The Spectrum Monitor

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

Volume 1 Number 4 April 2014

WWII "Morale Radio"

C-Band TV DX on a 6-foot Dish

TSM Reviews: Uniden BC536 HP Mobile Scanner

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Writers for *The Spectrum Monitor* welcome your comments. To contact any of the writers whose material you find in this issue, use the email address found with each column or feature article. Most writers also write regularly for their own blogs, the locations of which are found in the above "TSM Writers' Group" section of the magazine.

Cover Story:
"Morale Radio" Navy 6000BAC heavily shielded shipboard shortwave receiver (Courtesy: Rich Post); "C-band TV DX on a 6-Foot Dish (Courtesy: Mario Filippi); "Uniden BC536HP Scanner" (Courtesy: Uniden America).

The Spectrum Monitor is published monthly by Ken Reitz KS4ZR at 1403 Holland Creek Road, Louisa, Virginia 23093. Regular subscriptions to *The Spectrum Monitor* are $24 for one year (12 issues) and are available from www.thespectrummonitor.com. If you are not satisfied with your purchase you may receive a refund for the remaining issues on your subscription by contacting the publisher: ks4zr1@gmail.com. Your refund will be made in the manner in which the purchase was made. If you would like to write for *The Spectrum Monitor* please send an email to editor@thespectrummonitor.com and ask for our writer's guidelines. *The Spectrum Monitor* makes every effort to ensure that the information it publishes is accurate. It cannot be held liable for the contents. The reader assumes all risk in performing modifications or construction projects published in *The Spectrum Monitor*. Opinions and conclusions expressed in *The Spectrum Monitor* are not necessarily those of the publisher.

TSM

Dear TSM:

Send your comments to editor@thespectrummonitor.com
The Spectrum Monitor reserves the right to edit comments from readers for clarity and space availability.
Anonymous comments will not be published.

Comments, Advice, Kudos and Questions from Readers

I'm loving the magazine. It's a great read. It's gotten me interested again in radio for the first time in years! – Zach Rutledge

I feel better now after feeling the vacuum when *Monitoring Times* abruptly vanished back in December. I was a subscriber for almost 15 years. I wish you success with *TSM* and keep up the good work. – Nisar Ahmed

Borrowing on Kindle

Big thanks for the info on Teak Publishing in the March issue. I've had an Amazon Prime Kindle membership (thanks to my XYL, Joan KB0YRX) for two years and hardly used it. Nice to know I can 'borrow' Larry Van Horn's books and read them, starting in with "North American Enroute Aviation Guide!" – Wayne Heinen N0POH

Editor's note: As reported in many news outlets, on March 13 Amazon raised the cost of its Prime account from $75 to $99 per year, citing rising costs in fuel and transportation.

DIY Drones, the Safe Way

I enjoyed the "Do-it-Yourself Drones" article (*TSM* March, 2014 p.28). However, I feel the popular use of the word *drone* paints the hobby in a negative light. The word itself seems to infer that those hobbyists that fly such aircraft are spying, or otherwise invading people's privacy by photographing or recording video.

You see, In addition to SWLing, another hobby of mine is flying radio control (R/C) model aircraft. I belong to the Academy of Model Aeronautics (AMA), and am a member of a local flying club. In fact, you can't join a flying club without first being an AMA member, because the AMA provides liability insurance (for less than $60 per year) and the flying club provides a place to fly and do so with others, which is a lot of fun.

Every time I see the word *drone* it is accompanied by a photo of a multi-rotor 'copter (a name I prefer along with quadcopter/rotor, hexacopter, etc.). Another thing that I see is that these aircraft are sometimes flown by hobbyists in areas that can compromise safety, such as over populated areas, homes, people, traffic etc.

I ask anyone flying such craft to please respect privacy, property and fly safely. Don't give the hobby a bad name; join a flying club if you haven't done so. They provide a safe place to fly and many flying clubs have events called "fun flys," often open to the public to attend and, using a '*drone'* to shoot aerial photos or video at such an event, then post them on the club's website. That could be more satisfying than flying over your neighborhood and shooting pictures of people's rooftops. Anyone interested in R/C flying should check out the AMA website at **http://www.modelaircraft.org.** Great article and great magazine!" – Wayne Wlocka

Air Shows and Radios

Since 2006 the Air Force has prohibited radio equipment of any kind at air shows. No scanners, ham transceivers, no FRS, nothing with an antenna. Cell phones are permitted, but they usually take a quick look to make certain it is just a cell phone. No cameras either, but most people use their smartphones for photos. The reason for all this is 9/11. It does no good to show your ham license, the policy is clear, no radios. Media with local credentials are allowed cameras.

Base police/security are very serious. No backpacks or other bags, no coolers, beverages or food are allowed; even strollers are searched. I found these policies to be standard at Travis AFB, Fairchild and Mountain Home. I can't speak for the others since I only attend these three.

The work around is to go early to view the flight line planes, etc., and then head for the parking lot to listen to the air traffic. Or one can just park near the runways and listen the whole time. Don't expect to listen to any base radio traffic because bases now use Project 25 UHF systems and everything is encrypted. This includes some of the logistical traffic for the show as they are using radios normally used by base personnel. Some of the air traffic is on their 225-380 MHz allocations; more and more of air traffic is encrypted. For me, all this really lessens the air show experience. The article writers might have explained all this, as those not informed will appear at the entrance gate and get a rude shock. In Spokane, the pre-show publicity is very clear on the restrictions. The attendance has probably been cut in half, but that is OK because here the show attracts upwards of fifty thousand people." – Gary Webbenhurst AB7NI

Author Kevin Burke responds:

"At some shows we have met with some difficulty. The backpack restriction personally affects me because, even though I have a media pass for some shows, I carry my stuff with a camera bag that is a backpack. Once there was a show in Massachusetts that posted no scanners on their website, so I could walk 3/4 of a mile to the check point and hope to get through, knowing that I'd be going back to car to put the scanner away if denied, or just not take it in. I'm too lazy to walk that much, so I left it in car. I can't understand why a digital radio-filled base would not allow scanners; it makes no sense.

"I have had camera bags and chairs searched, and I've happily submitted my stuff for search, as these people are just doing their jobs. Usually I don't have the scanner out on display, and when found, I would be asked, 'Is this a radio?' I quickly answer that it just receives, 'I can hear the Thunderbird (or Blue Angel) pilots.'"

Author Brian Topolski responds:

"I know firsthand that not all adventures in today's post-9/11 world turn out to be pleasant ones. I too, have been turned away at an air show security checkpoint. Here's what happened: With wagon and scanners in tow, I approached the main gate of a military controlled air show. I had a sense that my plan for a good

day was about to go wrong. I could see security personnel watching me closely, and I still had 100 feet to go before the entrance. I never made it.

"They came to me and stopped me before I arrived. To them, I was a perceived threat and they followed their protocol by intercepting me in order to investigate. Had I been an actual threat, they did the right thing by not letting me continue any further. Now that's great security! It also was the end of my chance to be on the flight line with my rig. But I didn't let that ruin my day. After being scrutinized by base security, they realized that I was just an innocent hobbyist and not a threat. But still they had rules to be adhered to: 'no scanners allowed on the flight line.'

"After I got over that little speed bump, I headed back to the parking lot and set up my equipment in a tailgate style fashion off the back of my truck; complete with American/POW and Thunderbird flags raised, I was clearly visible. After all, I had nothing to hide. And the funny thing was, the same security police that turned me away at the gate, later piled into their military Humvee and visited with me during the show. They were all real nice and we had some laughs. They were also fascinated with being able to both watch and listen to the aircraft radio traffic as they performed their demos. We all hung out during the Thunderbirds and that brought us to the end of what turned out to be a very nice day! They thanked me for sharing my radio hobby with them, and I thanked them for not arresting me.

"So, before attending, it's wise to check what's allowed and not allowed on the flight line at any air show. Each one is different. I checked online and unfortunately, both Travis and Mountain Home AFB state that scanners and ham radios are not permitted. Sorry. It's a real downer for an otherwise innocent and enjoyable hobby. Thankfully NASCAR hasn't come to that."

Missing Air Show Schedules

The air show schedule for the Canadian Snowbirds was made available after the publication date for the March issue. It's presented below courtesy of the Royal Canadian Air Force:

May 17-18 Cape Girardeau, MO
May 24-25 Columbia, MO
May 31-June 1 Ft. McMurray, AB
June 4 Portage La Prairie, MB
June 14-15 London, ON
June 18 La Baie, QC
June 21-22 Stephenville, NL
June 24 St. Georges de Beauce, QC
June 28-29 Waterloo, ON
July 1 Ottawa, ON
July 4 Moose Jaw, SK
July 12 Yellowknife, NT
July 13 Peace River, AB
July 19 Cold Lake, AB
July 26-27 Whitecourt, AB
July 30 Kelowna, BC
August 2-3 Camrose, AB
August 6 Whiterock, BC
August 9-10 Abbotsford, BC
August 16-17 Bromont, QC
August 20 Greenwood NS
August 24 Moncton, NB
August 27 Brantford, ON
August 30 – Sept 1 Toronto, ON
Sept 2 Whitby, ON
Sept 3 Stratford, ON
Sept 6 Quebec City, QC
Sept 10 Port Stanley, ON
Sept 20-21 Hillsboro, OR
Sept 27-28 Redding, CA
Oct 3 Moose Jaw SK (Year-end Show)

2014 Air Combat Command F-22 and Heritage Flight 2014 Schedule was made available after the March publication date and is presented here courtesy of the Air Combat Command.

April 5-6 Lakeland, FL Air Show
April 12 Louisville, KY Air Show
April 26-27 Barksdale AFB, LA Open House
May 3-4 Chino, CA Air Show
May 10 Holloman AFB, NM Air Show
May 17-18 North Kingstown, RI Open House
May 30 June 1 Virginia Beach, VA Air Show
July 5-6 Traverse City, MI Air Show
July 19-20 Offutt AFB, NE Open House
July 26-27 Elmendorf-Richardson AK Open House
August 9-10 Davenport, IA Air Show
August 15-17 Chicago, IL Air Show
August 23-24 Duluth, MN Air Show
September 6-7 Sacramento, CA Air Show
September 10-14 Reno, NV Air Show
September 20-21 Hillsboro, OR Air Show
September 27-28 Pearl Harbor-Hickam, HI Open House
October 25-26 NAS Jacksonville, FL Open House
November 1-2 Stuart, FL Air Show
November 8 Nellis AFB, NV

Wildlife Tracking Frequencies

Does anyone know the frequency of the wild life tracking radios? There was a man with a radio and a Yagi beam in my neighborhood. I asked him the frequency and he had no idea. I wrote to a prominent wildlife magazine and got a nonsensical reply about usage but it did not contain the frequency range. – Ralph Craig AJ8R

According the U.S. Geological Survey, "The commonest frequency ranges used for VHF tracking are 148-152 MHz, 163-165 MHz, and 216-220 MHz." Three and five element hand-held Yagis are typically used to follow the signals.

Here's what you're listening for, according to the USGS, "Signals can be either continuous, which sounds through a speaker like a high-pitched whine, or pulsed, which sounds like a series of 'beeps.' Pulsed signals are usually used at rates of 30-120 per minute. Lower pulse rates yield longer transmitter life. Pulse widths can also vary, with 18 milliseconds being the minimum that is easily tracked. The narrower the pulse, the longer the life."

Different signals will be transmitted to indicate to the researcher which creature is being tracked, if more than one is being tracked. – Editor

VHF-UHF Dongle Update

I have set up for ADS-B reception on my laptop with the DVB-T dongle. What a great program! Now I know who/what is flying above the house. Oh, and I heard Air Force One Tuesday night at 0028 UTC communicating with Trenton Airport ATC. The President was in New York City (about 40 miles NW of here) and was probably flying back to the White House. What a hobby! I am a confirmed dongle-holic! – Mario Filippi N2HUN (See Mario's article, "Use a DVB-T Dongle for VHF/UHF Monitoring," *TSM* March 2014)

Correction

The Thunderbird audio recording that appeared in the March issue was courtesy of long-time aviation monitor and air show attendee, Ed Langworthy. We regret for the error. – Editor

TSM

RF Current

News from the World of Communications

RF Current is compiled and edited by Ken Reitz KS4ZR from news links supplied by TSM readers. If you find an interesting story pertaining to amateur, shortwave, scanning, broadcasting or satellites, send a link to editor@thespectrummonitor.com

Edward R. Murrow Transmitting Station, Greenville, North Carolina, the largest BBG transmitting facility in the U.S., may be safe for now from closure, but the threat looms. (Photo by Thomas Witherspoon K4SWL)

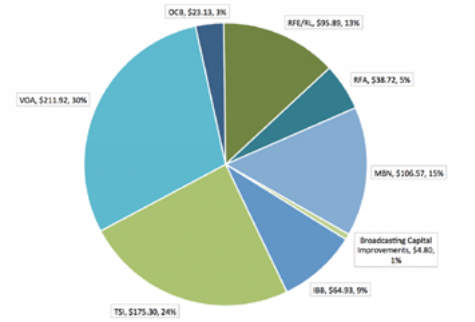
BBG Budget Cuts Shortwave, Reduces Staff

Cuts to shortwave broadcasting and staff reduction characterize the fiscal year (FY) 2015 budget as announced March 4 by the Broadcasting Board of Governors (BBG), the federal umbrella agency that oversees U.S. government international media outlets including Voice of America, Radio Free Europe, Radio Liberty, Radio Marti, and many others. According to a BBG press release:

"The FY 2015 budget request includes significant reductions in staff positions that are predominantly not tied to content production, as well as costs involving less-effective signal transmissions. The International Broadcasting Bureau and all the BBG-supported networks – Voice of America, Radio Free Europe/Radio Liberty, Radio Free Asia, the Middle East Broadcasting Networks, and the Office of Cuba Broadcasting – will restructure operations in ways to reduce fragmentation, overlap and duplication. Further inefficiencies will be reduced by rationalizing distribution by scaling back some shortwave broadcasts in favor of other distribution methods, such as FM and satellite radio, television, and digital media in places where audiences prefer these newer platforms."

In response, the Committee for U.S. International Broadcasting (CUSIB), a non-partisan organization often critical of BBG policy, issued a letter to BBG urging the BBG's Shortwave Committee to, "save BBG shortwave and medium wave radio broadcasts to strategic regions of the world. Radio can be the lifeline for poor people in many places in the world where they don't have access to television, Internet access, or electricity. Radio is cheap, and unlike Internet users, radio listeners cannot be tracked and monitored."

Meanwhile, the U.S. General Services Administration has a property listing



BBG FY 2015 funding request, shown by major elements. (Courtesy: Broadcasting Board of Governors)

you may want to take a look at: "800 acres located in the City of Delano, California…one parcel of land that is approximately one square mile (640 acres)…the site contains numerous satellite receivers, transmitters and antennas…" You may recognize the site as that of the former VOA Delano Transmitting Station.

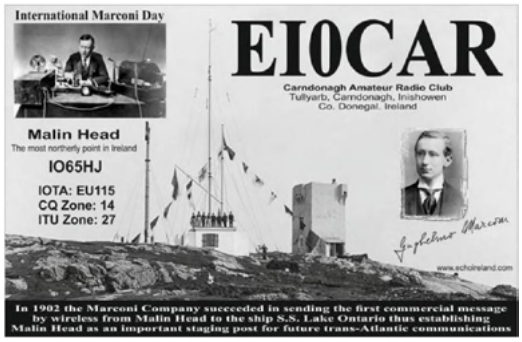
And, this one, dated, March 11, 2014: Greenville Transmitting Station Site (Greenville/Beaufort/NC), according to the Government Services Administration Notice of Surplus Determination: "The property, Site 'A' Transmitting Station is approximately 2,822 acres with improvements containing 54,318 square feet of rentable area."

The Department of Housing and Urban Development (HUD) has stated, "Notice is hereby given that the above-mentioned property has been determined to be surplus Federal Government property, and is available for disposal…" It suggests that the property is suitable for possible use as a facility to assist the homeless, a prison facility or for law enforcement purposes.

The listing reads, in part, "The main transmitter building was constructed in 1957. In addition to the main building, there are small ancillary buildings on the site, along with 40 transmitter antennas and 160 towers,

concrete foundations, asphalt paving, wood distribution poles and fencing on the property.

"The property is offered 'AS IS' and 'WHERE IS' without representation, warranty, or guaranty as to quantity, quality, title, character, condition, size or kind, or that the same is in condition or fit to be used for the purpose for which intended." According to *TSM* Shortwave Listening columnist, Thomas Witherspoon K4SWL, Site A is a mirror copy of Site B, the Edward R. Murrow Transmitting Station, and was decommissioned many years ago.



QSL card from EI0CAR Carndonagh Amateur Radio Club, Tullyarb, Carndonagh, Inishowen County Donegal, Ireland. "Commemorates the first commercial message by wireless from Malin Head to the ship S.S. Lake Ontario thus establishing Malin Head as an important staging post for future trans-Atlantic communications." (Courtesy: Carndonagh Amateur Radio Club).

Amateur, SWL Awards: International Marconi Day

April 26 marks **International Marconi Day** (IMD) a 24-hour period during which a number of amateur radio stations will be on the air to celebrate Marconi's birthday, an event for which awards are available to hams and shortwave listeners. A list of official IMD stations that will be on the air are found on the IMD home page. They will try to activate as many of the original Marconi transmitting sites as possible during the event, including storied U.S., Canadian, British, Irish and European stations. Other important sites will also be activated during IMD. QSL cards and certificates will be available with details found on the home page above. According to the IMD website, Marconi's actual birthday was April 25, 1874; IMD is held on a Saturday close to Marconi's birthday.

Courtesy: ADS-B Technologies, LLC.)

Missing Aircraft Leads to Monitoring Education

The mysterious disappearance of a Malaysian Airline Boeing 777-200ER, and the fate of the 239 aboard, occasioned widespread international speculation that led to the media educating the public on how airplanes communicate. Newspapers from the *New York Times*, *Washington Post, Chicago Sun-Times*, the *Mirror* (UK), *Times of India* and dozens of other media outlets explained, with the help of good graphics, how aircraft use HF and VHF radio; how Automatic Dependent Surveillance-Broadcast (ADS-B) works, the function of Aircraft Communications Addressing and Reporting System (ACARS) and the use of "pings" received by satellite.

Even amateur radio made it into the story. The International Amateur Radio Union (IARU) reported March 11 that the Malaysian Amateur Radio Transmitters' Society was called on to set up an amateur VHF/UHF station to work traffic between the airport at Kuala Lumpur and the hotel where families of those on board the plane were staying while awaiting word of the fate of the aircraft. One company even claimed to have three million volunteers examining satellite imagery in what it called a "crowdsourcing project." According to ARRL, the Malaysian Amateur Radio Emergency Service Society (MARES) asked amateur operators from India to Thailand to set up nets on 14.250 and 21.250 MHz from 1300 to 1500 UTC, to pass related traffic.

U.S. Radio Ad Sales Flat in 2013

According to a report from the Radio Advertising Bureau, ad revenues in the radio industry for fourth quarter and full-year 2013 were flat compared to 2012, an election year that saw billions in unrestrained interest group spending lavished on radio as well as television advertising. While online broadcasting is touted as the future for the industry, and the report shows an 18 percent increase in digital revenue year-on-year. Even so, it barely signifies compared to traditional radio spot revenue ($889 million for digital, compared to $14 billion for radio spot advertising).

Revenue trends, according to RAB research, show that automotive-related advertising leads all ad revenue from 2009 through 2013, and was on the increase from 23 percent in 2009 to 29 percent in 2013. Communications (cell phones and plans) came in second with 22 percent of ad revenue nearly straight across the board from 2009 through 2013.

The good news for radio stations is that 2014 is yet another political season and interest group coffers will be flowing directly into stations' accounts. The bad news for listeners is that interest group coffers will be flowing directly into stations' accounts and we'll have to listen to all that QRN. Unless, of course, listeners switch to non-commercial radio, satellite radio or online audio services for relief. The upshot is that commercial radio in the U.S. is financially viable, as long as it can limp from one political season to the next.

