of time exploring what is possible.

31 Meters: Like the amateur radio 30meter band, this band is a 24-hour powerhouse of a band! Broadcasters know this, and there are many stations active here. This band plays very well from early evening, through the entire night, and into early morning. Regional stations can be heard during the day. Solar activity increases the strength of signals on this band during early morning and late evening hours. If you are new to shortwave listening, keep this band in your rotation.

41 and 40 Meters: These are interesting bands! From a broadcast standpoint, fewer stations utilize these for international broadcast, but focus more on regional targets. This is a strong nighttime player, though regionally, both amateur radio stations as well as broadcasters rely on the dynamics of propagation unique to these frequencies. Sunspot activity can sometimes be detrimental to reliable propagation, here, so this year's low activity will make these bands quite reliable for strong stations.

49 and 60 Meters: These bands are great year-round especially during evening, night, and morning hours. Daytime signals are regional, though sometimes global propagation is possible. This year, expect great results in DX hunting.

75 and 80 Meters: These bands are solid nighttime players for the radio amateur with even mediocre antenna systems, especially after the noisy summer months, and if utilizing modes such as FT8. With a well-designed high-gain antenna system, and some power (500 watts or more), solid communications are typical from regional to global, especially during the winter season. International broadcast stations on 75-meters exist mostly in the Eastern hemisphere after dark, and reception of these stations can be had by capable stations in the Western hemisphere.

90 Meters: This is mostly a tropical band. While limited for long-distance (global), plenty of regional signals are found here (for instance, the Canadian time station CHU on 3.33 MHz).

120 and 160 Meters: These are nighttime DX bands, especially for tropical and regional paths. DX openings on 160-meters should peak during the early spring, late autumn, and all through the winter months, when seasonal electrical storms are few or non-existent, and when geomagnetic conditions are very quiet. A good loop antenna, up as high as possible, would offer a quiet ear, enabling the reception of very weak signals.

HF Propagation for January

We are in the winter season, with very short daylight hours. Average daily Maximum Usable Frequencies (MUFs) are at their seasonal lowest, but so are noise levels. While the solar cycle is slowly becoming more active, the appearance of many simultaneous yet occasional sunspots that quickly appear, grow in complexity, and then unleash a few X-ray flares, may provide moments of joy for higher frequency propagation. Winter peaks will help keep some of the daytime bands hopping with DX signals. We expect fair propagation conditions for lower shortwave bands throughout the month.

Nineteen meters through 11-meters will close shortly after sunset, to open again just before sunrise. But morning and evening DX openings between some areas in the

Northern hemisphere on these bands are very short, because the band in question closes on one end of the path before it opens on the opposite end.

Paths on the 31-meter band through the 15-meter band remain in their seasonal peak, especially between North America and Europe in the morning, and between North America and Asia during the late afternoon hours.

Twenty-Two meters and 19-meters continue to be the best daytime DX bands, with 31 and 25-meters running a close second. Plenty of surprises are possible on 31-meters during the morning and evening hours, and well into the hours of darkness. North/south paths on 25 through 15-meters will be reliable and open for most of the daylight hours, especially where paths terminate in the Southern hemisphere. Nighttime conditions on these higher frequencies remain short and weak, with mostly north/south path openings since the Southern hemisphere has longer daylight hours.

Signals are much stronger on 90 through 41-meters this year, and seasonally they are at their nighttime peak. DX activity tends to increase later in the evening toward midnight. Look for Africa and South Pacific (Australia, Papua New Guinea, etc.) on 90 through 60-meters throughout the night. On 41, 49 and 60 meters, long path DX is possible along the grayline terminator (the area between sunlight and darkness).

Seventy-five through 120 meters continue to remain stable, with very low noise levels. Some high noise may occur during regional snowstorms, but on average you can expect great nighttime DX conditions with the longer hours of darkness. Look for Europe and Africa around sunset until the middle of the night, and then Asia, the Pacific, and the South Pacific as morning approaches.

Signals below 120 meters are also greatly improved, unless we experience intense Coronal Mass Ejection (CME) events, where conditions will degrade. Mediumwave DX is hot during this season.

VHF Conditions

Sporadic-E can occur during January (though very rare), so be on the lookout. Very little Aurora is likely to occur, however, so don't expect Auroral-E propagation.

The *Quadrantids* meteor shower is the major meteor shower for January, and it can appear any time during the first week of January. This shower is active from December 28 through January 12, with maximum occurring on January 4. This shower can be quite intense, so it may be a good idea for setting up some 2- and 6-meter schedules. Morning meteor openings may be the best bet during this month. The hourly rate can be as high as 120 this year. If you visit https://www.meteorshowers.org/ on or before January 10, you might catch the animated display showing the Quadrantids.

Check out http://www.imo.net/calendar/ for a complete calendar of meteor showers in 2022.

Please don't hesitate to write and let me know about any interesting propagation that you have noticed. Do you have questions about propagation? I look forward to hearing from you. Turn on your favorite radio and enjoy the great DX season on the medium and short waves. Happy hunting!

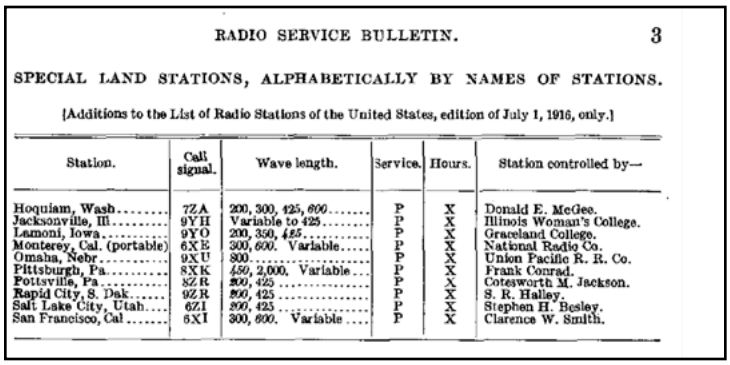
Feedback Requested

Do you have propagation-related questions, or a space weather question, about the Sun, the ionosphere, or the Sun-Earth connection, that you'd like answered? Please send in your questions and comments, as well as report your observations of any notable propagation conditions, via Twitter at @NW7US or @HFRadioSpaceWX or via the Space Weather and Radio Propagation Facebook page at **https://fb.me/spacewx.hfradio**.

Be sure to check out the latest conditions, as well as the educational resources about propagation, which I have put together for you at **https://SunSpotWatch.com** as well as on Facebook.

Interested in stunning videos of our Sun in action? There are quite a few space-weather and radio videos on https://YouTube.com/NW7US. Finally, be sure to check out the Tumblr blog, http://blog.nw7us.us , in which daily space weather posts are available.

TSM

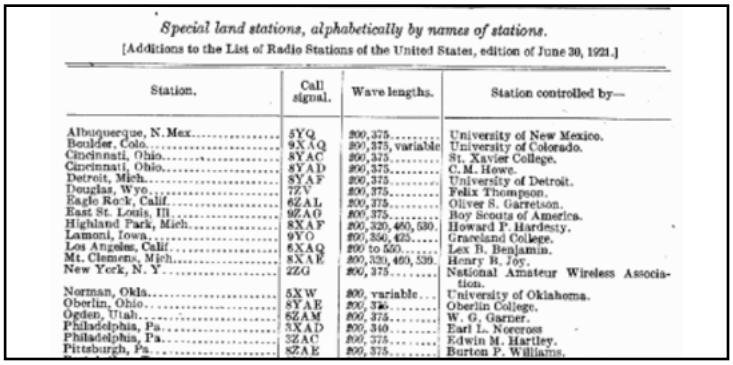


RADIO SERVICE BULLETIN. 3

SPECIAL LAND STATIONS, ALPHABETICALLY BY NAMES OF STATIONS.

[Additions to the List of Radio Stations of the United States, edition of July 1, 1916, only.]

Station.	Call signal.	Wave length.	Service.	Hours.	Station controlled by—
Hoquiam, Wash	7ZA	200, 300, 425, 600	P	X	Donald E. McGee.
Jacksonville, Ill	9YH	Variable to 425	P	X	Illinois Woman's College.
Lamoni, Iowa	9YO	200, 350, 425	P	X	Graceland College.
Monterey, Cal. (portable)	6XE	300, 600. Variable	P	X	National Radio Co.
Omaha, Nebr	9XU	800	P	X	Union Pacific R. R. Co.
Pittsburgh, Pa	8XK	450, 2,000. Variable	P	X	Frank Conrad.
Pottsville, Pa	8ZR	200, 425	P	X	Cotesworth M. Jackson.
Rapid City, S. Dak	9ZR	200, 425	P	X	S. R. Halley.
Salt Lake City, Utah	6ZI	200, 425	P	X	Stephen H. Besley.
San Francisco, Cal	6XI	300, 600. Variable	P	X	Clarence W. Smith.

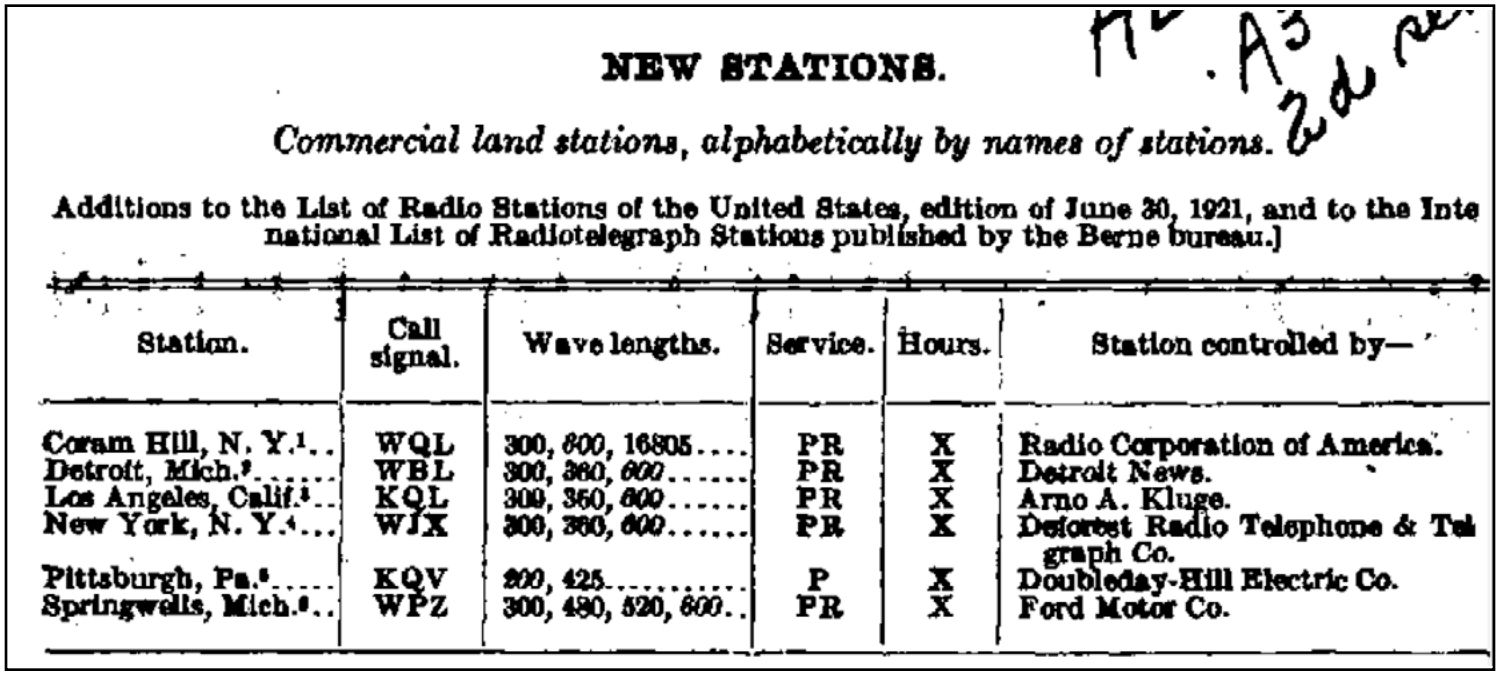


Special land stations, alphabetically by names of stations.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1921.]

Station.	Call signal.	Wave lengths.	Station controlled by—
Albuquerque, N. Mex	5YQ	200, 375	University of New Mexico.
Boulder, Colo	9XAQ	200, 375, variable	University of Colorado.
Cincinnati, Ohio	8YAC	200, 375	St. Xavier College.
Cincinnati, Ohio	8YAD	200, 375	C. M. Howe.
Detroit, Mich	8YAF	200, 375	University of Detroit.
Douglas, Wyo	7ZV	200, 375	Felix Thompson.
Eagle Rock, Calif	6ZAL	200, 375	Oliver S. Garretson.
East St. Louis, Ill	9ZAG	200, 375	Boy Scouts of America.
Highland Park, Mich	8XAF	200, 320, 460, 530	Howard P. Hardesty.
Lamoni, Iowa	9YO	200, 350, 425	Graceland College.
Los Angeles, Calif	6XAQ	200 to 500	Lex B. Benjamin.
Mt. Clemens, Mich	8XAE	200, 320, 460, 530	Henry R. Joy.
New York, N. Y	2ZG	200, 375	National Amateur Wireless Association.
Norman, Okla	5XW	200, variable	University of Oklahoma.
Oberlin, Ohio	8YAE	200, 375	Oberlin College.
Ogden, Utah	6ZAM	200, 375	W. G. Garner.
Philadelphia, Pa	3XAD	200, 340	Earl L. Norcross
Philadelphia, Pa	3ZAC	200, 375	Edwin M. Hartley.
Pittsburgh, Pa	8ZAE	200, 375	Burton P. Williams.

Left: Excerpt from the Radio Service Bulletin, issued by the Bureau of Navigation (forerunner of FCC), part of the US Department of Commerce, from August 1, 1916, publication of the call sign 8XK (forerunner to KDKA) to Frank Conrad, in Pittsburgh, Pennsylvania, who worked as an engineer at Westinghouse. Right: Radio Service Bulletin shows a listing for 8ZAE in Pittsburgh granted 200 and 375 meters sometime after June 30, 1921 controlled by Burton P. Williams, said to have been an employee of Doubleday-Hill Electric Co. (Courtesy: World Radio History online)



NEW STATIONS.

Commercial land stations, alphabetically by names of stations.

Additions to the List of Radio Stations of the United States, edition of June 30, 1921, and to the International List of Radiotelegraph Stations published by the Berne bureau.]

Station.	Call signal.	Wave lengths.	Service.	Hours.	Station controlled by—
Coram Hill, N. Y.[1]	WQL	300, 600, 16805	PR	X	Radio Corporation of America.
Detroit, Mich.[2]	WBL	300, 360, 600	PR	X	Detroit News.
Los Angeles, Calif.[3]	KQL	300, 360, 600	PR	X	Arno A. Kluge.
New York, N. Y.[4]	WJX	300, 360, 600	PR	X	Deforest Radio Telephone & Telegraph Co.
Pittsburgh, Pa.[5]	KQV	200, 425	P	X	Doubleday-Hill Electric Co.
Springwells, Mich.[6]	WPZ	300, 480, 520, 600	PR	X	Ford Motor Co.

In the August 1921 Radio Service Bulletin, KQV is noted under "New Stations," authorized for 200 and 425 meters issued to Doubleday-Hill Electric Co., in Pittsburgh, Pennsylvania. The FCC officially lists KQV as first licensed January 9, 1922. (Courtesy: World Radio History online)

KQV: 100 Years in the Shadow of KDKA

By Ken Reitz KS4ZR

KQV is the Pittsburgh, Pennsylvania, radio station that radio history forgot, residing as it has for most of the last century in the shadows of the more famous KDKA. KQV had a similar background. In late 1921, according to FCC records, an experimental station with the call sign 8ZAE was assigned to Burton P. Williams, an employee of Doubleday-Hill Electrical Co., in Pittsburgh. According to Pittsburgh Music History online, two men associated with Doubleday-Hill Electric Co., built a 20-Watt transmitter on the ninth floor of the company's building on Liberty Avenue in downtown Pittsburgh. The company sold, among other things, crystal radio kits and would fire up the transmitter to demonstrate radio reception. FCC records show that KQV (said to stand for King of Quaker Valley) was first licensed on January 9, 1922.

One hundred years ago the radio landscape blossomed with licenses. For example, the month that 8ZAE's license was published, a lot of educational institutions also became licensed including University of New Mexico (5YQ); University of Colorado (9XAQ); St. Xavier College (8YAC); University of Detroit (8YAF); Graceland College i9YO); University of Oklahoma (5XW); Oberlin College (8YAE); several high schools, National Radio Co. (6XO), Boy Scouts of America (9ZAG); and National Amateur Wireless Association (2ZG), brainchild of the irrepressible Hugo Gernsback founded in 1909, though his name is not associated with the

THE CHICAGO EVENING POST RADIO MAGAZINE, THURSDAY, JANUARY 31, 1924. 13

Here Amateur Reigns Supreme

Amateur Covers World with Radio

To the radio amateur the letters DX call up a vision of immeasurable distance that would have made our ox-cart pioneers and forefathers blink in amazement, but easily is obliterated with the pressure of fingers on a brass key.

This business of "packing up the old kit bag" for the sake of the wanderlust that is in all of us now has, thru radio, a modern version that does not require the lifting of a foot over one's doorstep. That is the major fascination in the wonderful game of amateur radio, the thrill that comes with each new conquest over space and time, ability to reach the ends of the world.

You read on every hand how the possession of a receiving set from the simple single circuit tuner to the latest superheterodyne brings "the world into the home," but seldom have you read how easily a radio transmitter can take you out into the world.

From the time that such men as Daniel Boone lifted rifles over their shoulders and hit the trail into the wilderness, there has lurked in all of us the strong desire to go beyond our immediate ken. It is the same ambition that led early explorers to this country and made possible the pioneer days that eventually developed in the building of the west.

Equal to Seven League Boots.

For a little more than the same amount of effort that it would take you to equip your home with a radio receiving set, you can install a telegraph code transmitter which is equivalent to a pair of seven league boots, a railroad pass, or a passport to distant countries. Sixteen thousand young men have done that in this

Amateur Records in Last Year

By BEVERLY DUDLEY.
(9BR and Member A. R. R. L.)

While much has been said about broadcast reception and improvements for 1923, comparatively little has been published on amateur activities. Amateur radio was not without its accomplishments during the last year, however, and many records were made that would have seemed almost impossible a few years ago. A few of the most outstanding amateur achievements for 1923 are reviewed here so the public may know what the "hams" are doing.

Probably the best piece of work being done by amateurs at the present time is the supplying of a means of communication to WNP, the radio station aboard the Bowdoin. Dr. MacMillan has two complete receivers and a complete 100-watt I. C. W. transmitter aboard the Bowdoin in his trip to the arctic, and with this equipment manages to keep in touch with the world almost as easily as if he were in the United States. Entertainment and news is obtained from the various broadcasting stations (notably 2XN or better known as WJAZ), but for communication, Donald I. Mix, WNP's operator depends entirely on American and Canadian amateurs, who, thru an efficient system of relaying messages, handle traffic for the men in the arctic. Mix, by the way, is a "ham" himself.

F. W. Dunmore, scientist of the United States bureau of standards, is shown here measuring the wave frequency of a radio broadcasting station. These tests are made so that each station may transmit on its allocated frequency and thus reduce interference.

Amateurs Want an International Code Language

HARTFORD, Conn., Jan. 31.—With the growing interest in private com-

Eighth District Works British for Two Hours

PITTSBURG, Jan. 31.—In the last two months radio amateurs in one

Maxim Takes Sea Trip for World Relay

NEW YORK, Jan. 31.—With one of the first private receiving antennas ever permitted a passenger on board a vesel bound for Europe and his cabin snugly equipped with a high-grade short wave radio set, Hiram Percy Maxim, president of the American Radio Relay league, left this city recently on the Belgenland of the Red Star line after assuring local radio men that he expected to hear United States amateurs in the Mediterranean.

In other cases where a passenger going to Europe has installed a private receiving set on board ship, it has been necessary to arrange for the use of the ship's antenna when it was not required for traffic. Anxious to use the radio set any time he pleased during the voyage, Mr. Maxim, who is a confirmed amateur radio man, obtained permission from the ship owners and the British Marconi company today to erect an aerial connecting with his own stateroom.

Keeps in Touch With League.

By prearrangement with the headquarters of the A. R. R. L. at Hartford, Conn., Mr. Maxim, intends to keep in constant touch with league affairs and will acknowledge receipt of such messages by means of the vessel's regular radio service. Above all else he will spend most of his time listening to American amateur stations.

The receiver conditions on the ship should be such that with very little trouble he could hear not only amateurs in the United States, but also those in England, France and Holland. Should he have difficulty in hearing messages from American

It was not uncommon 100 years ago to have a commercial and amateur license assigned to the same location. Commercial licenses allow the holder to 'broadcast' information (and entertainment, for that matter) to the world at large—something that Doubleday-Hill Electric would want to do in order to sell radio sets. Amateur licenses granted the holder two-way communications with other amateurs, something that hams want to do to improve distance and quality of transmissions. The amateur radio side of KQV (8ZAE) was quite active. This article from the Chicago Evening Post Radio Magazine from January 31, 1924, with the dateline 'Pittsburg' notes that B. P. Williams, operator of station 8ZAE, worked British station 2OD for two hours. The Chicago Evening Post devoted an entire page to amateur radio activities, with many items reported by the ARRL. (Courtesy: World Radio History online)

license and it's not clear why it took him ten years for his association to get a license. These stations joined an already impressive list of licensees for commercial enterprises, educational institutions, private individuals and religious organizations that would continue to grow with each passing month.

The details of the origins of KQV are murky in part because of the rivalry with KDKA in bragging rights to the Pittsburgh area. An article in the *Pittsburgh Press* from September 19, 1934, declared that "…[KQV] was just one of those amateur affairs established to carry radio messages from Doubleday-Hill to its Washington, D.C. branch."

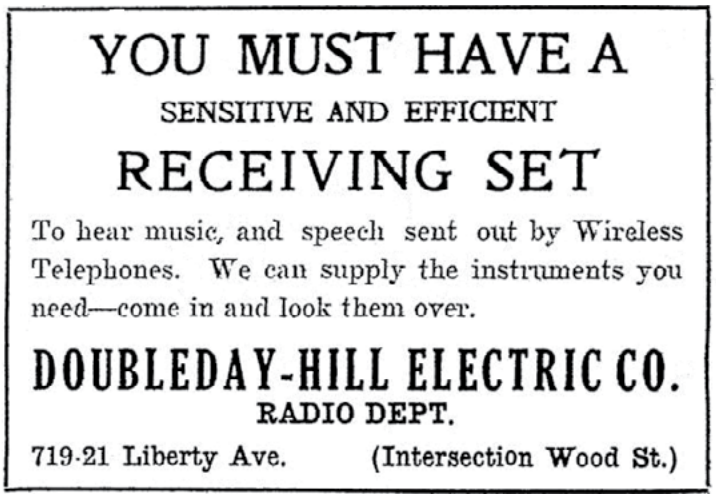
By 1927, according to FCC records, KQV was assigned 850 kHz with a power output of 500 Watts. Later, in 1928 KQV was assigned 1110 kHz, sharing that frequency with WJAS; KQV moved to 1380 kHz, sharing with WCSO in 1929 and WSMK in 1930. Power was increased to 1 kW (day) and 500 Watts (night) in 1940 and moved to 1410 in 1941. By February 1946 the station was allowed 5 kW (daytime) and 1 kW (night) while remaining on 1410 kHz as it does today.

Throughout the 1930s, 40s and into the 1950s, the station aired programming typically associated with the "Golden Age of Radio"—the variety shows, sitcoms and mysteries that became the hallmark of that era.

The peak period of broadcast popularity for KQV came about in 1957 when the station was sold to American Broadcasting-Paramount Theatres, which was the parent company of ABC Radio. On January 13, 1958, the station adopted the Top 40 music format pioneered by Todd Storz (see "Summer Reading: WWII Radio Operators and 1960s US Top-40 Radio" in the July 2021 issue of *TSM*).

In 1963 a new program director brought in top outside on-air talent and the stations quickly rose in area ratings to challenge the dominance of KDKA. KQV's street-level studio window let passersby watch the DJs in action and, according to newspaper reports from the era, often attracted several hundred teens to the studio each night during the 9:00 pm to midnight shift. One report claimed the station would premiere new Beatles records even before WABC New York, the Canada-to-Cuba east coast powerhouse and sister station to KQV.

Throughout its history KQV found it hard to topple KDKA from the top of local ratings. Even in a radio-retrospective piece in the *Pittsburgh Post-Gazette* from 2013, KQV gets scant mention. In April 1975 ABC sold KQV to Taft Broadcasting and the new owners made swift changes firing the music director the next month and a number of DJs



Ad from February 15, 1920, Pittsburgh Gazette Times for Doubleday-Hill Electric Co., promoting receiving sets in their radio department. (Public domain)

Ad appearing in the August 6, 1922, issue of the Pittsburgh Press promotes Doubleday-Hill Electric Co., as 'Pittsburgh's Pioneer Radio Store' offering a Magnavox R-3 for $45 ($736 today), a Grebe CR-9 receiver for $130 ($2,127 today). (Public Domain)

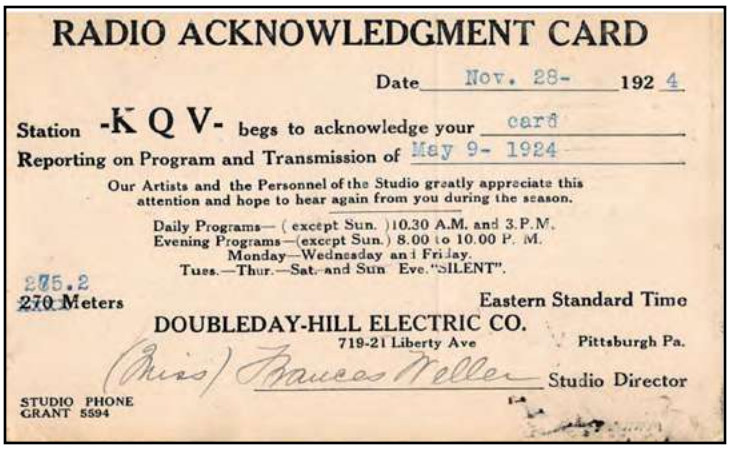
over the summer. On October 15, 1975, the Top-40 format was scuttled in favor of all-news. KDKA would hang on to its music format for another 17 years, but it too would have a "day the music died" moment on April 10, 1992, when even KDKA adopted the all-talk format.

But the all-news format wasn't turning the profit Taft had expected. In 1982 Taft would sell the station to Calvary, Inc., a company formed with the purpose of saving KQV, which was owned by former *Pittsburgh Tribune-Review* publisher Dick Scaife and Robert Dickey, Sr., a Pittsburgh area native who had been general manager at WINS-AM, New York City, who Taft originally brought in from New York to establish the all-news-in-22-minutes format at KQV.

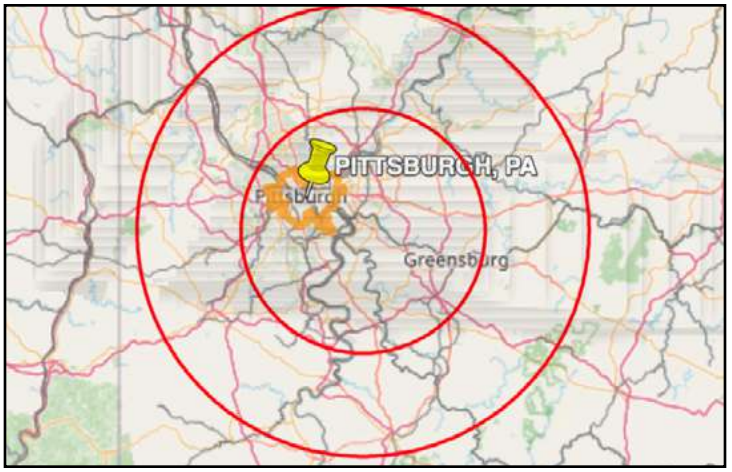
According to an article from February 5, 2018, in the *Pittsburgh Tribune-Review*, KQV continued to struggle financially as ownership, along with revenue instability, passed from the elder Dickey to two of his children in 2011 when he died. The two, however, were forced to suspend the station's license in 2017.

In February 2018 the station was sold again to Broadcast Educational Communications, Inc., owned by Robert and Ashley Stevens, who own several other AM and FM stations in western Pennsylvania, West Virginia and Maryland.

I spoke with Robert Stevens, whose involvement in



This KQV QSL card, dated November 28, 1924, shows the station operating on 275.2 meters (roughly 1090 kHz) by the Doubleday-Hill Electric Co., Pittsburgh, Pennsylvania. Note the program schedule—with no programming all day Sunday or Tuesday, Thursday and Saturday evenings—making this a tough station to catch. This QSL is part of the collection of Dave Thomas, a noted all-band DXer who lived in nearby Ohio. (Courtesy of the Committee to Preserve Radio Verifications)



Signal contour map for KQV today. (FCC map)

radio broadcasting goes back to the 1970s. He told me that KQV was indeed on the air, broadcasting on 1410 kHz with 5 kW daytime and 75 Watts at night as a listener-supported noncommercial AM station airing an automated "beautiful music" format.

While he had originally hoped to return the station to the air with the all-news format, that was not practical from a revenue standpoint. And, while they have explored additional possibilities, including online streaming, they are realistic about the current state of terrestrial broadcasting in the US—it's in a state of flux and revenue options are limited, especially for a non-commercial AM radio station.

If you live in the Pittsburgh area, it's possible that you can hear their daytime signal. But at 1410 kHz and 75 Watts nighttime, very few will be able to catch KQV. But, listening from my location through a KiwiSDR, I was able to confirm that this 100-year-old US legacy radio station is on the air and programming uninterrupted easy listening music, still in the shadow of KDKA.

TSM


Murrow's Boys: (Left) CBS radio war correspondent Edward R. Murrow, post-war in 1947, set the standard for US journalism with his handpicked correspondents. (CBS photo in the public domain) (Center) CBS war correspondent William L. Shirer in Compiegne, France, reporting on the signing of the armistice between Germany and France on June 22, 1940. (Public domain) (Right) CBS war correspondent Eric Sevareid from a US State Department photo. (Public domain)

Edward R. Murrow: Inventor of Broadcast Journalism

By Scott Caldwell

Edward Egbert Roscoe Murrow (1908-1965) was born in Greensboro, North Carolina, on April 25, 1908. He was the last of Roscoe Murrow and Ethel Lamb Murrow's four sons. The family resided in a log cabin that had no electricity, no plumbing, and no heat except for a fireplace that doubled as the cooking area. They lacked the success of the American dream, possessing neither a car nor a telephone. Despite the hardships of running a small farm, the family did not go hungry.

In 1913, the family made the 2,300 mile trek to the state of Washington, close to Ethel's cousin. The offer of land from the US government for homesteaders was also an added incentive for moving. They finally settled north of Seattle, on Samish Bay in the Skagit County town of Blanchard, only 30 miles from the Canadian border. The family continued to struggle financially until Roscoe obtained employment on a railroad that served sawmills and the logging sites. Roscoe taught his children the value of hard work and the interpersonal skills required to do it well. It was a lesson that Murrow never forgot, and he applied it well during his career.

After graduating from high school in 1926, Murrow attended Washington State College, where he majored in Speech. He was also actively involved in politics and became a member of the Kappa Sigma Fraternity. At the National Student Federation of America, Murrow presented a speech that urged college students to become more interested in national and international politics. This speech was the catalyst that enabled him to run for president of the federation.

His interests in education and politics would serve his future career very well. After earning his bachelor's degree in 1930, he obtained employment at the Institute of International Education. His role was based on offering assistance to prominent German scholars who had been dismissed from academic positions in Nazi Germany. In 1935, Murrow joined the CBS broadcasting network as Director of Talks and Education, an organisation that he would later become synonymous with. CBS was planning to expand its operation and recruit reporters to cover the days salient events. At that time CBS only had one announcer, Bob Trout (1909-2000) who offered Murrow advice on how to communicate effectively on the radio. In 1937, Murrow travelled to Europe as the newly appointed Director of CBS's European Operations. This role provided Murrow with an opportunity to change CBS radio into a prominent broadcaster of international current affairs.

The Voice of Democracy

The Second World War was a pivotal event for both radio and Murrow's career. In the late 1930s, CBS still did not routinely report the news from London and their overall approach to news reporting was limited at best. News coverage was the domain of radio commentators like H.V, Kaltenborn (1878 – 1965) and various faceless announcers who disseminated the headlines on the hour. The Great Depression had seemingly altered the role of radio into a provider of cheap and accessible entertainment, light relief from a run of continuously bad news. The humor of Jack Benny (1894-1974) and the singing of Bing Crosby (1903-1977) and Kate Smith (1907-1986) were very popular among listeners.

Thanks to his college background in Speech, Murrow understood the potential of broadcast radio as a medium for international journalism. In August 1937, he opted to hire an itinerant American who would be solely based in Europe and able to report from the politically unstable continent. By pure chance, reporter William L. Shirer (1904-1993) was in the unfortunate position of being laid off by the Universal Service in Berlin. Without seeking prior authorization from the CBS management in New York, Murrow hired Shirer almost immediately and he had to quickly organize a recorded audition to appease his superiors. They were subsequently not impressed with the results, claiming that Shirer's Midwestern accent and his nasal flat tone made him unsuitable for broadcasting.

Murrow countered this opposition by claiming that he was hiring reporters who could both think and write, and not just corporate radio announcers. This was the standard that Murrow measured potential reporters against, and Shirer was the first to meet his operational standards. Murrow would encounter this form of opposition in 1939 when he attempted to recruit Eric Sevareid (1912-1992)—he subsequently changed his first name from Arnold as he believed that it was not suitable for a war correspondent. His audition for CBS management was even worse than Shirer's as he mumbled his way through it. He was again hired at Murrow's personal insistence forming an elite group of war correspondents that would go down in history as "Murrow's Boys." Sevareid's broadcasting career would be equally illustrious and would span over four decades, vindicating Murrow's decision to hire him in the first place.

Countdown to War

Events in Europe would place radio broadcasting at the forefront of the action. Shirer was ironically in Vienna at the time of the Nazi takeover of power and he subsequently witnessed the German troops marching into the city. However, he was prevented from filing a report and he was escorted away from the radio station. Murrow intervened and suggested reporting the Nazi takeover of power from the safety of London. At a risk to his own safety, Murrow decided that he had to try and report from Vienna, at last, the birth of

Still working in 1975, Eric Sevareid (at far right) with fellow CBS journalists Walter Cronkite and Bob Schieffer interviewing President Gerald R. Ford in the Blue Room at the White House 1975. (National Archives and Records Administration)

the foreign radio correspondent had come about. CBS soon realized that they had the potential to station a correspondent in the main European capital cities. CBS Director Paul White first discussed the concept with Shirer, stating that he required coverage from London, Paris, Vienna, Rome, and Berlin. It would be broadcast on Sunday for half an hour, a prime slot to enhance its appeal to the American listener. The program format worked and it soon became a standard feature in American households. The format of the programming structure was fairly straightforward and set up early. Correspondents would compile their stories, clear them through censorship, and then transmit them via government-operated shortwave stations to CBS in New York.

The western democracies surrendered the nation of Czechoslovakia in a final attempt to prevent another world war. Murrow obtained another scoop at the Munich Agreement, yet personally, he was deeply concerned at the unfolding events and he viewed the rise of Nazism as a catastrophe for the free world. However, his listeners back home in isolationist America seemed largely indifferent to European affairs. Public opinion was anti-war, with more than 95 per cent of Americans were opposed to war against Germany. By summer 1940, Nazi Germany ruled Western Europe, with military resistance quickly eliminated through the radical military concept of *Blitzkrieg*. On June 22, 1940, the French Government capitulated and formally signed an armistice with Nazi Germany at Compiègne. Shirer reported on another exclusive story as the United Kingdom stood isolated and alone against Nazism.

Murrow filed nightly reports which began with the iconic opening line, "This is London." In Berlin, Nazi officials placed wagers with Shirer. One claimed that England would have surrendered by August 15, while another opted for September 7 as the most likely date for victory. On September 2, Shirer reported that a giant map of England had been in-

stalled by the Nazi press office to assist reporters in tracking the progress of the invasion—a previous map of France had fulfilled a similar purpose.

Across the English Channel in the relative safety of London, Murrow attempted to report on the world's first air battle. Murrow wanted to get the human element of the battle, and he subsequently interviewed ordinary civilians in a variety of locations around the burning capital city.

"Walking down the street a few minutes ago, shrapnel shuttered and stammered on the rooftops and from underground came the sound of singing, and the song was My Blue Heaven."

Murrow processed a unique mastery of the English language and was able to intimately connect with his listeners. Sevareid remarked that Murrow was the first great literary artist of a new medium. Murrow believed that radio had an unrivaled ability to bridge the Atlantic Ocean, actively bringing the listener to the story. On August 24, Murrow made what would become a trademark night-time broadcast from London's Trafalgar Square. The broadcast was live and completely unscripted.

London's fight for survival against the might of the German *Luftwaffe* became the focus of global press attention. A total of 120 reporters were stationed in the capital city reporting on the daily fortunes of war. However, Murrow stood out due to his unique reporting style. He portrayed the English as human: unflappable, dogged, and quirky.

The daily reporting routine was physically and mentally exhausting. Murrow had difficulty sleeping, his appetite was poor, while his smoking had increased to four packs of cigarettes a day. He had to also submit to CBS's strictly enforced policy of non-partisanship. To counter this policy, Murrow portrayed the British as the underdogs, relying on his listeners' shared history and natural sympathies to support them in their life and death struggle. Sevareid recalled Murrow's influence on American society: "The generality of British people will probably never know what Murrow did for them in those days."

In late 1941, Murrow returned to New York and received a great welcome home. One observer remarked that it was the greatest welcome for a journalist since Henry Morton Stanley (1841-1904) returned having located David Livingstone. Poet and Librarian of Congress Archibald MacLeish summed up the feeling of listeners in America: "But it was not in London really that you spoke."

Victory in Europe and the Horrors of War

One of Murrow's most controversial broadcasts was when he entered the Nazi concentration camp at Buchenwald. He visibly described the scene he encountered at the factory of death. Piles of bodies everywhere he looked. Murrow was subsequently criticized for the shocking content of his report. However, he refused to apologize for it, arguing that the American public needed to know about the horrors of the Nazi regime.

A Report on Senator Joseph R. McCarthy

Murrow would start a new documentary series, See It Now, which debuted in 1951. On March 9, 1954, Murrow closed his news report with a stinging editorial on the tactics employed by Senator Joseph McCarthy in his campaign against communist ideology in the US government.

"This is no time for men who oppose Senator McCarthy's methods to keep silent, or for those who approve. We can deny our heritage and our history, but we cannot escape responsibility for the results. There is no way for a republic to abdicate its responsibilities. As a nation we have come into our full inheritance at a tender age. We proclaim ourselves, as indeed we are, the defenders of freedom, where it continues to exist in the world, but we cannot defend freedom aboard by deserting it at home."

McCarthy responded to Murrow's claim on the program See It Now, aired approximately three weeks later. McCarthy argued that, "I never listen to the extreme left-wing, bleeding-heart elements of radio and television." His response was not judged too highly. He also attacked Murrow more publicly claiming that he had sponsored a communist school in Moscow. Murrow's political attack on McCarthy has become legendary in American broadcasting history.

Leaving CBS

The top CBS management regarded the See It Now program as a rating loser that angered prominent politicians, vexed loyal sponsors, and alienated southern affiliate stations when it approached the subject of civil rights. It was subsequently cancelled in 1958. It was up to the most trusted man in America, Walter Cronkite (1916-2009) to pull CBS out of the depths of low morale following Murrow's departure.

US Information Agency (USIA)

In 1961, Murrow left the employment of CBS to join the new administration of President John F. Kennedy (1917-1963). He served as Director of the US Information Agency (USIA) until 1964 when he resigned due to ill-health. President Kennedy gave careful consideration to the post. His first choice was the President of CBS, Frank Stanton (1908-2006). Stanton declined the offer but immediately nominated Murrow as the prime candidate. The relationship between Stanton and Murrow had deteriorated by this point and the true motives behind the nomination may have been self-serving, side-lining Murrow from CBS operations. In many respects Murrow was an ideal candidate for the Kennedy administration; providing liberal credibility. As the head of USIA, President Kennedy authorized Murrow to have access to National Security Council meetings and representation in policy development, something he would not have had working for CBS.

Political opponents of the administration had raised concerns at Murrow's confirmation hearings, relating to his

Shortwave broadcasting played a big role in getting America's message to the world, particularly in worn-torn Europe. Voice of America Site B shortwave transmitting station and massive antenna array in Greenville, North Carolina was rededicated in 2012 as the Edward R. Murrow Transmitting Station. It's the last remaining US owned shortwave station on US soil. This photo shows the satellite dishes used to distribute VOA programming to Africa, South America and the Caribbean. In the background is one of the large curtain arrays used for shortwave broadcasts to Africa and the Caribbean. According to USAGM, 85 percent of transmissions from this site are aimed at Cuba with programming from Radio Martí. Programming from VOA studios in Washington, DC, is sent via microwave and fiber optic cable to Greenville. (Courtesy: Thomas Witherspoon K4SWL)

last CBS documentary, "Harvest of Shame," which aired on CBS in 1960, exposing the harsh treatment of migrant labor in the US. A press leak revealed that Murrow had attempted to prevent its broadcasting on British TV by the British Broadcasting Corporation (BBC). Even a personal appeal to his colleague, Sir Hugh Carlton Greene, proved to be unsuccessful. The BBC subsequently refused, and Murrow's attempt to censor his own journalism became a brief political scandal. Many staff members at the Voice of America (VOA) felt that Murrow's reputation never quite recovered from this scandal.

Murrow also felt betrayed as he was informed about the pending invasion of Cuba by an American trained army of Cuban exiles. Even a hastily scheduled meeting with Allen Dulles (1893-1969) at the Central Intelligence Agency (CIA), failed to confirm the likelihood of military action in Cuba. Approximately, 20 minutes later, Murrow was summoned to the White House where he received a full briefing from the special assistant to the President for National Security Affairs, McGeorge Bundy (1916-1996). The plan appalled Murrow who predicted a psychological disaster.

Feeling sidelined by the administration, he failed to pass on information to his own staff at VOA. The VOA Director, Henry Loomis (1916-2008) learned of the infamous Bay of Pigs invasion by listening to news reports on his car radio, while commuting to work. Within two hours, Loomis had systematically increased VOA's Spanish language broadcasts from one hour per day to an unprecedented output of 19 hours. VOA would maintain this schedule until the final defeat of the Cuban exiles on April 22, 1961. VOA initially struggled to obtain credible sources of information during the invasion. Loomis later recalled that, "While there was a wild outpouring of stories and items, there was a dearth of hard items and confirmable detail – thus complicating the Voice's problem of providing accurate and credible information."

VOA attempted to produce a balanced coverage, reporting Fidel Castro's (1926-2016) claim that US aircraft had attacked Cuba and then Adlai Stevenson's (1900-1965) statement to the United Nations (UN) that claimed it was defecting Cuban pilots. Unfortunately, VOA's credibility was damaged as Stevenson had been misinformed. The success in VOA's programming output was of little consolation to Loomis and his team, who resented the way that they had been fed misleading information by the State Department and the USIA policy office.

Murrow received numerous awards after a remarkable career. President Lyndon B. Johnson (1908-1973) awarded him the Medal of Freedom in 1964. In March 1965, Queen Elizabeth II named him as an honorary Knight Commander of the Order of the British Empire. The Radio Television Digital News Association (formerly known as the Radio-Television News Directors Association) has been honoring outstanding achievements in electronic journalism with the Edward R. Murrow Awards since 1971. Award recipients demonstrate the spirit of excellence that Murrow set as a standard for the profession of electronic journalism.

Suggested Further Reading

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TSM

Many DXers like to take their DX pursuits outdoors, such as in a park or oceanside. This can be as simple as a small portable radio, or a more sophisticated setup aimed at luring in more elusive DX! (Courtesy of the author)

So, You Wanna Hear Distant AM Radio Stations, Eh?

A Beginner's Guide to AM DX

By Loyd Van Horn W4LVH

It's a late winter evening as you hunker into a warm bed. It doesn't get that cold in the deep South of the United States, but what chill there is makes falling into a cozy blanket all the more satisfying.

To help you drift off, you decide to turn on the clock radio that normally serves only as a reminder of just how little sleep you have in store for the night.

You turn the dial, trying to find a station carrying either some soft music or at the very least, some talk radio. Something about the sound of a human voice can turn it into audible Melatonin on nights like this. Through crashes of static in these quiet hours, you listen. Suddenly, a station appears. The voices, unfamiliar to you, with advertisements for businesses located on streets that are not those you frequent on your daily commute. A weather forecast, with temperatures much colder than those you are expecting for your hometown. The mention of the arrival of a snowstorm in the coming weekend perks up your ears further.

"Now back to St. Louis Blues hockey on your home for the Blues, 1120 KMOX, St. Louis's news, talk and sports station."

You arise in your bed. "Missouri?"

You begin to calculate just how far St. Louis is from your home. It isn't Brisbane or New Delhi, but it might as well be. What exotic atmospheric wizardry has brought radio signals from such distant locations to your bedside?

Without even realizing it, you just logged your first AM DX station. This exact scenario is how many of us who have been consumed by the DX hobby first dabbled our toes into these waters. A chance encounter with a newscast from a station in a distant city. The first-time hearing voices and music in Spanish and the surprise when they said, "…transmitiendo desde la Habana, Cuba." For some, that bedside session is as far as it goes. For the rest of us, a fascination develops to see just how far of a signal can we actually pull in? It is that very question that makes us "DXers."

The DXing DXer

For those reading these words who may be entirely new to this concept, DX is short for the search for distant radio signals. It originated as a shorthand method of saying

To get started in AM DXing, you don't have to have a sophisticated setup. A small portable radio or even the radio in your car will often do the trick! (Courtesy of the author)

Many DXers will keep a logbook of received stations. This can come in the form of a notebook or other paper log (as shown) or a computerized database or spreadsheet. (Courtesy of the author)

"distant/distance" during the days of telegraphs. Therefore, one who "DXs" is a "DXer." There are many types of DXers and if it radiates on a radio frequency you can pretty much guarantee someone will DX it.

For many though, it is AM DX where they get their start. For one, it is one of the easiest ways to start DXing! All you need is a radio that can tune AM (or mediumwave, as it is also known) frequencies.

In North America, these frequencies range between 530 kHz up to 1700 kHz. North American stations are spaced between these frequencies in 10 kHz allocations (i.e., 540, 550, 560 and so on).

Pretty much everywhere else in the world, mediumwave stations can be found between 531 and 1602 kHz (although Australia/New Zealand has stations all the way up to 1701 kHz) separated by 9 kHz of spacing (i.e., 531, 540, 549, 558, etc.).

One does not need a sophisticated and expensive set up to begin AM DXing, that low barrier to entry is why it remains one of the most popular forms of DX in the world after more than 100 years! In fact, for most, the best AM radio to use for DX is the one you have right now!

In addition to beside clock radios and home stereos, one of the more popular methods for many beginners is using the radio in their vehicle. Most factory-installed radios in vehicles are actually excellent AM DX machines.

Whatever radio you choose, you want to get as far away from noise as you possibly can. This can be a difficult endeavor as modern life has introduced a cacophony of buzzes, whirrs, and whistles into the AM band. There are some very effective methods for removing or at worst avoiding such interference, but they are a bit out of scope for this article. There are some resources though that can help, and we will discuss those a bit later.

So, you have a radio, and you are at least moderately away from pesky interference. What should you expect to hear when you turn your radio to the AM band? What next?

The Drive Time Rule

First, a little bit about how AM radio signals get from the radio station's transmitter to your receiver. Once an AM radio signal leaves the antenna at the transmitter site there are two components of that signal: groundwave and skywave. Groundwave signals, as you might have assumed, travel outward from the station's transmitting antenna(s) along the ground. How far this signal can be heard depends on many factors such as terrain as well as the conductivity of the ground itself (how well it conducts electricity).

For instance, a DXer on a coastal location can often hear groundwave signals from hundreds of miles away if they are separated by only saltwater because saltwater is an excellent conductor of electricity. As an example, when I lived in Charleston, South Carolina, (my house was roughly 12 miles inland from the Atlantic Ocean) I could tune in radio signals during the middle of the day (groundwave signals) from Miami, Florida and even from Cuba. If I was sitting with a radio on the beach itself, I could hear some of the bigger powered stations up the coast into DC and New York as well.

DXers in the Midwest, which has extremely conductive soil, can often hear groundwave signals from stations many hundreds of miles away as well. Those in areas with poorer ground conductivity may only hear groundwave signals from up to about 200 miles away at most.

The second portion of the transmitted signal goes upwards towards the atmosphere. This is referred to as "skywave." How it interacts with the atmosphere determines whether that skywave signal can be heard by DXers or not.

Exactly what impact the atmosphere has on AM radio signals changes depending on whether the DXer and the transmitting station are under sunlight or not. As the sun passes through the sky, its influence on the atmosphere and how AM radio signals propagates changes.

During the daylight hours, for instance, you are limit-

ed to only hearing stations that are relatively close to your location, as you are generally only able to hear groundwave signals during the day. This is because the sun energizes the atmosphere which results in the creation of the "D-layer" of our atmosphere each day (meaning it is present during daylight hours and goes away at night after sunset, repeating the cycle each day). This D-layer absorbs skywave AM radio signals, leaving only the groundwave signals to propagate to DXers.

However, as the sun begins to set, this D-layer begins to breakdown, albeit unevenly. This creates little pockets where there is no D-layer which allows the skywave signal to travel further into the atmosphere until it reaches the F-layer. The F-layer reflects AM radio signals and because of this the AM skywave signal will bounce off the F-layer of the atmosphere and head back towards Earth. This reflection is what allows an AM DXer to hear distant stations.

As the sun continues to set and we transition from dusk to nighttime, the D-layer eventually disappears completely and skywave signals are free to bounce off the atmosphere (sometimes more than once!) over great distances. Then, as the sun begins to rise in the Eastern skies around dawn, the D-layer begins to form once again, and the cycle continues.

This brings us to the answer of our first question: when should we listen? When you are just getting started, you should familiarize yourself with the AM band during all periods of the day as this will help you better understand how signals propagate to your location. This is always the first piece of advice I give new DXers: know your band. You should be able to know if you tune your radio to 930 kHz no matter the time of day, what you can expect to hear. This includes the format of the stations you expect to hear, what programs they run at various times, etc.

For instance, I know from my home in Mandeville, Louisiana, that if I turn my radio to 1200 kHz during the day, there is not really anything that I will receive. But starting around an hour before my local sunset all the way through around an hour after my local sunrise, I will hear WOAI-San Antonio, Texas. I know from listening to them repeatedly that in the overnight hours, they carry Coast-to-Coast AM with George Noory. So, if I tune my radio to 1200 during the overnight hours and there is a call-in show talking about aliens, I can probably safely assume that is WOAI. But if there is a station at 1200 kHz playing country music, or if I hear a station in Spanish, I know that is likely not WOAI and I should listen a bit further to see if I can nail down who it is!

Generally, the most satisfying periods to DX will be around your local sunset (from roughly two hours before your local sunset time, to two hours after), around your local sunrise (from roughly two hours prior and two hours after your local sunrise time) and the overnight hours (everything in between sunset and sunrise).

The periods immediately before and after your local sunrise and sunset are known as "grayline" periods. This is a magic portion of the day when the D-layer hasn't completely disappeared yet, but enough has eroded to allow for longer


DX News

Serving Medium Wave DXers since 1933

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MERRY CHRISTMAS TO ALL!

NATIONAL RADIO CLUB

Front cover of the latest DX News from the National Radio Club, devoted to AM band DX since 1933. (Courtesy: NRC)

distance receptions. This creates what we call "grayline enhancement" because that dusk/dawn period can allow signals to travel along the grayline and boost their signals a bit. This is especially helpful if you and the station are both in the grayline at the same time. Since the angle of the sun changes as the seasons change, what stations you hear enhanced by grayline in June will be completely different from those enhanced in January.

It just so happens that sunset/sunrise is also the time of the day that many stations will either power down/change their antenna pattern (this is done to protect their signal from interfering with other stations on the frequency at night and is mandated by the FCC on the station's license) or sign-off entirely (if they are only allowed to broadcast during the day). Because of this, as stations disappear due to these changes, new ones will rise on the frequency. Between these man-made and atmospheric variables, sunset/sunrise can be a very unpredictable and highly enjoyable time to DX!

It also just happens that these sunrise/sunset periods align with the "drive time" hours for radio stations. Radio stations prioritize the drive time periods (basically 6 am-9 am in the morning and 4 pm-7 pm in the afternoon) as their peak times of the day. That's when they throw their best content at you, because they know traditionally, they have a captive audience of people sitting in their cars listening. The last thing they want is for you to turn the dial to another station. While they have your attention, they want to make sure that you know exactly what station it is you are listening to, as well. That is why you will hear more station identifications during morning and afternoon drive than you hear at essentially any other part of the day.

This is why I am a fan of the "Drive Time Rule." While I will DX any station, any time, anywhere, my favorite times to DX are the drive times because I have a higher likelihood of hearing a station identification during this time. There is also a better chance of hearing more localized content such as local news, weather, traffic, and local advertisements. All of these help greatly in allowing me to identify the station I am hearing. Which brings us to: What should I listen for?

Becoming an ID Detective

In the early days of DX, hearing a station identify with their call letters and city of license was the holy grail. This is what all DXers sought out and anything less just didn't cut it when it came to claiming reception.

These identifications (IDs) are still used today by radio stations in the United States, as US stations are legally required to identify with their call letters and city of license as reasonably close to the top of the hour as possible (meaning it could be just prior to, right at the :00, or just after).

However, as the AM band has changed over the years due to there being more stations on each frequency and a decrease in localized content in favor of network programming, hearing a full "legal" ID isn't always going to be possible. There are still plenty of things though a DXer can use to verify the identity of a received station.

Listen for anything localized such as local advertisements, traffic updates, local news, local weather and any local programs (high school football/basketball are fantastic for a DXer, local talk-shows with telephone numbers for callers to call-in, etc.). Be careful not to confuse local content with syndicated/network content. Glenn Beck and Mark Levin are nationally syndicated, so hearing a caller on these shows from "Tucson" doesn't mean you are hearing a station in Arizona.

Hearing a weather forecast in degrees Celsius? You are likely hearing a station from Canada, as you will hear from 920-CKNX from Wingham, Ontario. Did that local ad give out an address, phone number or Web site? A quick Google search can help you glean a large amount of information on the location of your prospective station. If you compare that information to a list of known stations on the frequency, you can generally narrow down who you are hearing.

Generally speaking, US stations will usually have a commercial break around 15-:20 minutes after the hour. Sometimes these will have local ads, sometimes they do not, but they may at least play a quick liner that says something like "Cincinnati's home for news, the big one 700 WLW." A second commercial break will usually be found somewhere between :25-:35 minutes after the hour. These will often include local ads and at least a quick news/weather update from the local station. There is a third commercial break around :45-:50 after the hour which may or may not include any localized content. The final commercial break generally comes around :55 minutes after the hour and runs through the top of the hour. These will almost always contain some sort of localized content, including that prized top-of-the-hour (TOH) legal ID.

For stations outside of the United States, what you hear will vary. Though many still do try to identify who they are around the top of the hour as you'll hear on 540-XESURF in Tijuana, Mexico, the method in which they do this may vary. Some stations will play their national anthem near the beginning of the hour, such as you'll hear on 840-Dobleve in Cuba or 990-XECL in Mexicali, Mexico. Others have a

The author's home page: DX Central online, where you'll find more information about AM/FM band DXing and more. (Courtesy: DXcentralonline)

unique identifying sound such as time pips (a series of tones to mark the start of the new hour or minute, such as can be heard from Radio Reloj in Cuba) or a quick melody/song (Radio Progresso in Cuba has a very distinct song they will often play around the top of the hour that might be difficult to understand if you do not speak the language). However, persistence and patience (and experience) will usually pay off and net you some unforgettable DX!

One of the methods for identifying a station that has become increasingly popular over the past decade or so among DXers, as technology has improved, is comparing the online stream of a station to what you are hearing on your radio. This method, called paralleling (often noted by DXers in the shorthand "//") can be very helpful in comparing highly localized content. It is also extremely helpful for international stations, especially when they are in a different language than your native one. I have used this method very successfully to add countries such as Peru, Puerto Rico and Venezuela to my logbook by comparing the on-air signal heard on my radio with the online stream of the station.

Be careful, syndicated network content will be the same on the stream and on your radio but doesn't validate you are hearing a specific station. So, you have heard some stations, now what?

Dinosaurs and Computer Nerds…

This next step depends on how you plan on DXing and what level of commitment you want to the hobby. If you don't know yet what kind of DXer you are or want to be, that's OK! You can always adjust later. In the beginning, just get familiarized with the band and let the magic consume you! Regardless of what kind of DXing someone enjoys, DXing is remarkably personal. As a rule of thumb, live and let DX is a good mindset here to have. DX how you feel most comfortable and how you get the most enjoyment and allows others to do the same!

I cannot tell you how many times on social media I will see a new DXer revel at hearing a relatively routine or easy station only to see other DXers scoff or claim the reception is "no big deal." Don't be that person.

You will also note that the various types of DXers do not relate at all to level of skill. There can be highly skilled and experienced casual DXers and you can also find completely new and still learning hardcore DXers. What kind of DXer you are says more about your approach than your results.

The Casual DXer: Some DXers casually tune across the band, mentally or lightly notating on a piece of paper what stations were heard. They are there for the programming content or just the thrill of the chase. They don't keep stats of what they have heard, they don't have elaborate setups, they probably DX from the same chair they watch TV in, or just tune around a bit during their morning/afternoon commute and that is perfectly OK!

The Casual Logger: A little more hands-on than the casual DXer, this person probably keeps at least a notebook if not a formal logbook of stations heard. They may keep it more for sentimental value or just to have a record. They do this mainly so they can remember what stations they have received and possibly to share those receptions with other DXers in the club bulletins or on social media.

The Number Cruncher: Definitely keeping a detailed logbook and reviewing it regularly. This could be an 'old school' DXer that prefers a paper log or keeps an electronic log in the form of a spreadsheet, database or specialized program. They like to run stats so they can tell you how many stations they have heard per state, per frequency, in each country, etc. They often view DX more as a collecting activity and the goal here is to try to get the numbers up!

The Hardcore DXer: For these crazy folks (OK, your author may or may not include himself in this category) DXing is an ever-evolving experience. The hardcore DXer likely has an elaborate setup because they are trying to squeeze every ounce of signal from remote and distant locations that they can out of their gear. For these DXers, directional antennas and sophisticated receivers are necessary to chase after an increasingly exotic next goal. They crunch numbers regularly and keep highly detailed logs. They don't always just sit at home either, they can often be found taking their sophisticated setups outdoors as well to prime DXing locations in an effort to chase DX in new and exciting ways. They read everything they can on the hobby, study propagation obsessively and experienced ones can probably tell you the sunset/sunrise times for cities around the world that they have never even been to.

What kind of DXer you are really colors what you do with the DX you catch. Regardless of your style, it is highly recommended that you join one of the mediumwave DX clubs to interact with other DXers and learn even more about our hobby. In the United States, the main two clubs are:

- **The National Radio Club (NRC)**
- **International Radio Club of America (IRCA)**

Many DXers (your author included) will hold memberships in both clubs. Each produces a regularly published bulletin filled with loggings from other DXers, discussions on things such as how to reduce/remove noise from your location (or at least find the sources), call letter and format changes, antenna design/theory and much more. Both clubs also produce specialty publications that stand as required resources for most DXers.

So, it's time to go turn on our radios, right?

While we have covered a lot here, this is really only scratching the surface of all there is to know of AM DX. So, if we haven't quite satiated your craving for DX info, or if this article has you simply wanting to learn more, have no fear. To help, I have a Web site called DX Central which provides even more information for the new and experienced DXer alike. The "DX 101" section dives into even more detail on what to listen for and when on the AM bands, what kinds of gear we recommend, etc. We also have a YouTube channel where we post how-to videos, equipment reviews, an ever-growing catalog of air-checks (recorded identifications) and a regular live-stream called DX Central Live! where we hold a live DX session where other DXers around the world can join as we DX and can compare notes. Part of that live stream includes the MW Frequency Challenge where we challenge all DXers to DX on a single frequency for an entire week and submit their loggings of what they have heard. It can be a really fun way to not only interact with the larger DX community but fill out your logbook even further (if you are into that sort of thing!)

No matter how you like to DX, the AM band is sure to provide you with many hours of enjoyable and unforgettable experiences. I have been DXing AM radio now for nearly 30 years and can tell you that once it gets in your blood, there is no going back!

If you have any questions about the hobby, you can always to reach out to me as I love helping DXers get the most out of our experiences together. I may not have all of the answers because I am still learning every day myself, but I can at least know the folks that can offer some help!

About the Author

Loyd Van Horn W4LVH is the founder of the web site ***https://www.dxcentralonline.com*** *and a YouTube channel devoted to AM and FM DXing. He can be found on Twitter @DXCentral or by email at info@dxcentralonline.com*

TSM

TSM Reviews: The Worldwide Listening Guide By John A. Figliozzi

Reviewed by Ken Reitz KS4ZR

This is the 10th edition of The Worldwide Listening Guide by longtime shortwave radio writer, John Figliozzi. The Worldwide Listening Guide is published every two years and has become a vital source of information about international broadcasting today with a look at trends for the future of shortwave broadcasting and the latest technology that international broadcasters use to supplement their signals.

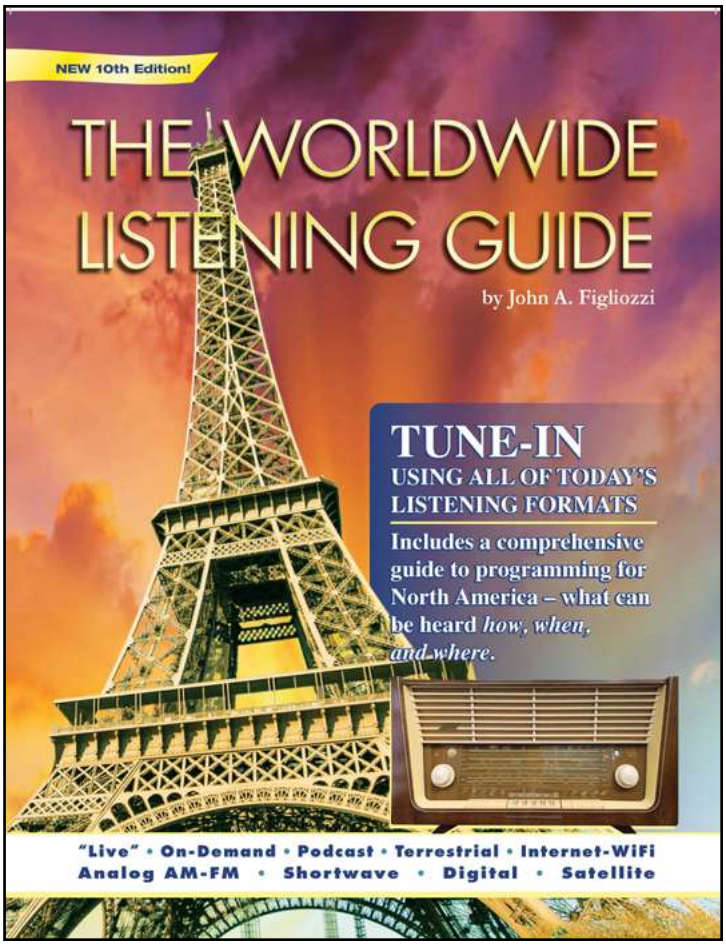
At 168 pages in a spiral-bound format, The Worldwide Listening Guide is a perfect introduction to the contemporary world of shortwave listening for those just getting started in the hobby as well as an updated reference for avid radio program listeners.

Figliozzi divides the content of this edition into "platforms," which includes the traditional multiband shortwave receiver, live streaming, podcasting, satellite radio, and AM/FM/HD radio because it turns out that what we have always thought of as shortwave programming heard on the high-frequency bands, is today found on many of the above platforms.

One great quick reference feature is the list of North American (Canada, US, Mexico) AM stations operating with 50 kW day and night, by frequency, beginning with 540 CBK Regina, Saskatchewan, and ending with 1580 KQFN Tempe, Arizona. Each entry lists the frequency, call sign, city and state (or province) and general notes (network affiliation, type of programming, language—English, French, Spanish), which makes it easy to identify what you may be picking up on your radio.

There is also a complete list of US and Canadian stations operating in the "expanded AM band" 1610-1700 kHz, which also includes the frequency, location and general programming notes. This sub-band is intriguing because all stations are limited to 10 kW maximum daytime and 1 kW or less at night. However, during the dawn and twilight periods, these signals can travel quite a distance. There's also concise information about mediumwave broadcasting from the Caribbean and other aspects of interest to broadcast band DXers.