Amateur Radio Scholarship Deadline Looms

The **Foundation for Amateur Radio** has announced that applications for 2014 scholarships are due by April 15, 2014, according to the FAR website. Scholarships range from $500 to $5,000 and are open to all full-time students who are licensed amateur radio operators. FAR administers 52 scholarships worth over $72,000. FAR and similar amateur radio scholarship programs are one of the most compelling reasons to get your child or grandchild interested in amateur radio, especially in today's economy, where families need all the financial help they can get to deal with tuition bills.

The Shack Slims Down (Again)

Last month we noted that Radio Shack had planned to close up to 500 stores. Just weeks later that number was boosted to 1,100 stores after revenue from store sales fell by 19 percent. Store closure will be based on store location, demographics, lease life and financial performance, according to news reports. The beleaguered retail electronics chain has some 4,300 stores in the U.S.; the closure of 1,100 stores will represent a significant downsizing for the company.

Grace Digital Mondo ($180) (Courtesy: Grace Digital)

Wi-Fi Radio's Impact Broadens

A new study shows that online radio listening each week now includes 36 percent of all Americans age 12 and older. The report, called "The Infinite Dial 2014," is a research finding from Edison Research and Triton Digital, a technology company focused on the digital audio industry, and sponsor of the research, according to the company's statement. The study was released in early March. Among the findings are:

- 80 percent in the 18-34 age group own a smart phone (it's
- 61 percent for all respondent age groups)
- 31 percent use Internet-only services, such as Pandora.
- 26 percent of mobile phone users have connected devices to a vehicle.

In a company press release, Tom Webster, vice-president of strategy and marketing for Edison Research noted, "The continued penetration of smartphones in America is changing behavior significantly. We are now seeing activities that were dominated by desktop usage in 2013, flip dramatically to become mobile behaviors. For millions of Americans, the smartphone has become the first screen."

The study was conducted from January 13 to February 14, 2014 via telephone interviews with 2,023 persons selected by Random Digital Dial sampling, including 808 cellphone interviews.

MI Station's RDS Hacked

Michigan Radio reported that their Radio Data System (RDS) had been hacked on their WVGR and WFUM transmitters serving the west Michigan and Flint areas. The hacker apparently programmed the RDS to display offensive messages that could have been seen on any radio equipped to display RDS. *Michigan Radio*, a public broadcasting service of the University of Michigan, in a statement issued March 10, said that it had updated the security settings used by hackers to get into the system, in order to prevent another such occurrence.

Say it Ain't So!

According to a report in the *Chicago Tribune*, the Chicago Cubs may be changing that team's flagship radio station. The report notes that WBBM-AM 780 could be the new radio home for the Cubs beginning with the 2015 season. If so, it would end its relationship with WGN-AM 720 that began in 1925.

FCC Enforcement

Cable Company use of EAS Alert Slammed

The FCC issued a Notice of Apparent Liability for Forfeiture (NAL) to cable-TV giants Viacom, NBC Universal and ESPN, Inc. for last year's airing of advertising content that used sounds similar enough to those used by the Emergency Alert System (EAS), to warn of a local emergency, so as to cause confusion among viewers or listeners as to whether or not there was an actual emergency. The content, a trailer for a movie, according to the FCC, was also accompanied by visual text stating, "THIS IS NOT A TEST" and "THIS IS NOT A DRILL." The FCC hit the three with a combined $1.93 million in fines. According to FCC documents, the three cable giants heard from several state broadcast associations as well as a representative of the Society of Broadcast Engineers following airing of the movie trailer.

CA Ham Nailed as FM Pirate

In 2012, a California ham was fined $17,000 for

operating a pirate FM radio station on 104.9 MHz in Suisun City, and for failing to allow inspection of his station by FCC personnel. The Technician class operator requested a reduction in the fine, "because he had no malicious intent in his operation, and because the proposed forfeiture is a harsh penalty for someone who immediately complied with a Notice of Unlicensed Operation," according to FCC documents. While the FCC disagreed with his assertion that he had no malicious intent, it was moved by his lack of previous violations as a licensed amateur and knocked $3,400 off the fine, which now stands at $13,600.

PA CB Op $18k Fine Confirmed

A Pennsylvania CB operator was not so lucky. After a series of violations (including failure to allow inspection of his CB station by FCC field agents and failure to abide by restricted operating hours from a previous violation) the FCC Enforcement Bureau confirmed an earlier fine of $18,000 levied against the unfortunate operator.

Ham Surrenders License in Consent Decree

A Cocoa, Florida, ham has agreed to surrender his license following a Consent Decree in which the FCC agreed to drop the investigation into his unlicensed activities on 465.300 MHz, which were interfering with the Brevard County (FL) sheriff's office. The case dates back to September 2012. One year later the FCC issued a Notice of Apparent Liability for Forfeiture in the amount of $25,000 for the violations. After proving his inability to pay the fine, all parties entered into a Consent Decree that included the surrender of the license and an agreement to make a voluntary contribution to the U.S. Treasury in the amount of $1,000 to be paid in $100 per month installments.

Instant Justice Dept.

And, this story from Spokane, Washington, TV station KREM, involving an attempt by copper thieves to steal copper wire from KLOG-AM's antenna system. In the report, the radio station's manager is quoted as saying that they found wire cutters at the site and evidence that someone got a nasty shock.

PANDORA ONE Price Hike

The online music service Pandora announced March 18 that it would be increasing the monthly fee for its commercial-free service, known as Pandora One, from $3.99 per month, paid annually, to $4.99 per month to be billed monthly, not annually. The new price structure takes effect May 1 of this year. According to the company's website, current monthly subscribers will not experience a price hike at this time. Current annual subscribers will see a price hike when their time for renewal is up, but will migrate to a discounted "loyalty" rate of $3.99 per month. The annual subscription option will be discontinued.

A company announcement noted, "Over this same period, the costs of delivering this service have grown considerably. For example, the royalty rates Pandora pays to performers via SoundExchange for subscription listening have increased 53% in the last five years and will increase another 9 per cent in 2015."

The company stated that the number of Pandora One subscribers is 3.3 million out of 250 million registered users. The change in subscription fee appears to be a result of court action recently in which a federal judge ruled the royalty rate Pandora pays would remain unchanged through 2015. The company had sought a lower rate that would be comparable to the rate paid by radio broadcasters. The new rates bring Pandora One in line with other similar commercial-free online music services.

ARISS Upgrades ISS Video

An announcement from the Amateur Radio on the International Space Station (ARISS) notes that a "Ham Video" transmitter was commissioned aboard ISS and performed as planned. In testing the system's S-band antenna, a blank transmission was made on March 8 and 9 and received on a 1.2 meter dish at Kayser Italia, manufacturer of the Ham Video system. Details regarding the Tutioune DATV/DVB-S software used in the transmission are found at: **http://www.vivadatv.org/page.php?p=tutioune-en**

TSM

WWII-era morale radios from left to right: Echophone EC-1, Minerva Tropic Master and Navy 6000BAC. (Photo courtesy of the author)

From Army Pirates to Morale Radio

By Rich Post KB8TAD

We call them "The Greatest Generation" but as the Nazi victories covered much of Europe and the draft was restarted in 1940, a 21 year old (and in 1941 an 18 year old), was called a G.I. The experience of World War I just twenty-three years earlier had taught the War Department that young men during war time needed wholesome outlets for their energy and free time both stateside, while undergoing training, and near the battle front.

While still in the U.S., the doughboys had experienced very good efforts by the YMCA, Knights of Columbus and the Jewish Board of Welfare working together at the various training camps. The American Red Cross had at times served almost within shelling range of the western front during World War I and the soldiers had nothing but praise for the morale boost of the doughnuts, cigarettes and prayers provided, but the Red Cross was not available in all needed areas. A study made after the war on methods of entertainment to boost morale concluded that the most success was through giving soldiers the means to do it themselves, tapping their natural abilities.(1)

Dough-boys to G.I.s

With the start of the new draft in 1940, six organizations combined efforts to support the rapidly expanding U.S. military. Those were the Salvation Army, YMCA, YWCA, National Catholic Community Services, National Travelers Aid Association and the National Jewish Welfare Board. An umbrella group called United Services Organizations was formed and quickly became known by its initials, the USO. Funded by private donations and largely staffed by volunteers, it was charged by President Franklin Roosevelt to provide for the emotional support and the on-leave recreational needs of the men in the armed forces.

In mid-1940, the War Department itself had a Morale Branch. It was renamed Special Services. One section of Special Services was set up to provide recreation and another to produce entertainment.

Changes in Entertainment

While the conscripts of World War I had seen black and white silent movies and knew of radio as used primarily for ship communication, the G.I.s of World War II were used to sound motion pictures including some in Technicolor and had grown up with radio as the center of family entertainment in the home. From comedy routines and programs such as Fibber McGee and Molly, Jack Benny and Bob Hope; to big band swing music; to crooners such as Bing Crosby,

KODK studio band of unidentified soldier/musicians. (Courtesy of Gresham L. Pace photo collection, Kodiak Military History Museum.)

Inside a mobile Armed Forces Radio studio. (Courtesy: 5th Army from war-time film "Army-Navy Screen Magazine" #31)

Judy Garland, and the Andrews Sisters; to dramas such as "The Shadow," radio had become the major source of entertainment by 1940-41. It seemed only natural that radio should be part of the entertainment for troops as they went overseas or to remote duty stations such as Alaska or the Canal Zone.

The first radio entertainment for soldiers in Alaska was set up by the soldiers themselves. In Kodiak and Sitka, there was a massive buildup in mid-1941 because of Alaska's proximity to Japan. But Alaska had few radio stations and offered little in the way of radio music and entertainment. Shortwave station KGEI in San Francisco was beamed to the Philippines and its news bulletins could be heard in Alaska. Some U.S. continental stations could also be heard if the weather was right, the radio was capable, and the electrical noise was minimal, but the soldiers wanted predictable music and entertainment during their downtime hours.

Not FCC approved!

In March 1941, a couple of months prior to the buildup for the garrison at the seaplane base in Sitka, two soldiers, Ervin Greene (2) and Jeff Boyce, hams who had been recruited into the Signal Corps for the immediate need to support the Alaska Communications Service, hooked up a phonograph oscillator, increased its power well beyond legal limits and started broadcasting music from phonograph records using the made-up call letters KRB. Fellow soldiers provided occasional live entertainment and reading of the news.

They also recorded programs from the lower 48 states using Greene's newly purchased Hallicrafters receiver and disc recorder for later playback on the pirate station. The FCC found out and ordered the broadcasting shut down. The mayor of Sitka and Sgt. Vern Hoban, their Officer in Charge intervened so that the two were not punished. Hoban and the mayor recognized the need for broadcast for both entertainment and as a means for quick communication to the town. Since the best ideas for entertainment for morale building come from soldiers themselves, it wasn't the last time Sitka would see a pirate station.

Kodiak Island was home to the Kodiak Naval Air Station and was soon to become homeport for six submarines. Located at the base of the Alaskan peninsula and about 550 nautical miles from Sitka, it was even more isolated. The Army built Camp Greeley to defend the Navy port. In September 1941, the camp grew from just a few hundred to over five thousand men.

Civilian contractors were in the process of expanding camp facilities. To relieve some of the boredom of isolation, a volunteer group of soldiers with the complete support of officers and camp commander set up a broadcasting station. At first, the "station" was just a phonograph and PA system, but in October, with the financial support of civilian contractors, who were themselves experiencing isolation, a turntable, microphones, amplifier-mixer and 15-watt transmitter were obtained. Civilian carpenters also donated time to build a studio and control room.

The resulting broadcasts of a few hours each day reached both the camp and the town of Kodiak, just six miles away. The station used the call letters of KODK. That made-up call served for over a year. The town of Kodiak, which had no radio station, strongly supported this new, although unauthorized source of entertainment.

On December 7, the war started for the U.S. The camp commander used the broadcaster to give updates and to encourage his men. By mid-January 1942, KODK was operational on a full schedule, on the air from 7 am to 10 pm daily. That brought some joy to the long dark nights of the Alaskan winter and the anxiety of the first months of the war.

Meanwhile, back in Sitka, the Fort Ray support camp, set up for Sitka coast artillery and harbor defense, was also expanding rapidly, eventually growing to 10,000 men. In February 1942, Charles Gilliam who had been a radio technician in civilian life, along with hams Chet Iverson and Charles Green had trained together. Sent to Sitka, the three stuffed a crate with reportedly 400 pounds of radio gear and

parts, everything they could think of needing in such an isolated location.

With the war underway, such personal gear could not be shipped to the camp, but a helpful buddy in charge of shipping labeled the crate as military equipment. (3) Gilliam and another soldier, Robert Nelson, rigged up a transmitter and began broadcasting phonograph recordings to fellow soldiers. They had no microphone but with encouragement from their listeners, labeled the station hut GAB for "Gil and Bob." In April, after obtaining a microphone, they broadcast the Fort Ray Easter services using call letters KRAY.

The Sitka post commander, Lt. Col. Walter Shoaff recognized the morale need they were fulfilling and approved construction of a studio building. In August, the station relocated to the new studio and the station began operating from 11 am to 10 pm daily.

With the strong support of the military, the civilian leadership in both nearby towns and red-tape cutting by the camp commanders, the FCC tentatively approved the pirate stations in mid-1942 and fully legalized both later that year, granting call letters WVCX to replace the KRAY call in Sitka on November 19, 1942 and WVCQ in place of KODK in Kodiak on December 5, 1942. Sitkans voluntarily assessed themselves 50 cents a month on their utility bills to help pay for programming for WVCX. In Kodiak, the new Rotary Club rounded up donations of $1200 to pay for a full library of recorded programming. (4)

The Beginnings of AFRS

In May 1942, the Special Services Division recruited Tom Lewis, vice-president of a major New York advertising agency with vast radio experience and lots of contacts in the radio business, offering him a commission as Major with the charge of setting up a global radio entertainment system for the troops. A devout man of prayer, Lewis had been contemplating how he could help in the war effort. When offered the position, Lewis later remarked, "I wasn't quite certain how high or low in the order of things the rank of Major belonged, but it sounded fine to me, an answer to prayer. I knew I could do it. It was so obviously the answer I had been seeking." (5) Lewis in turn recruited a number of friends into the organization to provide program production and distribution for the start of what would become the Armed Forces Radio Service (AFRS).

In August of 1942, Lewis visited Alaska and found out about the, as yet not fully-approved, Kodiak and Sitka stations. A survey done during that time by his associates found that soldiers preferred to listen to radio in their own barracks. Their favorite programs were dance music, news, comedy, sports, and swing music. Isolated from home, they wanted to forget their circumstances for a time to laugh, to hear music and get news as free from propaganda as they would have received if they were still at home.

R-100 URR morale radio (Courtesy: Larry Long KB3WBB)

Specific programs and personalities mentioned most often were "The Hit Parade," Bob Hope and Kay Kyser (James K. Kyser, comedian and band leader). Another favorite radio show geared specifically to servicemen premiered in March 1942 even before AFRS was set up. The show, "Command Performance," had soldiers write letters of request to "command" various civilian entertainers and performers to appear on the show.

With the war on and the nation doing its best to support the troops, entertainment personalities were more than willing to give of their time and talent to the weekly half-hour program that was to last throughout the war and several years of occupation. Another very popular show was "Mailbag," a similar program of musical requests and letters, jokes, and poems submitted by servicemen.

Some radio personalities entered the military just as Lewis had. Captain Glenn Miller, described as a "rock star of his era," and his band played a total of 505 radio shows in addition to live music in 11 countries. (6) Regular network shows were also distributed with the commercials removed. Lewis' goal of "every GI in the world being able to receive radio from home" would slowly be fulfilled.

The programs, produced through AFRS, were shipped out on new 16 inch 33 RPM vinyl transcription records to hundreds of troop locations, both for direct phonograph playback and to shortwave stations in the U.S. and abroad.

However, foreign shortwave stations and broadcasters had their own schedules and priorities. Recognizing the limitations of relying on broadcasters such as the BBC, AFRS set up the Armed Forces Network (AFN), which included actual portable studios and transmitters for use overseas.

AFN broadcasters, limited to 50 watts each, were set up in England on the American bases and followed the army into occupied areas throughout the war. The portable stations on army vehicles were complete with personnel, a small studio, control board, transcription turntable, record library, and transmitter. With their antennas and chosen positions on high ground for maximum coverage but near the front lines, they were sometimes targets for enemy aircraft homing in on their

Hallicrafters S-39 morale radio. (Courtesy: Larry Long KB3WBB)

signals.

Civilian Radio Receivers as Morale Radios

A film made for the 5th Army, which landed in Sicily and mainland Italy in 1943, shows a truck-mounted portable station in Italy and a number of scenes of troops and nurses listening to radios in the field and in tent encampments. The flag on the announcer's mike is AES, American Expeditionary Station. In viewing that film, now available as a free downloadable archive (7), none of the radios appear to be official "morale" radios that I have seen or collected over the years. Early in the U.S. involvement in the war, the soldiers simply used whatever radios they could get from the home front; often the three-way AC-DC and battery-powered portables, also called "picnic radios."

But, civilian radios did not hold up well under battle conditions with constant movement and exposure to weather extremes and moisture or, in the Pacific, to the high heat and humidity of jungle warfare. Most were also not capable of shortwave reception. It was obvious that the Army and Navy needed their own receivers. The earliest contracts I have found for Special Services Division and other Army morale radio receivers date from 1943 and were likely not delivered much before 1944.

I am not surprised that quite a few Echophone EC-1 sets were sold during the war to soldiers. Made by a subsidiary of Hallicrafters, the EC-1 was a civilian set introduced in 1940 at a price of $20. It was the only set made and sold directly to armed services personnel throughout the war. It was relatively small and light with no transformer, but with its tough metal case, AC-DC power and shortwave capabilities; it met several of the requirements for a morale receiver design. Most of the advertisements during the war featured a fictional Private (later Corporal) Hogarth and friends listening to his EC-1.

Navy Morale Receivers

The Navy did not allow civilian radios to be operated on its ships or in the merchant marine. Fear that enemy subs could zero-in on radiation from a super-heterodyne set's local oscillator allowed for only special, low-radiation sets to be used on board. Special models of entertainment radios were designed to meet the stringent radiation limit of less than 400 micro-micro-watts (picowatts) as measured at the receiver antenna input terminals. The E. H. Scott Radio Laboratories designed several models for the Navy including the RBO series, REE and others that met that requirement.

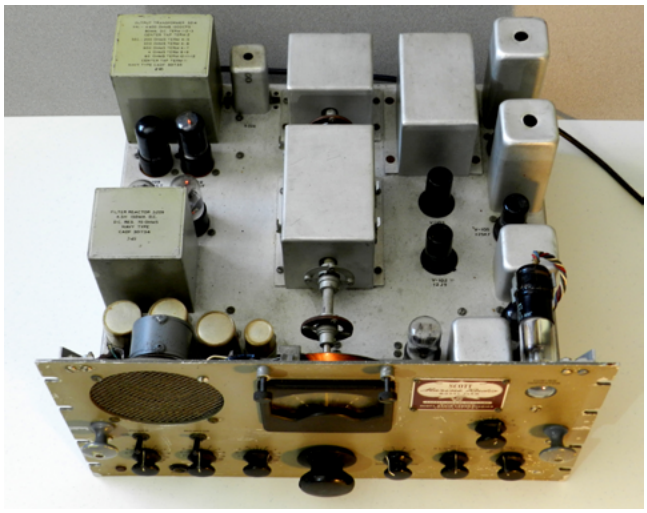
The Merchant Marine used the very similar Scott SLR series. Scott published a number of informational advertisements for their SLR sets in popular magazines such as National Geographic and Time in 1942 and 1943. One ad mentioned that the FCC had forbidden the use of radios on merchant ships except those that met the requirements, showing Scott's SLR-12A. All the low radiation receivers are quite heavy due to the necessary shielding to meet the radiation limit, but weight was not a problem for the Navy.