The Worldwide Listening Guide's section on shortwave begins with a primer on the physics of shortwave transmissions; an explanation of what frequencies are included in which bands, and a tutorial on the well-known challenges to shortwave broadcasting. There is a chart of all of the international shortwave broadcasters still transmitting to North America in English and another chart of stations transmitting to North America in other languages—targeting the émigrés and ex-pats.



(Courtesy: W5YI Group)

The Worldwide Listening Guide covers the digital side of over-the-air broadcasting including the HD Radio digital format for US domestic AM and FM broadcasting as well as the Digital Radio Mondiale (DRM) format for international shortwave with a brief explanation of how they work and their relative success. There's a brief explanation of US domestic satellite radio (a subscription service intended mostly for US commuters) as well as an explanation for internet radio (also known as Wi-Fi radio) with a guide to programming on the various BBC radio services, ABC Radio (Australia), CBC Radio (Canada), RTÉ Radio (Ireland), Radio New Zealand (RNZ) and National Public Radio (US) stations.

These sources provide the basis for the "Guide to the Consolidated Program Listing," some 4,000 individual programs that you can receive on AM/FM/SW, Sirius/XM, Wi-Fi radio or via smartphone app. That's a lot of listening and it makes up the bulk of The Worldwide Listening Guide.

And, this is the value of The Worldwide Listening Guide, which is for listeners looking for content—to entertain and inform—from around the world with something as simple as an internet radio, a shortwave radio or AM/FM radio. You can buy the The Worldwide Listening Guide for $29.95 at **https://www.w5yi.org**.

TSM

TSM Reviews: Global Radio Guide Winter 2021-22 By Gayle Van Horn

Review by Ken Reitz KS4ZR

Gayle Van Horn's winter 2021-22 edition of the Global Radio Guide (GRG)was published November 30 and covers shortwave programming for the winter broadcast season.

The GRG is an outgrowth of her shortwave listings that appeared in *Monitoring Times* for decades. When that magazine folded with the December 2013 issue, Gayle and husband, Larry Van Horn, began publishing a number of radio related titles in the Kindle e-publishing format under their own Teak Publishing name and the GRG became a successful title from the start.

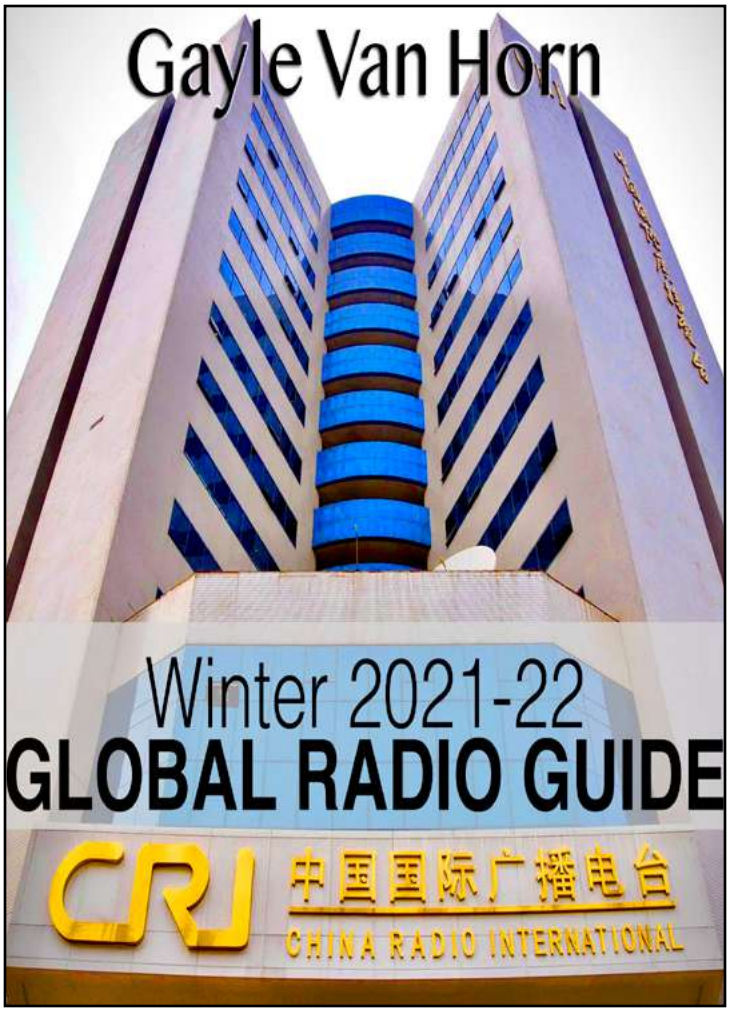
At over 500 pages, this latest edition covers a lot of international broadcast territory—which includes a number of in-depth shortwave listening articles. As evidenced from the cover image, one is about Chinese international broadcasting. There are other feature articles including one from former *Monitoring Times* shortwave columnist and current *TSM* shortwave columnist, Fred Waterer; an article by Dr. Adrian Peterson from Adventist World Radio on VOA relay stations in the Philippines; a review of the NES10-2MK4 Noise Cancelling Speaker; a survey of Software Defined Radios by Larry Van Horn (former *Monitoring Times* and current *TSM* writer/columnist) and a 10-page explanation of the Tropical Bands by the author herself.

In addition, there's a tutorial on QSLing (verification of reception) shortwave stations which has the latest addresses of those stations that do still QSL.

But the heart of the Global Radio Guide is the Global Frequency Guide, which starts on page 176 and runs for the next 318 pages. The guide, which is linked by page to the table on contents, follows the clock in Coordinated Universal Time (UTC) beginning with 0000 UTC, which makes it very easy to cruise the international shortwave bands and see which stations you have a chance of hearing at that time. For those using Software Defined Radios (SDRs) with sophisticated antennas or remotely tuned SDRs, mediumwave frequencies are also listed.

Of course, propagation and time of day will determine which of the many frequencies listed will be possible for you to hear given your actual listening location. But, as you start tuning through the frequencies for each broadcaster, you'll soon see which are received best.

The Global Radio Guide is an indispensable reference for seasoned shortwave listeners who are looking for everything from the big legacy shortwave broadcasters such as BBC World Service and Voice of America as well as lesser known but easily receivable shortwave stations



(Courtesy: Teak Publishing)

such as Radio Nacional do Amazonia (Brazil's Portuguese shortwave service to the Amazon region of Brazil on 11780 kHz); Radio Rebelde's Spanish service to the Caribbean via 5025 kHz; or Mexico's XEPPM Radio Educación in Spanish on 6185 kHz, or Channel 292 from Germany on 9670 kHz or, where to tune in programming in the Digital Radio Mondiale format such as All India Radio's French service on 9620 kHz. These are just a few of the off-the-beaten path programs you can hear among dozens more just scrolling through the frequencies.

There are so many frequencies listed for every hour that it takes a while to scan through them—they are listed in alphabetical order by country, including mediumwave frequencies—so you have to look carefully. But once you start looking you'll appreciate that shortwave listening is far from dead.

The GRG can be read on any e-tablet or Kindle format device including smartphone but it can also be read on a desktop or laptop computer. It's most handy on an e-tablet where you can keep it close by your radio for easy reference.

The Global Radio Guide Winter 2021-22 is $8.99 at **https://www.amazon.com/dp/B09MV5XMFZ**

TSM

Scanning America

By Dan Veeneman **dan@signalharbor.com**

Kent County, Michigan

A year ago, the Kent County Dispatch Authority completed an upgrade of their countywide public safety radio system, replacing an outdated analog system with a new $25 million digital radio system for police, fire and other first responders. The new system joins the Michigan Public Safety Communication System (MPSCS), a statewide radio network enabling direct coordination with local, state and federal agencies.

Kent County is located in the western part of the Lower Peninsula and is home to just over 650,000 people, with about 200,000 of those living in the county seat of Grand Rapids.

MPSCS operates from more than 280 repeater sites across all 83 counties in Michigan using APCO Project 25 Phase 1 standards. More than 100,000 users from over 1,000 different agencies and departments make use of the system.

The Kent County Dispatch Authority (KCDA) is the multi-jurisdictional board established by Kent County and the cities of Grand Rapids, Grandville, Walker and Wyoming to improve public safety communication in the county.

Over the past decade, Kent County dispatch has operated on as many as eight different radio systems. County dispatchers were unable to communicate via radio with neighboring dispatchers and personnel, including Michigan State Police, Allegan County, Ionia County, Newaygo County and Ottawa County. Without direct interoperability, Kent County dispatchers would have to make telephone calls to neighboring jurisdictions and have those dispatchers relay information, adding time, complexity and increased chance of error during emergencies.

In November of 2016, voters approved a telephone service surcharge to help fund 911 dispatch upgrades. The KCDA led four years of planning, repeater site acquisition and construction, equipment installation and testing.

The new system operates from twelve repeater sites and two dispatch centers, one for the county and one for the city of Grand Rapids. The upgrade includes six new repeater sites in Grand Rapids and the townships of Bowne, Casnovia, Gaines, Spencer and Vergennes. Additional antennas and radio equipment were added to repeater sites in East Grand Rapids, Wyoming and Plainfield Township as well as other MPSCS sites in Kent County.

In conjunction with the upgrade, nearly 4,000 portable and mobile radios as well as more than 800 pagers have been distributed to more than 40 police and fire departments in the county as they transition to MPSCS.

Encryption

Unfortunately for scanner listeners and those hoping for greater police transparency, most of the law enforcement talkgroups on the new system are encrypted, including the Kent County Sheriff's Office and all local police departments throughout the county. As a limited substitute, the Kent County Sheriff's Office, and the Grand Rapids Police Department both operate Incident Status Monitors that are available online.

Kent County MPSCS

The Kent County system operates APCO Project 25 Phase 1, simulcast on the following frequencies: 769.45625, 769.95625, 770.40625, 770.90625, 773.03125, 773.30625, 773.83125, 774.53125, 851.1500, 851.2625, 851.5375, 852.0375, 852.2375, 852.2875, 852.6625, 853.1375, 853.2500, 853.7500, 854.1625, 854.4625, 854.5125 and 854.8375 MHz.

There are a significant number of active talkgroups supporting activity in Kent County.

Decimal	Hex	Description
1372	55C	Rockford Emergency Medical Services (Unit 239)
3041	BE1	Countywide Vice Enforcement (Common)
3044	BE4	Metro Enforcement Team Drug Unit 1
3045	BE5	Metro Enforcement Team Drug Unit 2
3083	C0B	Countywide Narcotics Enforcement (Common)
3110	C26	County Mutual Aid (Countywide Common)
3326	CFE	County Law Enforcement
3327	CFF	County Special Event 1
3328	D00	County Special Event 2
3329	D01	Emergency Scene (Mutual Aid)
3501	DAD	County Medical Control Authority
3514	DBA	Life EMS (Kent County Dispatch)
3546	DDA	Hospital Pediatrics
3547	DDB	Ambulance to Hospital
3574	DF6	County Emergency Medical Services (Dis-

		patch)
4232	1088	County Health Department
6174	181E	Michigan Department of Transportation (Kent County)
11883	2E6B	Department of Health and Human Service (Grand Rapids)
12665	3179	Violent Crime Fugitive Task Force 1 (Grand Rapids)
12666	317A	Violent Crime Fugitive Task Force 2 (Grand Rapids)
12667	317B	Violent Crime Fugitive Task Force 3 (Grand Rapids)
13168	3370	Radio Amateur Civil Emergency Service (RACES)
13184	3380	Aero Med 2 Emergency Medical Services (Grand Rapids operations)
13273	33D9	Rockford Emergency Medical Services
13274	33DA	Rockford Emergency Medical Services (Unit 243)
13275	33DB	Rockford Emergency Medical Services (Unit 246)
13276	33DC	Rockford Emergency Medical Services (Unit 240)
13278	33DE	Rockford Ambulances
13279	33DF	Rockford Ambulance (Transport Vans)
13280	33E0	Rockford Ambulance
13288	33E8	Blogett Hospital
13289	33E9	Butterworth Hospital
13290	33EA	Helen DeVos Children's Hospital
13291	33EB	Grand Rapids Northeast Health Center
13292	33EC	Mercy Health Saint Mary's Hospital
13293	33ED	Mercy Health Southwest Campus
13295	33EF	Grand Rapids Fire Operations 1
13334	3416	County Search and Rescue
13493	34B5	County Law Enforcement (Dispatch North)
13494	34B6	County Law Enforcement (Dispatch South)
13495	34B7	County Law Enforcement (Dispatch West)
13496	34B8	County Law Enforcement (Secondary Dispatch)
13497	34B9	Sheriff (Car-to-Car)
13506	34C2	Ford International Airport Operations
13507	34C3	Kentwood Department of Public Works
13509	34C5	Kent County Department of Public Works
13510	34C6	Ford International Airport Utility 1
13514	34CA	Walker Department of Public Works
13515	34CB	East Grand Rapids Police (Car-to-Car)
13516	34CC	Grandville Police (Car-to-Car)
13517	34CD	Kentwood Police (Car-to-Car)
13520	34D0	Lowell Police (Car-to-Car)
13521	34D1	Rockford Police (Car-to-Car)
13523	34D3	Sparta Police (Car-to-Car)
13524	34D4	Walker Police (Car-to-Car)
13525	34D5	Wyoming Police (Car-to-Car)
13528	34D8	Ford International Airport Aircraft Rescue and Fire Fighting (Dispatch)
13529	34D9	Ford International Airport Police Patrol
13530	34DA	Ford International Airport Special Events
13531	34DB	Ford International Airport Parking 1
13532	34DC	County Fire (Dispatch North)
13533	34DD	County Fire (Dispatch East)
13534	34DE	County Fire (Dispatch West)
13535	34DF	Statewide Fire
13536	34E0	County Fireground 1
13537	34E1	County Fireground 2
13538	34E2	County Fireground 3
13539	34E3	County Fireground 4
13540	34E4	County Fireground 5
13541	34E5	County Fireground 6
13542	34E6	County Fireground 7
13543	34E7	County Fireground 8
13544	34E8	County Fireground 9
13545	34E9	County Fireground 10
13546	34EA	County Fireground 11
13547	34EB	County Fireground 12
13548	34EC	County Fireground 13
13549	34ED	County Fireground 14
13550	34EE	County Fireground 15
13551	34EF	Ada Fire Fireground
13552	34F0	Algoma Fire Fireground
13553	34F1	Alpine Fire Fireground
13554	34F2	Alto Fire Fireground
13555	34F3	Byron Fire Fireground
13556	34F4	Cascade Fire Fireground
13557	34F5	Caledonia Fire Fireground
13558	34F6	Cannon Fire Fireground
13559	34F7	Courtland Fire Fireground
13560	34F8	Cedar Springs Fire Fireground
13561	34F9	Cutlerville Fire Fireground
13562	34FA	Dutton Fire Fireground
13563	34FB	East Grand Rapids Fire Fireground
13564	34FC	Grand Rapids Township Fire Fireground
13565	34FD	Grattan Fire Fireground
13566	34FE	Grandville Fire Fireground
13567	34FF	Kentwood Fire Fireground
13568	3500	Kent City Fire Fireground
13569	3501	Lowell Fire Fireground
13570	3502	Oakfield Fire Fireground
13571	3503	Plainfield Fire Fireground
13572	3504	Rockford Fire Fireground
13573	3505	Spencer Fire Fireground
13574	3506	Sand Lake Fire Fireground
13575	3507	Solon Fire Fireground
13576	3508	Sparta Fire Fireground
13577	3509	Walker Fire Fireground
13578	350A	Wyoming Fire Fireground
13579	350B	County Incident Command
13582	350E	East Grand Rapids Department of Public Works
13588	3514	Animal Control
13589	3515	County Mutual Aid 1
13590	3516	County Mutual Aid 2

13591	3517	County Mutual Aid 3
13592	3518	County Mutual Aid 4
13593	3519	County Mutual Aid 5
13594	351A	County Mutual Aid 6
13595	351B	County Mutual Aid 7
13596	351C	County Mutual Aid 8
13597	351D	County Mutual Aid 9
13598	351E	County Mutual Aid 10
13599	351F	County Mutual Aid 11
13600	3520	County Mutual Aid 12
13601	3521	County Mutual Aid 13
13602	3522	County Mutual Aid 14
13603	3523	County Mutual Aid 15
13604	3524	County Special Event 3
13605	3525	County Special Event 4
13606	3526	County Special Event 5
13607	3527	County Special Event 6
13608	3528	County Special Event 7
13609	3529	County Special Event 8
13610	352A	County Special Event 9
13611	352B	County Special Event 10
13612	352C	County Special Event 11
13613	352D	County Special Event 12
13614	352E	County Special Event 13
13615	352F	County Special Event 14
13616	3530	County Special Event 15
13617	3531	Ada Fire Paging
13618	3532	Algoma Fire Paging
13619	3533	Alpine Fire Paging
13620	3534	Ford International Airport Aircraft Rescue and Fire Fighting (Paging)
13621	3535	Alto Fire Paging
13622	3536	Byron Fire Paging
13623	3537	Byron Medical Paging
13624	3538	Cascade Fire Paging
13625	3539	Caledonia Fire Paging
13626	353A	Cannon Fire Paging
13627	353B	Courtland Fire Paging
13628	353C	Cedar Springs Fire Paging
13629	353D	Cutlerville Fire Paging
13630	353E	Cutlerville Medical Paging
13631	353F	Dutton Fire Paging
13632	3540	Dutton Medical Paging
13633	3541	East Grand Rapids Fire Paging
13634	3542	Grand Rapids Township Fire Paging
13635	3543	Grattan Fire Paging
13636	3544	Grandville Fire Paging
13637	3545	Kentwood Fire Paging
13638	3546	Kent City Fire Paging
13639	3547	Lowell Fire Paging
13640	3548	Oakfield Fire Paging
13641	3549	Plainfield Fire Paging
13642	354A	Plainfield Medical Paging
13643	354B	Rockford Fire Paging
13644	354C	Spencer Fire Paging
13645	354D	Sand Lake Fire Paging
13646	354E	Solon Fire Paging
13647	354F	Sparta Fire Paging
13648	3550	Sparta Medical Paging
13649	3551	Walker Fire Paging
13650	3552	Walker Fire Paging (Duty Officer)
13651	3553	Wyoming Fire Paging (Full Time Crew)
13652	3554	Wyoming Fire Paging (Station 1)
13653	3555	Wyoming Fire Paging (Station 2)
13654	3556	Wyoming Fire Paging (Station 3)
13655	3557	Wyoming Fire Paging (Station 4)
13656	3558	Wyoming Paging (All Stations)
13659	355B	County All Call Paging
13666	3562	Ford International Airport Airfield Maintenance
13700	3584	Grand Rapids Police Operations
13701	3585	Grand Rapids Police Operations
13702	3586	Grand Rapids Police Operations
13703	3587	Grand Rapids Police Operations
13704	3588	Grand Rapids Community College Police (Dispatch)
13706	358A	Grand Rapids Police Operations
13707	358B	Grand Rapids Police Volunteer and Neighborhood Services 1
13708	358C	Grand Rapids Police Volunteer and Neighborhood Services 2
13709	358D	Grand Rapids Mutual Aid 6
13710	358E	Grand Rapids Mutual Aid 7
13711	358F	Grand Rapids Mutual Aid 8
13712	3590	Grand Rapids Mutual Aid 9
13713	3591	Grand Rapids Mutual Aid 10
13714	3592	Grand Rapids Mutual Aid 11
13715	3593	Grand Rapids Police Operations
13716	3594	Grand Rapids Police Operations
13717	3595	Grand Rapids Mutual Aid 14
13718	3596	Grand Rapids Mutual Aid 15
13720	3598	Grand Rapids Fire Fireground 4
13721	3599 I	Grand Rapids Police (Law Enforcement information Network)
13722	359A	Grand Rapids Police Operations
13723	359B	Grand Rapids Police (Dispatch North)
13724	359C	Grand Rapids Police (Dispatch South)
13725	359D	Grand Rapids Police Operations
13738	35AA	Grand Rapids Police Operations
13739	35AB	Grand Rapids Police Operations
13744	35B0	Kentwood Fire Paging (Station 1)
13745	35B1	Kentwood Fire Paging (Station 2)
13746	35B2	Kentwood Fire Paging (Station 3)
13748	35B4	Grand Rapids Fire (Dispatch)
13749	35B5	Grand Rapids Fire Fireground 2
13750	35B6	Grand Rapids Fire Fireground 3
13753	35B9	Grand Rapids Fire Operations 2
13754	35BA	Grand Rapids Fire Operations 3
13947	367B	Grandville Medical Paging
13948	367C	Cascade Medical Paging
13985	36A1	Grand Valley State University (Dispatch Grand Rapids)

16812	41AC	American Red Cross (Kent County)
23000	59D8	Kent County Emergency Service Team 1
23001	59D9	Kent County Emergency Service Team 2
23002	59DA	Kent County Emergency Service Team 3
23003	59DB	Kent County Emergency Service Team 4
23165	5A7D	Ford International Airport Aircraft Rescue and Fire Fighting (Operations)
23166	5A7E	Ford International Airport Operations 2
23167	5A7F	Ford International Airport Field Operations
23168	5A80	Ford International Airport Operations 3
23169	5A81	Ford International Airport Operations 4
23170	5A82	Ford International Airport Parking 2
23171	5A83	Ford International Airport Security 2
23175	5A87	Ford International Airport Police Patrol (Operations)
23176	5A88	Ford International Airport Utility 2
23276	5AEC	American Medical Response (Kent County Dispatch)
23277	5AED	American Medical Response (Kent County Operations)
23278	5AEE	American Medical Response (Kent County Tactical)
23282	5AF2	Grand Rapids Police (Emergency All-Call)
23335	5B27	Grand Rapids Fire Battalion Chief (Paging)
23350	5B36	Ford International Airport Alert Paging
23387	5B5B	Grand Rapids Fire Station 1 (Leonard Street NE) Alerting
23388	5B5C	Grand Rapids Fire Station 2 (Franklin Street SW) Alerting
23389	5B5D	Grand Rapids Fire Station 3 (Bridge Street NW) Alerting
23390	5B5E	Grand Rapids Fire Station 4 (Kalamazoo Avenue SE) Alerting
23391	5B5F	Grand Rapids Fire Station 5 (Monroe Avenue NW) Alerting
23392	5B60	Grand Rapids Fire Station 6 (Burton Street SE) Alerting
23393	5B61	Grand Rapids Fire Station 7 (LaGrave Avenue SE) Alerting
23394	5B62	Grand Rapids Fire Station 8 (Covell Avenue NW) Alerting
23395	5B63	Grand Rapids Fire Station 9 (Plainfield Avenue NE) Alerting
23396	5B64	Grand Rapids Fire Station 10 (Division Avenue S) Alerting
23397	5B65	Grand Rapids Fire Station 11 (Chester Street SE) Alerting
23398	5B66	Grand Rapids Fire (All Stations) Alerting

TSM

Federal Wavelengths

By Chris Parris **cparris@thefedfiles.com**

Scanning Nebraska, New Mexico and El Paso

Welcome to the first Federal Wavelengths column of 2022! I am planning on continuing the tradition of providing the latest and greatest in federal radio communications monitoring information. There are some ongoing stories that we will cover in the months to come, including some news on several "mystery" federal agency trunked radio systems, and frequency changes for other federal agencies.

To start off the new year, I have some reader submitted logs from the New Mexico, Colorado, and Nebraska, as well as a new feature of this column, Fed Files Tech Tips.

Nebraska Federal Frequencies

I have been exchanging some emails with an anonymous reader in the Grand Island, Nebraska area about what he is picking up with his scanners. He also provided some insight into how he searched for active frequencies in his area.

"Enclosed is a list of Federal Frequencies I have found over the last two months. A few of them I'm not sure who they might belong to. Also, I see you use the Laird WPD-136M6C-001 mobile antenna, I was wondering what kind of results you get with that antenna compared to the other antennas that you use for monitoring.

"When I use my scanners when I'm mobile I use three TRX-1s. I set one up for searching 162.00 to 166.5, the second one covers 166.5 to169.50, and the third covers 169.5 to 174.00. I use a Laird ¼-wave whip for the antenna on my vehicle."

I think that sounds like a great setup, as breaking down the search ranges into smaller sections always helps in catching those brief transmissions that might be missed!

Federal searching in the VHF bands in Nebraska is made a bit more challenging by the fact that the Nebraska State P25 trunking system is using some VHF federal frequencies at some of their trunked sites. The system uses a mix of 800 MHz, VHF public safety and some VHF federal channels. This happens with some wide area networks, as there just aren't many VHF public safety channels available for these new systems, and they can usually negotiate with the FCC and the NTIA to utilize lesser-used federal channels. These negotiations usually include federal agency access to the state trunked system.

In this case, any federal frequency with a P-25 Network Access Code (NAC) of 140 thru 14F might possibly be part of the state radio system, as that system utilizes those NACs on the voice channels.

Whistler TRX-1 (Courtesy: Whistler)

Here are some logs of federal activity that the reader caught in central Nebraska:

163.4125	N100	
163.7000	N169	Immigrations and Customs Enforcement (ICE)
163.8625	N167	FBI
163.9625	N167	FBI, input to 170.6250
164.2625	N555	Input to WAPA 171.2000
164.6500	N001	US Secret Service TANGO
165.1875	pl123.0	
168.5875	N169	Immigrations and Customs Enforcement (ICE)
169.7875	N140	Possibly Nebraska State Radio System
169.8125	N148	Possibly Nebraska State Radio System
170.5125	N1CB	
170.6125	N167	FBI Vote Scan (Short burst every 2 -3 minutes)
170.6250	N167	FBI

(Courtesy: TSA)

170.6625	N167	FBI Vote Scan (Short burst every 2-3 minutes)
170.8125	N167	FBI Vote Scan (Short burst every 2-3 minutes)
171.2000	N555	Western Area Power Administration (WAPA)
172.6000	N145	Possibly Nebraska State Radio System
173.7625	N142	Possibly Nebraska State Radio System
173.8125	N148	Possibly Nebraska State Radio System
173.9125	N140	Possibly Nebraska State Radio System
409.2000	pl 167.	Possible link frequency
409.6000	pl 167.9	Possible link frequency
410.5750	CSQ	NOAA Weather relay to 162.4250 Johnson Lake NE
411.9875	pl167.9	Possible link frequency
414.7500	N488	US Postal Inspection Service

Thanks to my anonymous source, as these logs show that even living in a rural area, active federal radio frequencies are still out there waiting to be found!

Denver Federal Logs

Another source has sent some frequencies they receive while in the Denver, Colorado area. This region has a lot to offer the scanner listener, even though the entire Denver area public safety channels are mostly encrypted nowadays. Federal and military traffic still can be heard, and encryption on those channels can vary. I haven't spent a good deal of time in the region lately, but would like to do more research there, especially on the Denver Federal Center, which at one time had a large FEMA antenna farm.

Here are what came from my Denver federal monitoring source, with a special update at the end of the list:

162.7000	N293	
163.6750	N00D	TSA @ DEN airport
166.2750	N293	US Mint, Denver
166.5875	N301	CBP Field Operations @ DEN air port
166.7375	N00D	TSA @ DEN airport
167.4375	N167	FBI
167.4625	N167	FBI
168.9625	N00F	TSA @ DEN airport
169.3000	N00D	TSA @ DEN airport
170.1000	N400	
170.3875	N455	Rocky Mountain National Park, EAST
170.6750	N400	
170.7500	N293	U.S. Marshals Service
171.7500	N455	Rocky Mountain National Park, EAST-2
172.9000	N01F	TSA @ Colorado Springs*

As promised, a quick update on that last entry. Just as the December column went to press, I received information from a source in Colorado Springs that the TSA operations at Colorado Springs Municipal Airport (KCOS) had moved to the new UHF frequency of 406.7375 MHz with a NAC of N076. The repeater input is 415.7375 MHz. This is the same frequency pair that has been confirmed in use at Boston Logan airport. Also, like Boston, the traffic is split between clear and encrypted. This makes two cites we have now confirmed as moving to new UHF channels. We'll see how this rollout progresses in 2022!

New Mexico and El Paso Activity

I recently received some great frequency lists from a source who spent some time in southern New Mexico and the El Paso area for work. This area is highly active with Customs and Border Protection Field Operations and Border Patrol activities. This region seems to be set up very similarly to what I have found in the southern Arizona and California areas, with numbers of local, stand-alone P-25 repeaters and some wide-area repeaters that carry traffic over a large area. More on those later.

Here are a few listings that were heard in the Albuquerque area:

162.5625	N293	Input to 173.2625
163.7500	N167	Input to 173.6375
162.3125	NA07	
166.0125	N136	VA Police Albuquerque
166.0875	N074	
166.5875	N01C	TSA @ ABQ
168.2750	N788	El Malpais National Monument
169.7250	N210	Pueblo of Pojoaque Police Dispatch
170.8375	N167	FBI Albuquerque Field Office
171.5375	N071	LE Dispatch of some kind- all RIDs

Mobile surveillance tower near Nogales, Arizona, helps patrol the US/Mexican border. (Photo by Josh Denmark CBP)

		"1"
173.2625	N293	LE Dispatch of some kind - all RIDs
		"1"
173.6375	N167	FBI Albuquerque Field Office

From a different trip to the area, this time near the Deming, NM and El Paso, Texas area:

162.3875	N294	
162.6125	NA34	
162.6500	NA15	CBP Border Patrol - input
162.8500	NA05	
162.8750	NA2C	Input to 171.9750 MHz
162.8875	NA39	
163.0625	NA14	CBP Border Patrol - input
163.2250	N102	CBP Border Patrol - input
163.4750	NA33	CBP Border Patrol - input
163.5000	NA2F	
163.7000	N169	ICE NAT TAC-1
163.8500	N293	
163.9750	N107	CBP Border Patrol Aircraft
164.9250	NA03	CBP Testing Fence sensors
165.7375	NA34	
166.7750	N293	Radio Checks
167.2375	N167	FBI El Paso
167.4000	N294	
167.4125	N1F1	
167.5875	N170	FBI El Paso
169.1625	N070	TSA @ ELP Airport
169.3875	N293	CBP AIR-5
169.5750	NA06	CBP Border Patrol
169.6000	N100	
169.6375		CBP Border Patrol
169.6625	N100	Homeland Security Investigations, Las Cruces
169.8875	NA03	CBP Testing Fence sensors
169.9125	NA06	CBP Border Patrol "Wide Area"
169.9375		CBP Border Patrol "Station 883"
170.0500	N100	
170.1250	N100	Homeland Security Investigations, El Paso
170.3375	NA06	CBP Border Patrol
170.3750	NA06	CBP Border Patrol
170.4375	NA03	CBP Testing Fence sensors
170.5375	NA01	CBP Border Patrol
170.5625	NA01	
170.9875	N294	
170.9875	N130	
171.1125	NA05	
171.1750	NA03	CBP Testing Fence sensors
171.1875	NA05	CBP Port of Entry
171.2500	NA15	CBP Border Patrol, "HATCH"
171.3125	NA03	
171.3250	NA01	CBP Border Patrol, "SIRI"
171.3500	N105	
171.3875	NA03	CBP Sensor testing
171.3875	NA2B	
171.6625	NA01	CBP Border Patrol
171.7625	NA2E	CBP Border Patrol
171.9750	NA2C	
172.0625	NA39	CBP Border Patrol
172.2375	NA03	CBP Fence Sensor testing
172.2625	NA01	CBP Border Patrol, "CH-3"
172.3000	NA14	CBP Border Patrol
172.4125	NA17	
172.7125	NA02	CBP Port of Entry
172.7625	N930	
173.1375	NA35	CBP Border Patrol, "STN RANGER"
173.1625	NA2F	CBP Border Patrol, "703"
173.4000	NA34	
173.4750	NA34	CBP Border Patrol
173.5750	NA33	CBP Border Patrol
173.6125	N110	
173.7000	NA1A	CBP
173.7125	NA16	CBP Port of Entry
173.7500	NA3B	CBP Port of Entry
173.8000	N301	CBP Field Operations
173.8000	N110	
173.8125	NA26	CBP Transports

As I mentioned earlier, this region has some "wide area" repeater networks. These have multiple repeaters that are linked together and use a common input frequency. My monitoring source attempted to map out some of these wide-area repeaters and here are some of the results of his research:

CBP El Paso Sector - Wide Area Repeaters: All these repeaters use NA01

Common Input - unknown
170.5375
170.5625
171.3250
171.6625
171.2625
All these repeaters use NA03 Common Input - 164.9250
169.8875
170.4375
171.1750
171.3125
171.3875
172.2375
All these repeaters use NA05 Common Input - 162.8500
171.1125
171.1875
All these repeaters use NA06 Common Input - unknown
169.5750
169.9125
170.3375
170.3750

Local Standalone Repeaters:

172.3000	NA14, 163.0625 in
171.2500	NA15, 162.6500 in, Hatch NM area
171.9750	NA2C 162.8750 in
173.1625	NA2F 163.5000 in, Columbus NM area
173.5750	NA33 163.4750 in, El Paso area
172.0625	NA39 162.8875 in

In addition to the federal law enforcement and interdiction efforts along the border, there is a large trunked radio system in the area serving Fort Bliss military base, as well as the White Sands Missile Range. This is a large system, and my source sent me only the information he was able to monitor, but you can see the entire system on Radio Reference. Here is what my source sent me as far as what was monitored on the Fort Bliss and White Sands Missile Range trunked system:

System ID	2D2
WACN BEE00	
Tower	1-50
Tower	Salinas Peak - Sierra
Site NAC	N2D0

406.1500
406.3500
406.5625
406.7750
406.9250
407.0750
407.2500
407.3500
407.4750
407.8875
408.1625

White Sands Missile Range: Trinity Site is where the world's first atomic bomb was tested at 5:29:45 a.m. Mountain War Time July 16, 1945. The open house is free and no reservations are required. At the site visitors can take a quarter-mile walk to ground zero where a small obelisk marks the exact spot where the bomb was detonated. Historical photos are mounted on the fence surrounding the area. (Text and image courtesy: White Sands Missile Range Public Affairs Office)

408.5625
409.1625

Tower	1-62
Tower	Stallion Range - Socorro
Site NAC	N2D0

407.9625
408.4250
409.3125
409.7625
409.9625
410.3625

Talk Groups Heard:
13013 - Fire Dispatch
13017 - Police Dispatch
13021 - Gates
13041 - IT Traffic
13060 - Range traffic, launching missiles
13103
13106 - IT Traffic
13114
13115 - THUNDER units at STALLION Gate
13147 - BRITS working on Wi-Fi and radio systems
13184

13207 - Escorts for some sort of radar site
13231 - Range traffic
26016 - Repeats ground control, 127.050 from Holloman AFB
26020
26042 - Aircraft Munitions
26046
26050
26063 - JACKAL Units, flight line ops
26102 - Flight line ops
26137 - HUSTLER Units on range

Thanks again to my sources out there for sharing. If you have some active federal frequencies you listen to or are curious as to who they are, send them along to me here at The Spectrum Monitor. I always keep my sources confidential unless they give me permission otherwise.

Tech Tips

With the new year, I am introducing a new feature in the Federal Wavelengths column, the Fed Files Tech Tips. These will be bits of technical information and other helpful items that can be used to optimize your pursuit of some federal or military radio traffic.

This month's Tech Tips is about what radios I use for my monitoring and why I chose them. I do use many different scanner radios in my listening at home and as I travel. I carry both Uniden and Whistler radios with me when I travel for work. I tend to use the Uniden scanners for actual scanning and the Whistler radios for searching out active federal channels. Both radios can do the same functions, so why choose one over the other?

A lot of scanner discussions in various Internet forums often play into the Uniden versus GRE/Whistler radios. But my experience has been that most scanner models these days are equally capable of good reception. The problems of P25 simulcast distortion aside, any modern-day scanner can receive radio signals equally well as the next model. The big differences are often in the radio's features and how the scanner interfaces with the user.

In my interests, the feature sets between the Uniden and Whistler radios are similar but they have some specific capabilities that I find useful for certain tasks. While both the Uniden Home Patrol line, including the 436, 536 and SDS radios, and the Whistler TRX models have the entire Radio Reference database stored on their internal SD storage card, the Uniden models seem to work better for scanning. When traveling, I can have the scan lists, called "Favorites Lists," already loaded up with my target systems for any area I travel to. The Whistler radios have "Scan Lists" that essentially do the same thing,

While I use the Uniden radios for scanning, I prefer to use the Whistler model radios for searching. The main reason I like the Whistler radios over Uniden for searching is the fact that Uniden has made the design decision that users

Whistler TRX-2 (Courtesy: Whistler)

don't want to hear anything that is digitally encrypted. Since most federal law enforcement communications is most likely encrypted, that means the radio tends to skip over those transmissions.

My particular interest in federal monitoring is not just to listen to clear traffic, although that is a bonus. I like to collect active frequency information and metadata, such as the radio identification, the P-25 Network Access Code (NAC) and talk group information. The Whistler radios will record all of that along with the audio from each transmission and store it on the radio SD card. You can download and look at each transmission and play it back as you need to on your computer, or on the scanner. The Uniden radios also record things you receive and allow for some squelch tone/NAC information to be displayed as you play back recorded traffic, but not with the amount of detail and ease that the Whistler radios do.

Of course, your reasons for using one brand of radio over another will vary. Everyone has their own preference, but in this case, it's been over a long period of time that I've had used these radios and other models, for my monitoring and logging. So far, this setup worked best for me.

Let me know how you have your radios set up for federal radio monitoring and we can compare notes in an upcoming column.

Federal Wavelengths Frequency List Legend

Unless otherwise noted, frequencies listed are FM and frequencies are shown in Megahertz (MHz). Frequencies listed will show additional information as follows:

PL	CTCSS Tone Squelch
D	DCS Digital Coded Squelch
RID	APCO P25 Radio Identification Number
CSQ	Carrier Squelch, no squelch tone
N	APCO P25 digital Network Access Code (NAC)
NX	NXDN digital, also known as IDAS and NexEdge
DMR	Digital Mobile Radio, also called MotoTRBO
WACN	Wide Area Communications Network, an APCO P25 trunked network Identifier

TSM

MilCom

By Larry Van Horn N5FPW **MilcomMP@gmail.com**

Mystery Russian HF Military Stations, Part Two

As we go to press, world headlines are dominated by the events surrounding a possible Russian invasion of Ukraine that some reporting indicates may occur sometime this year. As tensions continue to rise in the Russian Southern and Western Military Districts, savvy radio monitors are starting to monitor various Russian military frequencies for clues of possible future events.

One year ago, in my January 2020 TSM Milcom column, I wrote about some of the mystery military stations we hear on HF. Most of that column revolved around three Russian HF military stations: The Pip, The Squeaky Wheel, and The Buzzer. These three stations all transmit from the aforementioned Southern and Western Military Districts of Russia.

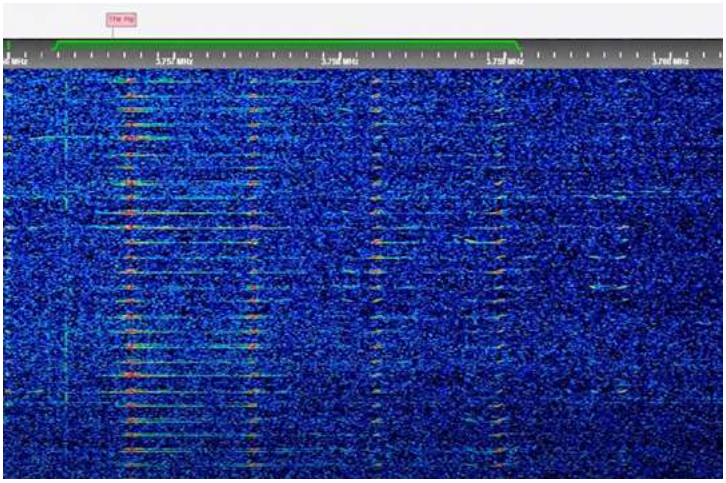
Since that January 2020 column, additional mystery Russian HF military stations have been identified and will be discussed in this column. First, I want to recap and update information about the original three stations previously mentioned. I have video/audio recordings of each of these stations available on my YouTube channel "From the Static." **https://www.youtube.com/channel/UC0-gPCWkJAY-DLEnOyJA6N4w**

The Pip (Enigma S30) – Southern Military District

Nicknamed "The Pip," by radio listeners, this Russian military station broadcasts on 5448.0 kHz (day), and 3756.0 kHz (night). It broadcasts continuous short, repeated beeps at a rate of around 50 per minute. Like the Buzzer, the beep signal is occasionally interrupted by voice messages in Russian sent by both male and female announcers. The Pip has been active since around 1985 when its distinctive beeping sound was first recorded by listeners. The station's format resembles, in many ways, that of its presumed sister station "The Buzzer."

The times at which the station switches from the day to the night frequency or vice versa are changed over the course of the year, to match the changing lengths of day and night. Higher frequencies have better propagation characteristics during the day, while lower frequencies do better in darkness.

The Priyom.org website reports that The Pip usually multicasts traffic, without the channel marker, on either 6913.0, 6922.0, or 7056.0 kHz during daytime with 7126.0 kHz being observed as of December 2019, and on 3371.0 kHz during nighttime. Some of these frequencies also carry exclusive traffic. Transmissions on 6922.0 kHz sometimes leaks conversations from within the radio room via an open microphone. Sound familiar?



The "Pip" (Courtesy of the author)

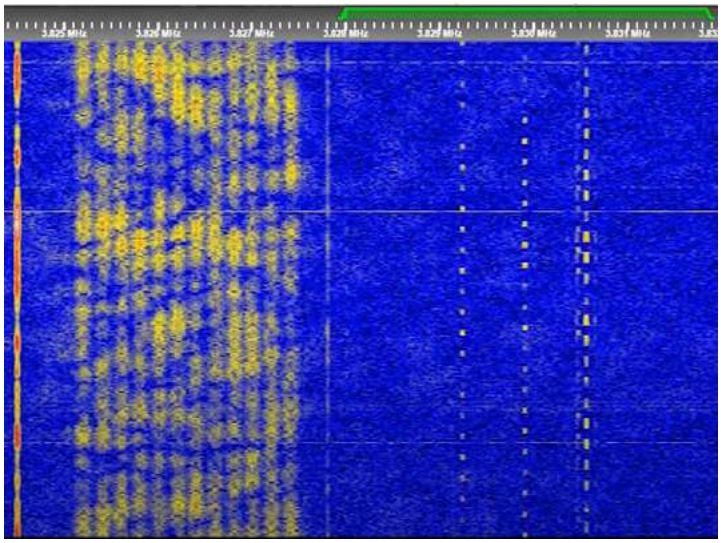
Like the Buzzer, the purpose of The Pip is not known, although there are many hypotheses. It is often suggested that The Pip is part of a larger radio relay or control system that includes The Buzzer and The Squeaky Wheel stations, which both follow similar formats.

In fact, activity on The Pip often used to be followed a few minutes later by a voice message on The Squeaky Wheel, suggesting that both were being operated by the same organization and shared the same purpose. On one occasion, The Pip's characteristic beeping sound could be heard in the background while a message was being transmitted on the Squeaky Wheel's frequency, which could indicate that both stations were even operated from within the same building or room. However, these activities have since ceased.

The Pip is transmitting from Rostov-on-Don, Russia. It is also a military command network that serves the Russian Southern Military District.

Squeaky Wheel (Enigma S32) – Southern Military District

The second of our mysterious Russian military stations is known as "The Squeaky Wheel," another nickname given by the radio hobby community. From around 2000 until



The Squeaky Wheel. (Courtesy of the author)

2008 the station's attention tone was a high-pitched two-tone signal that vaguely resembled a squeaky wheel. From 2008 the channel marker changed to two different tones in a short sequence repeated with a short silent gap. This station transmits voice on 3828.0 kHz (nights) with CW on 3895.0 kHz, and 5473.0 kHz (day) voice with CW on 5361.0 kHz. In May of 2017, the station was reported on several frequencies simultaneously 5411, 5432, 5452, 5473, and 5494 kHz.

Since this station appears to be associated with the other two, we may have an indication the true mission of the stations by traffic that has been intercepted from the Squeaky Wheel. There have been several times that voice messages in the format of Russian Military Strategic Flash Messages have been reported by this station.

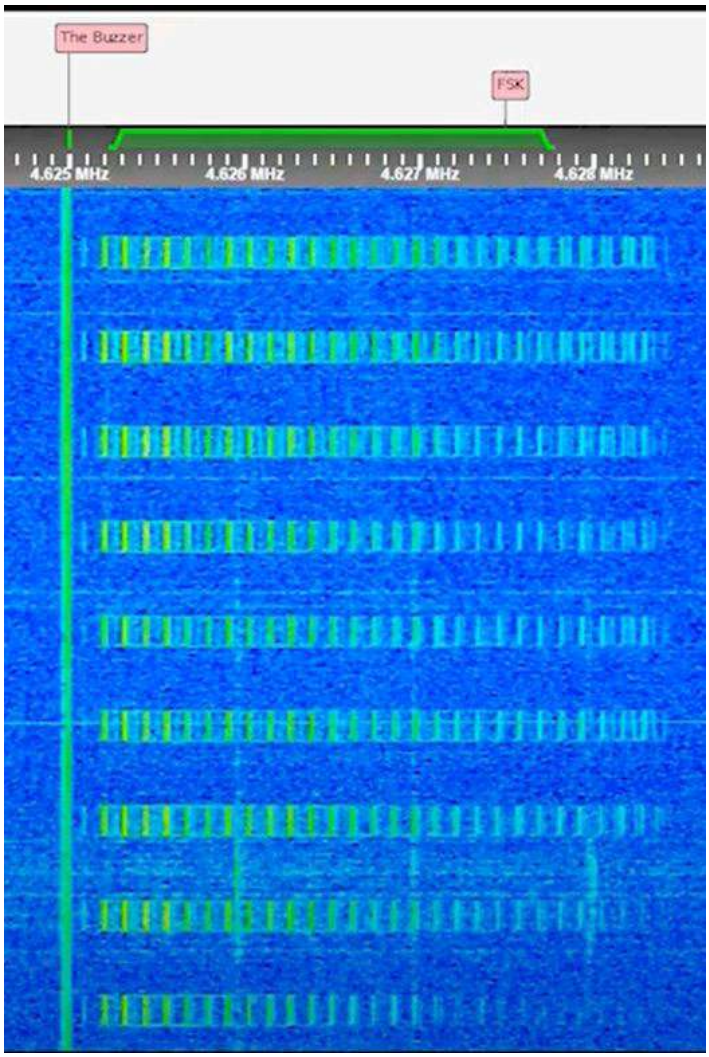
The exact transmitter site is unknown but like the "Pip" it is thought to be near Rostov-on-Don, Russia, which would indicate a Southern Military District network station. It has been noted by some regular monitors of this station that the signal strength is not very good in Central Europe and the signal sometimes even disappears for days in the noise.

The Buzzer (Enigma S28) – Western Military District

A Russian military station, nicknamed by radio hobbyists "The Buzzer," is an HF station that broadcasts on a frequency of 4625.0 kHz. First reported in the 1970s, the station transmits using AM with a suppressed lower sideband (USB modulation), but it has also used full double-sideband AM. The signal consists of a short, monotonous buzzer-sounding tone that repeats at a rate of approximately 21 to 30 plus tones per minute, 24 hours per day.

Sometimes the buzzing sound is interrupted, and a voice message in Russian is broadcast by either a male or female announcer. These messages are usually transmitted live, and they do follow a fixed format. Most of the station's messages are sent weekdays during local daytime (Moscow Time UTC+3).

The traffic sent on this station is simultaneously transmitted in Morse code on multiple other frequencies. Because



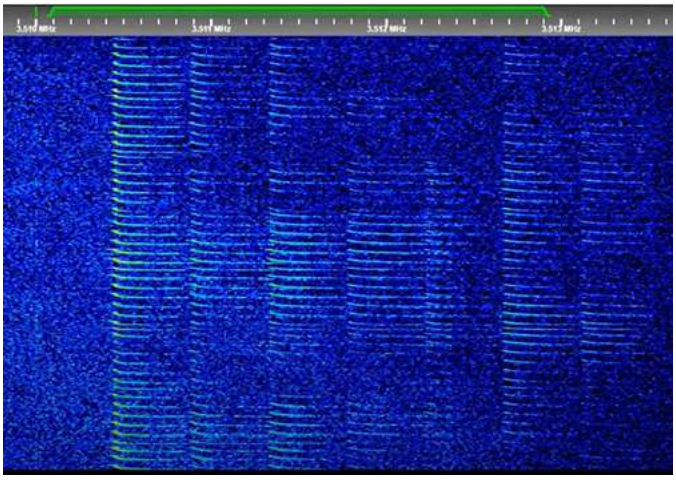
The "Buizzer" (Courtesy of the author)

this station uses old equipment that is prone to failure, channel separation issues have occasionally allowed those Morse code simulcasts to be heard on the voice station.

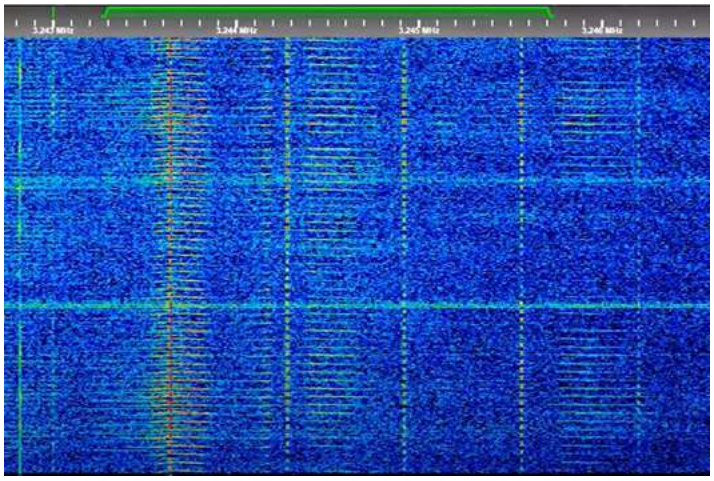
During these live voice messages, distant conversations and other background noises have frequently been heard behind the buzzer. Some suggest that this means the buzzing tones are not generated internally but are transmitted from a device placed behind a live and constantly open microphone.

Until 2010, the station identified itself as UVB-76, which was a bad transcription of the actual call sign UZB76, and it is still often referred to by the media and others by this name. Since then the station operators have used a wide variety of call signs and call words to identify the station.

Speculation over the purpose of this military-controlled station has quite honestly been all over the map. Everything from keeping military communication operators alert to a propagation/channel marker. One theory, described in a BBC article, stated that the tower was connected to the Russian 'Perimeter' missile system. The station was transmitting a "Dead Hand" signal that would trigger a nuclear retaliatory response if the signal is interrupted due to a nuclear attack against Russia. Since the station has been noted off the air at various times in the past, I think we can put that theory to bed.



The Air Horn (Courtesy of the author)



The Goose (Courtesy of the author)

There are reports that The Buzzer is controlled by the Russian Sudak communication hub ("Agalatovo"). It is widely believed to have several transmitter sites, among which they are often switched. Some of the identified ones include the 69th Communication Hub ("Iskra") and the 60th Communication Hub ("Irtysh"). This station is a Russian military command network that serves the Western Military District.

The Ukrainian-Russian 40-meter Ham Band War

What is not known by many radio listeners in this country is that Ukraine and Russia have been carrying out an all-out radio war in the vicinity of 7055 kHz in the 40-meter ham band. On June 6, 2020, the ARRL posted the following to their website:

"The International Amateur Radio Union Region 1 Monitoring System (IARUMS) May newsletter reports the Russian-Ukrainian radio war, which had been raging for years at 7055 kHz LSB (as well as on 7050 or 7060 kHz) reached a new escalation level in May.

"Almost every day, one heard the most massive mutual insults and aggressive, provocative hate rap music in Russian," newsletter editor and IARUMS Region 1 Coordinator Peter Jost HB9CET, said in the May edition. "Furthermore, from time to time, we saw insulting symbols (e.g., skulls) in the waterfall."

"Jost said it's believed the perpetrators are located in the border region of eastern Ukraine with the Russian Federation.

"In May, a digital jammer appeared, with interference temporarily up to about 12 – 15 kHz. "[IARUMS] has no means to stop this radio war," Jost wrote. "Only national authorities can do something with international complaints." The Deutscher Amateur Radio Club (DARC) intruder watch has submitted an official report on the interference to BNetzA, the German telecommunications regulator, the newsletter reported."

In July 2000, UDXF's Ary Boender in the Netherlands reported a very unusual occurrence on 7055 kHz in the 40-meter ham band.

From Ary's 2000 UDXF log – "Russian-Ukrainian Radio War. Anti-Russia song, slogans, jamming, loop transmissions, recordings of Russian military channel markers (Alarm, Squeaky Wheel, Buzzer), various stations on top of each other. Hopping from 7055 To 7060, 7050 and back to 7055 kHz LSB 24Jul20 1600 (AB)." Keep in mind that Ary was not indicating that the military stations were transmitting on those 7-MHz frequencies, only recordings of the sounds were being heard.

So, if you hear some really weird and strange transmissions including some of the mystery Russian HF military stations discussed in this article in and around 7055 MHz, you are hearing transmissions related to the Ukraine-Russia radio wars on 40-meters.

Three New Mystery Russian Mil Stations

At this point, it is important to note that the only stations of this kind that I have found are in the Southern and Western Districts of the Russian military. This is due to the perceived threat that the Russians have over NATO and possible NATO expansion into the former Soviet Union Warsaw Pact countries.

The Air Horn – Western Military District

This Russian military station operates in the western military district and transmits its channel marker 24/7 at 3510 kHz. The station originally broadcast on frequency 4020 kHz then moved to 4070 kHz and has now settled in on 3510 kHz. There is no indication that this station has sent any message traffic and it appears to serve as a test station.

The Goose – Western Military District

This Russian military station operates in the western military district, and it is believed to operate as a command station. It was first discovered in 2017. The station messages in monolith format. The station has changed frequencies

many times since it first discovered and has now settled on 4310 kHz and 3243 kHz.

The Alarm – Western Military District

This Russian military station operates in the western military district and was first discovered in May 2019. The channel marker transmits a signal that sounds like an alarm, thus its nickname given by the radio hobby community.

So there are now six mystery Russian HF military stations to monitor. If Russia does invade Ukraine, will we get a heads up from any of these stations? There is no way to know. But I regularly check these stations as part of my mil monitoring routine and if the worst happens, maybe one of these stations will tip me off on what is coming.

Russian Mystery Mil Station Frequency Guide (kHz)

Pip	S. Mil. Dist.	3756 (Night)/5448 (Day)
Squeaky Wheel	S. Mil. Dist.	3828 (Night)/5473 (Day)
Buzzer	W. Mil. Dist.	4625/6998 (Alt)
Air Horn	W. Mil. Dist.	3510
Goose	W. Mil. Dist.	3012/3110/3243 (Night)/4310 (Day)/6360
Alarm	W. Mil. Dist.	4770

DoD VHF High Band Air Ops Assignments

The 138-144/148-151 MHz Land Mobile Radio (LMR) band isn't just for ground operations/stations. There are users that use this band also at sea and in the air. Since the 2004 realignment of this band, I have been compiling a list of frequencies in this range that are exclusively used for air operations. The result of that research is presented below.

Air/Air (A/A)/Interplane: 138.250 139.800 141.300 143.200 143.250 MHz

Air/Ground/Air (A/G/A): 138.4375 138.550 138.600 138.625 138.750 138.825 138.950 139.000 139.900 140.200 140.500 141.175 142.600 142.700 142.800 142.900 143.000 143.600 143.725 143.750 MHz

Air Defense/Intercepts/Combat Air Patrols: 139.700 MHz
Air Operations: 138.150 138.200 139.1125 141.650 141.950 142.1125 142.9625 143.150 143.825 MHz

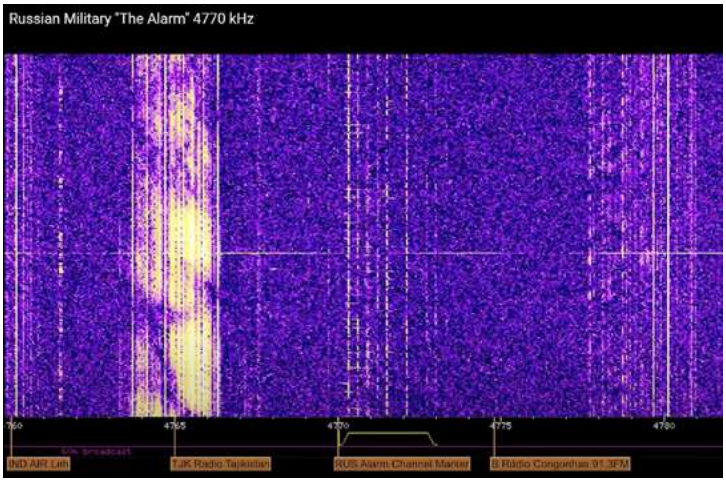
Aerial Refueling: 141.300 MHz

Pilot-to-Dispatcher (PTD): 139.1125 142.300 MHz

US Air Force Air/Air (A/A): 141.150 141.400 MHz

US Air Force AMC Training/Exercise/Contingency: 138.500 139.600 MHz

US Air Force Thunderbirds: 139.800 MHz



The Alarm RUS. (Courtesy of the author)

US Army Air/Air (A/A): 150.150 MHz

US Coast Guard Air/Air (A/A): 141.550 150.300 MHz

US Marine Corps Air/Air (A/A): 141.600 150.250 MHz

US Navy Air/Air (A/A): 140.300 141.250 MHz

These frequencies are exclusive nationwide assignments for air operations. But these aren't the only frequencies that will have air activity. There are other frequencies that will also have some air operations that are not a dedicated assignment for air operations. If you are searching in the FM mode and hear activity on a frequency that is obviously not FM but AM, switch your mode to AM. There are 670 frequencies in the 138-144/148-151 MHz and many of them will occasionally have air activity. As always if you have an addition, correction, or update, I would like to hear from you. You can write us via email at the address in the masthead.

Milcom Monitoring Tip of the Month

Someone on my Twitter feed @MilcomMP asks, "How do I monitor these mystery Russian HF military stations here in the US?" Easy! I use the KiwiSDR network and select SDRs in this network located in eastern Europe and western Russia. This SDR worldwide network is easily found online, just Google KiwiSDR. I also use the Twente University SDR in the Netherlands during darkness hours in Europe, Google Twente University SDR.

I will post any late breaking information on the Twitter feed above or to my Internet blog the Milcom Monitoring Post at **http://mt-milcom.blogspot.com**.

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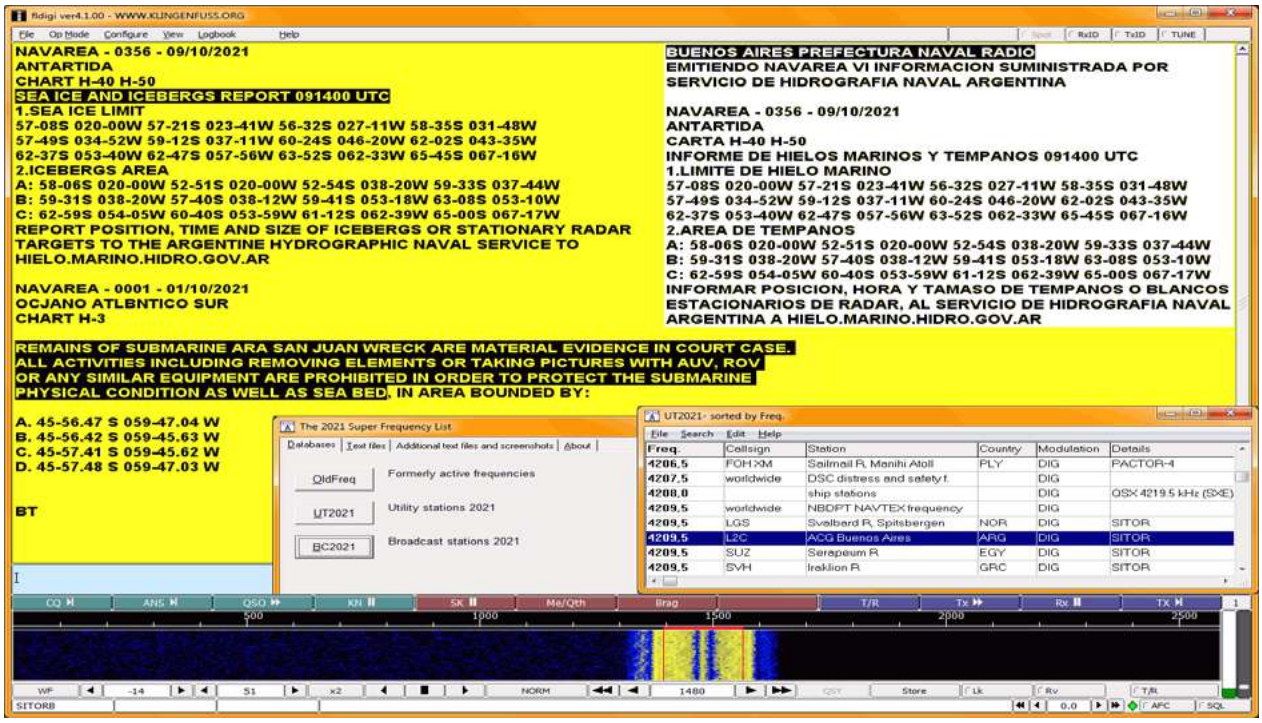

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Utility Planet

By Hugh Stegman **mtutilityworld@gmail.com**

On the Trail of MARSCOMM RTTY

Last summer I started hearing about some interesting sounding broadcasts from the latest version of the US Air Force MARS. These were said to be in unencrypted NATO radio teletype (RTTY), a legacy mode from the days before most of the allied navies switched to newer NATO emissions such as STANAG 4285.

This sounded like fun. RTTY decoders are easy to come by, and in fact my venerable JRC NRD-545 receiver has one built right into it. NATO's version uses a baud rate of 75 and a shift of 850 Hz, with the mark tone as the low one. There used to be a lot of this mode on the bands, but now it's down to a few frequencies using very robust encryption. Attempts to copy anything will only give screens full of gibberish.

A long time ago, MARS used to stand for "Military Affiliate Radio System." It may also have been a reference to the ancient god of war. Back then, MARS was basically a quasi-amateur service for US hams who wanted to help the military. Frequencies were right next to the amateur bands, and the two radio services had much more in common than they do now. MARS was used mostly for training, some emergency comm, and a lot of phone patches and "Marsgrams" from personnel stationed overseas. Changes in world communications made these latter morale activities somewhat less essential than they had been before.

Some years back, MARS changed its name to "Military Auxiliary Radio System." This turned out to be more than just a name change. First, the Navy disbanded its MARS altogether, deeming its continued operation to be unnecessary. The Army and Air Force carried on, gradually becoming generally tighter and more secretive. Today's MARS still bears a similarity to ham radio, but its communication security (COMSEC) has come a lot closer to traditional military procedure. Frequencies are confidential, and they change at regular intervals. Similar restrictions apply for detailed station locations, and for the names and ham calls of individual operators.

Typically, bulletins broadcast over today's MARS nets use a military mode usually referred to as MIL-STD-188-110A. This waveform is actually up to its "C" revision. It sounds a lot like STANAG 4285, but it is much easier to decode. Don't bother, though, because MARS usually encrypts its internal broadcasts. The major MARS interface with civilians is now on the US Department of Homeland Security's SHARES net, which we've discussed in this column many times. SHARES stands for SHAred RESources. Many US Federal agencies designate some of their frequencies for use with other net members, so that everyone has common channels for inter-operation.

MARSCOMM logo (Courtesy MARSCOMM)

I kind of miss the older version of MARS, and so I was eager to hear these new MARS broadcasts when someone published their schedule on the internet. I dialed up the frequencies, expecting the usual huge signals, but what I got was silence. This seemed odd because some other people talked as if they tuned in daily. Therefore, I went on a campaign to track them down, using remote SDRs all over the US and Canada. Slowly, I reached a point where I had enough to put into a column. Therefore, let's get to it.

MARSCOMM

The bulletins come from an entity of the US Air Force MARS called MARSCOMM. Presumably, this stands for "MARS Communications." In keeping with US military secrecy, they aren't talking much. It's apparently an extensive network of large MARS stations with all-band capability, deployed throughout the United States. I must add the weasel word "apparently," because there's not much of substance about MARSCOMM publicly available on the internet.

First, I just Googled it. Well, that didn't turn up a whole

lot of good information on this subject. Much of what does come up is obviously incomplete, obsolete, or just plain wrong. Some hits are actually for MARCOM, the NATO Allied Maritime Command. Others give the idea that a few people told a few other people to put up minimal web pages for the general public, but then nobody ever checked or updated the information.