Whether subs could actually detect radiation from a standard superhet radio receiver beyond visual contact has been debated. It is possible that the Navy's original concern was based on experience with early regenerative and super-regenerative receivers which could indeed be homed-in on from a distance if poorly designed or shielded and improperly operated. The Navy itself used regenerative sets such as the RAL and many WW II Liberty ships were using radios such as the Mackay 128, both of which are regenerative, but with stages of pre-selection ahead of the regenerative detector and proper shielding. Earlier regenerative sets were not as well designed.

In addition to the low radiation ship sets, the Navy also had morale radios made for shore use. Those, such as the REO and REP models made by Crosley, and the REH made by Belmont, had warnings not to use them on board ships due to unsafe radiation levels.

The Navy also ordered small sets made specifically for tough duty such as the Navy 6000-BAC morale receiver, which I am assuming was intended primarily for the Marines. Powerful U.S. West Coast shortwave stations, including KGEI, initially served the Pacific region.

The Marines established their own broadcast station at Munda on New Georgia in December 1943 and, in 1944, named Capt. Francis J. Knora as its representative to the AFRS. This was announced in an article in the "Marine Corps Chevron" newspaper. The announcement also invited Marines to write to AFRS, "Marines afloat, in the jungles and at advance and training bases throughout the Pacific and the rest of the world are now an integral part of the Armed Forces Radio Service and as a result the Leathernecks are invited to write their requests for favorite stars, tunes and programs which will be beamed back to them on radio short wave." The Marines did indeed send in their requests to AFRS, including one that came written on



Scott model SLRM low-radiation morale receiver for merchant marine service (left) showing extensive shielding. The Navy version is the REE. Scott 1942 ad for SLRM-12A set (right). (Photos courtesy the author).

a captured Japanese flag!

As the Pacific war raged, each major island location received an AFRS team and a 50 or 200-watt transmitter and several at one-kilowatt in order to cover the islands on the broadcast band. Short on sources for electric power, a kilowatt station on Guadalcanal made use of a captured Japanese diesel generator quickly dubbed the "Tojo Power and Light Company." (8)

In New Guinea, the transmitters were aptly named "The Jungle Network" while the chain of island transmitters in the South-West Pacific was dubbed "The Mosquito Network," a clever name likely due to constant "commercials" urging soldiers to use mosquito repellent and take anti-malarial Atabrine tablets. On a USO tour of the South Pacific, Bob Hope introduces himself as, "This is Bob – Mosquito Network – Hope." The tour audio was recorded and broadcast for both the Mosquito Network and for home front audiences. (9)

Army Morale Receivers

While the Navy had a contract for the Scott RBO morale receiver as early as March 1942, the Army contracts came later in the war. One of the first unique Special Services Division morale radios, model SSD2 has a contract date of 1943. Its order number, 36536, is a relatively high number in 1943 leading to the conclusion that the contract was issued late that year. Although capable of broadcast and several shortwave bands and voltages from 110 to 240 volts AC, it had only the typical 5-tube complement of a standard AC-DC set of the time, with an added autotransformer for handling the higher voltages. While knobs were recessed, the cabinet was made of wood. Not capable of battery operation, it offered little advantage over an Echophone EC-1 other than the 240-volt capability, which was the European standard. To operate their off-the-shelf 115-volt radios such as the EC-1 at higher voltages, soldiers simply placed a light bulb or two in series with their sets until the pilot light was about the right brilliance.

Later morale radios were designed with more rugged cabinets with moisture and fungus protection, ease of access to the alignment points, an RF amplifier stage and with battery capability using separate A and B batteries. For the Army, the most common radio used in the European theater was the R-100/URR, made by a number of manufacturers including Espey, Zenith, Majestic, and Grunow. It was developed and standardized by the Signal Corps, not based on an off-the-shelf model by a single manufacturer. Hallicrafters had earlier developed the RE-1, a radio with somewhat similar design. Both sets were named in memos written by the Headquarters, European Theater of Operations in October 1944 and March 1945 detailing their distribution with the RE-1 named as a suitable substitute for the R-100. The radios were to be provided on the basis of one per fifty men and to each isolated unit of less than 50 men. The R-100 or RE-1, each having battery capability were priority for organizations that did not have access to external power. The radios were not to be issued for personal use, officer clubs, or recreational rooms until all enlisted men had adequate supply "By Command of General Eisenhower".

The development of the RE-1 is described in an article in the May 1945 Radio News. (10) According to the article, "At first all sorts of radios were used for morale purposes from a camera-sized midget portable to a heavyweight communications receiver... The hardships of front-line service proved too severe for receivers that were never intended for anything but peace-time use. With the growing realization of how much a radio means to a soldier came the determination

Crosley-made Navy REP morale radio for shore use. (Courtesy the author)

to provide equipment which would really do the job – a receiver that could stand the extremes of temperature and humidity, that would resist fungus and corrosion, that could take the banging around it was sure to get -- and above all, a receiver that would perform anywhere, from power line or batteries, and that could pick up the programs from home, loud and clear. With these requirements in mind, the Army's Special Services Division asked Hallicrafters to design and build such a receiver –the new Sky Courier, model RE-1 was the result." The article goes on to detail the design which incorporated two separate audio output tubes, a 3Q5 when on battery power and a more potent 50L6 when operated on AC or DC plug-in power. All IF transformer adjustments are accessible without having to remove the chassis. The battery switch is actuated when the line cord plug is inserted into a mating socket on the chassis. The chassis wiring insulation was rated so as not to break down "when subjected to a potential of 2000 volts for one minute after being immersed in water for 24 hours and when placed in the flame of a Bunsen burner shall not burn faster than one inch per minute."

The Signal Corps designed R-100/URR is similar with the separate audio output tubes and a manual chassis-mounted switch for battery or line power but adds an RF stage and a 115 or 230 volt capability. It is also fused and has an external audio output jack for connection to a PA system. The article in Radio News leads me to believe that the Hallicrafters RE-1, designed relatively early in the war, served somewhat as a model for the R-100/URR. Hallicrafters also designed the Sky Ranger S-39, schematic date June 1944, as a replacement for its prewar S-29. The S-39 was a more capable portable that had an RF stage but not 230 volt capability or a more powerful second audio output tube. Its military designation has been identified as the R-80.

The Hallicrafters article on the RE-1 ends with the note that after the war, the radio "will be equally desirable for years to come." Indeed, the May 1945 article coincides with the end of the war in Europe. But May 1945 and later also saw further contracts for morale sets such as the Navy 6000BAC and its very similar Army equivalent. In May, few dared predict that World War II would be over in 3 months. Another radio designed for morale use was the Minerva Tropic Master whose schematic date is June 1945 and presumably was built later. It is considered by many to be a morale radio although I have not yet found evidence of an actual military contract. In fact nearly any small tough AC-DC metal cabinet radio with broadcast and shortwave bands could be considered a morale radio if built in 1945, the demand was so great. The radios were obviously intended for what was expected to be a long struggle, the invasion of Japan. After the end of the war, many of the left-over radios were reportedly sold in the military's post exchange stores to the occupation forces and others to the general public. Some were even air-dropped to isolated Japanese holdouts who had not heard the news that the war was over.

With the war-created shortage of radios immediately after the war, the left-over morale radios initially sold for a premium. The Minerva Tropic Master was advertised directly to soldiers and civilians for $75. A January 1946 ad from Gimbels department stores lists the Majestic R-100 for $95.70 and 5.40 extra for batteries. For perspective on these postwar inflated prices, the new Hallicrafters S-38 would be advertised in just a few months for $39.50, less than half the price of the Majestic.

The AFRS as an organization would remain as a permanent part of the military, later adding television to its name. Tom Lewis, as Colonel, would continue to serve with integrity and be a source of inspiration to the organization. Its most popular radio program, "Command Performance," would continue until 1949. And without a doubt, the most popular host of Command Performance for servicemen in World War II was Bob Hope. His popular mix of jokes and wisecracks accompanied by talented and pretty ladies proved popular not just on Command Performance. His equally popular USO tours with that same formula, the last of which took place in 1991, would endear him to servicemen for half a century.

I think I will fire up the Navy REP with its red warning label not to use it aboard ship and listen to some MP3 copies of Bob Hope hosting "Command Performance," by way of a tube-type phono oscillator that started it all. (11)

(1) Lessons learned from WW I can be found in the book "Keeping Our Fighters Fit for War and After" by Edward F. Allen with Raymond B. Fosdick, The Century Co., New York 1918, -- Now in public domain and may be legally downloaded from <**https://archive.org/details/cu31924027820210**>

(2) Ervin Greene's memoirs and pictures of that era are on his son's website **http://user.xmission.com/~slickrok/Escalante_Trails/Radio_Head/Radio_Head.html**

Armed Forces Radio Service 30-minute transcription disk label. (Courtesy: Air University History Archives)

(3) The account includes a report written by Susan McClear based on oral histories for the Sitka Historical Society on a grant from the Alaska Historical Commission

<http://user.xmission.com/~slickrok/Escalante_Trails/Radio_Head/Entries/2010/3/6_Alaskan_Pirates.html>

(4) "Rotarians at Kodiak, Alaska 'Godfather' an Army Radio Station", article in "The Rotarian", July 1943

(5) Chapter 4 <**http://afrts.dodmedia.osd.mil/heritage/page.asp?pg=50-years**>

of AFRTS history available as downloadable pdf chapters.

Also see a summary of the history at <**http://afrts.dodmedia.osd.mil/heritage/page.asp?pg=60-years**>

(6) See "Glenn Miller's legacy transcends music".<**http://www.maxwell.af.mil/news/story.asp?id=123282012**>

The University of Colorado at Boulder houses the Glenn Miller Archives (GMA) with more information on AFRS.

<**http://www.colorado.edu/music/departments/centers/american-music-research-center/glenn-miller-archives/gma-reports/armed-forces**>

Music from the Glenn Miller Army Air Force Band can also be found on the GMA site:
<**http://www.colorado.edu/music/content/glenn-miller-archive-audio**>

(7) View or download the video at
<**https://archive.org/details/Army-NavyScreenMagazine31**>

Captain Glenn Miller (center) was the WWII-era equivalent of a mega rock star. He and his band performed 505 radio broadcasts for the Armed Forces Radio Service. (Courtesy: Air University Public Affairs)

(Number 01, 5th Army Mobile Expeditionary Station)

(8) For a great read on getting the Guadalcanal station on the air and the history of the Mosquito Network, see the article by Martin Hadlow of the University of Queensland, Australia, linked at the bottom of the page at

<**http://afrts.dodmedia.osd.mil/heritage/page.asp?pg=mosquito**>

And the first-hand account of the Guadalcanal AFRS station by Ivan Saddler.

<**http://www.smecc.org/start_of_afrs.htm**>

(9) "Bob Hope - Somewhere in the South Pacific," Audio program with added photos
<**http://www.youtube.com/watch?v=j2CD2MXSTTU**>

(10) C.T. Read, "Radio for Morale," Radio News, May 1945

(11) A list of Command Performance shows downloadable in MP3 format can be found at
<**https://archive.org/details/CommandPerformance**>

For a light-hearted but very informative look at AFRTS as written by an insider, see "Brass Button Broadcasters," by Trent Christman, Turner Publishing Co. 1992

TSM

Uniden BC536HP scanner (Courtesy: Uniden America Corp.)

TSM Reviews:

Uniden BC536HP Mobile Scanner

By Chris Parris

There has been much written and posted across the Internet in anticipation of the new Uniden Home Patrol series of scanners since they were first announced. The new models were released in January of 2014, and have become a hot topic of discussion, so I decided to try my hand at the latest technology from Uniden.

As public safety communications systems have increased in their complexity, scanners have become more complex as well. Understanding and programming all the information needed to follow a digital trunked radio system is sometimes a difficult task, even for the veteran scanner user, and potentially a real stumbling block to new scanner users. Long gone are the days of simply inserting a quartz crystal for your local police frequency into your scanning radio. If scanner manufacturers are going to be able grow their market and introduce modern scanners to new users and make scanning easier, they need to make the programming, and operation of the scanning radio itself, simpler.

Uniden started changing the way we scan with the introduction of Dynamic Memory Architecture (DMA) programming, which allows for easier organization and more efficient use of the scanner's on-board digital memory. No longer are there simple banks and channels of frequencies as with the first generations of programmable scanning radios. Now all Uniden scanner programming is based around virtual folders of Systems, Departments and Channels.

The next step was taking the concept of the radio being able to carry the entire nationwide scanner frequency database inside the radio, so you wouldn't have hook up to the Internet to find programming information. Also, the radios themselves started being able to determine where they were located, either via an entered postal Zip code or GPS data (using an external GPS device), so that they could determine what systems were within reception range of the radio automatically. These features were introduced in the Uniden line with the Home Patrol 1 radio in the fall of 2010.

One of the most anticipated features of the new Uniden radios is the ability to receive APCO P-25 Phase II trunked systems, which use Time Domain Multiple Access (TDMA) digital modes that cannot be received on the previous generation of digital scanning receivers. The first generation of P25 digital trunked systems utilize FDMA or Frequency Division Multiple Access. TDMA mode allows the system to support nearly double the voice traffic as the current FDMA or APCO Phase I digital systems. This difference locked out scanner listeners to these newer systems until the PSR-800 radio came out from the now defunct line of GRE scanners. For quite a while, the only scanning receiver available that would receive these TDMA systems was the PSR-800, and when they were no longer being manufactured, these radios commanded quite the price on Internet auction sites.

I had not had any previous experience with the Uniden Home Patrol line of radios before now. I wasn't really sure if the innovations that the HP scanners carried would provide any significant improvement to my scanning hobby. Despite the fact that I use many of my scanners while traveling, I very rarely program up all the local fire and police channels for the city I am visiting. I do rely on scanning previously built frequency files that have been produced over the years and are tailored to the frequencies and radio systems that I am

Uniden BCD536HP mobile-mounted above the author's car dashboard. (Courtesy: Author)

most interested in (see the Federal Wavelengths column for more on that). But, I was curious about some of the new technology that Uniden was delivering with the line of Home Patrol radios and decided to take the plunge when my local dealer had received a new shipment of the BC536HP base/mobile radios after being out of stock for some time.

When the new 436HP and 536HP radios first shipped and were in the hands of anxious scanner users, the Internet was filled with excited messages of "I've got mine!" and "Let's see if this works!" Early results of the improved digital decoding of trunked systems as well as the ability to monitor the new P25 Phase II trunked systems seemed very positive. But, as users continued to program and try out different scanner features, they started to post complaints about problems they encountered.

As with some previous scanner models, even after considerable beta testing, the newly released Uniden radios have had some minor hiccups in both radio firmware and hardware. The story that came from the Uniden product manager was that sometime after the first release of the radio, the factory was found to be installing an incorrect component, or a component was being installed in the wrong position. This caused issues with the quality of the audio from the headphone jack of the radio. After discovering this problem, they recalled the radios that dealers had in stock to repair the problem, and those customers who already had their scanners were encouraged to return them to Uniden for repair or replacement. So far, Uniden appears to be taking user reports of problems seriously and have released some "maintenance" firmware updates to fix a number of these complaints.

Around the same time as the headphone problem was discovered, another audio complaint from new users started cropping up. With the new radios, Uniden apparently made a decision to increase the output power of the speaker amplifier. This redesign incorporated a "floating" speaker output of the BC536HP radio that most users were unaware of. The speaker outputs on most base type scanners are unbalanced; meaning that one side of the speaker is at electrical ground. The new scanner speaker outputs have neither side grounded and they should not be grounded, much like the speaker outputs on professional Motorola radio are. Users who were trying to plug the speaker outputs into computers for streaming or recording found that they had all sorts of problems with poor audio levels and audio quality. The solution is to not use the speaker output for anything but a speaker, or use a balanced isolation transformer on the speaker output.

I won't try to make this review a complete "how-to" article on setting up and operating the 436HP and 536HP scanner (as I'm no expert yet), but I will try to show what I had to go through while learning to make the scanner do what I wanted it to do.

Pulling the BC536HP radio out of the box you may notice some differences from the Uniden XT series of scanners. The radio appears to be nearly identical to the previous Uniden 996XT models, well built with a sturdy metal case, but with several major changes. First, the button layout and rotary controls have moved. I am still used to grabbing the large rotary encoder knob on the right hand side of the scanner, but in the new models it has moved over to the left side. There is now a micro SD memory card slot in the front to the radio. The buttons on the front of the radio have some new and unusual titles on them now. For instance, on the new 536HP radio there are no "SCAN" or "MANUAL" buttons. There is no longer a "LOCKOUT" button, it is now called "AVOID" and no obvious way to pause the radio on a particular transmission. But, as you use the radio, things make more sense.

The front panel display is now much more densely populated. There are 5 lines worth of system data and radio information displayed as the scanner operates, so the view can sometimes be a bit overwhelming. The display format can be changed to show the channel text labels and system

information, or it can be toggled to show actual frequency information as well as the channel text. Also, the display back-light is made with only white LEDs now. The alert color function, which on the 396XT and 996XT radios changed the back-light color when an alert was triggered, now only changes the colors of the area around the large rotary knob on the left side of the radio.

There were some cries of "Foul!" on the Internet when buyers opened the new radios and found no manual at all included in the box. The concept of a printed instruction manual has been fading for a number of years. Previous models often included a CD-ROM containing a manual and some software, but there is no disc at all included with these new radios. The most current version of the instruction manual is always available as a free download. This should allow Uniden to update the manual, as required, by firmware updates. Also, Uniden has started posting a number of demonstration videos on YouTube that show how to accomplish various programming operations on the scanner and on the Sentinel software.

In addition to the usual cables, brackets and hardware included with the 536HP scanner is a Uniden-branded 802.11 Wi-Fi module that plugs into the USB port on the rear of the scanner. This allows the scanner to be directly connected to a home wireless network without needing an external computer. This allows remote control of the scanner over the Wi-Fi connection as well as providing a connection to the Internet for streaming the scanner audio. Software to control the scanner via this network connection is still under development at this time.

Once out of the box, the scanner needs to be powered up and the internal clock needs to be set. This clock is how the scanner tags files that are stored or modified on the SD card in the radio. Once the time has been set, the radio can be connected to a computer via the included USB cable. The computer should have the latest version of the Uniden Sentinel software installed, which is a free to download. This will allow the software to make sure the frequency database and the radio firmware are up to date. The new method of updating the radio firmware is much easier to do than previous Uniden radio model updates. The updated firmware is pushed to the internal SD card in the radio and, once loaded, the radio simply updates itself. I had some trouble getting the Uniden Sentinel software to install properly on my main laptop, but was able to get it installed on a second laptop that I have just for radio and scanner programming.

Despite the concept that Sentinel programming seems to have taken care of a lot the preparatory work of programming your scanner for you, there is still some "housekeeping" that needs to be done once you have your local systems loaded into the scanner. For instance, one of my local trunked radio systems has a main simulcast backbone that is easily heard through the area, but it also has a number of small, low power "IntelliRepeater" (IR) sites that you really don't need to be scanning. These sites are included in the system programming, so the scanner wastes time searching for these site control channels and never finds them. These can be locked out, or "avoided," to use the new vernacular. But they are included in the trunked system when you load it into the radio.

In these new radios, each frequency or talk group on a radio system has a SERVICE tag. These tags include such things as Police Dispatch, Fire Dispatch, Public Works, Aircraft, Military, Federal, etc. This allows a user who just wants to listen to their local police activity to simply turn on all the frequencies or talk groups with a POLICE service tag, and hear only things marked as POLICE (There are custom service tags available to use if you have channels that don't fit the preset service names). These tags are applied in the Radio Reference database that the Uniden radio refers to, which works well in theory, but can have some unusual consequences. Errors sometimes crop up with these service tags, and they are only as accurate as the people who submit them, but users are constantly weeding out the mistakes. You will need to make sure that you have all of the "Service Types" that you want to listen to enabled. Even if you have all the systems and departments loaded, if the SERVICE types are not enabled on the radio, you sill see it scan and not hear anything.

Next, you can set up your "Favorites" list in the radio. You can step through the various radio systems that have been loaded and assign them to a specific Favorites List that can be called up any time and scanned. This assures that only the frequencies you want to concentrate on will be scanned.