There seems to be general agreement that MARSCOMM is an activity of the US 1st Air Force National Military Support Network. This is said to be under the command of the 12th MSN Squadron, with orders to provide "training, mission and emergency communications (ECOM) support for the Department of Defense (DoD) and NATO Members." These comms are also said to include exercise participation, radio checks, and message delivery, supporting deployed military and government personnel. No contact frequencies are given on the web, but currently the broadcasts mention 7545 and 11098.5 kHz USB. Several of the web sites do show two actual broadcast schedules, which I will now pass along.

Marine Broadcasts

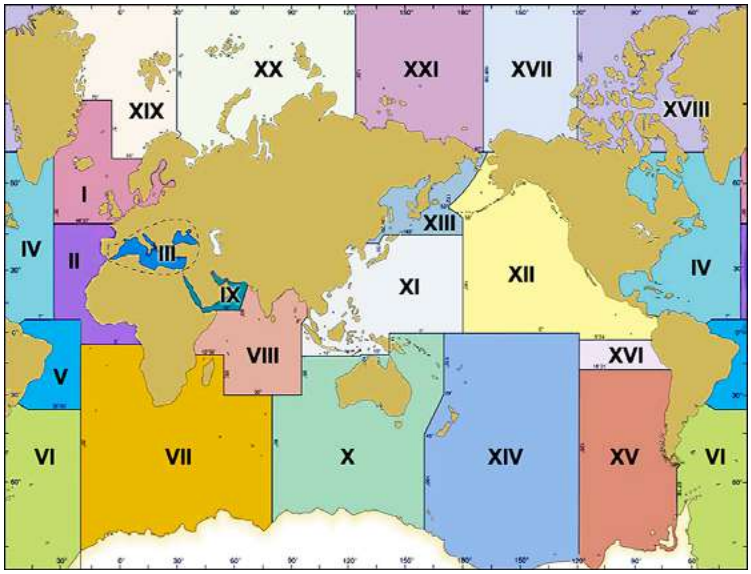
Here is the schedule for MARSCOMM marine safety broadcasts, verbatim, as given in public information:

NATO RTTY Marine Broadcast

1400z 4448.5 kHz
1800z 6994.0 kHz
2200z 11121.0 kHz
0200z 14877.0 kHz
Transmission: RTTY, 75 baud, 850 Hz Shift, Mark Low
HYDROLANT, HYDROPAC, NAVAREA IV and NAVAREA XII for areas 13, 15, 16, 17, 18, 19, 08, 25, 26, 27 and 28. Hurricane warnings for North America when needed.

Imagine my surprise when I tuned to 11121 soon after 2200 UTC, expecting the usual booming RTTY signal. What I got was silence. It turns out that the times in the schedule are when upcoming broadcasts are announced, and the long transmissions begin five minutes later on the same frequencies. This is a procedure used in quite a few countries for maritime safety and weather information. These other announcements are usually made on international calling and distress frequencies, as opposed to on-channel, but MARS would most likely not have authorization to use these. I became confused the first time, when I had obviously come in just a bit too late for the announcement, but too soon for the broadcast.

It also took me a while to catch on that these are dial/window frequencies, and the center of information for all broadcasts is 2.5 kHz higher. Therefore, tuning to the dial freq in USB will usually give no copy at all. Eventually, I found the center at 11123.5, and everything fell into place.



World NAVAREA map (Public Domain)

Sure enough, there were many maritime safety bulletins in standard international formats. These formats are very much like the Sitor-B Navtex messages and navigation warnings given on international maritime mobile bands.

HYDROLANT and HYDROPAC are old US Navy formats for navigation safety alerts. Their text at least used to come from the Navy's Hydrographic Office. LANT is the Atlantic Ocean, and PAC is the Pacific.

NAVAREAs divide the planet's oceans into maritime areas of responsibility, as defined by international agreements in world conferences. They are assigned to specific governments in the regions. These issue the relevant warnings in another standard format. Area IV is the western portion of the North Atlantic, which is assigned to the US. XII is for the Eastern Pacific from the North American west coast out to the International Date Line. This is also a US responsibility.

A remote SDR in Utah picks up 11123.5 (center) quite nicely. It's signed "MARSCOMM / NORTHWEST 02," presumably referring to an origin somewhere in the US Pacific Northwest. Don't even ask for specific transmitter locations. I have yet to hear the other skeds, having apparently never been on the right radio at the right time. Let's just say that these do not have global coverage, and let it go at that.

I have a feeling that 14877.0 kHz (14879.5 center) is going to be a tough one. That's a bit high for long-haul HF propagation in winter at 0200 UTC in the US. It might be best to nail it by ground wave, and there may or may not be a station running the broadcast in just the right place to hit a given receiver. I'll keep trying.

Aviation Weather Broadcasts

MARSCOMM also gives several daily aviation weather broadcasts. All of these are on 6994.0 kHz, center 2.5 kHz higher, in the same RTTY mode as the marine warnings. Here is their official schedule, again verbatim:

Select Aerodrome Weather Broadcast

Frequency: 6994.0 kHz
Times: 1300z, 1500z, 1700z, 2100z, 2300z, 0100z, 0300z
Transmission: RTTY, 75 baud, 850 Hz Shift, Mark Low
METAR / TAF for KTIK, KOFF, KNHC, KSUU, KSKA, KWRI, and KLNK. Hurricane warnings for North America as needed.

The good news here is that I've checked this frequency at most of these times and found broadcasts. An older type of online SDR called the WebSDR receives these very nicely. It's different from the Kiwi SDRs that we talk about. Nearly all of the receivers available online are intended for ham band use. However, their "40 CW" range does go low enough. I've had perfect copy from WebSDRs that have big antennas in California and Utah. Again, the center frequency is 2.5 kHz higher. Transmissions are again announced at the top of the hour, and the actual information starts five minutes later.

The bad news is that there are some problems with the schedule as it is given. For a start, "KNHC" is the international weather designator for the National Hurricane Center in Florida. While KNHC does issue warnings, the weather information that is actually broadcast is for KNHK. This is the international airfield designator for the Patuxent River Naval Air Station in Maryland. It's also called Pax River, and sometimes Trapnell Field. It's identified correctly in the actual broadcast. The hurricane warnings are given separately, when conditions warrant.

At present, the broadcast transmits weather reports for the sites, in this order: KTIK (Tinker AFB, OK); KOFF (Offutt AFB, NE); KNHK (NAS Pax River, MD); KSKA (Fairchild AFB, WA); KWRI (Joint Base McGuire Dix Lakehurst, NJ); KLNK (Lincoln Airport, NE, used by Air National Guard); and KSUU (Travis AFB, CA).

METAR stands for METeorological report, Aviation, Routine. It is a terse reporting format intended for airport observations. Its compressed nature takes us back to the days when slow wire teletypes and RTTY were the major means by which weather information was distributed in a timely manner. METARs are time-stamped, and frequently updated. Expanded voice versions are still given in USB on HF aero frequencies by the various international Volmet ("flying weather") stations. These particular airfields are not in any current Volmets, however.

TAF stands for Terminal Aerodrome Forecast. This is another old international weather code. As the name would imply, it's the conditions expected at an airport over the next few hours, usually given in multiple lines of highly abbreviated information. Lists of the codes used in METAR and TAF are available online. I've also seen on- and off-line decoders for these formats.

So far, all the transmitters that I've heard giving the aero broadcasts have been located in the western parts of the contiguous US. There are likely others, but I don't know where they might be. After all, the people who know aren't telling. Good hunting!

Airframes.org is not Dead

Last month, a free and very useful aircraft and airline search engine suddenly went away. It had indexed thousands of registrations, ICAO codes, operators, and selcals. Its loss was widely bemoaned.

I subscribe to a flight tracking site, so I can still use its slick and comprehensive search engine. However, I missed Airframes.org. It was such a nice public service, as done by volunteer aviation enthusiasts at their own expense. It was intended strictly for low-volume use by other enthusiasts just to look up their own visual or radio spottings. There just aren't many sites like that on the web any more. Most newer resources sell subscriptions, usually at a profit. Some people griped about needing to log in, but I found the information exchange to be pretty minimal. I never had a problem with the usual issues that come up regarding tracking or unwanted e-mail.

Well, Airframes.org is back. A few days ago, the old web address became active again, with the whole site instead of just a rather terse and angry goodbye message. I didn't save this message, so I don't remember what the problem was. I think it had something to do with a new policy at the European host that the webmaster didn't like. However, the problem is apparently solved.

There we go. One good thing happened in 2021, which otherwise was not all that great a year for most people. Have a nice holiday, and a better year in 2022.

Resources:
Minimal MARSCOMM site:
https://marscomm.us

IHO Navarea map with links to agencies:
https://iho.int/navigation-warnings-on-the-web

Airframes.org search engine:
http://www.airframes.org

TSM

Shortwave Utility Logs

Recent Shortwave Utility Logs Compiled by Mike Chace-Ortiz

Frequency (kHz)	Callsign	Time (UTC)	User, Location	Systems Details
3818.50	RCV	0145	Russian Navy, Sevastopol	AT3004D 12 tone HF modem, tfc (on USB)
4209.50	TAH	0214	Istanbul Radio, Turkey	100bd/170/I SITOR-B, "istanbul turk radyo" and msgs in TT [RID=MA]
4295.00	FUE	0040	French Navy, Brest	600bps/L STANAG4285 HF modem, "all de fue" ITA2 marker (on USB)
4338.00	FUG	0220	French Navy, Saissac	600bps/L STANAG4285 HF modem, crypto tfc (on USB)
5155.00	TBB	0300	Turkish Navy, Ankara	600bps/L STANAG4285 HF modem, CARB "//tbb040i(0)/…" (on USB)
5215.60	FUO	0213	French Navy, Toulon	1200bps/L STANAG4285 HF modem, crypto tfc (on USB)
5300.00	TBO	0300	Turkish Navy, Izmir	600bps/L STANAG4285 HF modem, crypto tfc (on USB)
5391.00	LBJ	0300	Norwegian Navy, Bodo	300bps/L STANAG4285, crypto tfc to "Z7E" YL/EE voice coord (on USB)
5391.00	Z7E***	0300	Norwegian Navy, UNID Warship	300bps/L STANAG4285, crypto tfc to "LBJ" Bodo YL/EE voice (on USB)
5478.00	RCV	0300	Russian Navy, Sevastopol	50bd/250 BEE, idle on reversals
6411.20	SXTDIS***	0215	Brazilian Navy, Laradio MS	100bd/200 GTOR, tfc to "MANIBA", "EAFLEV" with CWID sign-off
6431.80	FUG	0200	French Navy, Saissac	50bd/850 FSK UNID System, sync, cont, ACF=21
6521.50	???	2200	Russian Navy, ???	50bd/200 BEE, short messages
7545.50	NSY	0145	US Navy, Sigonella	75bd/850 STANAG4481 FSK, secure
8137.00	WCY	2224	Marine Weather & Comms, Lakeland FL	USB, op Chris with yachts checking-in regarding Caribbean
8204.50	NSY	2344	US Navy, Sigonella	75bd/850 STANAG4481 FSK, secure
8309.20	???	2200	UK MIL DHFCS, Ascension Island	1200bps/L STANAG4285 HF Modem, crypto tfc (on USB)
8310.00	???	2200	Brazilian Navy, ???	100bd/200 GTOR, in IRS mode
8335.70	???	2345	UK MIL DHFCS, Inskip	600bps/L STANAG4285 HF Modem, crypto tfc (on USB)
8421.50	CORESM***	2300	Ecuadorian Navy, Corvette "Esmeraldas"	PacTOR-III HF modem, crypto msg to "CORMAN"
8421.50	CORMAN**	2300	Ecuadorian Navy, Corvette "Manabi"	PacTOR-III HF modem, crypto msg to "CORESM"
8427.00	KPH	2220	MHRS, Point Reyes CA	100bd/170/I SITOR-B, news reports in EE
8463.20	EBA	2349	Spanish Navy, Madrid	600bps/L STANAG4285 HF Modem, short KG84 crypto (on USB)
8538.20	PJK	0140	Dutch Navy, Curacao	600bps/L STANAG4285 HF modem, crypto tfc (on USB)
8573.60	FUX	0145	French Navy, Le Port	600bps/L STANAG4285 HF Modem, crypto tfc (on USB)
8676.00	NPM	0221	US Navy, Lualualei HI	50bd/850 FSK UNID System, sync, cont, ACF=0
8764.00	TUG***	0300	US Coast Guard, Cutter "Aspen"	125bd/1750 MIL-188-141A, ALE calling "11Z" (on USB)
10321.00	???	1415	Russian MFA, Moscow	UNID MFSK HF modem, tfc with PSK inserts and short TTY end burst
10862.00	???	2150	Australian MHFCS, North West Cape	600bps/L STANAG4285 HF Modem, crypto tfc (on USB)
12017.00	NSS	2115	US Navy, Davidsonville MD	50bd/850 STANAG4481 FSK, secure
12665.20	JWT	2230	Norwegian Navy, Stavanger	600bps/L STANAG4285 HF modem, crypto tfc (on USB)
12704.50	CTA	1500	Portuguese Navy, Lisbon	600bps/L STANAG4285 HF modem, crypto USB, CARB on LSB (on
12786.00	NMC	2126	US Coast Guard, Point Reyes CA	120lpm/576/800 Fax, surface analysis
12840.50	PBB	1230	Dutch Navy, Den Helder	75bd/850 Baudot, CARB "02a 04b 06a 08a 12b 16x 22c pbb"
12873.60	FUG	1230	French Navy, Saissac	1200bps/L STANAG4285 HF modem, crypto tfc (on USB)
13411.60	FUE	1300	French Navy, Brest	1200bps/L STANAG4285 HF modem, crypto tfc (on USB)
14434.30	NPM	2115	US Navy, Lualualei HI	50bd/850 FSK UNID System, sync, cont, ACF=0
14548.20	???	1437	UK MIL DHFCS, Akrotiri	1200bps/L STANAG4285 HF Modem, crypto tfc (on USB)
16112.00	1005***	1400	Mauritanian Gendarmerie, ???	125bd/1750 MIL-188-141A, ALE DBM message to "1008" (on USB)
16134.90	KVM70	1810	Honolulu Meteo, Hawaii	120/576/800 FAX, Weather pix
16830.50	SVO	1407	Olympia Radio, Greece	100bd/170/I SITOR-B, sports news in GG in SBRS mode
17016.80	KPH	1805	MRHS, Point Reyes CA	CW, "VVV VVV VVV CQ DE KPH"
17060.60	FUX	1805	French Navy, Le Port	1200bps/L STANAG4285 HF modem, crypto tfc (on USB)
17151.20	NMC	2115	US Coast Guard, Point Reyes CA	120lpm/576/800 Fax, WX pix
18365.00	6WW	1800	French Navy, Dakar	1200bps/L STANAG4285 HF modem, crypto tfc w/ carrier (on USB)
18493.50	FUV	1400	French Forces, Djibouti	1200bps/L STANAG4285 HF modem, crypto tfc (on USB)
20168.00	XSS***	1439	UK MIL TASCOMM, Forest Moor	125bd/1750 MIL-188-141A, ALE sounding (on USB)

Shortwave Utility Logs

Recent Shortwave Utility Logs Compiled by Hugh Stegman

Frequency	Callsign	User, Location	Time	System Details
21.40	NPM	US Navy, Lualualei, HI	0039	MSK, encrypted submarine broadcast
24.00	NAA	US Navy, Cutler, ME	0042	MSK, encrypted submarine broadcast
257.00	LW	NDB, BC, Canada	0023	AM/MCW, tone Morse ID in USB only
290.00	YYF	NDB, BC, Canada	0019	AM/MCW; tone Morse ID at 400 Hz
385.00	MR	NDB, Monterey, CA	2337	AM/MCW, tone Morse ID at ~1000 Hz
404.00	MOG	NDB, Montague, CA	2349	AM/MCW, tone Morse ID at ~1025 Hz
518.00	"H"	VAJ, Canadian CG, BC	0000	Sitor-B, NAVTEX gale warning for Vancouver
1734.00	OXZ	Lyngby Radio, Denmark	2141	USB, voice with navigational warnings
2182.00	IPD	Civitavecchia Radio, Italy	1952	USB, announcing gale warnings on 1698, 1707, & 1677
2474.00	PBB	Dutch Navy, Den Helder	0308	RTTY (75/850), CARB "02A 04B 06A 08B 12A 16B PBB"
3185.00	"99"	Russian Air Defense	0318	CW, tracking strings every minute, T=0, ?=no data
3320.00	Unid	Unknown UK Military	2343	STANAG 4539?, 3-channel oddity with 3314 & 3329 kHz
3330.00	CHU	Canadian NRC, Ottawa	2351	R3E, standard time pips and ASCII
3413.00	Shannon Volmet	Shannon Radio, Ireland	1955	USB, female robot with European aviation weather
3498.00	Unid	Unlicensed pirates	2354	LSB, two Italian males chewing the rag, similar on 3470
3881.00	Unid	French Military (M51)	2358	CW, endless 5-character groups at 21 WPM
3889.00	Unid	Russian Intelligence (F06)	1700	FSK (200/1000), several messages, also on 3744 & 3542
4086.00	Unid	Unknown military	2359	CW, hand sent message in 5-figure groups
4280.00	PBB	Dutch Navy, Den Helder	2249	RTTY (75/850), CARB "02A 04B 06A 08B 12A 16B PBB"
4331.00	4XZ	Israeli Navy, Haifa (M22)	2005	CW ID, then message #793 in 5-letter groups; //6607
5045.00	Znamya	Russian Military	1412	USB, radiogram "Signal 1729," in Russian
5432.00	238	Polish Intelligence (E11a)	1605	USB, callup "238/40" & message in English
6559.00	"01"	ARINC, San Francisco, CA	0258	HFDL, working UPS63, B747 freighter N620UP
6936.00	SAQC	Chinese Military (M89)	2016	CW, repeating "V YHXD YHXD YHXD DE SAQC SAQC"
6996.50	MARSCOMM	US 1st AF MARS	2300	RTTY (75/850), announcing 2305 weather broadcast
7480.00	6662	Possible CA OES	1931	ALE, sounding on SECURE net frequency
7805.00	EVANSTON	WY State Emergency	2203	ALE, sounding on SECURE net frequency
8104.00	SVJ4	Hellenic Natl. Met Svc., Greece	1022	FAX (120/576), wave prognosis chart
8190.00	CAVATORTO	Italian Financial Police	0921	ALE, patrol boat, calling patrol boat SALONE
8503.90	NMG	USCG, New Orleans, LA	1926	FAX (120/576), noisy 24-hr wind/wave forecast
9065.00	CM	Algerian Military, Blida	0908	ALE, calling aircraft 745
9221.00	110	Chinese Air Force	1042	ALE, calling 145
10227.50	SNB813	Polish Military, Krakow	1159	ALE and USB voice check with SPT424, Kosovo
10505.00	VALPARAISO	Chilean Gendarmes, Valparaiso	2355	ALE, sounding
11123.50	MARSCOMM	US 1st AF MARS	2205	RTTY (75/850), HYDROPAC North Pacific safety warning
11282.00	Delta 428	Delta Airlines B757 N538US	2150	USB, selcal check AL-CH with San Francisco, on CEP-2
11494.00	OPB	US OPBAT, Bahamas	2028	ALE, calling N18, USCG HC-144A #2318, on COTHEN
11707.00	Thug 31	USAF C-17A	1600	USB, working Hot Rod 10, unknown aircraft
12222.00	K67	USCG MH-65D #6567	2103	ALE, HITRON, calling TSC, COTHEN Tech Service Ctr., FL
13907.00	X03	USCG HC-27J #2703	2043	ALE, calling PAC, USCG COMMCOM, CA, on COTHEN
14582.00	N05	USCG HC-144A #2305	2008	ALE, working LNT, USCG COMMCOM, VA, on COTHEN
14670.00	CHU	Canadian NRC, Ottawa	1944	R3E, standard time pips, decoded ASCII time & date
15867.00	LNT	USCG COMMCOM, VA	2036	ALE, calling J49, USCG MH-60T #6049, on COTHEN
16898.50	XSG	Shanghai Radio, China	2356	SITOR-B, maritime msg #160 in 4-figure-coded Chinese
17016.80	KPH	MRHS, Pt. Reyes, CA	2344	CW, usual "VVV DE KPH" marker wheel
18594.00	PAC	USCG COMMCOM, CA	2045	ALE, working N05, USCG HC-144A #2305
19334.50	Unid	N. Korean Intell, Pyongyang	0847	ARQ (600/600), encrypted text message
20469.00	VMC	Australian BoM, Charleville	2340	FAX (120/576), noisy Pacific surface chart
20890.00	PAC	USCG COMMCOM, CA	2034	ALE, calling N18, USCG HC-144A #2318
22477.50	KPH	MRHS, Pt. Reyes, CA	2344	CW, usual "VVV DE KPH" marker wheel

The World of Shortwave Listening

By Jeff White, Chairman, HFCC **info@wrmi.net**

Shortwave and the Utah Connection

As I flew over the State of Utah in October of 2021, I thought of the Mormon pioneers who made the trek from Illinois to Salt Lake City in the mid-1800s over rustic, often inhospitable desert and mountain territory. "Come, Come Ye Saints" is a hymn they wrote to describe their difficult journey. Its lyrics, in part, read:

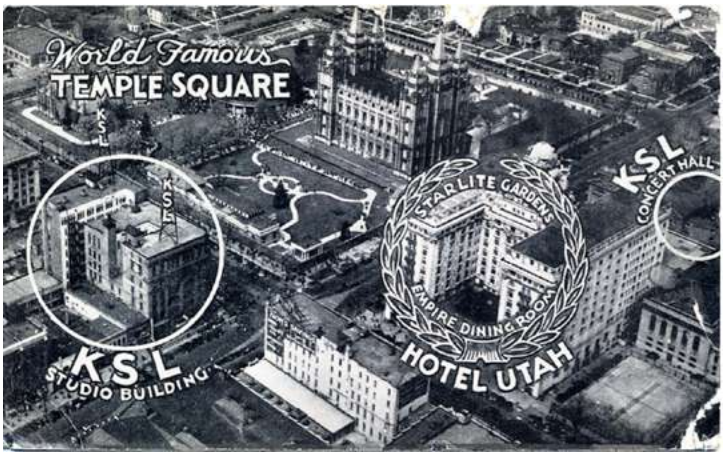
"Come, come, ye Saints, no toil nor labor fear
But with joy wend your way
Though hard to you this journey may appear
Grace shall be as your day
'Tis better far for us to strive
Our useless cares from us to drive
Do this, and joy your hearts will swell
All is well! All is well!
"We'll find the place which God for us prepared
Far away in the West
Where none shall come to hurt or make afraid
There the Saints will be blessed
We'll make the air with music ring
Shout praises to our God and King
Above the rest these words we'll tell
All is well! All is well!"

How much easier it was for me to fly across the country in five and a half hours to this state with so much beautiful scenery. My mission was partially to trace the story of a very memorable shortwave radio station and its successors.

I found myself—for the first time since I was a kid 48 years ago—in Temple Square, in the center of Salt Lake City. But first, some background about shortwave in the state of Utah. As far back as 1939, the Church of Jesus Christ of Latter-Day Saints (commonly known as the Mormon church or LDS church), headquartered in Utah, was interested in getting on the air on shortwave.

They struck a deal through their broadcast arm, mediumwave station KSL, to buy shortwave station W9XAA from the Chicago Federation of Labor (CFL), which also operated Chicago mediumwave station WCFL. But when the CFL as license-holder requested approval from the FCC to sell the shortwave station, the FCC denied the request.

In 1962, through the International Educational Broadcasting Corporation (IEBC) in Salt Lake City, the LDS church succeeded in buying the historic shortwave station WRUL in Scituate, near Boston, Massachusetts. Two years later, the IEBC became Bonneville International, the parent company for all of the LDS church's broadcasting interests. They changed the callsign from WRUL to WNYW, with studios in New York City. Both KSL mediumwave and WNYW shortwave were affiliated with the CBS Radio Network, carrying CBS newscasts. In the process of time, WNYW became WYFR, and then WYFR became my own station, WRMI.



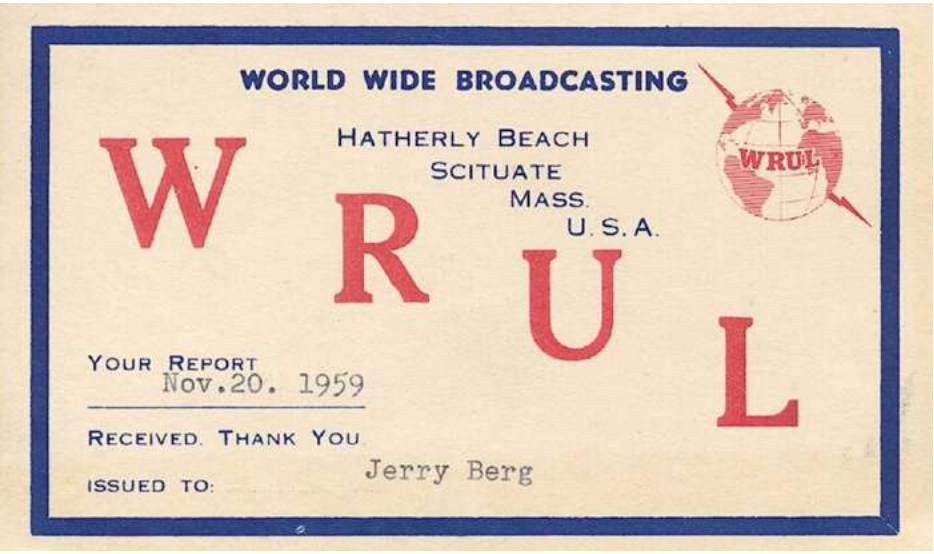
KSL postcard from 1939 shows KSL studio building (left circle)—note twin antenna towers adorned with KSL signage. The KSL concert hall (right circle) with Temple Square and Hotel Utah also clearly featured. (Courtesy of The Committee to Preserve Radio Verifications)

The Shortwave Scene in Utah: KUSW

But back to Utah, and the first shortwave station physically located there was "Super-Power KUSW," as they identified themselves. Some suggest the callsign KUSW rather obviously indicated "Utah Short Wave." But other publications state that it actually stood for the more grandiose "United States Worldwide." The official target audience for KUSW was actually North America, as well as Europe and parts of Africa.

Those of you who were shortwave listeners back in the 1980s may remember hearing WRNO from New Orleans, Louisiana, which was the first real attempt at commercial shortwave broadcasting in the United States in recent years.

Ralph Carlson, a radio broadcaster in Utah, liked the idea of WRNO when he visited the station, and he got a



QSL dated 1959 from WRUL, Scituate, Massachusetts, issued to Jerry Berg, author of On the Shortwaves. In 1962, through the International Educational Broadcasting Corporation (IEBC) in Salt Lake City, the LDS church succeeded in buying WRUL. Two years later, the IEBC became Bonneville International, the parent company for all of the LDS church's broadcasting interests. They changed the callsign from WRUL to WNYW, with studios in New York City. Both KSL mediumwave and WNYW shortwave were affiliated with the CBS Radio Network, carrying CBS newscasts. (Courtesy of The Committee to Preserve Radio Verifications)

license to do his own version of it in Salt Lake City. The station was KUSW, and it went on the air in December of 1987.

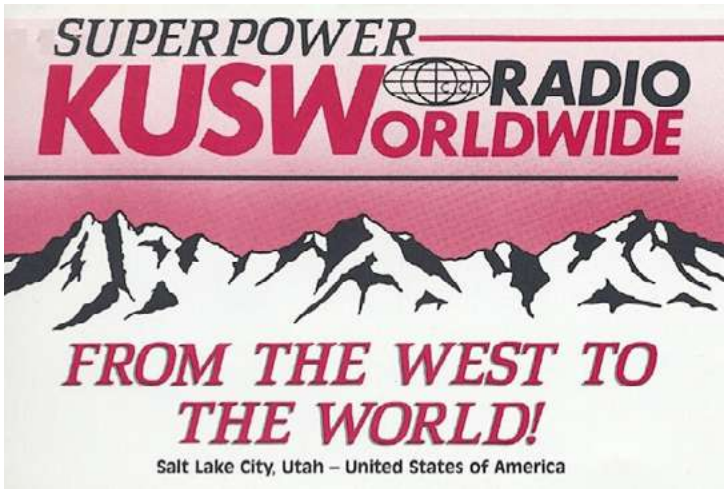
The facility for this new station was constructed in just five months in Murray, Utah, south of Salt Lake City in the Salt Lake Valley. The offices, studios, and transmitter were all installed in the same building, and the adjacent antenna system was supported from two towers, 145 feet tall.

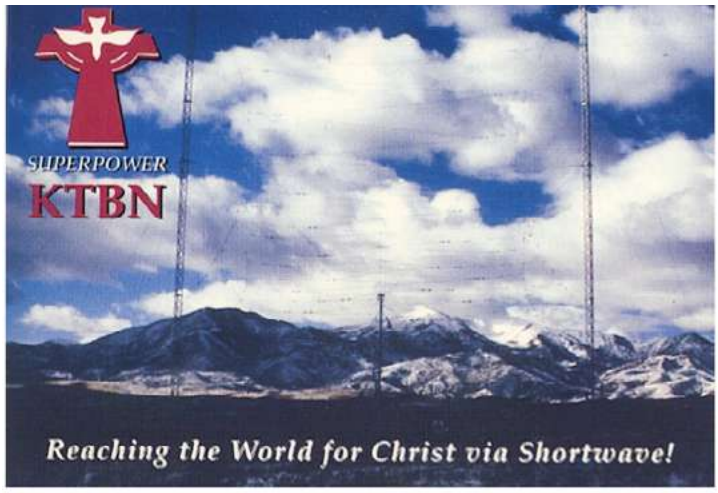
The 100-kilowatt Harris transmitter model SW100B was fitted with automatic tuning for 10 preset shortwave channels. This facilitated rapid frequency changes in just 10 seconds. Sadly, this led to them playing hopscotch all over the shortwave bands, changing frequency every few hours, much to the chagrin of their listeners, who were never quite sure where to find the station -- an illustration, if ever there was one of "just because you can, doesn't mean you should!" The TCI sloping net style log-periodic antenna system model 515-3 was capable of handling 100 kilowatts on any frequency from 3.9 MHz right up to 18 MHz. The antenna had a 70-degree beam which radiated its maximum power towards Ontario, Canada, though 10 percent was radiated from side and back lobes. They stated that their target audience included all of North America, Europe and parts of Africa and especially the two million Americans who were living outside the country at that time.

The original intended date for the beginning of test transmissions from shortwave KUSW was November 20, 1987, with regular service commencing on December 1. However, because of installation delays, the official inauguration date was ultimately moved to December 26, 1987.

Super-Power KUSW Worldwide Radio (as the station identified on air) was owned by Carlson Communications who also owned a small network of AM and FM stations in three adjoining states: Utah, Nevada & Arizona. The shortwave facility was associated with Carlson's local stations KRSP AM and FM in Salt Lake City, with several of the KUSW presenters also having air shifts or other duties at KRSP. The shortwave programming was produced independently of the local stations, though. This was not a relay situation. Subsequently, the studios of KRSP FM were relocated to the same building as KSL in Salt Lake City.

The regular scheduling for commercial shortwave KUSW contained a mix of contemporary secular rock and blues music, news, a program called "Music





"Superpower KUSW Radio Worldwide" commenced broadcasting from Salt Lake City in December 1987. The plan for news, pop music and the promotion of Utah could not be sustained, however, and in 1990 KUSW was sold to Trinity Broadcasting Network, which used it to simulcast the TV audio of the TBN religious network. The station's new call letters were KTBN. It closed down in 2008. (Text and graphic from 'The American States on Shortwave' by Jerry Berg)

and the Spoken Word" on Sundays from Temple Square in Salt Lake City, live coverage of some Utah Jazz basketball games, other religious programming, and twice a year live coverage of LDS church conferences. To earn supplemental income to support its broadcast coverage, KUSW also invited listeners to purchase sports and radio equipment, and novelty items from its own membership catalog.

The non-LDS religious programming on KUSW was brokered by Pan American Broadcasting in Cupertino, California, which also brokered programming at that time over Radio Africa in Malabo, Equatorial Guinea, with 100 kilowatts on 15190 kHz.

Soon after KUSW went on the air, reception reports began to arrive at the rate of around 30 each day. One reception report came from the pilot of an American Air Force plane who was listening while in flight. All reports were acknowledged with a QSL card, showing an artistic representation of the distant mountain range. During the station's four years of on-air operation, only one QSL card design was issued, and it was available at both KUSW in Utah and Pan American in California.