I have been able to field test the 536HP scanner in my home area, both as a base unit and as a mobile scanner, and I've taken the radio on the road to a couple of different metro locations. In all instances, the radio seemed to perform very well with trunked systems, both digital and analog, as well as conventional radio systems. I have yet to be able to monitor any APCO P25 systems using the TDMA or Phase II digital mode, but I hope to make it to an area with such a system soon.

One great improvement, at least for me, is that when searching frequencies, you no longer have to decide if you want to search for analog CTCSS tones or P-25 digital NAC information to be displayed. The new line of scanners will display any analog tones or digital NACs without having to choose between them. Another very nice feature that Uniden has added is the ability to record and replay scanner audio clips. If you miss part of a call, you can simply hit the REPLAY button, and the scanner will replay the audio and display the frequency and tone information on the display as it was recorded. The length of the recording can be set in the programming. You can also save recorded audio clips to the memory card in the scanner.

A receiver update that Uniden offered with these new models was the promise of improved reception of trunked systems using multiple simulcast transmitter sites using the same frequencies, so called simulcast systems. Digital simulcast system trunked radio systems using the CQPSK

Uniden BC536 Manufacturer's Specifications

Band Coverage : 31 Bands

Size: 2.8 in (W) x 1.5 in (D) x 6.3 in (H) (without antenna)

71.1 mm (W) x 36.9 mm (D) x 160.9 mm (H) (without antenna)

Weight: 12.3 oz. (with antenna and battery)

Operating Temperature: + 14º F (– 10º C) to + 140º F (+ 60º C)

Storage Temperature: – 22º F (– 30º C) to + 158º F (+ 70º C)

Power Requirements: 3 X AA Rechargeable Ni-MH Batteries (2300mAh) (included) 3 X AA Alkaline Batteries (not included)

D V 5.0V ±5%. Connect to PC with USB cable (included)

LCD Display: 192 X 160 Full Dot Matrix LCD with white-color back-light.

Internal Speaker: 24ohm, 0.8W Max.

Certified in accordance with FCC Rules and Regulations Part 15 Sub-part C as of date of manufacture.

Weather Channels: 7 Channels

Scan Rate: 85 channels/second

Search Rate: 80 steps/second (12.5kHz step)

250 steps/second (5kHz step)

Scan Delay: 2 seconds

Audio Output Power: Internal Speaker - 360mW nominal (24ohm)

Headphone (L-ch) 4mW nominal (32 ohm)

Antenna: 50 ohms (Impedance)

Close Call Sensitivity (No Modulation)

(NFM) 40.8400 MHz -58 dBm

(FM) 72.5150 MHz -65 dBm

(AM) 127.1750 MHz -69 dBm

(NFM) 161.9850 MHz -71 dBm

(AM) 272.9500 MHz -71 dBm

(NFM) 406.8750 MHz -66 dBm

(NFM) 857.1500 MHz -64 dBm

(NFM) 1299.9250 MHz -58 dBm

Signal Noise Ratio (nominal)

VHF Low 1 Band

(AM) 25.0050 MHz 49 dB

(NFM) 40.8400 MHz 43 dB

VHF Low 2 Band

(WFM) 54.0500 MHz 53 dB

(FM) 72.5150 MHz 47 dB

(FMB) 107.100 MHz 60 dB

Aircraft Band

(AM) 127.1750 MHz 50 dB

VHF High 1 Band

(NFM) 161.9850 MHz 41 dB

(NFM) 173.2250 MHz 42 dB

(WFM) 197.4500 MHz 52 dB

VHF High 2 Band
(AM) 272.9500MHz 50 dB

UHF Band
(AM) 325.0500 MHz 50 dB

(NFM) 406.8750 MHz 41 dB
Public Service Band

(NFM) 758.0125 MHz 42 dB
(NFM) 857.1500 MHz 42 dB

1200 MHz Band
(NFM) 1299.9250 MHz 41 dB

Sensitivity (12 dB SINAD Nominal)
VHF Low 1 Band
(AM) 25.005 MHz 0.4 µV
(NFM) 40.840 MHz 0.3 µV
(NFM) 53.980 MHz 0.3 µV

VHF Low 2 Band
(WFM) 54.050 MHz 0.7 µV
(FM) 72.515 MHz 0.3 µV
(FMB) 107.100 MHz 0.6 µV

Aircraft Band
(AM) 118.800 MHz 0.4 µV
(AM) 127.175 MHz 0.4 µV
(AM) 135.500 MHz 0.4 µV

VHF High 1 Band
(NFM) 138.150 MHz 0.4 µV
(NFM) 161.985 MHz 0.3 µV
(NFM) 173.225 MHz 0.3 µV
(WFM) 197.450 MHz 0.6 uV
(NFM) 216.020 MHz 0.3 uV

VHF High 2 Band
(AM) 225.050 MHz 0.3 µV
(AM) 272.950 MHz 0.4 µV
(AM) 315.050 MHz 0.4 µV

UHF Band
(AM) 325.050 MHz 0.4 µV

(NFM) 406.875 MHz 0.3 µV

(NFM) 511.9125 MHz 0.3 µV

Public Service Band
(NFM) 758.0125 MHz 0.3 µV
(NFM) 806.000 MHz 0.3 µV
(NFM) 857.150 MHz 0.3 µV
(NFM) 954.9125 MHz 0.3 µV

1200MHz Band
(NFM) 1299.925 MHz 0.4 µV

Features, specifications, and availability of optional accessories are all subject to change without notice.

Specifications provided by the manufacturer.

form of digital transmission have been problematic for most digital scanner radios, and users had to resort to all sorts of antenna tricks to be able to receive only one of the simulcast trunked sites and get good digital reception. So far, my reception of simulcast trunked systems, both analog and digital, appears to be good. Conventional systems also seem to come in well with the Uniden radio, as with previous models. The Uniden scanners have always carried decent radio receivers on board, although they continue to suffer from some annoying pager images in the VHF federal bands. My hope is that someday the scanner manufacturers will move towards improving the radio receiver itself instead of offering additional features.

I can say that the experience so far with the Uniden BD536HP scanner has been a positive one and a definite learning experience, proving the idea that the more you use or do something, the easier it becomes. Even with reading the instructions and watching the demonstration videos, just taking control of the radio and doing things for yourself really helps you understand the radio and it's capabilities. Please don't let the early issues that some users reported steer you away from the radio. So far, Uniden appears to have a winner in the new BC436HP and BC536HP scanners.

For the latest updates and postings about these new Uniden radios, and to see what other scanner owners are finding with these new radios, be sure to visit the Uniden web site and check for updates here, **http://info.uniden.com/twiki/bin/view/UnidenMan4/BCD536HP.** Also check in on the scanner forum on the Radio Reference website, **http://forums.radioreference.com/uniden-forums. MSRP: $650, available for $600 at Universal Radio, a *TSM* advertiser.**

TSM

Six-foot dish with C-band LNB ready for action and looking at satellites over the Atlantic. From top: Maya-TV Honduras, Nepali-TV and RTPI, Portugal

C-Band Free-to-Air Satellite on a 6-Foot Dish

Mario Filippi N2HUN

(All photos courtesy of the author)

After several years of enjoying Ku-band Free-to-Air (FTA) satellite using a 39-inch motorized dish, I decided to see what adventures lay ahead in the C-band. Having a small budget to work with, and going it alone, the decision was to employ the services of a small, stationary C-band dish, specifically a six-footer. These are the least expensive and lightest of all the dishes to work with. They can also be shipped with the least expense since they come in several pieces, known as "petals."

After shopping around on the Internet, I was able to locate one on sale by Hypermegasat (**www.hypermegasat.com**), a top-notch supplier of FTA equipment that I've dealt with for several years. The cost of the dish, associated hardware, and shipping amounted to $164. The dish arrived within a few days in a surprisingly small and easily maneuverable cardboard box.

I entered into this project knowing full well that a six-foot dish was sub-optimal for C-band reception, and that an eight foot dish would perform better, but as I said earlier, this was a one-man operation and an eight footer would be too heavy and unwieldy for me to handle. Also, the cost of shipping an eight-foot dish would be considerably more. This was all taken into consideration prior to purchasing the dish.

Dish Assembly

Upon opening the box, the next step was to remove all the petals, mount, and assorted nuts and bolts and compare them with the instruction sheet to ensure that all the necessary parts were there. There were surprisingly few parts.

As per the instructions, the first step was to assemble the dish, which was done outside on my deck. A small coffee table was enlisted to aid in assembling the petals. The assembly of the dish was completed in a few hours with all the parts fitting very nice and snug. Since this was a stationary dish, an Az-El (Azimuth-Elevation) mount was included with the purchase and attached to the dish. The dish assembly was now complete, and assembly went smoothly and without a hitch. All parts needed for assembly were included, that's always a plus!

As was mentioned earlier, one of the reasons I chose a six-foot dish was because of the minimal weight. Fully assembled the dish weighs about 75 pounds, which is easily handled by a sawed-off runt like me who weighs in at 137



Six-foot dish in a box delivered to the author's house (left). Assembling the dish petals and mount on the dish using a flat outdoor surface (center). Setting the feed horn section of the LNBF focal length for optimum performance (right). (Photos courtesy of the author)

pounds! It was slightly unwieldy though, and due to several windy days the installation was postponed.

Selecting a Site, Anchoring the Mounting Pole

I was interested in reception of C-band satellites in the Atlantic region, namely those in longitudes from about 22° W to 61° W, satellites considerably to the east of the usual ones over the Continental U.S. (Conus) region. The site for mounting such a dish had to have an unimpeded view of those birds. My previous experience with mounting and using Ku-band dishes over the past several years came in handy in this respect, so the southeast corner of my property was chosen for mounting the pole.

Several plumbing and electrical supply houses were then visited to purchase a mounting pole, and initially the preference was for metal, but the weight and cost made me decide to use 3.5 inch Schedule 80 PVC which is about a third of the cost and much lighter and easier to maneuver.

Next, using a post-hole digger, a hole about three and one half feet deep was dug, with a few inches of gravel added to the bottom for drainage. Batter boards were then attached to the pole to keep it level as a few bags of concrete were poured into the hole. To add strength to the pole I filled it as well with concrete to the top then waited several days for it to cure. In the end, the pole was about three feet in the ground and about two feet above ground, more than enough to support the 75-pound dish.

Hoisting the Dish

Due to several days of high winds, mounting the dish to the pole had to wait longer than my patience would allow. Finally, a calm day and now time to mount the dish! Even a small six-foot dish, due to its' size, is very unwieldy and off-balance, but with a strong heave-ho I was able to lift it in one movement onto the mounting pole. Next, using a stepladder, the LNB arms, bracket, and LNB were attached to the dish. A final tightening of each bolt, nut, and screw was done to assure a tight assembly, followed by a light coat of spray auto polish to prevent wear and rust. The completed dish installation looked neat as a pin, and the installation so far proceeded with ease. I was in awe of such a large and beautiful dish.

Dish Tune-Up

As mentioned earlier, the C-band satellites of interest to me were located from 22° W to 61° W, as a majority of these carried international programming. As a longtime shortwave listener, a satellite dish brings the world to your living room much like a world-band radio, so there lay my xenophilic interests. After consulting several satellite locator tables, I decided to aim for a bird with a good signal to the lower 48 states and the greatest number of transponders and channels. SES-6 at 40.5° W was a good starting point with the added advantage of having circularly polarized signals, so no adjustment for skew was needed.

Using the tools of the trade, I assembled a compass, RG/6 coax, satellite meter, FTA receiver, and a small TV set at the dish, pointed roughly at an azimuth of 146 degrees. Note that MPEG-4 format is more prevalent on the C-band so an MPEG-4 capable receiver was used. Since the dish had no elevation scale, unlike smaller Ku-band dishes, it was basically a matter of trial and error at different elevations until a swing on the satellite meter signaled the presence of a SES-6.

Having had a wealth of experience at aiming smaller Ku-band dishes, only a short amount of time passed until SES-6 was received. Once the azimuth and elevation were optimized it was just a matter of adjusting the LNB for optimal focal distance. Proper adjustment of focal distance was accomplished by moving the LNB forward or backward in small increments while watching the TV screen. This was a little tricky since signals were greatly affected by standing in front of the dish while adjustments were made!

You may notice in my pictures that the LNB originally used was a dual Ku/C LNB, since that was all I had on hand at the time. However, I changed over to a C-band-only LNB that greatly improved signal strength. After checking with several individuals on various FTA forums, the consensus was that a C-band-only LNB is preferable when using prime-focus dishes (where the LNB is located in the center of the dish, supported by legs of equal length, as opposed to most Ku-

Author's six-foot C-band dish with circular LNBF, looking at satellites over the Atlantic region. Left from top: Hippodromo de San Isidro; Centro Missionario Bethesda; TV Cidade de Fortaleza.

band dishes that are offset-fed; the LNB is off to the side of the dish on a single support).

Satellite Reception Summary

As the old saying goes, "the proof is in the pudding," as evidenced by the photos on these pages. Please note, however, that my reception results reflect a period of the past six months at the longitude/latitude of my location in central New Jersey. You may fare better, or worse, than the author depending on your location.

My eastern-most satellite to date is SES-4 at 22W, a proud accomplishment (it's very low in the sky), but it yielded only one Portuguese-speaking channel from Brazil, along with a few non-FTA and one radio channel. SES-6 at 40.5 West brought in the most channels, perhaps due to the fact that it contains a whopping 70+ transponders!

A larger dish, eight-feet or, better yet, a ten-footer, such as those black, mesh dishes sold by the millions back in the 1980s and 90s, will fare much better. That's because not all transponders are equal power. My results included the easiest to receive transponders. A dish with better gain (large reflector size) will perform considerably better. Reflector surface accuracy also plays a role. My six-petal dish will not have the same surface accuracy as a one-piece, spun-aluminum dish of the same size, for instance.

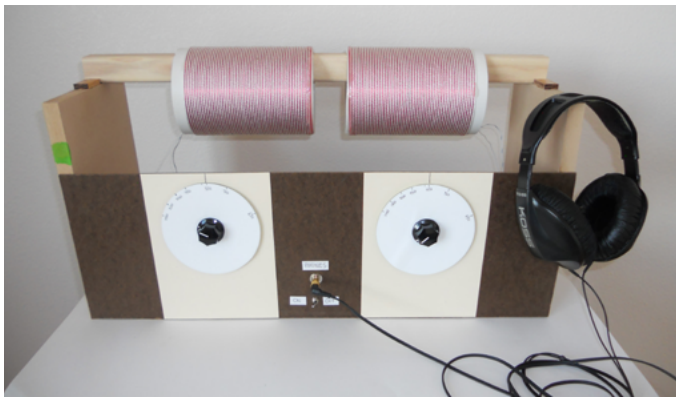
A Look Back and a Summary

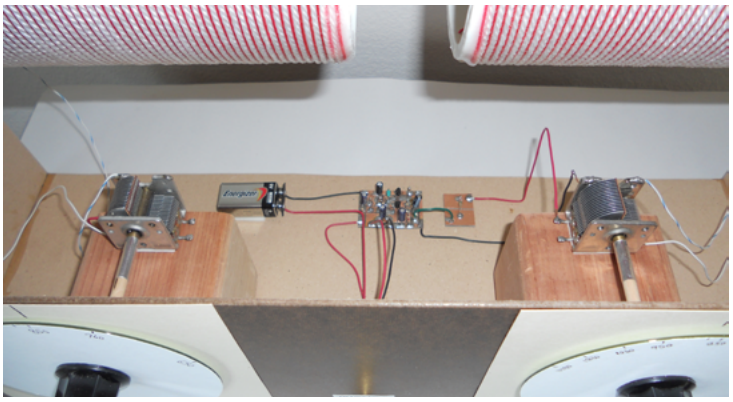
A few years back, I ventured into C-band reception using only a 39-inch Ku-band, offset focus dish with a dual C/Ku band LNB. That escapade brought a scant few C-band channels on only two satellites, but it whetted my appetite for further experimentation. When a reasonably priced C-band dish became available, I took the plunge. Throwing all caution to the wind, I purchased one, knowing the odds were stacked against enjoying C-band reception to the fullest.

My experience so far shows that while an entry-level dish may not perform as well as larger ones, it nonetheless allowed me to view channels from different areas of the globe that I could not receive on the Ku-band. The fact that it is stationary is also an advantage as I see it, because it forces one to practice aiming at satellites and keeping terms such as skew, azimuth, and elevation in your vocabulary.

As a former sport fisherman, satellite hunting has a lot of parallels. The dish is like a fishing rod and you are casting your line to a place 22,600 miles away to see what you can "catch." When you get a "nibble," *i.e.* from a swing on your satellite meter, you carefully "set the hook" *i.e.* by tweaking the Az-El parameters, then you are ready to "reel in" your catch. That's how it was done ladies and gentlemen! Good luck fishing!

TSM





Author's experimental AM/DX receiver outside view (left) and inside view (right) showing layout and placement of components. (Courtesy: the author)

Build this Experimental AM DX Receiver

James Kretzschmar AE7AX

Sometime in 1964 my father (SK KC5BVE) took me to a radio shop in Plattsburgh, New York and purchased for me a Philmore crystal radio. He had many stories of growing up in rural Iowa in the 1920s and listening with his crystal radio to KDKA 1020 kHz in Pittsburgh, Pennsylvania. Fortunately, I was able to have similar experiences with my crystal radio, however I never remember receiving anything other than local stations. Fast forward several years to the year 2001 and I entered the crystal radio building contest sponsored by the XTAL Radio Society … what a blast making the radio. I would read about something and the wheels would start turning in my head … let me try this, maybe if I adjust that, etc.

Advance the calendar to 2008 and I again entered a crystal radio-building contest, this time sponsored by the Birmingham Crystal Radio Group. With a 200-foot long wire antenna in the trees behind my house I was able to pull in 35 different stations from my location in Winston Salem, North Carolina, all with a 1N34 diode as the detector and a crystal (piezoelectric) earphone.

The receiver presented here is pretty much the same as my entry in 2008, except that I have added a two transistor audio amplifier that uses 8-ohm headphones. This was added for two reasons: one, because I really did not feel like straining to hear a faint station, and two, I think everybody can easily find 8-ohm headphones. The receiver is presented not as an "exact duplicate" project, but rather something to assemble and tinker with. Everybody will have different parameters such as geographic location, antenna, and proximity to local AM stations as well as parts variations; all of which can affect the performance. Perhaps you have had some ideas that you have wanted to try, and maybe this receiver will provide just enough motivation to get things going.

Referring to the pictures, the receiver consists of an inductor (coil) and variable capacitor that form a resonant circuit attached to the antenna which is coupled (variable) to another resonant circuit that is connected to a diode (detector) and audio amplifier. For the receiver's simplicity, it works remarkably well.

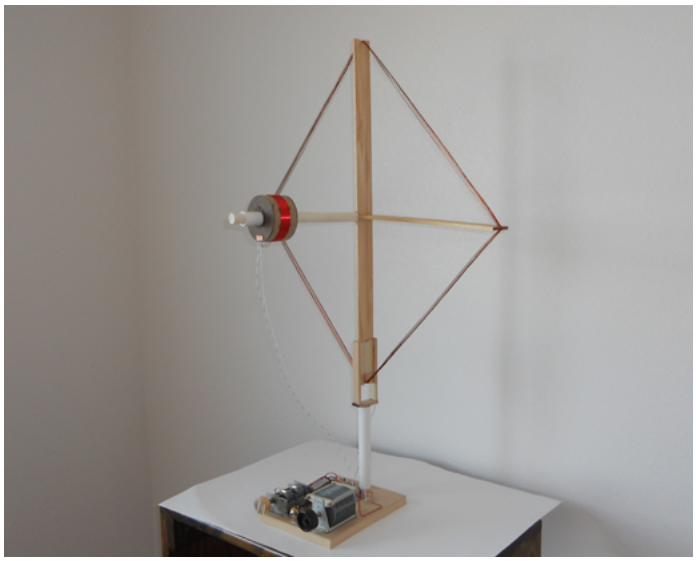
In the process of preparing this article I experimented with several inductors (coils). For each I strove to achieve 250 microhenries, this is because, when in parallel with the variable capacitor (365 pf), it will resonate pretty much across the entire AM band (530-1700 kHz). Another name for the paralleled coil and capacitor resonant circuit is called a tank circuit.

Some of the coils were close to the predicted inductance (using math formula #2) and others were a little lower than expected. The coils that worked the best were the ones I wound on 4.5 inch PVC pipe with 60 turns of #18 wire spaced the width of 1.5-mm diameter nylon cord. The inductance is about 180 microhenries, so if I were to rewind these coils I would add about five more turns.

I also experimented with some larger coils with #30 enameled wire; however, they did not perform as well. In general, the bigger the coil diameter and the larger the size of wire, the better the performance (selectivity and sensitivity) of the receiver. This has to do with a property of resonant circuits called "Q," and you want "Q" to be as high as possible.

In the references below I have listed a good website that will explain this concept, and give you some ideas on how to make your own coils. I did include the mathematical formula regarding "Q" so that you can see that the lower the resistance in your coils the higher the value of "Q" will be … a good thing.

Larger sizes of wire will have less resistance than smaller sizes. Because approximately 70 feet of wire is needed to wind coils this can be an important factor in keeping "Q" high. For example 1,000 feet of #30 wire has 103 ohms of resistance, versus #18 wire that has 6.3 ohms per 1,000 feet. Please refer to a copper wire table (Internet search) for details of resistance per 1,000 feet of other sizes of wire.



The receiver using a box loop antenna and pick up coil that can slide in/out. Although this looks real "cool," it did not work real well. One positive is that it is very directional.

The Math

1. Capacitor-Inductor (in parallel) Resonant Circuit:

$$F = \frac{1{,}000{,}000}{2\pi\sqrt{LC}}$$

F = Frequency (KHz)
L = Inductance (Microhenries ... uh)
C = Capacitance (Picofarads ... pf)
Pi = 3.14159

2. Inductance of a Single Layer Coil (approximate for an air-core coil)

$$L = \frac{D^2 N^2}{18D+40B}$$

L = Inductance (Microhenries ... uh)
D = Coil Diameter (Inches)
N = Number of Turns
B = Coil Length (Inches)

3. Q Factor (Inductor)

$$Q = \frac{X_L}{R}$$

Q = Quality Factor (no units)
R = Resistance (ohms)
X = Inductor Reactance (ohms)
X = 2(
(f=freq, L=Inductance)

NOTE: As the frequency increases … the Reactance and Q increases
As the resistance decreases … the Q increases

The Parts

For some reason, I can never throw away a good cardboard tube or piece of PVC pipe, because I know that eventually it will become a coil form for an inductor in some future project. If ever challenged with "Why?" you can say that you are re-purposing these otherwise pieces of trash, thereby doing your part for recycling. Good sources of wire are old transformers or motors … look inside thrown away televisions or microwaves. Many recycling businesses will sell copper wire at lower prices than you can buy at home improvement stores. Probably your best bargains for wire and variable capacitors will be a hamfest. Under References and Resources I have listed several websites where you can find parts.

Operation and Performance

My antenna is 100 feet of wire, about 15 feet high, going from the house to a small tree in the backyard and then back to the deck; a very modest antenna farm! However, this receiver has worked very well. So far, a few DX stations that have been heard at night have included WBAP 820 kHz in Fort Worth, Texas, KNX 1070 kHz in Los Angeles, California, and WGN 720 kHz in Chicago, Illinois. During the daytime I receive several stations from the local area, and even KOA 850 kHz in Denver, Colorado from my location here in Cheyenne, Wyoming. What has worked well in my set up is to first tune the resonant circuit of the detector to the frequency where you want to be, then adjusting the antenna resonant circuit for peak reception, and then adjusting the coupling between the coils. Remember this is an experimental receiver so there are lots of variables. Bottom line … have fun!

About the Author:

James Kretzschmar is a retired USAF general dentist and currently works part time for the Alaska Native Medical Center in Anchorage, Alaska, and for the Wyoming Air National Guard. He has been a licensed radio amateur since 1972 and holds an amateur Extra Class license. His interests include building anything electronic, mostly small QRP transmitters and receivers and tube stereo amplifiers. He considers himself a true amateur because he has no formal training in electronics … lots of reading and experimenting.

References and Resources (theory, parts, coil calculators, radio station lists)

1. American Radio Relay League 2003 Handbook

2. The XTAL Set Society, **www.midnightscience.com**

3. The Birmingham Crystal Radio Group, **www.crystalradio.net**

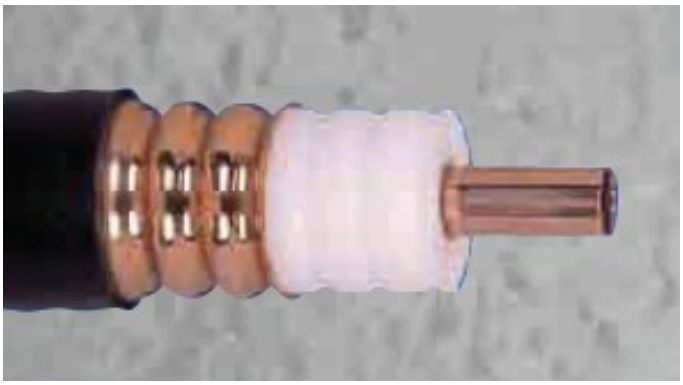
4. Crystal Radios, **www.crystalradio.net**

5. AM DX Information, **http://www.angelfire.com/wi/dxing**/

6. AM DX Information, **www.AM-DX.com**

7. Inductor Theory **http://www.kennethkuhn.com/students/crystal_radios/**

TSM



Cutaway of a section of RG-213 (left) shows the parts of a coax cable. (Courtesy of the author)

Andrew 7/8-inch hardline coaxial cable. (Courtesy: ABR Industries)

Unraveling the Mysteries of Coaxial Cable

By Mark Haverstock K8MSH

Coax has become a ubiquitous fixture in the radio and television world. Those of us who have scanners, transceivers, or shortwave receivers have come to use it as the universal pipeline between radio and antenna. It's convenient, fairly flexible, and can be run just about anywhere. The use of coax cable first became popular among hams and hobbyists after World War II, but the history of coax actually dates back to the 19th century.

In the mid-1800s, engineers had begun developing transatlantic cable communications. These early telegraph–and later telephone–cables were made of a center conductor, encased in a cylindrically-shaped insulator made from a rubber-like material called gutta percha–from the sap of a tree by the same name that grew in Malaysia. It was a great insulator and could withstand the pressures and cold associated with the ocean depths. At the time, these cables had no outer shield–the seawater surrounding them completed the return circuit.

These early cables worked for their transatlantic application, but bandwidth lagged behind needs. By 1920, these cables could handle about 100 Hz – not bad for telegraph, but it limited telephone communications that required much greater bandwidth and higher frequency response.

In 1929, two AT&T engineers, Lloyd Epenscheid and Herman Affel, developed the first broadband cable. Their cable was basically a hollow tube surrounding a center conductor, held in place with equally spaced washers with air as the dielectric. It wasn't really intended for telephone or radio use, but rather for transmitting audio and video signals–paving the way for TV transmission. The first major event transmitted by cable was the 1936 Olympic games, with the closed-circuit line running from Berlin to Leipzig, Germany. When World War II came along, military contractors cranked out coax for the war effort. The development of polyethylene changed everything: Polyethylene made possible the production of cheap, flexible coaxial cables, which in turn enabled the deployment of military radar–which helped win World War II. After 1945, hams could obtain military surplus cable cheaply. This is one of the main reasons that we use coax today; it became a popular trend in the post-war years among hams.

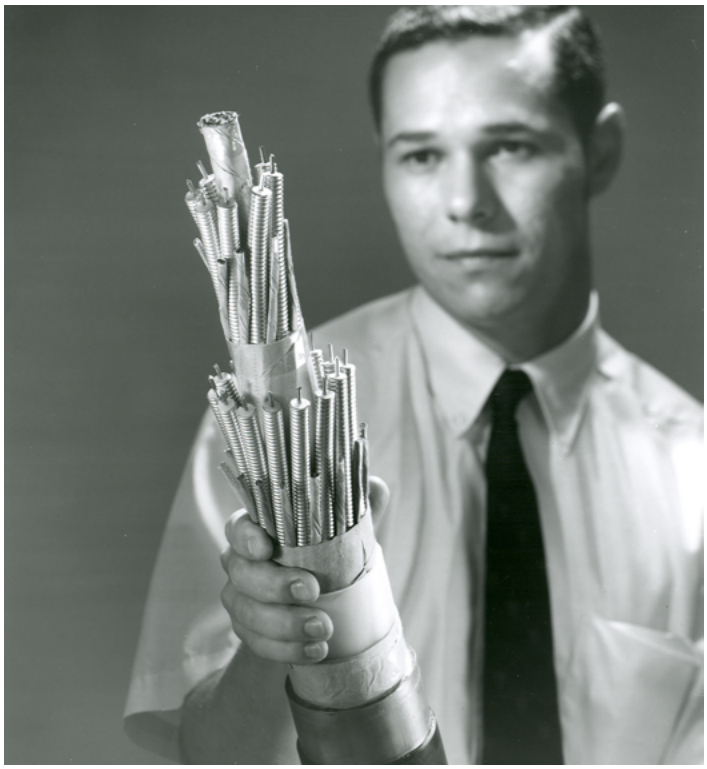
Fortunately, coaxial cable is no longer made from wire and tree sap. The basic composition includes (from inside to out) a solid or stranded conductor, dielectric, one or more layers of shielding, and a protective jacket.
Solid copper conductors are best used for permanent installations where they won't be bent or repeatedly flexed. Where more strength is required, solid steel covered with copper may be a better choice to prevent breakage. Stranded copper conductors are flexible, which makes them more suitable for antennas with rotors, patch cords, and other applications that require repeated flexing or tight bends.

The dielectric separates the center conductor from the surrounding material. Dielectric materials are chosen for their ability to maintain certain electrical properties and minimize signal loss. For example, PE, solid polyethylene, is good for low temperature applications. FPE, foamed polyethylene, has lower attenuation figures and capacitance than solid PE.

Shielding plays a dual role in coaxial cables. It not only protects signal loss, but also helps to prevent electromagnetic interference (EMI) and radio frequency interference. RG-8X cables use a single copper braid shield, while the similarly-sized LMR-240 uses both copper braid and foil. Other varieties like RG-393 use multiple foil and/or braided shields for better protection against interference.

Jackets provide protection from the elements and act as insulation. The jacket types used will depend on the installation environment. Flexible polyvinyl chloride (PVC) is commonly used on general-purpose coaxial products for indoor/outdoor applications. Polyethylene (PE) provides protection for underground/direct burial applications. Fluorinated ethylene propylene (FEP) has a

Coaxial cable inventors Lloyd Espenschied (left) and Herman A. Affel, examine sections of coaxial cable. AT&T installed the first coaxial cable for television use in New York City during 1936. (Courtesy of AT&T Archives and History Center)



Coaxial Cable, 22-Tube (exploded view), 1970. This coaxial cable carried up to 90,000 telephone calls simultaneously. (Courtesy of AT&T Archives and History Center)

wide temperature range from -50 to 200 degrees C and meets rigorous fire safety test standards for placement in plenums.

Hardline is another variety of coax cable constructed using round copper, silver or gold tubing or a combination of such metals as a shield. Center conductors are often fabricated of solid copper, or copper-plated aluminum. The dielectric in hard line may consist of polyethylene foam, air, or a pressurized gas such as nitrogen or desiccated air (dried air). In gas-charged lines, hard plastics such as nylon are used as spacers to separate the inner and outer conductors.

Typically, hardline is thicker than conventional cable, at least a half-inch up to several times that diameter, and has low loss even at high power. Hard lines are almost always used in the connection between a transmitter on the ground and the antenna on a tower–especially for VHF and UHF frequencies. Hard line may also be known by trademarked names such as Heliax (Andrew), or Cablewave (RFS/Cablewave).

The various shields used in hardline also differ; some forms use rigid tubing, or pipe, others may use a corrugated tubing, which makes bending easier, as well as reducing kinking when the cable is bent to conform. Some have PVC jackets, others don't.

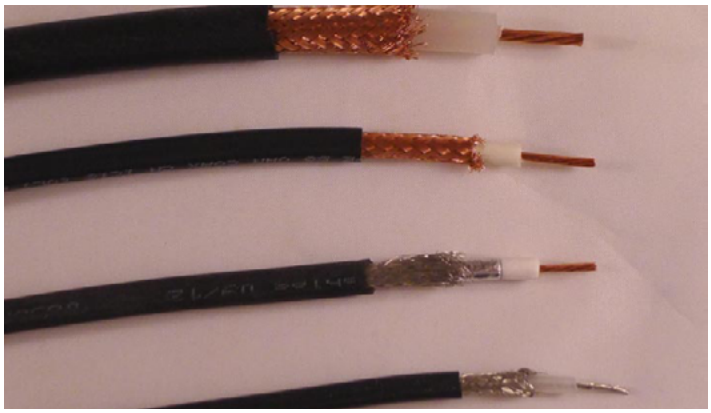
RG stands for "Radio Guide," which was the original military specification for coax cable. The number that follows the RG was just a page in the radio guidebook. In reality, these are just general descriptions of the types of cables available. Every manufacturer has their own variations, including differences in shielding material, insulation, outer jackets, and other traits. Transmission loss, power handling, and other specs will vary somewhat from one brand to another. So an RG-8 cable from one manufacturer may be different from that of another.

For example, the Belden 8214 version of RG-8 has an 11 AWG stranded center, with bare copper braid and an outside diameter of .403 inches. Yet the JSC 3020 version has a 13 AWG stranded center, bare copper braid, and an outer diameter of .405 inches. Loss figures and power ratings are similar, within a few tenths of a dB.

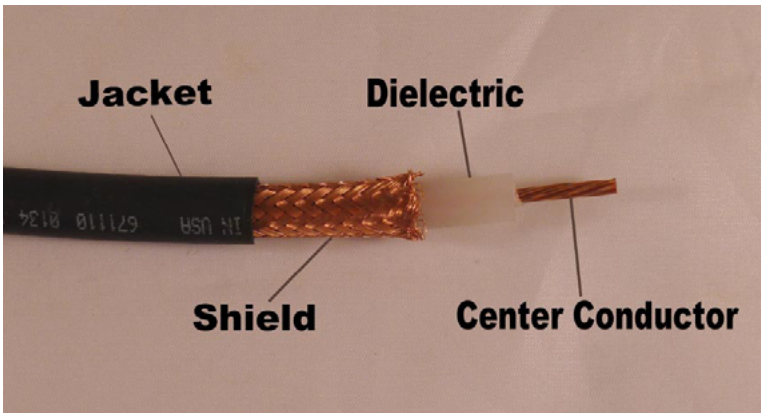
Military specifications (MIL-SPEC) have also changed. The current Mil Spec, MIL-C-17G, supersedes the old RG system. In addition, Times Cable has developed a set of naming specifications, based on its LMR series, using the actual cable diameter. LMR400 is actually 0.400 inches and LMR-240 is 0.240 inches, making them the same size as the old RG-8 and RG-8X cables. Their cables have additional foil shielding, making their larger diameter LMR cables a cost-effective alternative to low-loss hardline.

Sometimes, buyers can get lost in the comparison game. When scanning the spec charts, most of us instantly focus on attenuation (loss) figures, which are generally expressed in dB per 100 feet at a given frequency. Though these may be a deciding factor in choosing your cable, splitting hairs over a few tenths of a dB doesn't make much difference in real-world applications.

Let's say you have a choice between a moderate priced coax with 3db loss per 100 feet and some really expensive line with 0.1 db loss per 100 feet. Sure, it will give you nearly a 3db increase in signal strength to your antenna. But the difference of 3db won't be noticed by the station on the other end, whether it's around the block or around the world. They won't hear or see any signal



Moving from top to bottom of picture: exposed sections of RG-213, RG-8X, RFC-240, and RG-58 cables. Notice that RFC-240 has both aluminum and braided shields. (Courtesy of the author)



Cutaway of a section of RG-213 shows the parts of a coax cable. (Courtesy of the author)

difference on the S-meter at their end, and you probably won't notice the difference on your receiver.

A difference of 3 db or less between two varieties of coax probably isn't sufficient cause to spend more money– unless you're a perfectionist or have money to burn. But when the difference becomes greater than that figure, it may justify the effort and expense.

Power levels are also an important consideration, especially if you run an amplifier or continuous modes, such as AM or digital modes. Generally, the lower the frequency, the more power the cable will handle. For example, DX Engineering 400Max cable will handle 6.9 KW at 5MHz, 4.8KW at 10MHz, and 2.8KW at 30MHz.

What do You Really Need?

The type of cable you need depends on the following: frequency of operation, power level, length of cable you need (you need better cable if you have a long run, for instance) and whether the cable will be installed inside, outside, or buried in the ground. Another consideration: will the cable be subjected to frequent bending, such as a cable that connects to an antenna on a tower with a rotator?

Aside from impedance, which for most radio applications will be 50 ohms, the next important specification of coaxial cable you should consider is the attenuation for 100 feet of cable. The next critical parameter is the power handling. The environmental and mechanical specifications are also an important consideration, but not equally in all cases.

In the table on the next page, you will see that the attenuation per 100 feet for the smaller cables is generally much greater than for the other cables. So the smaller cables are OK for short runs, or for low frequency antennas. I typically use RG-8X for short interconnect cables inside the shack. At higher frequencies, such as 144 MHz and higher, the larger cables will always be a better choice.

Another fine point of the specs are the shields. For instance, cable with one 95% shield means that the shield covers 95% of the cable surface. That means that signals can get in and out of the cable though that 5%, and that increases the loss. High quality cable has two shields, with one being rated 100% because it usually is a foil that completely covers the insulation inside the cable, while an outside braid gives the cable better power handling.

Apply the old carpenter's saying to coaxial cable: measure twice, order once. For instance, if you need 50 feet from your radio to the antenna, make sure to measure the actual length you need, including bends and turns. You can easily underestimate up to 50 percent if you just measure the straight-line distance. It doesn't hurt to order a little extra, since it's easier to trim a cable than splice one. I typically order an extra 10%, with any leftovers going to making patch cables or doing mobile installations.

Right Cable, Right Application

The following are suggestions for using some of the most popular varieties of coaxial cable and their equivalents.

RG-6: This .332-inch OD cable is primarily used for CATV, satellite TV and video applications, but can also be an inexpensive solution for radio applications. It's readily available at home improvement stores, hardware stores, and electrical supply houses. The 75-ohm impedance is just about the ideal match for a 73-ohm flattop dipole and is a close enough match for most 50-ohm applications. Power ratings are comparable to RG-8X. Quality of this cable can vary significantly – be sure to choose brands that have sufficient shielding.

RG-58/58A: This flexible cable is about .195 inches OD with a single braided shield. It's typically used for lower power applications, short patch cords and mobile installations. The small diameter allows it to fit into tight spaces typically found in vehicles. Because of the relatively short distances involved in mobile installations, losses are minimal.

RG-8X/8mini: This .242-inch OD cable is extremely popular among the ham radio community primarily because it's super flexible, relatively low loss, and fairly inexpensive. It's good for patch cables and HF applications

Cable Losses dB per 100 feet (rounded to nearest tenth)

Type	Frequency (MHz) 5	10	30	50	100	150
RG-58	0.9	1.3	2.5	4.1	5.3	6.1
RG-8X	0.6	0.9	1.4	2.1	3.0	4.7
LMR-240	0.5	0.8	1.3	1.7	2.5	3.0
RG-213	0.4	0.6	1.0	1.5	2.1	2.8
RG-8U foam	0.3	0.5	0.9	1.2	1.8	2.2
Belden 9913	0.3	0.4	0.7	0.9	1.3	1.6
LMR400	0.3	0.4	0.7	0.9	1.2	1.5

-Values indicated are approximate and are for comparison only.
-Figures may vary slightly between brands of cable.