The programming from shortwave KUSW was relayed via an American navy vessel off the coast of Panama in Central America during the downfall of President Manuel Noriega. I found an article in the local newspaper in Salt Lake City, the *Deseret News*, by Sheila Sanchez, dated December 29, 1989. She wrote:

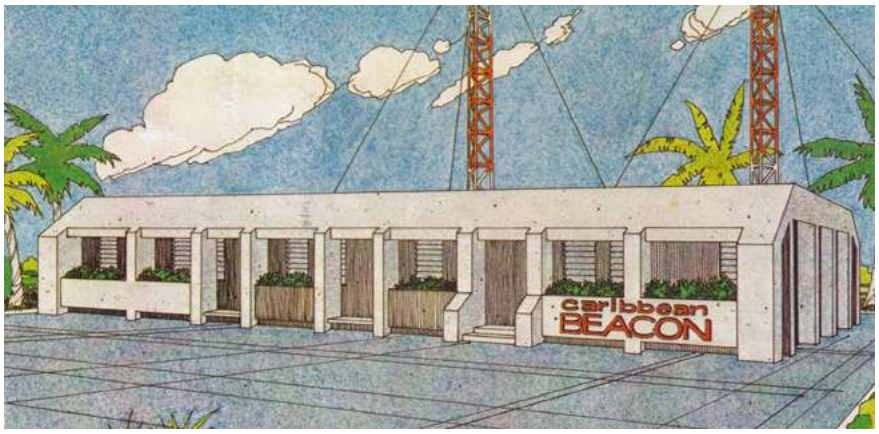
"When disc jockey Sheryl Sheafor picked up the phone Thursday in the studios of a Salt Lake City short wave radio station, she couldn't believe the voice on the other line. It was 'Buck' - a seaman third class stationed on the USS Emery S Land AS39 submarine support ship in Panama, calling to request a song that would be played through a loudspeaker in a parking lot across from the Vatican Embassy in Panama City. Sheafor, Superpower KUSW Radio's most popular on-air personality, said the seaman requested a song called 'Painting by Numbers,' by James McMurtry, because it has a phrase that says, 'You might be down in the Canal Zone being all you can be.'

"Sheafor said the song was requested to encourage U.S. soldiers stationed in Panama. Buck had told her KUSW's signal is picked up on his ship, where it is transferred to the military base. From there the signal is forwarded to the loudspeaker across from the Vatican Embassy, where General Manuel Noriega -- an opera fan (!) -- sought political asylum on Christmas Eve. 'It was very exciting,' Sheafor told the Deseret News. 'This kid could have called anybody, but he called us. We are a short-wave station and, evidently, they listen to us on the ship all the time. We play rock 'n' roll and we take requests from all over the world. When he called, we had just announced our request line was open. We play requests from anybody who calls.'"

Noriega surrendered on January 3, 1990. We don't know if KUSW's rock music played a major role in that!

In an article in *Monitoring Times* in January 1988, Ralph Carlson promoted the idea of commercial shortwave, citing an article in the *Wall Street Journal* which said that shortwave receiver sales were up 50 percent over the previous year, and that the percentage of the population (presumably in the U.S.) that listens to shortwave was expected to grow from 4 percent to about 20 percent during the next 15 years. He also said that studies showed that the typical shortwave listener was male and had a median age of 34. He spent about 12-15 hours a week listening to SW. A third of them had a college degree, and another third had advanced degrees. He said: "We are confident that there are many firms interested in advertising and promoting to this market."

To reach this lucrative market, Carlson developed a program schedule that included American contemporary music, and news of interest to international listeners, including news about the western United States. He also intended to promote Utah tourist attractions like ski resorts, Bryce Canyon and Zion national parks, and Temple Square in Salt Lake City. And he would allocate a block of time to religious groups.



Part of a QSL/brochure for Caribbean Beacon from mid-2000s broadcasting programming from The University Network under the direction of Pastor Melissa Scott. In 2017 the station was taken off the air by Hurricane Irma. (Courtesy: MT Shortwave blog)

"We see shortwave broadcasting as an exciting new arena," Carlson said. "Up to now, most of the stations have been either government or religious operations. Our programming will be mostly music but will be designed to attract the international audience." The KUSW rate card showed that 60-second spots could be purchased for as little as $40. All programming was in English.

Early plans were for KUSW to install a second shortwave transmitter for coverage into Latin America. However, that never materialized. Sadly, like WNYW before them in the 1970s, KUSW found that advertisers were just not sufficiently interested in the international audience for the station to be sustained on a commercial basis. So instead, KUSW was sold to the Trinity Broadcasting Network for around $2 million. The last day for broadcasts as KUSW was Sunday, December 16, 1990, and its on-air programming ended at 0300 UTC on 11695 kHz.

Two days later, on Tuesday December 18, 1990, the station was reactivated under a new callsign, KTBN, which indicated its new owner, the Trinity Broadcasting Network.

Under the new owners, programming was always, and only, a relay of the audio channel of their TV network via satellite. Back then, four Adventist TV programs were carried by TBN, quite similar in content to the audio programming from Adventist World Radio. So, these two were relayed on shortwave by KTBN, for which QSL cards were offered from the AWR office in Indianapolis.

The pre-recorded station announcement from KTBN at the top of the hour identified the station and made requests for reception reports. Just two shortwave channels were in use: 7510 (later changed to 7505) kHz during the hours of darkness, and 15590 kHz during the daytime.

Thirteen years later in June of 2004, Trinity announced that they planned to close their shortwave station KTBN due to lack of listener response. It remained on the year for four more years, however, until it was finally closed on March 30, 2008.

During its thirteen years of on-air history, KTBN issued three different QSL cards, one in black & white and two in color, though each portrayed a photograph of the same distant mountain range that had been featured on the KUSW cards.

From Utah to the Caribbean: The Caribbean Beacon Anguilla

So shortwave station KUSW-KTBN near Salt Lake City in Utah had been on the air for a total of 21 years, running from 1987 to 2008. The station's shortwave transmitter and antenna system were then duly dismantled and shipped to the island of Anguilla in the Caribbean, where it was used to add to the equipment at the station already on air known as the Caribbean Beacon.

That station had been originally launched as a mediumwave station, but in 1996 a new Continental 100 kW shortwave transmitter was installed at their Sandy Hill site, together with an antenna system that had been previously in service with shortwave KGEI at Belmont, California. Twelve years later, the shortwave equipment from KUSW-KTBN was also incorporated into the Caribbean Beacon, carrying the programming of Dr. Gene Scott's University Network.

Jerry Plummer, the station's frequency manager, explained what happened more recently:

"Hurricane Irma, in 2017, did major damage to the existing antenna, although the transmitter was not damaged. After a few weeks, the existing antenna was repaired to the degree that the Beacon could air again at about half power.

"In the meantime, the initial lease agreement or Memorandum of Understanding with the Anguillan government had expired without Beacon engineer or lawyer intervention. When this was discovered, a new lawyer was employed and officials from Pastor Melissa Scott, owner of the Beacon, served as emissaries to negotiate the new MOU with the Anguillan government. Unfortunately, the expiration delay caused much consternation with Anguillan officials for renewal success, and after well over a year of fruitless negotiations, Scott officials declared the entire Caribbean Beacon system as expired.

"The Continental transmitter was packaged up and shipped to Scott headquarters in California, where it remains to this day. The fully operational transmitter is currently for sale. The antenna parts that were still usable accompanied the transmitter to California.

"Pastor Scott still beams shortwave over twelve hours daily from shortwave station WWCR in Nashville, Tennessee, which has been carrying Scott broadcasts since the early 1990s."

Incidentally, my wife and I drove by the former transmitter site of KUSW and KTBN in Murray, several miles south of Salt Lake City. I had a map, geographical coordinates of the station and a photo of the transmitter building

and antenna. And I can tell you that today there is no sign of there ever being a shortwave station on that site -- no transmitter building, and of course no antenna. There is just a cement plant nearby and locals say there are some copper mines in the area.

A few hundred miles south of Murray there are some very large and very fragile rock arches which are major tourist attractions. According to National Geographic, humans can't hear it, but the rocks hum and whine at levels that at times rival a rock concert. These unique vibrational frequencies can give clues to the strength of the arches—and inform efforts to preserve them—in places like Utah's Bryce Canyon, Arches, Zion and Canyonlands national parks -- all very interesting places to visit.

Those national parks are in the southern part of Utah. In the northern part of the state, there are also a number of popular tourist attractions. The number-one attraction is Temple Square in downtown Salt Lake City, where the famous Mormon Temple is located. It and much of the surrounding square are under construction for the next three or four years, in part to make them more seismic-proof in this earthquake-prone area. Across from the Temple is the Tabernacle, where we were able to watch an organ recital by an accomplished organist who plays the impressive 11,630-pipe Tabernacle Organ, one of the largest in the world.

The Tabernacle Choir sings along with the organ each Sunday for the syndicated radio and TV program "Music and the Spoken Word." In the plaza outside is a bell tower. The bell has been featured as a time signal on local stations KSL radio 1160 AM and 102.7 FM and KSL TV.

Across the street from Tabernacle Square is the Church's Family History Center, where anyone can make use of hundreds of computers, thousands of genealogical records and dozens of human assistants to trace your family history. I was amazed to be able to trace my own family tree back to around the year 600 AD in Switzerland and the British Isles.

Salt Lake City sits in a valley, surrounded by the beautiful snow-capped Rocky Mountains. A short drive northwest of the city is Antelope Island State Park. The island sits in the middle of the Great Salt Lake, which is the largest saltwater lake in the Western Hemisphere, sometimes known as "America's Dead Sea." There are pronghorn antelope on Antelope Island, but we didn't see any during our visit. We did see some of the 700 or so free-ranging buffalo that inhabit the island, as well as a coyote crossing the road in front of us. There is a short causeway which allows you to drive from the mainland to the island. And road signs tell you to tune in to 530 kHz AM for Antelope Island Radio.

To the southeast of Salt Lake City, up in the mountains, is a famous tourist town known as Park City, a village with some local radio stations, such as public station KPCW (91.7, 91.9 and 88.1 FM), which carries BBC World Service newscasts. *Special thanks to Ray Robinson of KVOH and Adrian Peterson of AWR for portions of this text.* **TSM**

The Shortwave Listener

By Fred Waterer **programming_matters@yahoo.ca**

January on Shortwave and 'Marion's Attic'

Welcome to a new year of radio listening! There's lots to interest you this month including a really cool "interview" with Marion Webster and Kristina, of Marion's Attic fame. Let's get right to it, shall we?

WRMI Presents a Pan-American New Year's Eve

Courtesy of WRMI, Luis Alejandro Vallebueno and Uncle Bill Tilford present an hour of songs and customs from several Latin American countries plus messages from several special guests. If propagation permits, listenable throughout the Americas, parts of Europe and western Africa. Spend an hour with us before (or after) your physical parties. It will be in Spanish with moments of English and Portuguese. January 1, 2022, 0200-0300 UTC (December 31, 2021, 2100-2200 EST) 5800 & 7780 kHz

New Year's Eve was once one of my favorite times of the year to listen to shortwave. In fact, I wrote an article about it in 2005 for Monitoring Times, this publication's predecessor. Nowadays, not so much. One must use the internet to attempt this. Nevertheless, the days surrounding the New Year often turn up some real gems. End of the year retrospectives, cultural and music specials—it's a great time to listen. Call me a geek but I still tune in to WWV at 0000 UTC. If you can find a BBC frequency, you'll hear the bells of Big Ben at that time as well.

Many of the nations of the world celebrate Orthodox Christmas in January. Radio Ukraine International (heard online) broadcasts some of the most stunning *a cappella* church music, tune in around Orthodox Christmas early in January (Christmas is the 7th, New Year's Day is the 14th). Voice of Russia and Radio Bulgaria used to be good for this as well.

Speaking of Bulgaria, on the website of the Bulgarian National Radio you can now listen to the new podcast of Radio Bulgaria, "Bulgaria Today" in English, German, French, Spanish, Russian, Serbian, Greek, Albanian and Turkish.

BNR has resumed its programs in foreign languages after a five-year pause. The change coincides with the 85th anniversary of the first foreign-language broadcasts for foreign audiences celebrated by Radio Bulgaria in 2021.

Radio Bulgaria's new audio program brings its listeners an overview of the most important news stories from and about Bulgaria, monitors the Covid situation, presents interesting tourist destinations and sheds light on the way of life, culture and history of this country. Each podcast ends with

Bulgaria returns to international broadcasting, sort of (Photo courtesy of Bulgaria National Radio))

a dedicated music slot, "Song of the Day," which allows the large audience of Radio Bulgaria around the world to listen to the latest Bulgarian pop and rock hits, folklore masterpieces, classical music and jazz compositions.

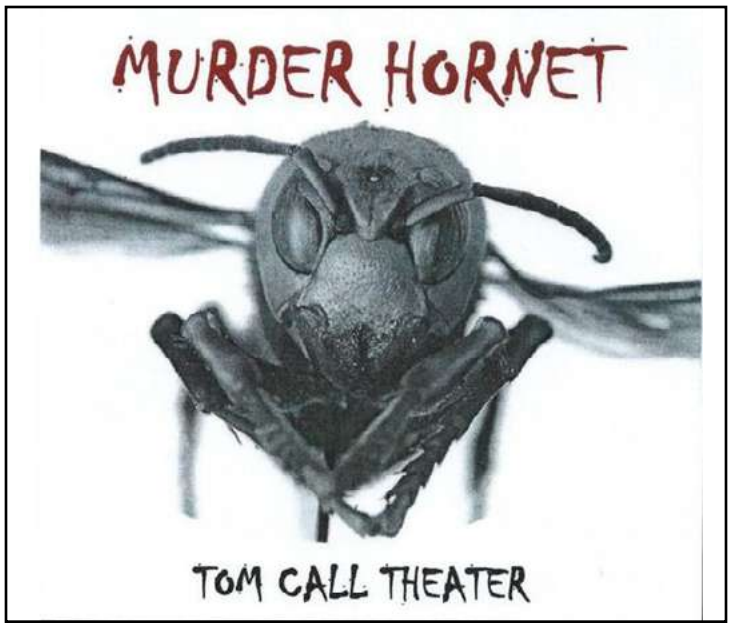
The restart of the foreign-language programs is part of BNR's campaign "Hear the voice of Bulgaria," aimed at presenting and promoting this country among foreign citizens interested in business, education or tourism in Bulgaria. Bulgaria Today is available via any mobile device through the BNR website.

This would be a good program to add to the WRMI lineup, or even use those transmitters in Bulgaria that are still operating, just a thought.

Tom Call Theater has a new program planned for broadcast the first week of 2022 called "Bloody Mary." The cast of Tom Call Theater includes Jackie Silva, Mackenzie Griffin, Marta Wejman, Barry Merluzzo and Keith Albee. Tom Call Theater can be heard on WBCQ on Wednesdays at 0000 UTC and Fridays at 2300 UTC on 7490 kHz.

Tune in for an hour of oldies music at 2300 UTC Monday-Friday (i.e., 6:00 pm Eastern Time) on 4980 kHz, presented by APS Radio (began, November 29)

Beginning December 2, WRMI is pleased to broadcast a weekly DX program especially oriented toward the large number of amateur radio operators in our audience. The name is "CQ Calling." It's produced and presented by Larry Deyoe, who says: "I've been an avid medium wave and shortwave DXer since 1972. I began in broadcasting in 1977 in Portland, Oregon, a total of 11 years in commercial radio. I host a nearly daily YouTube show between 20:00 and 21:00



Tom Call Theater brings you "Bloody Mary" in January (Photo courtesy of WBCQ)

UTC called 'Ham Radio Live!' which is a live show watched daily by people from around the world. The show encourages people to get their ham license while also celebrating shortwave, DX, CB and radio history. The live viewers are a key element to every show." CQ Calling is aired on WRMI Thursdays at the following times and frequencies: Thursday 0815 UTC on 7730 kHz, 2015 UTC on 15770 kHz, Friday 0030 UTC on 9395 kHz and Friday 0115 UTC on 9955 kHz. The latter broadcast is also simulcast on WRMI's internet stream.

Texas Radio Short Wave presents a number of programs this month: January 2, at 0100 UTC via WRMI on 5950 kHz a TRSW special to be announced. Stay tuned at 0200 for Red Dirt on January 9, 16, 23 and 30 at 0200UTC on WRMI at 5950 kHz. It can also be heard on the 23rd at 0300 UTC on WBCQ on 6160 kHz.

Marion's Attic Interview

I recently corresponded by email with Marion Webster and Kristina of the WBCQ program Marion's Attic. They were kind enough to send a very detailed response. I found it fascinating, and I think you will too! My comments and questions are in italics

"Hello Fred. This is Marion typing, with Kristina, my co-hostess, next to me. We are pleased to answer your questions regarding our radio program, 'Marion's Attic.' I see ten questions, so here goes.

Fred: I suppose I'm curious about how you got started, collecting the equipment, and the recordings.

Marion: "My family had windup phonographs; they treated them as household appliances. Later, we had electric phonographs. I even had some records of my own. I liked listening to records, but I never thought much else about them, until I took a long walk on a forgotten road. You see,

(Courtesy: Texas Radio Shortwave)

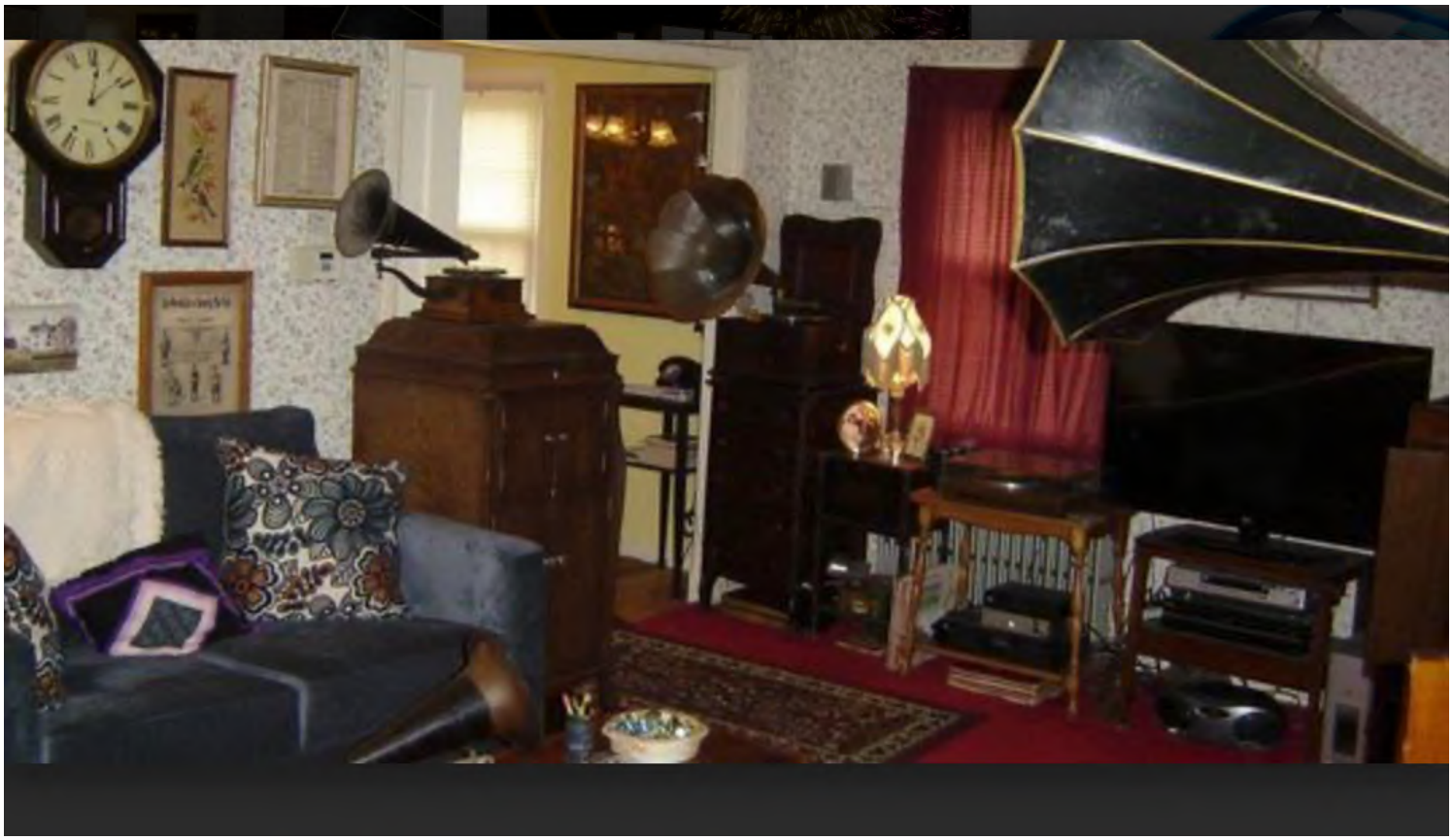
a friend had asked me, 'Marion, pick a place for us to go on a long walk.' The thought of Robert Frost's poem of 'taking the road less traveled' immediately came to mind, and a suitable road, once the main road between two towns, paved at each end, abandoned in the middle, was selected. Along the way, on the paved section of the road, there was a weathered farmhouse that displayed a sign in the window, saying, 'Tag Sale, come in.' To make a long story short, the farmhouse was a time capsule from 1905. It was there, I found several dozen cylinder records, including ancient brown wax cylinders and records, that I later learned, were four-minute wax Edison records. I could only bring back two cylinders that day and completed the long walk without breaking them. I returned the next day, with my car, and bought the rest. Though no cylinder player was found on the farm, one was for sale only three miles away, an Edison Standard, Model-D. That was the start of it all. How wonderful and exciting it was to hear sounds from before my own time. My interests grew, so did my collection."

Fred: The encyclopedic knowledge about the recordings is impressive. Your collection appears to be a lifelong labor of love.

Marion: "I am only book smart. Over the years, I have purchased some excellent reference books. I have also visited the Edison National Historic Site in West Orange, New Jersey. You might say the collection is a labor of love, yes, but for the love of the artists who made so many people happy, so long ago. They must be heard once in a while. The collection is not just for me and Kristina; it's for anyone who tunes into shortwave radio, wishing to be entertained, not lectured to. WBCQ give us the ability to do that, at a very reasonable rate."

Fred: One of the web pages suggests your theme song is 'An Arkansas Husking Bee.' What caused you to choose it?

Marion: "Yes. The opening theme song is, 'An Arkansas Huskin' Bee,' played by the Columbia Band. The record is announced at the beginning, though I do not include it. I chose the record because when I heard it the first time, I thought, 'if I ever had a radio show, that would be the theme music.' This song happens to be one of the first molded Columbia cylinder records made with the new molding process, about 1901-02, also having been made with the same brown



Marion's Parlor, showing just some of the equipment used on Marion's Attic (Photo courtesy of Marion's Attic)

wax material as used with the earlier mechanically duplicated brown wax records."

Fred: How did you get into broadcasting?

Marion: "Do you know, it was the same friend who asked me to go for that long walk, who told me years later, 'Allan Weiner of WBCQ, was looking for programming. Marion, why don't you do a show with your old records?' In one week's time, I sent Allan an audition tape, my first show. He didn't sound too sure of the show's concept, but he gladly offered airtime for me. That first half-hour show aired September 21, 1999, airing Tuesdays, at 4:30 PM, Eastern Time. It was an odd time slot; between two 'lecturers.' Nevertheless, much gratifying feedback was received, so much so, Allan asked me to do an hour time slot on Saturday nights at 9 PM. This started April 1, 2000. We've been moved a few times, but we've remained steady at the 5 PM, Sunday time slot for several years, now. The signal at that time is more regional. 9 PM Saturdays offered true worldwide broadcasting. There were 28 half-hour programs. These days, WBCQ airs Marion's Attic on other transmitters, plus we also broadcast via Global Community Radio (service) out of Geneva, New York, Saturday, at 7 AM. There are radio stations around the country who take the GCR, channel-2 radio service feed, most being on the FM broadcast band. We are on the air in New Orleans, LA, via WXDR-FM, for example. We've had great feedback from there."

Fred: Did the program originate on WBCQ or did it have an earlier incarnation?

Marion: "The program originated on WBCQ, the Planet. We've always been on WBCQ. We've been to their studio in Monticello, Maine, for a live show. That day, we were simulcast on four shortwave transmitters, with engineer Tim Smith acting as board operator, Allan Weiner as transmitter owner and operator. WBCQ is so cool. I consider Allan a leader of shortwave broadcasting. Other stations are following his ideas, it seems.

Fred: You and Kristina have a very endearing relationship. The on-air chemistry is obvious. As a listener I have a mental image of a doting niece, who just knows instinctively when to step in and help out.

Marion: "Kristina is sensitive, having above average mental powers, and is quite adept at reading my mind. Where does that gift come from? She is not doting, but a true fireball. Doesn't she have a lovely radio voice?"

Kristina: "That's our little secret, Marion."

Fred: Looking at your photos, it all looks very fascinating. How do you get the music to air?

Marion: "Electrically recorded discs and some of the early acoustic discs are played back electrically, using a mid-1960s Garrad turntable, which uses a Pickering RV-15 cartridge with 78 RPM stylus. Sound from cylinder and disc machines that reproduce mechanically are gathered using small condenser microphones, one at the 'sweet spot' in the horn, the other mounted closely near the underside of the reproducer. One side of the playback reproducer diaphragm is amplified by the horn, but the sound from the other side of the diaphragm is normally lost. The other side of the diaphragm contains sound of higher frequencies and placing

the microphone there, adds a lot to the clarity of the music, especially the words to songs. Importantly, the sound on one side of the diaphragm is 180 degrees out of phase with the other. Swapping the phase of the diaphragm microphone ensures the sound from both microphones add up OK, leaving no cancellations."

Kristina: "Marion is a lot smarter than she sounds. She wired her own studio!"

Marion:" Yes, and I gave you a NIXIE Tube broadcasting timer for you to keep track of the time."

Kristina: "It's fun to stare at it."

Marion: "The turntable audio runs through a sub-mixer and an audio equalizer. You may hear me adjust that live, during shows, when electrically playing 78s. The output of the equalizer is fed to the audio mixing console. Other audio inputs are Marion's mic, an Electrovoice RE-50B dynamic, Kristina's mic, an RCA 77D ribbon mic, two guest microphones, two CD playbacks and a high end 16/33/45/78 turntable, a name I cannot remember. Each audio input has its own equalizer, too. The audio console output feeds a high-quality PC sound card, with the program recorded as an MP3 file. It is this file we upload to WBCQ."

Fred: In this digital age of virtually everything, I love the sound of the recordings and the tactile nature of placing the needle in the grooves

Marion: "We try to make the listening experience as if you were in the attic with us. That involves lots of the authentic sound effects that you hear; the cranking of the phonograph, the record being placed on the mandrel of the cylinder machine, the needle drop, a creaking antique chair I sit on. I'd also like to add that Kristina and I do not stop the recording process, once underway. This gives the audience a live experience, which happened only hours prior to broadcast. I can think of only one time we stopped; it was during a remote broadcast in Pennsylvania that involved flammable refreshments and our host's amazing accordion playing abilities. It is to be noted that we have produced several dozen programs away from the attic studio; in lighthouses, log cabins, and antique shops. We have excellent remote recording equipment."

Fred: Do you get a lot of feedback from listeners? What's the best way to contact you?

Marion: "This question I am proud to answer with a resounding, 'YES!' Our lives have been enriched by our fans; many have been fans the entire 22 years of broadcasting. We have made wonderful friends who have shared their phonograph and record collections with us, Bruce and Dolores, of Lititz, Pennsylvania, for example. We've recorded several programs with them, using Bruce's perfectly restored phonographs and records. We have rather a mysterious fan, who collects Edison Diamond Disc records, who is a regular guest, Baron von Knight.

"We must mention the late Bill and Judy Frankfort, of Fritztown Pennsylvania. It was Bill who fulfilled my wishes to hear five-inch diameter, concert-size cylinder records, made between 1898 and 1901. This was back in 2004. We later went on to have quite a collection of Concert Cylinders ourselves. We'll be playing these in an upcoming show. For the record, no pun intended, we recorded 28 programs with the Frankforts; I'd call them phonograph parties, because we certainly had one each time we recorded in their log cabin. Today, they are both gone, but we do have a couple of Bill's treasured phonographs to trigger our sometimes foggy memory of those fun recording sessions.

"We have had television stations wishing to interview us about Marion's Attic, which we've had to turn down. There was once a Marion's Attic fan club in the UK, when we were on Saturday nights. We've heard from many overseas listeners in Europe, Central and South America. We once bought transmitter time on WBCQ's, 17.495 MHz transmitter, for a year, in addition to the 39-meter band. With that transmitter, we had listeners in Australia, New Zealand and Japan."

Fred: Speaking of December do you do anything special on the air around Christmas or New Year's?

Marion: "Yes, we have produced many Christmas programs and some New Year's programs (that I don't remember). Also, Halloween and St. Patrick's Day, Memorial Day, Veteran's Day. Loves songs for Valentine's Day. We don't always do specials, sometimes it's hard to find records on specific topics."

Kristina: "Ugh. Marion's collection is not organized. I don't know how she pulls off shows as she does. My job is easy, I just announce and follow along. Marion has 2500 different cylinder records, perhaps 10,000 discs; all in no particular order. How she finds what she does, is uncanny."

Marion: "I just use 'The Force' to find what I need."

Kristina: "We love the fact that we broadcast over shortwave radio. Marion's Attic is proof that shortwave is not dead—realized by the feedback we've received over the years. The WBCQ internet feed is quite popular, too. One week, the WBCQ server overloaded, stopping the feed, with a message popping up for all tuned in that said, 'Maximum listeners reached.' Always remember that our intention is not to be famous, but only to make people happy. We do that, and our listeners support the show by covering the cost of airtime. Allan Weiner says, 'WBCQ is about Peace, Love and Understanding.' Being on his station is a remarkable opportunity. For test purposes only, Allan put us on his 500 kW 9330 kHz transmitter, on four occasions. Wow, how many broadcasters can say their voice has been on a 500 kW station, with an enormous antenna?"

Marion: "Yet we will always remain humble and anonymous. Someday, the true nature of Marion will be revealed, a story worthy of publication, for certain."

Kristina: "Oh, brother."

Marion: "Anything else, Kristina?"

Kristina: "Tune into WBCQ, 7490, Sunday 5 PM eastern time (2200 UTC), or WBCQ's website, listen live, or via WXDR Saturday morning at 7 AM. Website: marionsattic.net."

Marion: "Over to you, Fred." **TSM**

Radio 101

By Ken Reitz KS4ZR ks4zr1@gmail.com

ATSC 3.0 Progress; HD Radio and Expanding Satellite Radio

TSM Reader's question: "What's the latest on ATSC 3.0? Am I going to need a new TV? I've heard that it isn't backward-compatible with older HDTV sets for over-the-air viewing."

Answer: Yes, No, and Maybe!

ATSC 3.0 is the new digital Over-the-Air (OTA) TV format, which is also known as NextGen TV. If you watch TV via your local cable-TV service or satellite TV company or streaming via Roku or other streaming device, the answer is no. Because you'll be using the cable-TV box or satellite-TV receiver or Roku or other streaming device to output to your TV. So, no change

It's true that ATSC 3.0 is not backward compatible with ATSC 1.0 sets. If you watch TV only via OTA-TV antenna, the answer is maybe. Because the rollout of ATSC 3.0 is very slow, you may not need a new ATSC 3.0 TV or ATSC 3.0 converter for another few years, depending on where you live

If you live in an area that is now broadcasting in ATSC 3.0 and you don't have an ATSC 3.0-capable TV set and you want to watch the new ATSC 3.0 programming, the answer is yes

And, even if you live in an area where ATSC 3.0 is being broadcast, the FCC requires those stations to continue simulcasting ATSC 3.0 and ATSC 1.0 for the next few years while consumers catch up, so the answer is no.