Typical Coaxial Cable Signal Loss in dB per 100 ft for Matched Loads

Freq.	RG-58	RG-8X	RG-8U	RG-6	RG-11
1 MHz	0.4	0.5	0.2	0.2	0.2
10 MHz	1.4	1.0	0.6	0.6	0.49
50 MHz	3.3	2.5	1.6	1.4	0.8

Note: If your feed line SWR is significantly higher than 1:1 (matched), losses will be much greater than those listed above.

up to 30MHz. RG-8X will handle 1 kW or more and is generally suitable for runs up to 100 feet. It's also acceptable for short runs on 144/220/440 MHz, especially in mobile applications. I've also find it useful for SWL and scanner antennas in runs of 100 feet or less.

LMR 240: This .240-inch OD cable is an improvement over 8X, adding foil shielding to obtain better loss figures. Size for size, LMR cables have the lowest loss of any flexible cable. The ultra-flex version is easier to work with, and is suitable for use with antenna and rotor combinations.

RG-213/RG-8: These .405-inch OD cables are best for high power use and providing low loss, especially for runs of more than 100 feet for HF use. The RG-8U foam dielectric has a slight edge over the solid dielectric RG-213 when it comes to losses.

LMR400: Though this cable is generally the most expensive of those listed, it provides some of the lowest attenuation figures of all the cables. The ultra-flex version is still pliable enough to use with antenna/rotor combos if you provide a generous bend radius. This is the preferred cable for VHF/UHF use, though it will work very well with HF. The larger diameter LMR600 is sometimes used in place of hard line if cost is a primary consideration.

Often cable choices are subjective, based on factors that don't appear in the specs. If you ask a group of hams, they'll all have different opinions of what cable to use and why – often based on availability, price, or what happens to be in the storage box in the basement.

As an example, a ham friend of mine runs 90 feet of Heliax to his 43-foot HF vertical in the back yard. Overkill? Probably. But he really likes to brag about the low losses he has – and he happened to get it for free. Another runs 100 feet of RG-58A to his G5RV dipole. For a few pennies more per foot, he could use RG-8X instead – but he doesn't. He works mostly low power digital HF modes, so it really doesn't bother him.

Cable Fast Facts:

Do cables degrade over time?

Coaxial cables deteriorate slowly over time and faster in bad conditions–such as outdoors where it can be exposed to harsh weather and UV light. When should you replace it? Consider installing new cable if there are obvious signs of wear, such as nicks or tears in the jacket or signs of water infiltration. Some experts recommend routine replacement every 5-10 years. Another good time to replace is when you're putting up a new antenna in place of another, rather than using the old cable.

How about using "bargain" cable?

As with most items, the old adage that "you get what you pay for" still applies. Cables made from quality materials will generally last longer, meaning less frequent replacement–important if you have to do some serious tower climbing to replace your cables. Buy the best you can afford and stick with a name brand, such as Belden, Davis RF, Times, DX Engineering and others sold by reputable dealers. Also, keep quality in mind when selecting connectors and hardware.

What does velocity factor mean?

The velocity factor is the speed at which an RF signal travels through a material compared to the speed this same signal travels through a vacuum. Typically, the cables with lower velocity factor are more lossy, but that's because they use solid insulation, instead of a low density foam or air with small spacers to keep the center conductor roughly "centered" inside the outer conductor. Velocity factor is also used in calculating wavelengths of cables for the purpose of matching or phasing antennas.

Coaxial line loss calculator:
http://timesmicrowave.com/calculator

About the Author:

Mark Haverstock K8MSH, an Extra Class licensee, became a ham in the 1960s and is active in ARES and the ARRL VE programs. He's the author of more than 500 fiction and nonfiction articles for publications including Monitoring Times, Boys' Life, Guideposts for Kids, National Geographic Kids and Popular Communications among others.

TSM

Scanning America

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

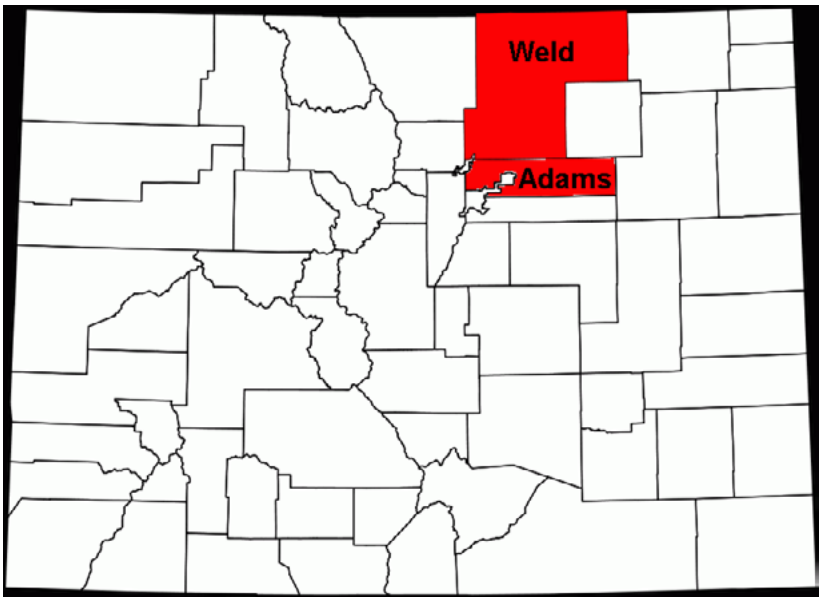
Scanning Adams and Weld Counties in Colorado

Although statewide public safety communications systems are commonplace, they do not always meet the needs of local communities that rely on their services. In Colorado, two counties have broken away from the State's Digital Trunked Radio System (DTRS), citing a lack of local control and concern that the system is not being properly maintained in their service area and will likely fail.

DTRS is managed by the Consolidated Communications Network of Colorado (CCNC), a non-profit corporation created in 2002 to represent the agencies and organizations using the system. The State of Colorado is a partner, along with other agencies, in DTRS but does not own the entire system.

DTRS has more than 200 repeater sites spread across four regional zones (Colorado Springs, Denver, Fort Collins and Grand Junction), operating on both 700 MHz and 800 MHz frequencies. There are currently more than 60,000 unique radio identifiers on the system serving hundreds of federal, state, local and tribal agencies.

Adams and Weld Counties formed the Front Range Communications Consortium (FRCC) via an inter-governmental agreement, giving them the ability to manage public safety radio resources for their respective regions, including costs, maintenance, and future upgrades.



Weld County

Weld County is located in northeast Colorado, on the border with Nebraska and Wyoming. It covers more than 4,000 square miles of relatively flat terrain and is home to about 250,000 people.

In February, the county opened the new $4 million Weld County Regional Communications Center (WCRCC), located on North 17th Avenue in Greeley. It provides dispatch and support services for more than 40 law enforcement, firefighting and emergency medical services agencies and employs more than 50 dispatchers.

Weld County has a number of active analog, conventional (non-trunked) frequencies that can be monitored by nearly any scanner:

Frequency	Description
153.7850	Weld County Fire (Dispatch South)
154.1450	Weld County Fire (North Dispatch)
156.2025	Greeley Public Works
453.1500	Greeley Fire (Paging)
453.3000	Greeley Mobile Data Computers (MDC)
453.5500	Greeley Mobile Data Computers (MDC)
453.7875	Weld County Jail
453.8500	Weld County Board of Co-op Edu Services
461.4500	Weld County School District 6
463.0500	Northern Colorado Medical Center (MEDCOM 3)

Adams County

Adams County is located just to the south of Weld County and is home to more than 440,000 people in an area of about 1,200 square miles. It is immediately north of Denver and is home to the Denver International Airport (International Air Transport Association code: DEN).

Adams County is a pioneer in implementing the next generation of public safety wireless communication called Long-Term Evolution (LTE).

A 2012 federal law created the First Responder Network Authority (FirstNet), an independent organization tasked with the establishment and operation of a public safety broadband network. Current public safety radio systems are considered narrowband, meaning that they carry voice and low speed data on relatively narrow channels. A broadband network has the capability of carrying high-speed data, enabling applications such as live video transfer and image database access. First-

Net is the license holder for a large chunk of contiguous spectrum in the 700 MHz band and hopes to cost-share the billions of dollars necessary to build such a broadband network by fostering partnerships with cellular and wireless companies. The idea is to allow commercial providers access to the 700 MHz spectrum, enabling feature-rich commercial services they can sell at a profit. In exchange, public safety agencies would make use of the commercial infrastructure, such as cell sites and switching centers, thus avoiding the expense of building out a system just for themselves.

Last December, Adams County secured a lease agreement for the use of 700 MHz broadband spectrum from FirstNet, allowing them to move forward with a demonstration LTE network for public safety. The new network will enable 2,000 first responders to test equipment and features from about 18 repeater sites located around the county in a real-world environment. Adams County has a diverse mix of urban, suburban and rural populations that offers a useful variety of demonstration scenarios. Performance results learned here would be used in future broadband systems across the country.

Search and Rescue

Adams County is subject to a variety of severe weather events that can jeopardize citizen safety. Rampart Search and Rescue is a non-profit organization of 55 trained search and rescue (SAR) volunteers operating in Adams and Morgan Counties under the authority of the respective County Sheriffs. They perform a variety of rescue and assistance activities, often in inclement weather and difficult terrain. They make use of a number of analog frequencies to coordinate operations.

Frequency	Description
47.48	Search and Rescue (Low Band)
151.1600	Dispatch (Squaw Mountain)
155.1600	Mutual Aid
155.1750	Tactical 1
155.2050	Tactical 2
155.2200	Tactical 3
155.2350	Tactical 4
155.3400	Medical Mutual Aid
155.5725	Administration
155.6925	Tactical 5
460.0625	Adams County Emergency Operations Center
460.0875	Storm Chasers
851.012	Adams County Sheriff

Front Range Communications Consortium

The Front Range refers to an area of eastern Colorado bordering the foothills of the Front Range Mountains. The area includes some of the most populated areas of the state, including

the cities of Denver, Boulder, Fort Collins and Loveland. Both Adams and Weld Counties intend to remain members of the Consolidated Communications Network of Colorado (CCNC) but are committed to independent operation via the FRCC. Other jurisdictions, including Douglas and Jefferson Counties, are reportedly examining the FRCC as a more flexible, responsive and cost-effective solution to their public safety needs.

The FRCC has purchased and now operates an APCO Project 25 voice and data system from Motorola. Included with the system is an ISSI 8000 (Inter-RF Subsystem Interface), allowing direct interoperability with other P25 systems, including members of CCNC and the Denver Metro Area system. This ensures that agencies with mutual aid agreements will continue to communicate effectively and allows the sharing of talkgroups between systems. The ISSI has interfaces for three P25 systems and each interface is capable of supporting ten simultaneous communications.

For systems where RF coverage does not overlap, the FRCC is able to support "roaming" users as part of a previously established agreement.

The FRCC network is a so-called "pure" P25 system; meaning that all voice traffic is digital and the control channel follows the APCO 9600-baud standard rather than the older proprietary Motorola 3600-baud method. The system is composed of numerous repeater sites, each with a set of dedicated frequencies. Many of these sites were moved from DTRS. For instance, in Weld County the repeater sites providing Weld County Simulcast, Southeast Weld (Prospect Valley), Tri-Area, New Raymer, Grover and Nunn have been be moved out from the CCNC and integrated into the FRCC System

Adams County Repeater Sites
Adams County Simulcast
770.10625, 770.35625, 770.60625, 771.10625, 771.48125, 771.73125, 772.15625, 772.48125, 772.73125, 772.74375, 772.98125 and 772.99375 MHz.

Bennett
770.11875, 770.36875, 770.61875 and 772.49375 MHz.

Hoyt
770.61875, 771.11875, 771.49375, 771.74375 and 772.16875 MHz.

Weld County Repeater Sites
Weld County Simulcast
851.0375, 851.2375, 852.4000, 852.7250, 853.1375, 853.3125, 853.5750, 856.3875, 857.3875, 857.8375, 858.8375 and 859.8375 MHz.

Fort Lupton
770.25625, 771.00625, 771.25625, 771.54375, 771.84375, 772.09375, 772.39375, 773.16875 and 773.41875 MHz.

Grover
852.1500, 852.7125, 853.1750 and 853.8750 MHz.

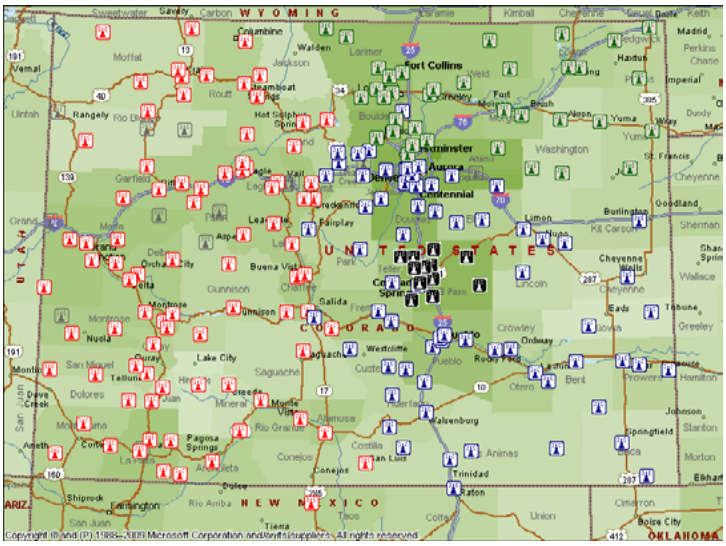
Keensburg
771.53125, 771.83125, 772.08125, 772.38125, 773.15625 and 773.40625 MHz.

Nunn
851.2500, 851.9125, 852.3125, 852.9000 and 853.3750 MHz.

Raymer
851.2750, 851.4500, 851.9750, 852.4750 and 853.6250 MHz.
The FRCC system has a large number of talkgroups, assigned to county and local agencies.

Decimal	Hex	Description
6	006	North Metro Fire (Dispatch)
7	007	North Metro Fireground
8	008	North Washington Fire (Dispatch)
9	009	North Washington Fireground
10	00A	North Metro Fire (Administration)
11	00B	Thornton Police (Dispatch)
12	00C	Thornton Police (Car-to-Car)
13	00D	Thornton Police
14	00E	Brighton Police (Dispatch)
15	00F	Brighton Police (Car-to-Car)
16	010	Brighton Police
17	011	Commerce City Police (Dispatch)
18	012	Commerce City Police (Car-to-Car)
19	013	Commerce City Police
20	014	Northglenn Police (Dispatch)
21	015	Northglenn Police (Car-to-Car)
22	016	Northglenn Police
23	017	Adams County Sheriff (Dispatch)
24	018	Adams County Sheriff (Car-to-Car)
25	019	Adams County Sheriff Tactical
26	01A	Federal Heights Police (Dispatch)
27	01B	Federal Heights Police (Car-to-Car)
28	01C	Adams County Sheriff Records
29	01D	Thornton Fire (Dispatch)
30	01E	Thornton Fireground Alpha
31	01F	Brighton Fire (Dispatch)
32	020	Brighton Fireground
33	021	Adams County Fire (Dispatch Southwest)
34	022	Adams County Fireground (Southwest)
35	023	Adams County Fire (Dispatch South)
36	024	Adams County Fireground (South)
37	025	Federal Heights Fire (Dispatch)
38	026	Federal Heights Fireground
39	027	Bennett Fire (Dispatch)
40	028	Bennett Fire Fireground
41	029	Strasburg Fire (Dispatch)
42	02A	Strasburg Fireground
53	035	Adams County Mutual Aid
55	037	Adams County District Attorney
107	06B	North Metro Drug Task Force
168	0A8	Statewide EMS Mutual Aid Channel
420	1A4	FRCC Mutual Aid (North 1)
421	1A5	FRCC Mutual Aid (North 2)
422	1A6	FRCC Mutual Aid (North 3)
423	1A7	FRCC Mutual Aid (North 4)
424	1A8	FRCC Mutual Aid (South 1)
425	1A9	FRCC Mutual Aid (South 2)
426	1AA	FRCC Mutual Aid (South 3)
427	1AB	FRCC Mutual Aid (South 4)
1900	76C	Greeley Police (Dispatch)
1901	76D	Greeley Police (Channel 2)
1902	76E	Greeley Police (Channel 3)
1903	76F	Greeley Police (Channel 4)
1904	770	Greeley Police (Tactical 5)
1905	771	Greeley Police (Tactical 6)
1906	772	Greeley Police (Administration)
1907	773	Weld Countywide Fire (Dispatch)
1908	774	Weld County Fire Fireground 2 (Greeley)
1909	775	Weld County Fire Fireground 3 (Eaton)
1910	776	Weld County Fire Fireground 4 (Windsor)
1911	777	Weld County Fire Fireground 5 (Ault-Pierce)
1913	779	Weld County EMS (Dispatch)
1914	77A	Weld County EMS Operations 1
1915	77B	Weld County EMS Operations 2
1916	77C	Weld County Fire Fireground 23
1919	77F	Weld County Fire Fireground 11 (La Salle)
1920	780	Weld County Fire Fireground 12 (Mtiew)
1921	781	Weld County Fire Fireground 6 (Evans)
1922	782	Weld County Fire Fireground 7 (Nunn)
1923	783	Weld County Fire Fireground 8
1924	784	Weld County Fire Fireground 9 (Hudson)
1925	785	Weld County Fire Fireground 10 (Fort Lupton)
1926	786	Weld County Inter-agency 1
1927	787	Weld County Inter-agency 2
1928	788	Weld County Inter-agency 3
1930	78A	Weld County Sheriff (Dispatch)
1931	78B	Weld County Sheriff Tactical 1
1932	78C	Weld County Sheriff Tactical 2
1933	78D	Weld County Fire Fireground 20 (Pawnee)
1934	78E	Weld County Sheriff Channel 4
1937	791	Weld County Fire Fireground 21 (Raymer)
1938	792	Weld County Local Police (Dispatch North)

1939	793	Weld County Local Police (Ops North)
1940	794	Weld County Local Police (Tactical)
1941	795	Weld County Fire Fireground 16
1942	796	Weld County Fire Fireground 17
1943	797	Weld County Fire Fireground 18 (Galeton)
1944	798	Weld County Sheriff (Operations)
1945	799	Weld County Local Police (Operations So.)
1946	79A	Weld County Local Police (Dispatch So.)
1947	79B	Weld County Mayday
1948	79C	Weld County Inter-agency 4
1949	79D	Weld County Inter-agency 5
1950	79E	Weld County Inter-agency 6
1951	79F	Weld County Emergency Operations
1952	7A0	Weld County Emergency Operations
1953	7A1	U of Northern Colorado Police (Dispatch)
1954	7A2	Evans Public Works
1955	7A3	Weld County Fire Fireground 19 (Briggs)
1956	7A4	Weld County Fire Fireground 13
1957	7A5	Weld County Fire Fireground 14
1958	7A6	Weld County Fire Fireground 15
1959	7A7	Weld County Human Services (Transport)
1960	7A8	Fort Lupton Police
1961	7A9	Keenesburg School District
1963	7AB	Weld County Fireground 22
2000	7D0	Weld County Law Enforcement (All Call)
2286	8EE	Fire Mutual Aid (Denver Metro Northeast)
2287	8EF	Police Mutual Aid (Denver Metro NE)
2288	8F0	Fire Mutual Aid (Denver Metro SW)
2289	8F1	Statewide EMS Mutual Aid-1
2290	8F2	Police Mutual Aid (Denver Metro NW)
2291	8F3	Statewide EMS Mutual Aid-2
2295	8F7	Fire Mutual Aid (Denver Metro NW)
2296	8F8	Police Mutual Aid (Denver Metro SW)
2297	8F9	Fire Mutual Aid (Denver Metro Southeast)
2298	8FA	Police Mutual Aid (Denver Metro SE)
2358	936	Fitzsimmons Police (Dispatch)
2360	938	Fitzsimmons Police
4000	FA0	Mutual Aid Channel 1 (Denver Metro)
4001	FA1	Mutual Aid Channel 2 (Denver Metro)
4002	FA2	Mutual Aid Channel 3 (Denver Metro)
4003	FA3	Mutual Aid Channel 4 (Denver Metro)
4020	FB4	Mutual Aid Channel 21 (Statewide)
4072	FE8	Thompson Valley EMS (Administration)
4073	FE9	Windsor Fire (Dispatch)
4074	FEA	Windsor Fire
4121	1019	Sable and Altura Fire (Dispatch)
4122	101A	Adams County Technical Services
4123	101B	Adams County Sheriff (Jail)
4124	101C	Adams County Sheriff (Courts)
4125	101D	Adams County Sheriff
4126	101E	Commerce City (Special Events)
4127	101F	Thornton Police (Car-to-Car)
4128	1020	Thornton Police
4129	1021	Thornton Fire Fireground Bravo
4130	1022	Thornton Police (Special Events)



Colorado public service repeater sites.