If you live in an area that is now broadcasting in ATSC 3.0 and you get a converter box capable of tuning in ATSC 3.0 broadcasts the answer is no, because you'll use your old TV to display the converter output. Though converter boxes for ATSC 3.0 are not widely available and tend to be expensive. The only ATSC 3.0 converter I've found is from Zapperbox ($329). According to their website (as of mid-December) they expected to be shipping sometime in early 2022

And, if you do buy a new TV with built-in ATSC 3.0, get a high-quality brand. Two years ago, I bought a Samsung 4K set that barely outlived its warranty before irreparably breaking down. This fall I bought a Sony 4K with ATSC 3.0/1.0 reception capability, it should last for years, which is about how long it will take for our local stations to begin transmitting in ATSC 3.0

Skip the expensive converter boxes this time: This Sony KD-43X85J, 43-inch smart LED 4K UHD TV features ATSC 3.0/1.0 tuning at just $598. It has lots of extras including four HDMI inputs, one composite video input, 3.5 mm jack for headphones or soundbar and fiber optic audio output for your stereo. (Courtesy: Crutchfield)

Since high quality name-brand sets with ATSC 3.0/1.0 reception are widely available at reasonable prices, I'd skip the converter box and go directly to the new TV. And don't wait around for a federal handout to let you convert to ATSC 3.0. Since stations are required to simulcast both ATSC 3.0 and 1.0 for the near future, and the economy having more pressing matters at hand, it's unlikely that federal legislators will want to cough up the kind of money it did back in 2008-09 during the original digital switch ($1.34 billion).

To be fully utilized, ATSC 3.0 will eventually connect your TV to the internet through 5G mobile broadband. It's too early to tell what kind of reception will be had in areas that used to be called fringe or deep fringe with or without the 5G connectivity. Suffice to say, if you live in fringe or deep fringe reception areas, you'll need to rely on an outdoor, amplified, rotatable VHF/UHF antenna. In our area, TV stations broadcast on both VHF and UHF channels, so a UHF-only antenna will be missing some of the action.

Regardless, rollout of 5G and ATSC 3.0 has been slower than anticipated prior to the pandemic, which was already predicting a lack of crews required to switch out the ATSC 3.0 antennas and install the hundreds of thousands of 5G transmitters required to finish this project. On top of that,

Zapperbox ($329) back panel. This ATSC 3.0 converter connects to your ATSC 1.0 TV via HDMI to display Nextgen ATSC 3.0 channels. It also connects to the internet via LAN wire or wirelessly. It also requires an external TV antenna. Don't look to the federal government to help foot the bill for converters this time around. With pandemic economic uncertainty, the $1.3 billion in subsidies from 2009 likely won't be seen this time. (Courtesy: Zapperbox)

the *Wall Street Journal* reported in July 2021 that "industry analysts say the service is largely indistinguishable from 4G LTE service." The report noted that experts expected that, "… by the end of 2023 two-thirds of the US would be covered with a 5G service that's notably better than what is currently out there on 4G." According to the *WSJ* report, the highest average download speeds for 5G are in South Korea at 350 Mbps. The US ranks 15th in world on the list with about 80 Mbps average download speed at 5G.

Another TSM reader asks, "What's the latest on HD Radio?"

For many years I've been reviewing HD Radio receivers going back to the old *Monitoring Times* days. The peak of HD Radio production was about 15 years ago when the broadcast industry began a heavy campaign in favor of digital over-the-air radio, hoping to lure listeners away from Sirius/XM satellite radio. Top manufacturers such as Polk Audio, Boston Acoustics and Cambridge Soundworks hit the market with high-ticket radios costing $300-400. The fad quickly fizzled as few stations were transmitting HD Radio signals and listeners discovered that the hybrid digital radio signals (transmitting both analog and digital signals at the same time) didn't travel as well as analog signals. The discrepancy between the two had more to do with FCC's limitation on the digital side—stations were allowed to transmit the digital signal at only 10 percent of the power of the analog signal. Not only did those HD radio sets disappear, but manufacturers have not revisited the table-top radio market again

At that time, AM and FM stations were experimenting with broadcasting in the digital format and at night it was possible to tune into some big-time AM stations for their digital signals, much to the dismay of AM band DXers because the simulcast analog and digital signals created a lot of unwanted hash near the frequencies of those stations experimenting with the format. Anyway, the digital format was largely wasted on AM because, with very few exceptions, they are virtually all in the talk-radio format for which the potential audio improvement would not be noticed. Since that time, the FCC has allowed digital-only broadcasting on the AM band, but few stations have done so. Most notable among those who did is WWFD 820 kHz in the Metro DC-area. Eventually, most AM stations stopped experimenting and it's rare today from this location to receive any AM digital transmissions day or night. On FM the results are mixed. Some stations that had transmitted in the digital format have abandoned it, including some networks of public radio stations who had been among the first to adopt the scheme.

Where Did All the HD Radios Go?

With the initial wave of HD Radio sets off the shelf, there were few makers venturing into the arena. The best of the newest was the Sparc SHD-T750, (reviewed in the November 2020 issue of *TSM*) which sold for $150 on Amazon. But all Sparc brand HD Radio sets are currently out of stock, according to the company's website, including the SHD-T750, which is not available even on Amazon. There is no way to know if these models will return to the shelves or be replaced with newer models—no one knows—it's the nature of the times

The T750 had the best HD Radio display of any HD-capable set not located in a car dash, featuring a full-color display for album art as well as radio station info, including what was playing on other auxiliary FM channels of the main FM station

That leaves the whole field to our old friends at Sangean, who offer four sets worth looking at, if you are interested in checking out the HD Radio landscape where you live, though none have the capabilities of the Sparc T750. Still available on Amazon as of this writing:

Last HD Radios standing? Sangean's lineup of HD Radio receivers are what's left for consumers. The two best HD Radio receivers today are the HDT-20 ($200 at bottom) component receiver (without an internal amplifier or speakers) and the HDT-18 ($170 at top left) is a stand-alone, tabletop set with a single speaker. Both have external antenna connections. Screen at top right is from the Sparc SHD-T750 AM/FM/HD radio (not currently available), shows the difference in displays between the Sparc T750 and Sangean models: full-color album art, station call sign, extra HD channel indicator and programming notes on the other HD Radio auxiliary channels playing at the same time. There is no indication at this time when Sparc models will be back in production. (Courtesy: Sangean)

Sangean HDT-20 ($200) component AM/FM/HD tuner
Sangean HDR-18 ($170) tabletop AM/FM HD radio
Sangean HDR-16 ($132) portable AM/FM/HD radio
Sangean HDR-14 ($81) portable AM/FM/HD radio

While I prefer the HDT-20, it does not have a built-in audio amplifier or speakers as it's designed to work with a separate stereo amplifier; it also has fiber optic audio-out for improved stereo reproduction over RCA audio plugs. If you don't have a stereo through which to play the HDT-20, the HDR-18 is the next best to get. A stand-alone table-top radio, it does as good a job at reception as the HDT-20 but offers only one speaker and the display, like the HDT-20 is monochromatic text-only.

However, it does have antenna connections for external antennas (you'll need AM and FM external antennas for best reception) and presets for 10 FM and 10 AM stations (you'll likely not need that many for HD stations on either band). Sangean's portable HD Radios (I've used them all) are a little too flimsy, have a very limited display, no external antenna connectors, require an audio adapter to input to your stereo and tend to flop over when you're trying to change stations. If you're going to investigate HD Radio, splurge for at least the HDR-18.

Trouble in the Dashboard

HD Radio reception at home is mostly an afterthought. Virtually all cars sold today have HD Radio reception built-in to the car's "infotainment" system, though most consumers don't know they have it. That's because, in many cases, you have to hunt around in the menus to find it. But even in the car, HD Radio has competition. The original reason for HD Radio to begin with 20 years ago was to combat the Sirius/XM radio death star that threatened to change in-car listening forever with a subscription-based service that could be listened to from coast-to-coast no matter where you drove. It worked. Now, all cars come with Sirius/XM receivers and a three-month free trial subscription—even many used cars do as well.

The folks at Sirius/XM satellite radio have not been dozing off. They realize that satellite radio is also in transition. Though they have some 76 million paying customers, they see that internet streaming of radio stations is a concept that's rapidly approaching on the horizon. How soon will it get here? Nobody knows, but Sirius/XM is betting on satellite delivery lasting at least another 10 years because earlier in 2021 it placed orders for two replacement satellites, SXM-9 and SXM-10 from Maxar Technologies, which has been building satellites for Sirius/XM since the first ones launched in 2000 and second-generation satellites launched in 2009 and 2013. These kinds of communications satellites typically have a lifespan of 10-12 years, sometimes more.

Last year Sirius/XM launched its new satellite-streaming service called 360L that first appeared in certain 2021 BMW models. And now Ford has introduced Sirius/XM 360L in many of their SUVs. According to Ford, "All Sirius/

(Left) Sirius/XM 360L retrofit for your current vehicle ($150 plus subscription fee of $23/month). Kit includes vehicle dash mounting devices, magnetic mount satellite antenna with cable, power adapter and audio cable to plug into your audio system input. (Right) Sirius/XM 360L mounted and connected through the vehicle's 'infotainment' system. This system can be easily adapted for use in the home.(Courtesy: Sirius/XM)

XM and SYNC 4-equipped vehicles come with a three-month all-access trial subscription." In the case of vehicle models with built-in Wi-Fi connectivity, 360L integrates with the satellite receiver and the internet allowing the reception of over 350 Sirius/XM streaming channels including Pandora (which Sirius/XM bought several years ago) in addition to direct tuning of any radio station streaming online. That represents a huge threat to HD Radio's terrestrial radio reception. Of course, unlike over-the-air radio, this service is not free; introductory plans can be had for as low as $8.25/month for the first 12 months, after which the subscription jumps to $23/month.

If you don't have a Ford or BMW, what can you do? Well, Sirius/XM has a 360L vehicle kit for $150 that will integrate with your vehicle's audio system and, if you use a Mi-Fi, Jetpack or mobile hotspot, you can listen to any streaming station through your kit connected to your vehicle's audio system. According to the Sirius/XM website, your first three months are free after which you'll pay $23/month like everyone else, though a $15 activation fee might be applied.

There is no doubt that the future of traditional over-the-air radio is in a state of change. With AM stations migrating to FM, the proliferation of FM translators and boosters continuing to crowd the FM band; the continued adoption of auxiliary channels on local HD Radio stations and eventual streaming of any online radio station (or podcast for that matter) directly through your car's infotainment screen, there's a bright future ahead for commuters—assuming everyone eventually goes somewhere to work. However, HD Radio will likely be only a small slice of that quickly expanding pie. Consumers continue to show a healthy appetite to pay for what they want to hear and, so far, $23/month seems like a good price to them.

Sirius/XM has positioned itself well for this transition. Having snapped up music streaming service Pandora and integrated it into its online streaming plan (without extra charges to subscribers) as well as having invested in an interim future of satellite delivery and found ready acceptance by manufacturers in their dashboards (and more importantly made paying to listen to the radio a routine matter for consumers), Sirius/XM has a commanding heights position.

Xperi, the company behind HD Radio, also owns TiVo (the subscription TV digital recording platform), DTS (the digital audio company that licenses its audio to the cinema and electronics industry), and IMAX (the immersion theater service) among others. Its position is somewhat limited compared to Sirius/XM. Growth in HD Radio has not been particularly robust even before the pandemic. There are fewer AM stations experimenting with the digital transmission scheme than even just a few years ago

A great number of FM stations are not transmitting in the hybrid digital scheme (in fact, most FM stations in my area aren't even bothering to use the RDS data service that has been available on transmitters for decades). One reason for the HD Radio plateau is that stations are charged a fee to license the FCC-sanctioned Xperi digital broadcast technology and must buy new equipment capable of transmitting the hybrid HD FM signal and additional transmitting antennas as it requires separate transmitting elements

This comes at a time when many FM stations are incurring extra expenses because the tower space they rent is actually owned by a local TV station and the switch to ATSC 3.0 requires TV antenna retrofits and most stations have seen steep revenue declines since the start of the pandemic (though new and extensive gambling money may make up for that).

Xperi has just recently announced its own in-dash service called DTS AutoStage, which is designed to put OTA HD radio and internet connectivity front and center in new, high-end cars starting with some Mercedes S-Class models, but time may not be on their side.

TSM

Adventures in Radio Restoration

By Rich Post KB8TAD **kb8tad@gmail.com**

Eico ST-40: An Integrated Hi-Fi Stereo Amplifier from 1961

As electronics, Hi-Fi, and stereo entered the 1960s, nearly all audio was still based on vacuum tubes. There was also a push for compact but powerful amplifiers. The 6L6 series and its variations such as the 5881 and 7027 had been the powerful mainstay of audio output for a generation in the US. In Europe, the EL-37, EL-34, 6550, KT-88 and similar were the choices for high power. Those tubes were all large and/or tall.

The 7591

In April 1960, Westinghouse introduced a new tube intended for high power in a very compact size. It was the 7591. The new octal tube was the size of a 6V6GTA, a tube that was generally limited to class AB1 push-pull amplifiers that were rated at about 10-14 watts. By contrast, the new 7591 could do up to 28 watts RMS in cathode bias push-pull class AB1 and up to 45 watts with fixed bias, all at very low distortion levels. According to the Westinghouse data sheet for the 7591, "plate construction with special heavy material of high heat conductivity allowed the use of the tube at higher plate dissipation than was possible with conventional plates." The maximum plate dissipation rating was 19 watts, nearly twice that of the comparably sized 6V6GTA, and capable of about 3.3 watts for the screen grid dissipation, and at peaks of audio power, the screen grid was purposely designed to handle more dissipation.

ST-40 without top cage. (KB8TAD photo)

The screen was connected to two of the octal pins, likely to allow for more heat conduction. Those dissipation ratings met or exceeded the published maximums for the much larger 6L6GB. The 7591 was immediately adopted by a number of Hi-Fi stereo manufacturers including kit producers Heathkit and Eico.

Eico came out with the ST-40 and ST-70 kits in January of 1961. Each used four of the new tubes, made for Eico by the Westinghouse Electronic Tube Division as noted on the tubes. The ST-40, rated at 20 watts per channel was advertised as a Williamson-type cathode bias amp, and the ST-70 with fixed bias was rated at 35 watts per channel. The ST-40 kit was priced at $79.95 (about $740 in today's dollars) and the ST-70 was $94.95 (about $880). Both were also available as factory-built at $129.95 and $149.95 respectively. The $50 and $55 difference between kit and factory-built meant most were kit-built. ($50 in 1961 would be equivalent to about $460 today, a real incentive to build the kits!). The two Eico models have identical cabinets, chassis dimensions, control layouts and preamp sections but obviously somewhat different power and output transformers. Like most tube audio Hi-Fi of the past, the amps have acquired significant value to tube audio enthusiasts. While the new vacuum tube audio enthusiasm is decried by some, since much of the literature seems to be based on subjectivity of the sound, that renewed inter-

• **Integrated Stereo Amplifiers.** Two new integrated stereo amplifiers, the 70-watt ST70 and the 40-watt ST40 (shown), have been introduced by Eico. Both amplifiers are able to handle any stereo program source: FM-AM radio, FM-Multiplex, magnetic cartridge, ceramic or crystal cartridge, tape head, or preamplified tape. Controls include selector switch, tape monitor switch, separate level and balance controls, balance check switch, scratch and rumble filters, loudness-level switch, and individual feedback-type bass and treble tone controls for each channel. The ST70 has, in addition, a tape speed equalizer

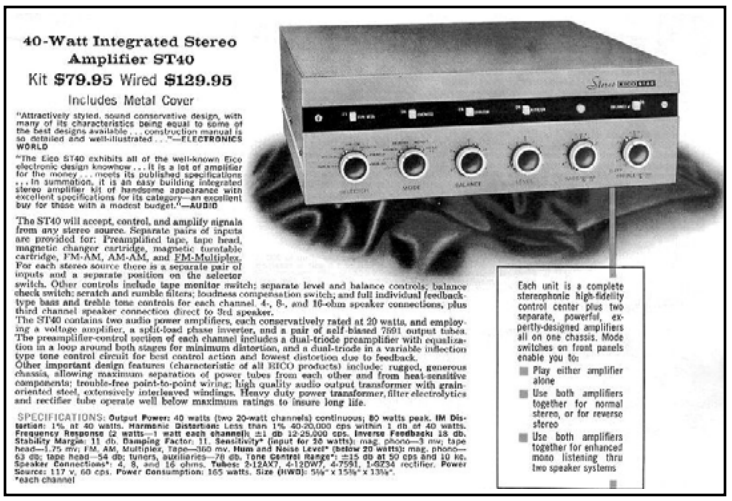
and a speaker phase reversal switch. Frequency response of the ST70 is stated as plus or minus ½ db from 10 to 50,000 cps and harmonic distortion is less than 1 per cent from 25 to 20,000 cps. The dual power amplifiers of the ST40 are Williamson-type circuits employing voltage amplifiers and split-load phase inverters driving the output stage. Frequency response of the ST40 is stated to be plus or minus ½ db from 12 to 25,000 cps; harmonic distortion is less than 1 per cent from 40 to 20,000 cps. The ST70 sells for $94.95 in kit form, $144.95 wired. The ST40 sells for $79.95 in kit form, $124.95 wired. All prices include metal cover. Eico Electronic Instrument Co., Inc., 33-00 Northern Blvd., L.I.C. 1, N.Y. **B-9**

Introducing the ST-40 and ST-70 in Audio magazine February 1961, page 78. (Author's collection)

est in vacuum tube audio has resulted in renewed manufacture of certain tube types, including the 7591.

Two Eicos

I ended up with a pair of ST-40 amps some time ago. It was time to revisit them. I knew that the iron was good in both having checked the power and output transformers after acquiring each one but had done little else with them thus far. I started on one that, as acquired, had a pair of replacement 7591 tubes made by RCA. The other pair of 7591 were still original Westinghouse Eico tubes. However, one of that pair showed white on the inside of the glass, indicating loss of vacuum. I lifted it out of the socket by the base, a good thing as the tube glass simply came off in one piece in the process, the heat having cracked the glass just inside the base. The rectifier tube was a 5U4GB, an incorrect substitute for the 5AR4/GZ-34. The GZ-34 is important to the design of these and other hi-fi amps because it has a delayed warm-up to match the warm-up times of the other tubes which keeps the immediate high voltage peak surge on the capacitor-input filters under control. The ST-40 amp uses 500-volt electrolytic sections for the first two filter stages for the B+ to the plates and the screen grids of the 7591 tubes. I can



40-Watt Integrated Stereo Amplifier ST40

Kit **$79.95** Wired **$129.95**

Includes Metal Cover

"Attractively styled, sound conservative design, with many of its characteristics being equal to some of the best designs available . . . construction manual is so detailed and well-illustrated . . ."—ELECTRONICS WORLD

"The Eico ST40 exhibits all of the well-known Eico electronic design knowhow . . . It is a lot of amplifier for the money . . . meets its published specifications . . . In summation, it is an easy building integrated stereo amplifier kit of handsome appearance with excellent specifications for its category . . . excellent buy for those with a modest budget."—AUDIO

"The ST40 will accept, control, and amplify signals from any stereo source. Separate pairs of inputs are provided for: Preamplified tape, tape head, magnetic changer cartridge, magnetic turntable cartridge, FM-AM, AM-AM, and FM-Multiplex. For each stereo source there is a separate pair of inputs and a separate position on the selector switch. Other controls include: tape monitor switch; separate level and balance controls; balance check switch; scratch and rumble filters; loudness compensated switch; and full individual feedback-type bass and treble tone controls for each channel. 4-, 8-, and 16-ohm speaker connections, plus third channel speaker connection direct to 8ed. speaker. The ST40 contains two audio power amplifiers, each conservatively rated at 20 watts, and employing a voltage amplifier, a split-load phase inverter, and a pair of self-biased 7591 output tubes. The preamplifier-control section of each channel includes a dual-triode preamplifier with equalization in a loop around both stages for minimum distortion, and a dual-triode in a variable inflection type tone control circuit for best control action and lowest distortion due to feedback. Other important design features (characteristic of all EICO products) include: rugged, generous chassis, allowing maximum separation of power tubes from each other and from heat-sensitive components; trouble-free point-to-point wiring; high quality audio output transformer with grain-oriented steel, extensively interleaved windings. Heavy duty power transformer, filter electrolytics and rectifier tube operate well below maximum ratings to insure long life.

SPECIFICATIONS: **Output Power:** 40 watts (two 20-watt channels) continuous; 80 watts peak. **IM Distortion:** 1% at 40 watts. **Harmonic Distortion:** Less than 1% 40-20,000 cps within 1 db of 40 watts. **Frequency Response** (2 watts—1 watt each channel): ±1 db 12-25,000 cps. **Inverse Feedback:** 18 db. **Stability Margin:** 11 db. **Damping Factor:** 11. **Sensitivity*** (input for 36 watts): mag. phono—3 mv; tape head—1.75 mv; FM, AM, Multiplex, Tape—360 mv. **Hum and Noise Level*** (below 20 watts): mag. phono—63 db; tape head—54 db; tuners, auxiliaries—70 db. **Tone Control Range*:** ±15 db at 50 cps and 10 kc. **Speaker Connections*:** 4, 8, and 16 ohms. **Tubes:** 2-12AX7, 4-12DW7, 4-7591, 1-5R54 rectifier. **Power Source:** 117 v, 60 cps. **Power Consumption:** 165 watts. **Size (HWD):** 5½" x 15⅜" x 13¾". *each channel

Each unit is a complete stereophonic high-fidelity control center plus two separate, powerful, expertly-designed amplifiers all on one chassis. Mode switches on front panels enable you to:

- Play either amplifier alone
- Use both amplifiers together for normal stereo, or for reverse stereo
- Use both amplifiers together for enhanced mono listening thru two speaker systems

Eico ST-40 catalog description. (Author's collections)

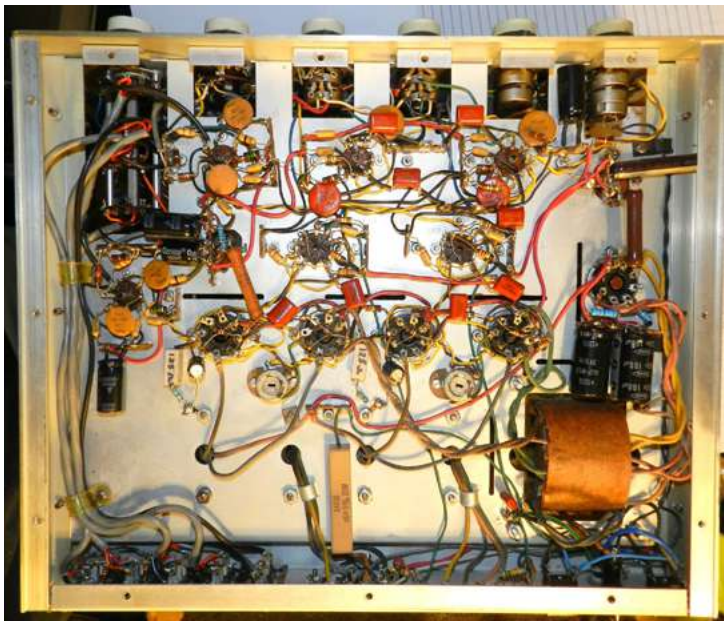
imagine that a 5U4GB would likely surge past that voltage before the output tubes had a chance to draw current. It also required 3 amps for its filament versus just 2 amps for the GZ-34. While doing preliminary cold checks, I cleaned all the controls with DeoxIT, especially those multi-pole slide switches that Eico used for high and low filters, loudness, and tape monitoring. I also thoroughly cleaned the knobs, case and chassis with waterless hand cleaner.

Capacitors

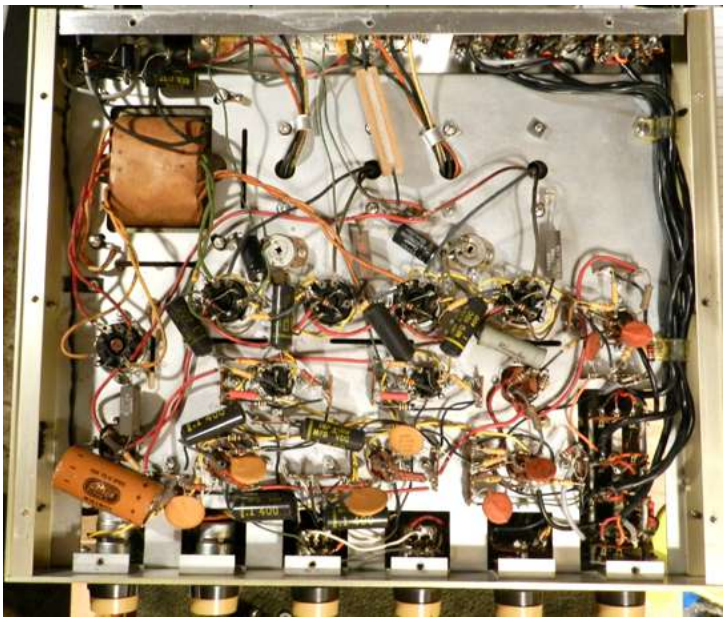
The tubular coupling capacitors were all the "Imp" version made by General Instruments. I had decided to replace all of them since in the past I have found some of the Imps to be very good but others not so. As it turned out, the Imp caps all passed the leakage test as new, but since they were only rated at 400 volts, I decided to replace them with inexpensive modern 630-volt film caps that would likely be more reliable for another generation. The amplifier had two multi-section aluminum electrolytics each of which I replaced with individual caps below the chassis using new terminal strips as necessary but leaving the original caps on the chassis for appearance. Given today's higher line voltage, I replaced the first 500-volt electrolytic section with a series pair of 450-volt caps with 300K-ohm one-watt equalizing resistors. That was perhaps a bit of overkill, but that stage would not be likely to fail. The second stage electrolytic section for the screen grids was replaced with a 500-volt cap as originally designed. The rest of the cap sections were rated at only 350 or 400 volts. All were replaced with 400- or 450-volt caps.

Resistors

The five-watt power resistor between the first and second filter stage surprised me by showing a resistance that had gone down, from 1800 ohms as marked to about 1630 ohms, thus needing to be replaced since the reduced resistance would increase the screen voltage. Normally, I expect power resistors to be either stable or to have gone up slightly in resistance. I found that the downstream resistors between



The first ST-40 chassis after restoration. (KB8TAD photo)



Starting on the second ST-40 chassis (before restoration). (KB-8TAD photo)

the electrolytic cap sections for the preamp stages had also gone up in value but not quite out of tolerance. Those were half-watt carbon resistors which I felt were a bit underrated. They were replaced with modern metal-film one-watt resistors. A modern one-watt metal-film resistor is about the same physical size as a half-watt carbon resistor and does not look out of place. I checked the other resistors but found nearly all of them to be well within tolerance. Most of the critical resistors in the split-load phase inverter stages were metal-film types. Keeping the plate and cathode resistors in each inverter stage as near as possible to the design values assures equal voltages at the input grids of the push-pull output stage.

Testing

With the vacuum loss in the one 7591, I checked all the remaining ones with my tube tester, looking for both quality and reasonably matched pairs. The remaining seven 7591 consisted of the two made by RCA, four Eico made by Westinghouse, and one that was labeled as H. H. Scott but without manufacturer identification. As it turned out, the Scott-labeled tube showed leakage between elements which I determined was between the cathode and the screen grid. That left 6 tubes. The two from RCA were a near match to each other although testing slightly weaker than the original Westinghouse Eico tubes which tested as new. For testing the reworked ST-40 chassis itself, I initially used my homebrew solid state plug-in rectifier made up of a tube base and two series pairs of 1N4007 diodes. That was to check my new electrolytics and connections right from the first volt, not needing a rectifier tube warm-up before conducting. After I confirmed that everything was working as it should at low voltages, I gradually increased the power to the chassis with my Variac and isolation transformer while observing the first stage B+ voltage and also the power draw. At 400 volts on the output tube plates, I checked the voltage across the 125-ohm cathode resistors which provide the self-bias for each push-pull stage. I had earlier replaced those resistors, having found them somewhat out of tolerance. However, the voltage drop of 14.8 volts across those resistors indicated a cathode current of about 118 mA with no signal, and the amp was not yet at its normal operating B+ which I estimated to be at or close to 450 volts on the plates.

Tube Data

I had downloaded the data for the 7591 and 7591A tubes from Sylvania, RCA, Westinghouse and Tung-Sol. The specification for pentode-connected class AB1 with cathode bias was 82 mA (Sylvania, Westinghouse and RCA) or 88 mA (Tung-Sol) for plate current plus 11.5 mA screen current at no signal and 94 mA plus 22 mA at maximum signal. The common cathode resistor for the push-pull pair as listed in all four sets of specifications was 200 ohms.

Modifications

I was already exceeding the no-signal specifications with the chassis not yet at the full B+. I don't normally second-guess the engineers who design equipment, but something had to change. I had no desire to destroy my remaining 7591 tubes by running them beyond the manufacturer's specifications and risking both those and any new tubes. If you have been following the numbers at this point, you might have noticed the discrepancy between the cathode resistors that Eico used, and the resistors recommended by the manufacturers' data sheets. The Eico resistors were 125 ohms while all the data sheets called for 200 ohms. That would be my first change, bringing the tube self-bias to what the manufacturers had called for. I added a 75-ohm two-watt

6GM5 and homebrew adapter. (KB8TAD photo)

6GM5 and 7591 size comparisons. (KB8TAD photo)

resistor in series with each of the two 125-ohm resistors. I also noted that the screen voltage indicated by the data sheets was about 50 volts less than the plate voltage at 450 volts which I assume was at zero signal. The 1800-ohm resistor between the first and second stage of B+ filtering had gone down in value to about 1630. While I had corrected that back to 1800, more needed to be done. I ended up changing that resistor to 2000 ohms.

While researching other amplifier schematics with similar cathode bias output stages, the Eico had the lowest value of cathode resistance of any given its high level of plate and screen voltages. The closest amplifier with the original 125-ohm cathode resistance value was the Arvin model 90P58 which used 120 ohms in that position. However, its plate voltage was only 320 with 300 on the screen. Therefore, I felt fully justified in making the changes. As a result of both modifications, the amplifier was much closer to the mark according to the tube data and less in danger of the tubes exceeding the allowable plate dissipation or incurring runaway grid emission.

After I was satisfied that everything was running as it should, I completed the one ST-40 by changing its power cord to a 3-wire safety grounded version.

The Other One

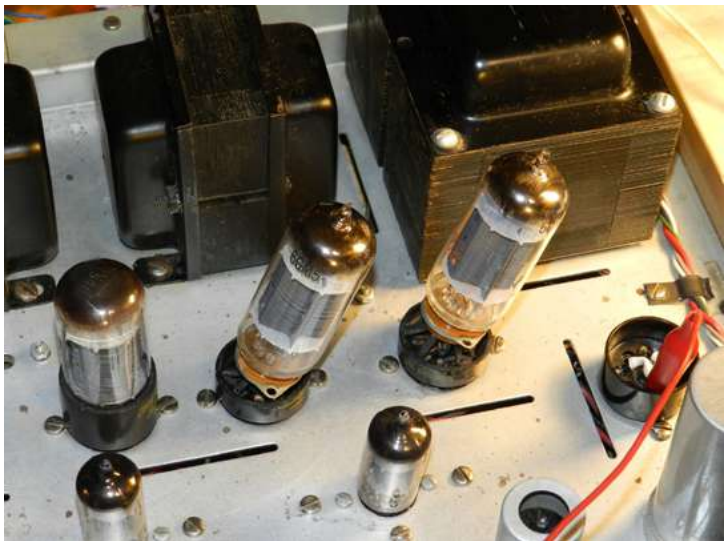
The second ST-40 was treated in similar fashion. It had less noticeable wear on its case, thus likely had been subjected to better treatment or less use. However, its 1800-ohm power resistor had also gone down in value to 1700 ohms, making for excess screen current. I replaced it and changed the cathode resistors just as I had in the first amp. The carbon resistors between the electrolytic filter stages for the preamp had increased in value just like those in the first chassis and were replaced. With the insights and experiences gained from the first chassis, the second chassis was finished more quickly.

New 7591 Tubes

I will have to obtain some new 7591 tubes to replace the missing ones and for use as spares. Newer 7591 tubes are made in Russia and China. The ones from Russia have the better reputation. The problem with building new tubes that are as good as the Westinghouse originals is that often an existing tube is re-based to roughly match the capabilities of the original. Because of that, replacements may not match the physical size of the originals or the specifications. The Westinghouse 7591 was a relatively unique tube designed very late in tube technology in the USA. Some of the metallurgy, design know-how and manufacturing tolerances may no longer be available. Given the age of the ones in the Eico ST-40 amps, I was impressed by how well they had stood up despite having endured some abuse. We'll have to see how good some of the current new ones are. While not cheap, the prices of the new ones at about $20 to $25 each are actually quite reasonable compared to what might be expected given simple inflation.

Possible Replacements

One option to the 7591 is the 6GM5 which has identical specifications but with a Noval (9-pin miniature) base. These were primarily used in television sets and can sometimes be found as New Old Stock. Adapters can be purchased on the Net, but the "impoverished experimenter" can easily make an adapter with a dead octal tube base and a 9-pin Noval socket. Another option requiring an adapter is the similar 7868 with a 9-pin Novar socket. (But don't use a Novar tube in a Noval socket. If it fits, it will stretch the pin diameters of the socket openings such that a Noval tube can no longer be used in the socket). Both options require some concern for clearance in an amplifier because the adapter adds height and may not fit all applications which was also true of some of the earlier overseas-manufactured 7591 tubes.