4131	1023	Adams County District 14 (Buses)
4132	1024	Adams County District 14 Schools
4133	1025	Thornton Road and Bridge
4134	1026	Thornton Trash and Recycling
4135	1027	Thornton Parks and Recreation
4136	1028	Thornton Neighborhood Services
4137	1029	Adams County District 12 Schools (Security)
4138	102A	Adams County District 12 (Buses)
4139	102B	Adams County District 12 Schools (Maintenance)
4140	102C	Adams County District 12 Schools
4141	102D	Adams County District 12 Schools (NW)
4142	102E	Adams County District 12 Schools
4143	102F	Adams County District 12 Schools (South)
4144	1030	Adams County District 12 Schools
4145	1031	Commerce City Police (Special Ops)
4146	1032	North Washington Fire Department (Training)
4147	1033	Adams County District 12 Schools (Buses)
8161	1FE1	Statewide Hospital Mutual Aid
9001	2329	Greeley Fire (Dispatch)
9011	2333	Tri Area Ambulance District
9012	2334	Weld County Road and Bridge (Asphalt)
9013	2335	Weld County Road and Bridge (Mining)
9014	2336	Weld County Road and Bridge (Truck-to-Truck)
9015	2337	Weld County Road and Bridge
9016	2338	Weld County Road and Bridge
9017	2339	Weld County Road and Bridge
9018	233A	Weld County Public Works (Plows)
9019	233B	Weld County Public Works
9024	2340	Xcel Energy Fort Saint Vrain Power Plant
9025	2341	Xcel Energy Fort Saint Vrain Power Plant
9056	2360	Rampart Search and Rescue

9113	2399	Mountain View Fire Department 1
9114	239A	Mountain View Fire Department 2
9540	2544	Mountain View Fire Department 3
9541	2545	Mountain View Fire Department 4

New York National Weather Service

As a follow-up to our report in this column last month, there is still no resolution to the interference problems related to the National Weather Service (NWS) transmitter in New York City, which remains out of service. Management has apparently given up trying to remedy the situation directly and is planning to move the transmitter to another location that presumably will no longer generate interference on marine VHF channel 16, which is monitored by the U.S. Coast Guard and used primarily for emergencies and vessels in distress.

PUBLIC INFORMATION STATEMENT
NATIONAL WEATHER SERVICE NEW YORK NY
504 PM EST FRI FEB 21 2014

...NOAA WEATHER RADIO NEW YORK CITY REMAINS OUT OF SERVICE...

THE NOAA WEATHER RADIO TRANSMITTER THAT SERVES THE NEW YORK CITY METROPOLITAN AREA CONTINUES TO CAUSE RADIO FREQUENCY INTERFERENCE ON THE U.S. COAST GUARD CHANNEL 16 TRANSMITTER FOR INTERNATIONAL DISTRESS...SAFETY AND RESCUE.

THE NEW YORK CITY NOAA WEATHER RADIO TRANSMITS ON A FREQUENCY OF 162.55 MHZ WHICH IS VERY CLOSE TO THE U.S. COAST GUARD CHANNEL 16 BROADCAST FREQUENCY.

AFTER MANY MONTHS OF TROUBLESHOOTING... WE ARE UNABLE TO ISOLATE THE SOURCE OF THE INTERFERENCE PROBLEM. THEREFORE WE ARE PLANNING TO RELOCATE THE TRANSMITTER. RELOCATION WILL TAKE AT LEAST SIX MONTHS.

IT IS IMPORTANT TO NOTE THAT DURING THIS TIME...NOAA WEATHER RADIO WILL BE TURNED ON TO BROADCAST LIFE SAVING WEATHER WATCHES AND WARNINGS.

THIS INCLUDES WATCHES AND WARNINGS FOR TORNADOES...FLASH FLOODS...AND SEVERE THUNDERSTORMS, INCLUDING SPECIAL MARINE WARNINGS. THESE BROADCASTS WILL ENSURE DISSEMINATION THROUGH THE EMERGENCY ALERT SYSTEM...WHICH IS CARRIED BY THE BROADCAST MEDIA.

WE WILL PROVIDE UPDATES ON THE STATUS OF THE NEW YORK CITY NOAA WEATHER RADIO TRANSMITTER THROUGH PUBLIC INFORMATION STATEMENTS AS MORE INFORMATION BECOMES AVAILABLE.

More information is available on my web site at **www.signalharbor.com**, and I welcome your comments, questions and reception reports via email to dan@signalharbor.com.

TSM

Federal Wavelengths

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

Super Bowl XLVIII Scanning Report

The biggest football game of the 2013 National Football League season was scheduled to take place in East Rutherford, New Jersey on February 2, 2014 and the preparations for the big game had a lot of people concerned about more than the usual problems of security and crowd control. For the first time in many years, the NFL had awarded the Super Bowl game to a city with an outdoor stadium in a cold climate region of the country, and unfortunately for those of us who were working at the stadium, the weather did play a role in getting ready for the big game. Luckily, the winter storms that swept through the northeast United States provided a small break just in time for Super Bowl Sunday.

As with past Super Bowl games, this event was designated as a National Security Special Event, which usually puts the Department of Homeland Security in charge of security preparations. The Secret Service is usually the lead agency as far as event security planning, with the Justice Department and the FBI heading up counter-terrorism and intelligence for the event. More information on a National Security Special Event can be found at these web pages:

http://en.wikipedia.org/wiki/National_Security_Special_Event

http://www.secretservice.gov/nsse.shtml

Despite the fact that the federal government usually takes the lead role for Super Bowl, this game involved many local and state law enforcement agencies. Even though the game itself was being played in New Jersey, there were Super Bowl related events at numerous locations in Manhattan in New York City, and at several locations in Northern New Jersey. This required a number of common communications gateways for all the different police agencies and federal agencies to keep in touch.

As I wrote in the March Federal Wavelengths column, achieving interoperability between local, state and federal agencies in an event such as the Super Bowl is a large task for the various agencies. In this case, the various agencies appeared to have a large number of patched channels that provided good communications connectivity between the various cities, state agencies and federal agencies involved with the Super Bowl.

Set up to tune in. The author's portable listening post. (Photo by Chris Parris)

There were quite a few VHF and UHF statewide interop channels that were tied together with some New Jersey State Police 700 MHz and 800 MHz trunked-system talk groups, as well as some federal interoperability channels. The federal interop frequency of 167.7875 MHz was tied-in to at least one other local public safety channel and, in the days prior to the Super Bowl, multiple check-ins were heard on quite a few statewide and federal channels that had been linked together. Be sure to check out the **National Interoperability Field Operations Guide** (NIFOG) and keep those frequencies handy for events such as this. You might not hear much on a day-to-day basis, but when things get busy, these frequencies will get busy as well!

As it has done for the past six years, my day job of television broadcasting engineer found me on location at MetLife Stadium for two weeks prior to the big game. I was there as a technical manager, supervising facilities for the broadcasters carrying the game to countries outside the United States. It involved running a lot of cable, parking a lot of TV mobile units and mobile satellite uplinks, checking fiber optical cable paths, making sure equipment gets delivered as needed, and this year, making sure the snow and ice didn't ruin our day.

I arrived in East Rutherford on January 20 and came loaded with a larger than usual cache of radios. I normally carry three hand-held radios in my backpack as I travel the country for work. This time I brought two base model scanners and two additional wide-band receivers. I hoped to explore more of the radio spectrum this year than in past events. Our hotel was located only a short drive to MetLife Stadium, so after getting my bags unpacked, I proceeded to set up and program a few scanners in my hotel room. Because we were situated in the metro New York City area, scanning this event had some challenges.

For the first week on scene, I mainly monitored the normal

Customs and Border Protection (CBP) over-flight of NYC. (Courtesy: DHS CBP)

Multi-channel monitoring can be a little complicated. (Photo by Chris Parris)

federal channels that are busy in the northern New Jersey and New York City areas. New York City typically has quite a few federal radio frequencies that are busy nearly every day. Trying to sort out what were normal, day-to-day federal radio operations from special operations for the Super Bowl was sometimes a challenge.

One agency that was busy many days prior to Super Bowl Sunday was the Department of Energy (DoE). They were on location and flying over the area with specially equipped DoE helicopters. In this case, it was a Bell 412 helicopter with specialized radiation mapping equipment. The idea is to map the normal radiation patterns in the NYC area so they can compare that baseline information to see if anything unusual was detected during the time around the game. The DoE bird was seen and heard flying over a large area around the stadium, as well as over northern New Jersey and New York City itself.

Helicopters were seen almost constantly during the week prior to the big game, and a whole fleet of military helicopters provided the flyover for the national anthem. The New Jersey State Police provided aircraft to cover the team bus motorcades. Coast Guard HH-65 Dolphin helicopters made several passes around and over the stadium. Customs and Border Protection Office of Air and Marine had at least three helicopters in for the event, including two UH-60 Blackhawks in from the Detroit area. As with past events, there were many OMAHA call signs heard, leading me to believe the call signs are assigned to the pilots or crews and not with the aircraft.

As with past Super Bowls, this game featured a Combat Air Patrol (CAP) flight of F-16 fighters to enforce the no-fly zone around the stadium during the game. The New Jersey Air National Guard 177th Fighter Wing, call sign DEVIL, would be providing the fighters. They scheduled a rehearsal event for the fighters to interface with CBP helicopters and other air assets around the area of the stadium, so I left my scanners going in the hotel room with various CBP, Coast Guard and NORAD military frequencies running. Sure enough, around 04:20 AM on January 30, my radios awoke me. The scenario appeared to be CBP helicopters intercepting a Civil Air Patrol Cessna aircraft flying along the Hudson River between New York and New Jersey. They used 260.9 MHz and 123.1 MHz for some of the communications, checking that the NORAD Eastern Air Defense Sector HUNTRESS, the CBP helicopters and the fighters could talk to each other.

After the "test" for the New Jersey Air National Guard jets, there were several media reports on how the jets would be on stand-by for the big game, but would not fly unless needed. However, just as the afternoon turned into evening at the stadium, we started hearing the fighters checking in with HUNTRESS on 260.9 MHz right over the stadium. Airborne tankers using the NATION call sign provided aerial refueling during the game. And, fortunately, it was a quiet evening as the Seattle Seahawks defeated the Denver Broncos.

Here are the frequencies I was able to log from my monitoring positions at MetLife Stadium and my hotel room near by. As with all the logs posted in this column, all frequencies are in Megahertz (MHz) and narrow-band FM unless otherwise noted. Besides each frequency will be a designation of the tone squelch used, either Continuous Tone Controlled Sub audible Squelch (CTCSS) or Digital Coded Squelch (DCS). If the frequency was logged as P-25 digital, it will show the Network Access Code (NAC). No tone or NAC are designated as Carrier Squelch (CSQ).

136.3750, AM – Customs & Border Protection (CBP) – aircraft common
140.1000, AM – NJ Air National Guard DEVIL flight
140.7000, AM – NJ Air National Guard DEVIL flight
162.3250, N293 – US Coast Guard NET 111
162.6375, N167 – Federal Bureau of Investigations (FBI)
162.6625, N678
162.7500, N167 – FBI
162.8500, N9C5 – Immigration and Customs Enforcement (ICE)
162.9125, N069 – ICE Nationwide (repeater in)
163.1125, N272 – ICE National TAC
163.6500, N024 – ICE
163.8625, N167 – FBI
163.9875, N167 – FBI
164.0250, N167 – FBI
164.1000, N001 – Possible US Secret Service
164.3500, NE07 – Department of Energy (DoE)
164.6500, N001 – US Secret Service TANGO
164.7375, N653 – NYC Federal Interop – input to 167.7875 MHz
164.8875, N001 – US Secret Service OSCAR
165.2125, N001 – US Secret Service MIKE
165.2375, N301 – CBP

165.2875, N650 – Bureau of Alcohol Tobacco Firearms & Explosives (BATFE)
165.3750, N001 – US Secret Service CHARLIE
165.4875, N301 – CBP VACIS
165.5125, N001 – Possible US Secret Service
165.5625, N767
165.7375, N301 – CBP
165.7875, N001 – US Secret Service BAKER
166.2000, N001 – Possible US Secret Service
166.4000, N001 – US Secret Service GOLF
166.4375, N325 – CBP - input to 165.2375 MHz
166.4625, N167 – FBI Federal Common
166.4625, N301 – CBP Federal Common
166.4625, CSQ – CBP VACIS – radio checks
166.7000, N001 – White House Communications Agency (WHCA) NOVEMBER
167.3625, N167 – FBI
167.4625, N207 – FBI - Special Operations Group
167.5375, N167 – FBI
167.5625, N167 – FBI
167.6375, N167 – FBI NYC A-10
167.7875, N653 – NYC Federal Interop
168.2250, N167 – FBI
168.3750, N167 – FBI
168.7625, N167 – FBI
168.8250, N167 – FBI
168.8375, N293 – CBP - AIR 1
168.8875, N167 – FBI
168.9125, N935
169.1625, N293 – CBP - AIR 4
169.3000, N001 – Transportation Security Administration (TSA)
169.4500, N301 – CBP - NET 2
169.6000, N169 – ICE
169.6250, N167 – FBI
169.6500, N4F9
169.7250, N864
169.9750, N167 – FBI
170.0000, N003
170.3750, N167 – FBI
170.4500, N167 – FBI NYC H5/H6
170.6250, N167 – FBI
170.9875, N611
171.0750, N325 – CBP
171.2500, N069 – Immigration and Customs Enforcement (ICE) Nationwide
171.4625, N24F
171.5500, N167 – FBI
171.6875, N293
171.6875, N9C5 – Immigration and Customs Enforcement (ICE)
171.7250, N159
172.1500, N001 – Transportation Security Administration (TSA)
172.1875, N167 – FBI
172.5000, N369 – TSA - VIPR Operations
172.5250, N167 – FBI
172.6625, N615
173.0000, NE07 – Department of Energy (DoE)
173.6625, N167 – FBI NYC A1/A2
260.9000, AM – Combat Air Patrol (CAP) TAC 1 - from Atlantic City ANG
282.3000, AM – Air Traffic Control with Combat Air Patrol DEVIL flight
316.3250, AM – Helicopters in National Anthem flyover of MetLife Stadium
407.6625, N421 – Federal Emergency Management Agency (FEMA)
407.7250, N482 – US Postal Inspection Service (PIS)
408.2000, N270 – Federal Protective Service (FPS)
409.3375, N293 – Unknown, possibly Emergency Ordinance Disposal (EOD) Teams
412.9750, N293 – US Coast Guard NET 409
418.3375, N293 – Unknown, possibly Emergency Ordinance Disposal (EOD) Teams
418.9750, N156 – Drug Enforcement Administration (DEA)

A few notes about some of the frequencies I logged and listed above:

136.3750 MHz, AM – This is the CBP Office of Air and Marine VHF channel, often referred to as the "Company" channel by CBP pilots. This time, not only were the CBP aircraft using it, but the New Jersey State Police helicopters as well. It ended up being a default VHF common channel for all the law enforcement air operations around the stadium.

163.1125, N272 – ICE National TAC 1 - I heard a number of references to either other channels or agencies here, including FAM1 and FAM2 (FAM is short for Federal Air Marshal).

167.5375 & 167.5625 MHz, N167 – These are nationwide common FBI channels. Both were heard with what appeared to be patches to other state or local interoperability channels at the stadium. One patch was to the NJSP dispatcher covering the stadium itself.

169.3000, 172.1500, N001 – These are standard TSA frequencies found at most airports across the country, but it appeared that the TSA might have had a repeater set up at MetLife Stadium. Several check-ins were heard and references to a command center. I was too far from Newark airport (EWR) for these frequencies to be coming from there.

172.5000, N369 – This appeared to be a repeater for the TSA Visible Intermodal Prevention and Response (VIPR) teams. Since this event relied heavily on rail and public transportation to get people to the stadium, the presence of the VIPR teams makes sense. There were numerous radio checks with various VIPER units over several days prior to the big game. One operator referred to this channel as "Five-thousand." You can read more about the VIPR teams here: **http://www.tsa.gov/about-tsa/visible-intermodal-prevention-and-response-vipr**

Fed Files Website

I have finally had time to launch my personal web site dedicated to federal monitoring, **http://thefedfiles.com**. It is only in the early stages, but I have been able to post links to many federal monitoring resources and I am working on a way to share frequency lists, scanner data files, audio files, pictures and more. Keep checking back and I will keep you updated on the progress of the web site here in the Federal Wavelengths column, on the Fed Files blog page (**http://mt-fedfiles.blogspot.com**) and on Twitter, **@TheFedFiles**.

TSM

Utility Planet

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

Taiwanese Navy: The Strange Tale of "AIRPLE"

The Republic of China, generally referred to as Taiwan, has one of the world's most puzzling high frequency (HF) Automatic Link Establishment (ALE) networks. It's used by the navy and has been heard worldwide. Many listeners have heard it and wondered what was going on. Well, it's just standard military communication, though it's done in somewhat unfamiliar ways. In fact, it's done in rather odd ways.

For a start, it's usually, though not always, in lower sideband (LSB) instead of the far more common upper sideband (USB). Several other agencies use LSB, but this is the only one that seems to switch back and forth. If there's any pattern to this, no one has found it.

Furthermore, it will always go to USB for follow-on communication. This uses the MIL-STD-188-110A serial digital modem, called 110A for short. To the ear, this sounds like a continuous hiss.

Unlike the more commonly heard STANAG 4285, which has a similar sound, 110A exposes its signal parameters to the receiving station. The listener does not need to guess these. Like STANAG 4285, it's generally encrypted. On amateur equipment, which is being pushed to its limits here, both decode best with strong signals.

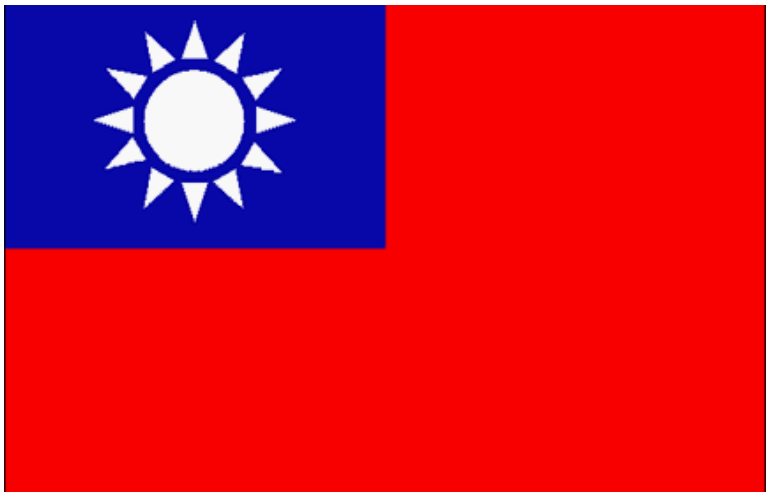
But most of what's heard is just plain old second-generation ALE. The relevant standard for this one is MIL-STD-188-141A, and its successors and is easily decoded by computer programs for most platforms.

All of the ALE addresses (station identifiers) on this net are six characters in length. For technical reasons relating to the design of the ALE protocol, six is a popular length, as are three and nine.

After that, things get a bit weird. All but one of the addresses are English words, or character strings hacked from these. All but one start with the letter "A." The odd one out is DL00001.

There's a certain fascination with the word "Apple." Maybe the guy who programmed all this liked his iPhone, or maybe it just sounded good. Anyway, listeners have copied APPLEF and APPLE2, along with various weird mashups like AIRPLE and APHALE.