Testing 6GM5 tubes in home brew adapters as substitutes for 7591. (KB8TAD photo)

Looking through my tube stash, I noticed I had two new old stock 6GM5 made by GE. I checked for the needed clearance allowed for an adapter. Because of the height of the power transformer, I had about 7/8-inch clearance from the top of the 7591 to the top of the transformer and just about 3/16 inch beyond the transformer to the perforated metal case. That meant a maximum added height of about 1 inch. I re-used the base of the 7591 that had lost its vacuum and broke the H H Scott-labeled 7591 with inter-element leakage. In comparing the plate structure of the two dead tubes, I determined they were identical; thus, it is possible that H H Scott also contracted with Westinghouse for its tubes. As always when handling unknown metal, I thoroughly washed my hands afterwards. I reduced the height of the recycled tube bases by scoring them with a hack saw blade and cutting away the excess.

After completing the adapters, I successfully tested the adapted 6GM5 pair as if they were 7591 tubes with my TV-7 tube tester. That was mostly to check my work. However, I was a bit concerned about the height of the substitutes plus the adapters in the amplifier itself. The top nipple of the 6GM5 tubes came uncomfortably close to the perforated metal top cover of the ST-40. To prevent possibly breakage, I simply bent the adapters so that the tubes were at an angle and the glass and the nipples were below the height of the power transformer. To no surprise, the substitute 6GM5 tubes worked great. Since they were new but old stock, I could use them for comparison to any new tubes of current production.

That Loudness Switch

In looking on the Net about what others have said and done to the Eico ST-40 and its fixed bias brother, the ST-70, the biggest complaint is that of the loudness switch. What exactly is a "loudness" switch and why was it included in the integrated amps? A loudness setting corrects for the Fletcher-Munson equal loudness curve at reduced loudness. At low volumes, the ear senses less apparent loudness volume of the

Advertised as the 'Medalist Line' in High Fidelity Magazine January 1961 (Author's collection)

lower audio frequencies. Thus, the loudness setting inverts that apparent loss of bass frequencies at lower volumes. Eico engineers chose to reduce the higher frequencies to match the reduced loudness of the lower frequencies, the reverse of more modern approaches which typically boost the lower frequencies. It is possible to use the latter approach by rewiring the Eico loudness circuit. However, I decided to simply use the Eico approach of switching in the loudness setting and then cranking up the volume, achieving the same results. My only modifications were out of concern for tube life and today's higher voltages. Next month we'll take a look at the companion Eico ST-96 AM-FM tuner.

Resources:

Eico ST-40 Manuals
Construction manual courtesy Audio-Karma
http://akdatabase.com/AKview/displayimage.php?album=42&pos=33

Owner's manual courtesy Audio-Karma
http://akdatabase.com/AKview/displayimage.php?album=42&pos=34 TSM

Antenna Connections

By Robert Gulley K4PKM **ak3q@ak3q.com**

The "L" Antenna Option

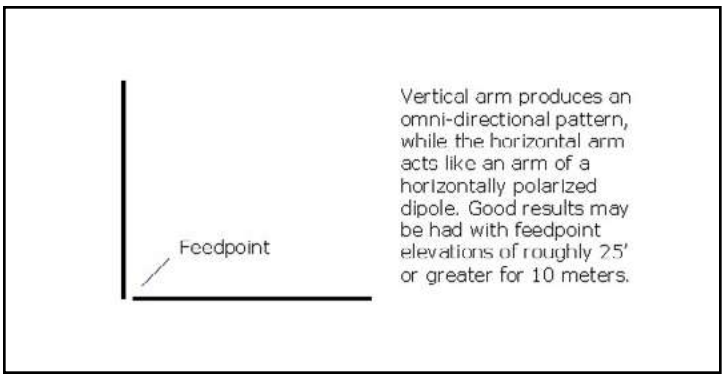
Sometimes simple solutions are the best, at least in terms of expense, deployment, and use. As every antenna is a compromise of some sort, there will always be antennas which have wider or narrower radiation patterns, propensity for DX work or close-in signals but not both, ease or complexity of assembly and setup, and so on. So, when you find an antenna that can check several of these boxes and still perform admirably, it is worth a look!

Working local and DX stations often presents issues when choosing among antennas, particularly when working the upper bands. Early in the history of amateur radio almost all antennas were horizontally polarized, so issues of cross-polarization did not factor into antenna decisions. All of this has changed now, with most local simplex and repeater work on higher bands being accomplished with vertical antennas, while DX work, even on higher frequency bands, is still primarily done with horizontal polarization. What to do?

For common bands such as 2, 6, and 10 meters, there will likely be a desire to operate both local and distant signals, using both FM and SSB (or digital modes). Unless one has a lot of antenna room (and permission to put up antennas at all), one antenna gets chosen at the expense of another. Using a horizontally polarized antenna to work locally often comes at a cost. Such cross-polarization of signals leads to a significant signal drop-off when dealing with line-of-sight FM repeater signals and local simplex SSB with vertical polarization.

Typically, these conflicting radiation patterns would require two types of antennas: one with horizontal polarization, and one with vertical polarization for each band desired. For any one of these bands (or for 4 meters), an "L" antenna may provide a good solution as it offers both horizontal and vertical polarization in one antenna. This means both local and DX stations may be worked with reasonable success.

I have talked with many hams who avoid working SSB or digital DX because they simply do not have the room for a second antenna, or do not wish to add the complication that a separate antenna and feedline would present. DX SSB (or FM) work is less common than local work, especially above 10 meters, and so a lot of folks go without. This is a shame because there are several times throughout the year when 10-meter and above propagation is possible (and now even more so with solar conditions improving), but contact opportunities are few. With newer modes like FT4 and FT8, this is even more frustrating because opportunities are even greater for working skip openings and DX signals which might be too weak to work on SSB, but decode nicely with WSJT-X.



"L" shaped dipole design. (Courtesy of the author)

In fact, the present propagation conditions for 10 meters have been slowly improving for the last few months and will continue at least for the foreseeable future. January also brings with it some 6-meter skip opportunities, and even 2 meters will be open for skip a bit this winter.

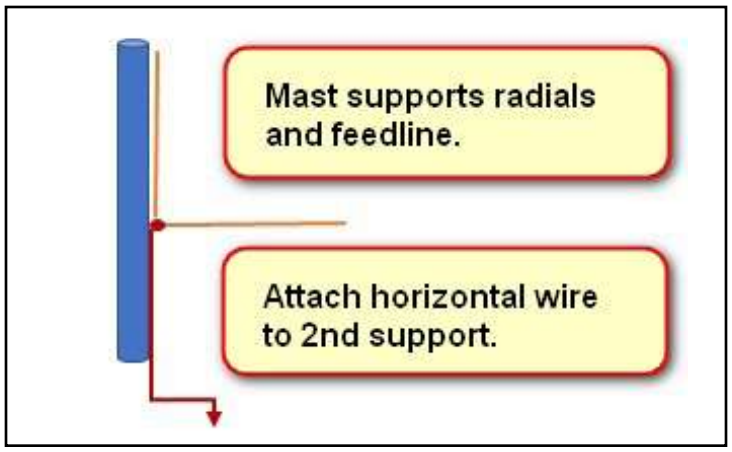
While an "L" antenna for 6 or 10 meters is not going to be a "DX-buster," at reasonable heights the antenna will take care of any local needs one may have, as well as exhibiting wide-band coverage for the digital/CW and SSB portions of the band. Good propagation conditions will mean the antenna is capable of good DX without sacrificing local simplex and repeater use. The same holds true for higher bands 2 meters and even 440 MHz.

Longer versions of the "L" antenna have been popular for shortwave broadcast reception, but not much is seen about them for the amateur radio operator. As for using them with lower bands, the characteristics will be similar, but the sizes, supports, and the feedpoint height can get a bit difficult below 20 meters. Besides, at 20 meters signals are hard-pressed to remain local, and so other antennas will no doubt be a better choice.

Since the horizontal portion of the antenna has a radiation pattern like that of a horizontal dipole, the direction of the horizontal arm becomes somewhat important, depending on the desired bi-directionality. Like a standard dipole, running the horizontal arm of the antenna in a north/south direction will produce an east/west lobe, and *vice versa*.

Design

The design of the "L" antenna could not be much simpler. It is, as the name implies, a dipole formed in the shape



Support design is simple and lends itself to permanent or portable use. (Courtesy of the author)

of an "L" and may be at 90° or a bit less. (Some folks refer to an end-fed antenna erected in the shape of an inverted "L" as an "L" or "Inverted-L" but this is not the same type of antenna—the "L" antenna we are visiting here is basically just like a dipole, but with one arm vertical.)

This antenna is an excellent small-space antenna as it is essentially ¼-wavelength in width for whatever band or bands it is being used on. A 10-meter dipole antenna, which would usually take up 16 feet, takes a little over 8 feet. That is a significant savings. Additionally, the small size means it might be able to be used easily in an attic or cathedral ceiling indoors—again a real possible solution for covenant restricted areas.

The "L" shape is its strength: the vertical arm gives vertical polarization and thus good for close-in work, while the horizontal arm of the antenna gives it its DX capability.

On the theory side of things, the "L" antenna is in some ways like a ground plane antenna in its vertical characteristics, but without the other three radials which cancel each other out. With a ground plane antenna, the four radials defeat any radiation from the radials by design. With the "L" antenna the single horizontal radial acts like an arm of a dipole and thus radiates.

As an added bonus, the feedpoint impedance is right around 50 Ohms as designed, making this antenna a natural for coax use. If the impedance is a little low, the horizontal leg may be lengthened a bit, while if it is high, the vertical element may be lengthened. Or the material diameter may be increased in the vertical section while using wire for the horizontal section. The wider vertical element will also increase bandwidth, just as with any vertical for the higher frequencies. Judicious placement of the center frequency will produce an SWR of well less than 2:1 coverage across 10 meters, meaning both CW and Phone segments will be easily available.

Aluminum tubing can easily be used for both the vertical element and the horizontal element (wire can be substituted for the horizontal element, but the vertical element should be wider than just wire). A tube diameter of around ½ inch will work fine and should produce full-band coverage easily. Wide tubes may be used, of course, but will not significantly increase bandwidth. A 1:1 balun should be used to prevent current from traveling down the coax into the shack.

As an alternative to aluminum tubing, one could use ladder line with each end soldered together to form "wide" wire, simulating a tube. As with any wire antenna, always have extra wire to allow trimming back. This can make an extremely inexpensive antenna which is also fairly stealthy!

One design aspect of which to be aware is the presence of local reflections. Since this antenna has both a horizontal component and a vertical component, care should be taken to avoid locations where there are conductive surfaces nearby. Reflections from local sources could interact with the expected radiation pattern and significantly reduce DX reception.

Another possible use for this antenna is as a portable antenna. Using a telescoping mast, for instance, one could secure the vertical element at the top of the mast, and then attach the feed point with strain relief to the middle of the mast, with the feedline traveling down the rest of the mast and then over to the radio. The horizontal part of the "L" could then be guyed to a post or tree as needed.

A Multi-Band Version

The "L" antenna design can also make a decent multi-band HF antenna if ladder line is used for the feedline along with a tuner. An additional advantage to this antenna design, besides simplicity and lessor expense, is the small amount of room required for the antenna. An antenna with a length of 60-66 feet makes up roughly a half-wavelength on 40 meters, which means this antenna would need about 30-33 feet in height and approximately the same length in width to work 40-10 meters.

Slightly longer and 80 meters would not be out of the question, but getting the height might be difficult, and of course, 20-10 meters would only require about 16 feet in height. As always, the higher the feedpoint the better, but even 8-10 feet can be used.

Most likely the antenna would need to be made out of wire, and so the above-mentioned method of "fattening" a wire with ladder line would be the most cost-effective. More difficult might be securing the vertical portion of the antenna. If a strong support with a pulley system is available for securing the top of the vertical element with a guy wire, this might be a good option. Without this, one would need to find a means of securing the wire to prevent sagging and excessive sway in the wind. Bamboo or fiberglass masts could be used as a support, and the antenna wire could then be taped or secured with tie-wraps along the vertical support.

The radiation pattern of these antennas is consistent with the horizontal pattern of a dipole, and the vertical section has good take-off angles and a bit of directivity in the direction of the horizontal wire. This is likely the result of the interaction of the horizontal wire and ground.

TSM

Amateur Radio Insights

By Kirk Kleinschmidt NT0Z **nt0z@stealthamateur.com**

The Bad Weather Blues

Last year—2021 that is—was groundbreaking and challenging on many fronts. Not to be outdone by pandemics and political upheaval, the weather in Southeastern Minnesota went out with a similarly big bang. On December 15, Minnesota experienced a whopping 16 tornadoes, most of which were in a 50-mile ring around my QTH! And that wasn't even the most bizarre part of the unexpected, unprecedented storm outbreak. The fact is, prior to December 15, 2021, Minnesota has never recorded a single tornado in the month of December! Not even close. The state is definitely in the upper reaches of Tornado Alley, but prior to this month we've never had "snow-nadoes!"

A giant weather front that stretched from Texas to Canada was rapidly traveling Eastward across the country at speeds of 60 to 70 miles an hour. Because the storm itself was traveling that fast, we had to expect wind gusts of at least that speed. Accordingly, the highest peak gusts recorded in Rochester topped out at 78 miles an hour, but we had steady, straight-line winds in the 35 to 45 MPH range for several hours. Parts of Colorado saw Peak gusts of 107 miles an hour! After the fact, the Weather Service declared the event a derecho, much like the one that did massive damage in Iowa, Illinois, and Wisconsin last year.

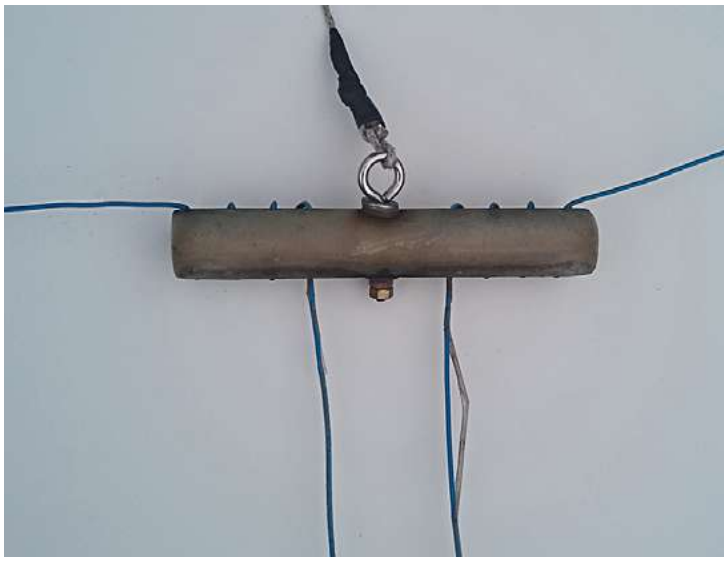
Eerily, this wasn't a storm that popped up on short notice, as we could see it rapidly progressing across the country on the Weather Channel, state by state. In addition to worrying about property, life, and limb, I was worried about my antennas! My NA4RR hexagonal beam, appropriately nicknamed the Death Ray, sits atop a short 20-foot tower that's bolted to the side of my carport and is subject to being unceremoniously torn off the building and blown down the street. My 101-foot doublet, which had been up for five years, was attached to a different (unfortunately unclimbable) tower at a height of 35 feet, with each leg supported in its respective tree by a length of string trimmer line. The inverted-L verticals in the back yard are similarly supported by a pilot line made from string trimmer line that runs between two strategically placed treetops.

Minnesota is a breezy place, always placing near the top of the "best wind power locations list," so we routinely get 30-MPH straight line winds for hours at a time, but

An unprecedented winter derecho brought down my venerable 101-foot doublet. The wire elements didn't break, nor did the string trimmer element support lines. What broke, pictured here, was the yard arm. made from varnish-coated closet rod, the other half of which is still U-bolted to the top of the tower. Takeaway? Paint wood—don't varnish it. See text. (NT0Z photo)

winds in the 50-75 MPH range can easily destroy antennas, towers, shingles, rooftops, sheds, etc. Although I sometimes complain about my QTH being in a slight depression, the fact that I have a 10- or 15-foot ridge about 300 feet from my property, in the direction of the strong winds, probably saved us from more severe damage. (That, and plenty of trees between the ridge and the house.) In the end, although multiple locations only several miles away suffered tornadoes, snapped off power poles, power outages, and other typical storm injustices, most of our damage was to tree limbs and, of course, antennas! We didn't even lose power.

In high winds, treetops can whip to and fro rather severely, which can be hard on wire elements and support ropes. I wasn't worried about the wire elements themselves because they're made from 12-gauge THHN house wiring, which is very hard to break. The string trimmer line that held the ends up had never broken before, so with a 20-plus-year history of success I didn't really think that the support lines would break. In the end, the standoff arm (yardarm?), made from a three-foot length of varnished closet rod that stands



After five years of exposure to Minnesota's harsh climate, my W7FG-style "continuous element and feed line" center insulator was doing just fine before the antenna's support arm failed. I will use this design in the future. See text. (NT0Z photo)

Five years ago, shiny and new: My version of the W7FG doublet uses 1.25-inch silicone "milk" hose with a varnished oak dowel inside for added strength. The wire, laced up just like "downtown," is THHN house wire, which is a bit beefier than my usual antenna wire. My antenna also needed to hang from a yard arm and be pulled up with a Dacron rope, so I added the eyebolt. See text. (NT0Z photo.)

the doublet's center insulator off from the top of the tower, sawed back and forth with such gusto that it snapped off!

And when it did, the weight of the ladder line pulled the center of the doublet down so that it was only supported at the ends. This wouldn't have been a big deal save for the fact that one leg, which runs somewhat adjacent to the hexagonal beam, had whipped back and forth in all of the mayhem and was now on top of the hex beam and sort of tangled in the beam's wire elements and support cords. Not good!

Because it's now Actual Winter here—with no sleigh rides to grandma's house unless grandma is running the Iditarod—and because I still haven't fully recovered from carpal tunnel surgery, I didn't think it was practical to try to tilt the tower down to untangle the mess. Fixing antennas in gale force winds with near-zero wind chills isn't at all fun, nor is it always successful.

I examined the snarl through a set of binoculars and I determined that the only way to save the expensive (relatively) hexagonal beam was to sacrifice the inexpensive (definitely) doublet, so I cut the antenna wire in a strategic place—ouch!—and I was relieved to see that the end of the now-cut antenna wire slithered nicely out of the hexagonal beam's infrastructure and fell to the ground without damaging the Death Ray in any way.

It was sort of like sacrificing one child to save another (sorry, Billy!), but saving the directional beam had to take priority. There were two additional factors that went into the decision. First after five years of being outside in Minnesota weather, with temperatures ranging from 20 below to 100 above, the doublet was already due some TLC. Second, the fact that the doublet ran in close proximity to the hexagonal beam was an unfortunate oversight back in the day. I had always wondered whether that leg of the dipole would interfere with the Death Ray's pattern or with the antenna's SWR profile, and now, sacrifice aside, I'd get the opportunity to make that comparison!

As detailed in this column several years ago, the 101-foot doublet was constructed using a technique that I had never used before (but will definitely use again). The antenna elements and the wires that made up the integral ladder line feed we're not cut or soldered in any way but were continuous from the dipole end insulators to the point where the ladder line entered the basement shack. This worked very well and eliminated a couple of potential failure points. It was a challenge to construct, but not a big deal if it's done outside of a Minnesota winter.

Moving into the side yard after stepping through the single row of pine trees that screens the side yard from the main yard, I saw that—yep—the inverted-Ls we're also on the ground! The treetops that support the antenna's pilot line are extremely whippy in high winds, which caused my first-ever string trimmer line failure after more than 20 years of using and abusing the hefty mono-filament lines.

Righting that wrong was pretty straightforward because the "right" string trimmer line had failed—the short one that went over the top of the contained, 40-foot pine tree instead of the sprawling, taller willow tree that held up the far end of the pilot line. Still, in dreadful, windy, near-Arctic conditions I had to use my slingshot to shoot a length of Kevlar fishing line over the tree in just the right place.

The rubber surgical tubing that provides the oomph to the slingshot was nearing the end of its life and didn't have nearly the power that it had when it was new. I was shooting a big lead fishing sinker over the tree and, for a variety of reasons, including the nasty weather and low temperatures, I was concerned that the surgical tubing might break. Having experienced this as a kid, without losing an eye, I knew that I did not want to experience it as an adult!

Connected (l-r), the antenna wire, PVC pipe end insulator, "trucker-grade bungee," and string trimmer support line. After five long years, the wire and the trimmer line didn't break, nor did the mega-bungee, which got fuzzy but remained sturdy. See text. (NT0Z photo)

To properly loft the line I had to draw the pocket of the slingshot back farther than I was comfortable with, but thankfully, the procedure required only a single shot to properly place the line. I tied a fresh piece of string trimmer line to the fishing line and reeled it back over the treetop. And after attaching the new support line to the business end of the inverted L's main support cord/insulator, I adjusted the support lines on each end for proper left-to-right positioning (after warming up indoors), and that antenna was back in action, good as new.

So, as 2022 starts out I'm down an antenna, but it could have been much worse. My house and property seem unscathed and, because I moved my car close to the house to be sheltered from the storm, a big birch limb fell onto the empty driveway instead of onto my car, which I normally park there.

Postmortem, Better Preparation

After taking a look at the parts of the fallen doublet I was mostly pleased by what I saw. The 12-gauge THHN house wiring held up well, as did the novel center insulator and continuous element / feed line construction. Even the industrial duty bungee cords held up well. Although they did get a bit fuzzy, they didn't break, even after five years of continuous duty in the harsh local climate.

During the festivities, despite the fact that I had two TVs playing, one tuned to the Weather Channel, the other

The doublet's "integral" ladder line feeder is made from THHN house wire, tubular electric fence insulators, and UV-stabilized zip ties. This design is rugged, weathers perfectly, and works flawlessly. I will use it again as necessary. (NT0Z photo)

showing a local TV station's emergency weather coverage, plus a weather alert radio that was alarming so often it sounded like a kids' sound effects machine, I was concerned about staying connected if the power went out in a big way. So, I grabbed my trusty Baofeng UV-5R, which I had previously programmed (and tested) with two local repeaters.

I tuned between the two machines, accidentally kerchunking the first repeater. Oops! Because of the kerchunk I figured the machine could hear me, but I was unable to raise a response from anyone who might have been using it. The same went for the other repeater (minus the kerchunk). I called and asked for a radio check but found no takers.

I was expecting a fair amount of chatter considering that calamity was unfolding in every direction. I was quite surprised to have heard nothing—not even a peep—on either repeater. Now, my familiarity with local repeaters is less than limited, so it's possible that all activity, if there was any, took place on the "D-Star Machine," which my radio can't access. It's something I obviously need to address, but still, considering that there are several hundred hams listed in the FCC database within the city limits, the "crickets chirping" silence was still surprising.

The mighty Baofeng's rubber ducky antenna is also not ideal for hitting any local repeater. I have done it in the

Is this a good look for my "emergency" CB radio? Not so much. It doesn't even have an antenna, although I'm sure I could have connected it to the Death Ray or the inverted-L. But, yeah...room for emergency improvement! See text. (NT0Z photo)

recent past by stepping outside onto the deck, but that wasn't really an option with said Arctic derecho. I obviously need a 2/440 outdoor vertical and, perhaps, a more powerful radio. That would take care of that.

I also didn't check local CB activity because my SSB CB—a gift that I have yet to use—is sitting disconnected on the shelf, which isn't an ideal place for it! I haven't used a CB radio for 45 years but still…I have my marching orders to improve my local preparedness.

Build for Maximum Hell

Note to readers and to self: When building outdoor antennas and antenna structures, build for maximum hell! For many recent years most of my antennas were inside attics, where I could get away with building them from tinfoil and bobby pins, as there were no physical or weather effects at all. After the move to my present QTH, this doublet was my initial experiment with building antennas to withstand harsh environmental conditions. The wires didn't break (12-gauge wire instead of the usual 18), the industrial duty bungee cords didn't break (trucking industry monsters instead of the usual junky ones), but the support stand-off did. I really wasn't expecting that!

Instead of using low-grade polyethylene "canoe anchor" rope to raise the antenna up the tower, I used Dacron rope, which is known for its ability to survive harsh UV and weather conditions, which it did. I even used a marine grade pulley, which also did not fail.

I suspect that the stand-off arm failed because I sprayed it with several coats of polyurethane varnish. In examining other outdoor projects over recent years I've noticed that this varnish does not protect wood for more than a few months (including the wooden booms of cherished WA5VJB Cheap

Now that the doublet has fallen, the Death Ray stands alone! Because of its temporary location, a 51-foot-long dipole element used to run above the hexagonal beam with a 6-10 foot separation. Will this clean up the slight SWR issue on 12 meters? Will it clean up the pattern? Fingers crossed, I'll let you know! (NT0Z photo)

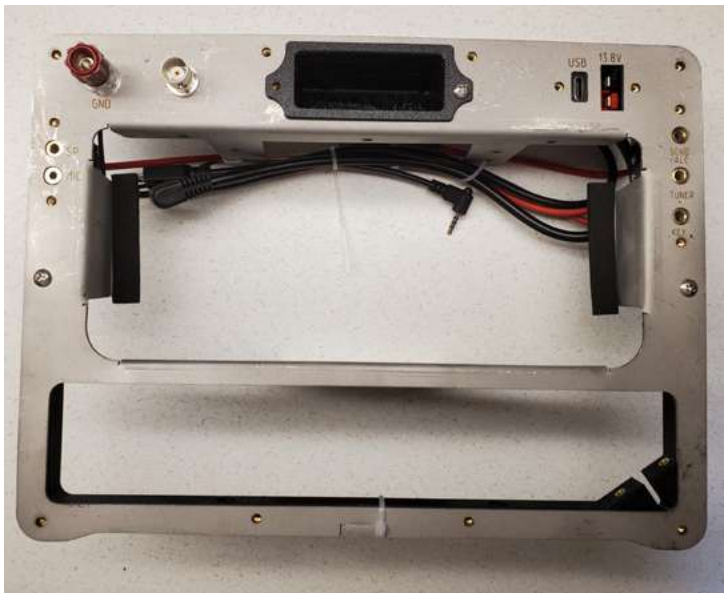
Yagis). What does protect wood through thick and thin is a coating or two of high-quality exterior house paint. My next doublet support arm, if it's not made from solid steel, will enjoy a nice coating of brown exterior house paint. As a result, it will also match the trim of my house, in case that matters!

TSM

VHF and Above

By Joe Lynch N6CL **n6cl@vhfandabove.com**

IC 705 After Market Item: A Go Box



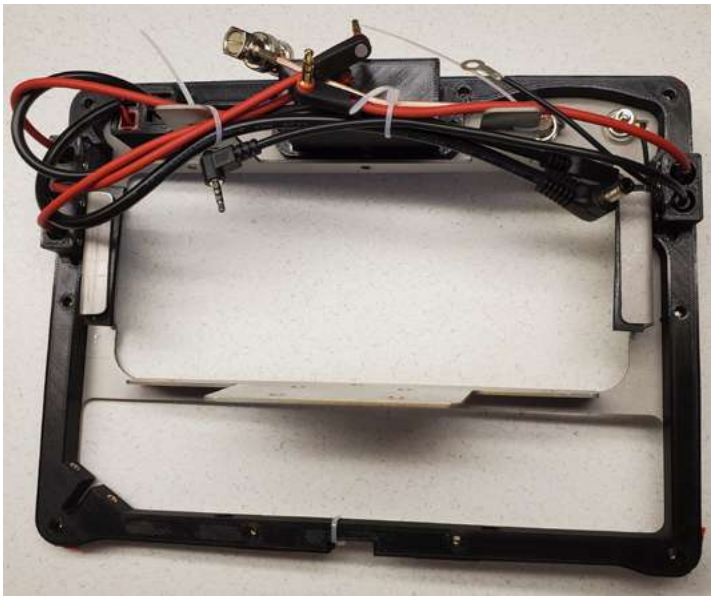


Photo 1 (Left) Top view of mounting plate. Photo 2 (Right) Bottom view of mounting plate. (N6CL photos)

As the photos illustrate, my latest ICOM IC 705 after market item is this compact go box. Called the Outdoor Waterproof Radio Box Carrying Cage for the ICOM IC-705, it is made in China, it is available from several vendors on eBay for around $200, which includes tax and shipping. Measuring 10.5-inches long by 8-inches wide by 6-inches high, the box houses a steel plate that has a cutout hole for the transceiver and another cutout hole for accessories (see photo 1 above left).

Located along the top edge of the plate are, from left to right, a ground banana plug, a BNC female connector, a USB connector, and an Anderson DC connector. The mic and speaker jacks are located down the left side of the plate.

The ALC, tuner and key jacks are located down the right side of the plate. A wiring harness of sorts is located under the plate (see photo 2 above right). It includes all the cabling you'll need to connect the IC-705 to the plate. I noted that the ground wire is very thin, so I will replace it a larger size wire. Also, I would have liked to have an inline female BNC connector that would mount to the underside of the plate.

The IC-705 mounts snugly into its hole (see photo 3 next page). It is held above the plate by slightly cushioned L-bend extensions on both narrow sides of the cutout hole.

All put together and installed, the go box makes for a neat, light weight piece of carry-on luggage that is no larger than a woman's makeup kit (see photo 4 next page).

My only other caveat is that when the transceiver is installed, it is somewhat permanent. If you want to grab and go with it in your rucksack, you must disconnect all the connections as you are lifting it out of the box. I have the PEOVI Camera Mounts IC-705 Carrying Cage. The side handles would make it much easier to lift out the transceiver from the hole (see photo 5 next page). However, there is a momentary conflict between the cage and the plate that is caused by the installation of the camera shoe plate onto the cage (see photo 6 next page). Perhaps I will have a solution for my dilemma in a future column.

ARISS SSTV Event Scheduled to begin December 26

The following is from ARISS.org: An ARISS Slow Scan TV (SSTV) event is scheduled from the International Space Station (ISS). The event is slated to begin on December 26 at 18:25 UTC for setup and operation and continue until December 31 ending at 17:05 UTC. Dates and times subject to change due to ISS operational adjustments.

Images will be downlinked at 145.8 MHz +/- 3 kHz for Doppler shift and the expected SSTV mode of operation is PD 120. The main theme will be for this event will be lunar exploration. Radio enthusiasts participating in the event can post and view images on the ARISS SSTV gallery page.

Photo 3 (Left) My IC-705 installed. Photo 4 (Right) The go box ready to go. (N6CL photos)

After your image is posted at the gallery, you can acquire a special award by linking to **https://ariss.pzk.org.pl/sstv**/ and follow directions for submitting a digital copy of your received image.

The Quadrantids or Quads Meteor Shower

The first meteor shower of the year is the Quadrantids or Quads meteor shower. It derives its name from the constellation Quadrans Muralis, or Mural Quadrant, which no longer exists. It was named by French astronomer Jerome Lalande, who created the constellation in 1795. It was located between the constellations Boötes the Herdsman and Draco the Dragon.

Italian astronomer Antonio Brucalassi first observed the Quads meteor shower in January 1825. Activity for the shower begins around December 26, culminating with its short peak usually between January 2 and 3, and ends around January 16. This year's peak will occur during the night (somewhere around 0200 UTC) of January 2-3. The International Meteor Organization predicts the peak to be on January 3 at 2040 UTC.

On average, the peak activity should last for around eight hours. Historically, the zenith hourly rate (ZHR) is over 100. However, the result of the 2014 shower indicated a ZHR of 315. Visually, its smaller meteors will be easy to see because there is no moon to interfere with visibility. The minor shower, the December Leonis Minorids, will be active during the same time as the Quads. Its ZHR is 5. For more information on these and other meteor showers see: **https://earthsky.org/astronomy-essentials/earthskys-meteor-shower-guide**.

Current Contest

The annual ARRL January VHF contest will take place between 1900 UTC on January 15 and 0359 UTC on January 17. The object of the contest is for U.S. and its possessions and Canada to work the world. . Complete rules are located here: **http://www.arrl.org/january-vhf**.

TSM

Photo 5 (Left) Side view of the PEOVI Camera Mount cage. Photo 6 (Right) Bottom view of the PEOVI Camera Mount cage. Photo courtesy of PEOVI Camera Mounts. (N6CL photos)