Other known addresses include the following: ABACUS, ABDUCT, ABJECT, ABLAZE, ABOARD, ABOUND, ABROAD, ABSURD, ACACIA, ACCEDE, ACCENT, ACCEPT, ACCESS, ACTUAL, ADJUST, ADMIRE, ADROIT, AFFECT, AFFORD, AGHAST,



Flag of Taiwan

AIRGUN, ALLUDE, AMBUSH, AMOUNT, ANSWER, ANTENN, ANYHOW, ANYWAY, APPEAL, APPEAR, ARIGHT, ARTIST, ASLANT, ASSAIL, ASSURE, ASTYRE, ATTEND, AWHILE, AWNING, and AZALEA.

Known frequencies, in kilohertz (kHz), are the following: 7657, 7762, 7993, 8051, 8777, 8895, 9169, 9202, 9392, 10180, 10660, 10754, 11180.5, 14349, 14350, 14420, 14919, 16000, 17460, 17470, 17480, 16180, and 18035.

Obscure Radio Beacons

A friend once wrote that she loved these columns, but they had way too much stuff about "obscure radio beacons." This might have been true. However, one never knows when today's obscure radio beacon might turn out to be guarding tomorrow's important military ops frequency.

There really are people who DX these. They have web sites, clubs, and everything. Beacons are fun to chase because most of them transmit continuously. There's no waiting. One either has propagation, or one does not.

For the same reason, weak beacons make great propagation indicators. The ten-meter amateur band has a huge number of low-powered stations using continuous wave (CW) with on-off keyed Morse. These live from about 28150 to 28300 kHz. They come from just about everywhere.

Most of these just repeat their call sign. The calls are usually easy to find with Google, or more specialized ham databases. Some also transmit their grid square, which can also be searched online. A few send their city in plain text.

While these beacons are licensed, plenty of others aren't. HiFERs are High-Frequency Experimental Radio, using

Sea-based VSAT system for ships at sea; part of Inmarsat services. (Courtesy: Inmarsat)

extremely low power and electrically tiny antennas. They are therefore legal for unlicensed operation on certain frequencies.

A number of U.S. HiFERs are found between 13554 and 13565 kHz. All are CW, and most are using a very slow mode called QRSS. The name is a play on QRS, the international procedural signal for "send more slowly."

They do just that, and then some. Their speed is measured in minutes per word rather than words per minute. Each dit or dah is several seconds long, eliminating the problem of fading taking out parts of characters. Various computer programs can deal with QRSS.

Jack Metcalfe, an experienced listener in Kentucky, recently heard one in straight Morse, around 5 words per minute. It's MTI, Stone Mountain, GA, on 13557.5.

Other CW beacons are just plain unauthorized. They're louder than the HiFERs, and they get reported from all over North America.

Most are in the Southwestern U.S. They have simply been left way out in secret desert locations, far from roads and people in general. Some have been transmitting for years.

One of these is coming out of the speaker here right now. It's on roughly 4079.65 kHz CW, sending Morse for "TMP," followed by its internal temperature in degrees Fahrenheit. It gets hot and cold out there.

Another is the "wind beacon" on approximately 4102.28 CW. It's also audible here right now. It sends Morse "W" (didahdah) followed with a series of beeps generated by a simple anemometer. It also gets windy out there, and the beeps speed up when it does.

It's all good, nerdy fun.

No More Globe Wireless

Globe Wireless, the one-time maritime communications giant in the United States, has ceased to exist. Its acquisition by London-based Inmarsat became final in January of this year. The sign over the door of its Florida headquarters has been replaced by an Inmarsat sign, and the web site now goes straight to Inmarsat's.

Inmarsat logo (Courtesy: Inmarsat)

Globe, which started in California as KFS World Communications, became well known for acquiring many of the coastal stations that everyone had come to know and love. As single entities, these had become unprofitable in an age of satellite comm.

Globe was really sailing against the tide here, but they did find a niche for HF radio. The stations were gradually merged into one global digital network. It successfully offered large cargo vessels a turnkey alternative to expensive satellite time for certain routine communications.

This network was then itself integrated into Globe's overall offering, which by then also included Inmarsat and Iridium satellites. Products included various imaginative services with trademark names like Touch the Ship. These did very mundane, but necessary, services for real, professional seafarers.

Globe is said to have generated $91 million in revenue last year. Still, rumors circulated regarding its search for a buyer. In stepped the aforementioned Inmarsat Global Limited, a much larger private company.

The history here is interesting. Originally, Inmarsat referred to the International Maritime Satellite Organization. This was a non-profit international group. It was set up by the International Maritime Organization of the United Nations to implement the switch to space-based communication.

As Inmarsat grew, it was privatized, spinning off what was left of the regulatory body. It became a publicly traded corporation, which grew through acquisitions and product expansions. Along with ships, its customers now also include aircraft, governments, and satellite comm users in general.

According to Inmarsat CEO Rupert Pierce, as quoted on floridatoday.com, Globe's technical expertise will be valuable in the rollout of its new Global Xpress system. This uses a new generation of Ka-band satellites.

No one knows where HF fits into all this. While demand for the service still exists, often satisfactory shore station equipment does not. All seven U.S. calls have been transferred to an unknown entity, perhaps a spin-off or a holding company. Stay tuned for more information.

More VHF Skip

The VHF (Very High Frequency) low band has been crackling with long-haul F2-region skip since 2014 began. Since this solar cycle is comparatively weak, the skip is weak

too. However, it's there.

Recent logs show daily activity from 30 megahertz (MHz) up to around 34 MHz most days. On a couple of occasions, a few weak signals have popped in and out as high as 38 MHz. This, though, is really the exception.

At this editor's monitoring location in Southern California, most signals have come from the traditional places heard every solar maximum. These are in the Midwestern, Mid-Atlantic, and Northeastern regions of the United States.

This is consistent with normal F2 propagation on this band. The optimum distance is typically around 2100 miles. On a good day, the skip zone starts to fill in a little, with Texas and the southern U.S. becoming audible.

The best catch here has to be the U.S. Army on 30450 kHz. "Victor Bravo Range Control" was conducting radio checks with a number of firing ranges at Ft. Hood, in Texas. All of the names checked out on publicly available lists, and the operator mentioned a secondary frequency of 38300 kHz. This was referred to as the "Lifesaver Net."

The most satisfying catch, however, was on 33900 kHz. For months, time stamps and content identified it as a fire department dispatching center in a semi-rural U.S. area. The band between about 33.2 and 34 MHz is full of these. They disappear, one by one, as newer radio systems replace them. Fortunately, enough are still around to make the band interesting.

This one uses 2-tone pages. These resemble the selcals heard on HF aircraft channels, only with higher audio frequencies. Their piercing, full-modulation tones will wake up the listener at any hour. However, they are designed to wake up receivers at small volunteer fire departments.

Unfortunately, the ear-melting sine waves are all that get through most of the time. The voice is there, but nearly always unintelligible.

The reason is technical. Radios on these frequencies typically use narrow-band frequency modulation (FM). It sounds great with strong signals on local, line of sight paths. Unfortunately, F2 skip can really tear it up. This gets especially bad when fading is present, which it nearly always is.

Voice intelligibility goes away fast. Names of obscure U.S. townships turn into worse grunge than anything the Cuban Babbler ever sent. Welcome to never-never land.

The breakthrough on 33.9 came after one of this winter's many snow storms. A series of fire department dispatches referred to a building collapse at a broadcasting station.

No matter how many times one played, equalized, processed, analyzed, and generally massaged the recorded voice, it sounded like the dispatch was to a station with call letters of "WBAL." This is AM 1090 in Baltimore, MD, but nothing else checked out to support that as a location.

The next morning, Cable News Network's typically over-the-top "Catastrophic Storm" coverage just happened to include video of a roof giving way under snow at a studio used by a station with call letters WGAL. No injuries, but it put the station off-air for the night.

Bingo! THAT one came back to TV Channel 8 in Lancaster, PA. A quick trip to Radioreference.com and FCC listings made it obvious that the skip signal was KGC755, the county fire and emergency medical dispatch. Mystery solved.

Radioreference and FCC data also identified a mysterious beep on 31760 kHz. This is a 600-Hz tone around half a second long. It blips away, at regular intervals, any time the skip is in.

Those who really get into this stuff just love mysterious noises on the radio. They're a challenge, arousing considerable speculation. Imagination runs wild. Maybe it's a channel marker for some outlaw revolutionary group, or a forgotten Cold War relic in some icy region.

No such luck. It was only WXY630, a remote base station at a West Virginia coal mine. Occasionally, voice traffic can be heard, and it has the beep. Otherwise, the sound is almost certainly some kind of malfunction.

This kind of detective work is what makes VHF skip, and much of utility monitoring in general, so compelling. It has certainly become a lot easier now. At one time, the only license reference was a blurry microfiche kept in FCC field offices. Today, one becomes almost drunk with power.

Honestly, now, isn't this more fun than Netflix?

TSM

Digital HF: Intercept and Analyze

By Mike Chace-Ortiz AB1TZ/G6DHU mchaceortiz@gmail.com

Eavesdropping on Egyptian Diplomatic Communications

The majority of the world's diplomatic communications have long since moved from the shortwave bands to satellite, secure private networks and some, doubtless, the Internet.

The Egyptian Ministry of Foreign Affairs (MFA) however, has remained a fixture on HF for at least three decades and still presents an excellent target for listeners eager to branch out into the world of digital decoding. The majority of its communications can be intercepted with readily available and inexpensive or free software.

From MFA to Embassy

The Egyptians use three methods of communication between the MFA in Cairo and its outlying embassies. The most common system used is the 16-channel, high-speed 9001 or 3012 model modem manufactured by Australian company Codan. This modem can move data at up to 6000 bps, and is one of the fastest error-free modems on the air today that can still fit within a 3 kHz bandwidth radio channel. These modems also use a slower 80 bd PSK waveform called Chirp that is used to establish the link between MFA and embassy, determine whether or not encryption is to be used, switches on data compression, and centers the sender and receiver on the same frequency to within a few Hz of each other. Both the modem and Chirp are a long, rough sounding buzz.

Only the high-end decoders from Hoka, WaveCom and go2 are capable of decoding the high-speed modem and the Chirp, but the free Sorcerer software can decode Chirp which will at least identify for you which embassy is in communication with the MFA. The majority of data sent using the Codan modem is encrypted, but sometimes faxes and other messages are sent in the clear.

Operator chatter after the Codan modem traffic and some less urgent or smaller messages are still sent using SITOR-A, a low speed FSK ARQ (Automatic Repeat Request) system using 100 bd with 170 Hz shift. SITOR-A has a very distinctive and rhythmic "chirp, chirp, chirp" sound with around 2 chirps per second.

In an ARQ system, stations alternate quickly between sending a few characters of data, including enough information to detect errors, and waiting for the receiving station to acknowledge successful receipt or ask for a repeat. In the case of SITOR-A, this all happens in a 450 ms cycle. The Codan modems also operate in ARQ mode but the sending bursts are often 5 or 10 seconds long and vary in length as conditions change, getting longer on good quality links, in what is called an adaptive system.

Also frequently used is SITOR-B, closely related to SITOR-A but designed for broadcast use rather than point-to-point and is a FEC (Forward Error Correcting) system. SITOR-B also sends data at 100 bd and with a shift of 170 Hz and is a continuous signal.

FEC systems transmit additional information along with the data sent that allows the receiver to correct a reasonable number of errors. As you might imagine, there's a delicate balance in FEC systems between sending enough error correcting information to fix most errors and getting a message through in reasonable time. The Egyptians use SITOR-B mainly for asking the MFA or an embassy to move to a different frequency. SITOR-A and B are supported by many decoders including MultiPSK, Multimode, fldigi and all the higher-end packages. Since the maritime NAVTEX system also uses SITOR-B, any decoder supporting that mode will also decode the Egyptian traffic.

Which End is Which?

Cairo and the embassies usually employ split-frequency or duplex operation. This means that the MFA and embassy are on different frequencies, usually separated by a couple of megahertz. As you might expect, if you are listening to the receiving end of a SITOR-A or Codan link in the process of being sent a long message, you won't see anything print in your decoder, because all you're hearing is the short "OK, next data please" or "No good, repeat please" part of the process.

In this case, you either wait on frequency for the link to change over to sending mode, or hunt for the sending frequency. Once you find both ends, if your radio has two independent VFOs that can receive simultaneously, you can place the sending channel in one and the receiving channel in the other and hear both the data burst and the answering "please repeat" or "OK, next please" burst.

Where to Tune?

The great thing about the Egyptians is that they are on the air every day except most Fridays, work almost around the clock and use hundreds of channels from 4 MHz to 24 MHz, which means that you are almost guaranteed to

find them. The downside is that there's no set schedule and the channels used on any day are often different, so some tuning around is usually required. Here's a list of channels that have been used frequently over the past months between the hours of 0700 and 1900 Eastern Time:
7777, 9045, 9077, 9225, 9227, 10171, 10222, 11033, 14505, 14444, 16028, 16033, 16140, 16222, 16225, 16333, 16355, 18025, 18035, 18471, 18910, 19055, 19066, 19345, 19643, 19652, 18925, 20035, 20085, 20100, 20136, 20173, 20333, 20900, 22666, 22866 & 22966 kHz

Note that these are USB (dial) frequencies. Codan modem data and Chirps are sent with a +1500 Hz offset and SITOR-A and B with a +1700 Hz offset. Any software capable of decoding the Codan traffic will usually automatically select +1500 Hz offset since that is the manufacturer's standard and generally not changed by users, but you will probably need to manually set any SITOR-A or B decoder to the correct center frequency of +1700 Hz.

What You'll Hear

When using Codan Chirp to establish links, five digit identifiers are used. MFA Cairo uses 99901 to 99910 and each embassy has its own identifier. For example, 33309 is Lagos and 11107 is London. These identifiers are direct translations of the four letter selcall identifiers when using SITOR-A for link set-up, which are SSxx for MFA Cairo and TVxx or KKxx series for the embassies. Dr. Ralf Kloth's website has a handy tool for converting between the two systems. A complete list of embassy identifiers and selcalls is much too long to reproduce here, but is available at the UDXF website.

SITOR-A and B data is sent using a special alphabet called ATU-80, designed to carry Arabic instead of English text. There is a one-to-one correspondence between regular characters and ATU-80 characters, so it is possible to "translate" the Arabic into English. Again, most common words and the translation of city names has already been done and is available on my profile page at Utility Monitoring Central.

Here's a typical example of an ATU-80 telex from Embassy London "yphkg dgmg" and MFA Cairo "bkfqsr kdakrfr":

```
yfasr   faj   44/25          0381
42/1/2991
jg   yphkg   dg-----mg
kds   bkfqsr kdakrfr    jwkhy    qjkor
klflysr   z. klflyk  ofysr
      nakusr    jodljkh  yphkg // jlpwl .
kdfskx .
```

A distinctive off line encryption scheme using hexadecimal encoding is also frequently seen as in this example between Military Intelligence Cairo "71" and Embassy Sanaa, Yemen:

```
from : 71
to   : sanaa
time & date: 14:07, wednesday, december
02, 2009
number of groups:   124
urgent
001aa 89612 0069e 51c6d e4091 35103
de4d5 18445 85500 7832e
14010 10057 ad60c d7be1 47f9b c9e51
c6de4 09135 10391 35103
```

And here's an example of a common "please change frequency" message sent using SITOR-B:

```
mfmfmfmfmfmfmfmfmfmfmfmfmfmfmfmfmfmfm

 hjkj kbs  jjwg ezgfuwj ods  02211
02211   02211    02211  ky ky
```

In this case the embassy is being asked to tune to 11220 kHz USB, Arabic numbers being sent backwards when using ATU-80. As with most messages, the operator signs off with the typical "ky ky" or "bye bye".

Digital Digest on Kindle

Thank you to the many readers who have already purchased annual compilations of columns from Digital Digest, the predecessor to this column from the pages of *Monitoring Times*.

The 2013, 12, 11 and 2010 anthologies are priced at $3.99 each, with 2009 at $2.99 and can be found on *TSM*'s Bookshelf on page 80. Amazon provides a free application allowing these electronic books to be read on just about any desktop computer, tablet or smartphone.

Shortwave Utility Logs

Recent HF Utility Logs Compiled by Mike Chace-Oritz and Hugh Stegman

Frequency	Callsign	User, Location	Time	System Details	Last Heard
2187.50	NMG	U.S. Coast Guard, New Orleans	0627	DSC safety test with 311923000, vessel *Apollon* (C6UI4)	2014-02-15
5552.80	Unknown	Mexican Navy, Rosarita	1749	USB Tadiran, 1-kHz beeps, with autolink and voice	2014-03-19
5687.00	DHM91	German Air Force Transport HQ, Muenster	1515	USB working aircraft GAF712	2014-02-25
5714.00	Unid	Possible French Navy	1515	USB, coordinating RTTY exchanges	2014-02-27
6604.00	New York	New York Volmet, NY	0205	USB, malfunctioning; all data items said as missing	2014-02-19
6685.00	Korsar	Russian Air Force, Pskov	1730	USB, working 76686, an IL-76, in Russian	2014-02-25
6685.00	86825	Russian Air Force IL-76	1845	USB, departing Kedr (Bryansk), in Russian	2014-02-26
6685.00	76749	Russian Air Force IL-76	1923	USB, calling Davlenie (Taganrog), in Russian	2014-02-26
6690.00	Magic 56	NATO E-3	1546	USB, working Station 66, unknown	2014-03-05
6715.00	Halifax Milit	Canadian Forces, NS	2002	USB, Rescue 337, a CC-130H	2014-02-28
6911.50	CLS***	U.S. Army, Ft. Campbell, KY	0533	ALE sounding	2014-02-25
7515.00	Unknown	Mexican military	1810	USB, 1-kHz beep & voice, Tadiran autocall on 7514 & 7513	2014-03-19
7527.00	COE***	U.S. Army Corps of Engineers, Mobile, AL	1611	ALE, calling MV4	2014-03-10
7549.00	M050IN	Michigan National Guard	2035	LSB ALE, sounding	2014-03-08
8050.00	DKB***	U.S. Army, Ft Bragg, NC	0339	ALE sounding	2014-02-27
8090.00	Nabor	Russian Strategic Forces	1309	USB, Russian "Bear Net," working 45971, also ID "Shpora"	2014-03-13
8090.00	26913	Russian Strategic Forces	1902	USB "Bear Net," working 45973, in Russian	2014-03-13
8131.00	Balans	Russian Air Force, location unknown	1911	USB, working 09151, in Russian	2014-02-28
8417.50	XSV	Tianjin Radio, China	1345	CW ID in Sitor-A burst marker	2014-02-06
8816.00	9***	Russian Air Defense	1438	CW tracking string: single-figure ID, time stamp, null data	2014-02-26
8888.00	Syktykvar	Russian VOLMET	1533	USB aviation weather in Russian	2014-03-02
9025.00	OFF9X***	U.S. Air Force, Offutt AFB, NE	0500	Unknown entity, sounding in ALE	2014-02-28
9295.00	B5Z159	U.S. Army 5-149th Aviation, Ft. Eustis, VA	1729	ALE sounding	2014-03-05
9303.50	AAR6IN	U.S. Army MARS	1947	USB, closing net	2014-03-08
9316.50	TFAVTN***	U.S. Military, aviation?	1949	ALE, calling KY, also on 11608.5	2014-03-08
11175.00	Croughton	U.S. Air Force, UK	1225	USB, patching Reach 65 to weather office for Norway wx	2014-03-10
11175.00	Offutt	U.S. Air Force, Offutt AFB, NE	1435	USB, patching ECONOMIC for orderwire traffic	2014-03-16
11181.00	Lisboa	Portuguese Air Force, Lisbon	1210	USB, calling aircraft AFP, in Portuguese, no joy	2014-02-27
11193.00	Moscow Rad	Long Distance Operational Control, Russia	1224	USB, company patch in Russian regarding maintenance	2014-03-13
11205.00	Ascot 6666	UK Royal Air Force aircraft	1506	USB, calling Tascomm, who replied, but no joy	2014-03-05
11354.00	Priboj	Russian Naval Air Transport, Moscow	1407	USB, working 47524, a Navy AN-26, in Russian	2014-02-25
11354.00	Toulouse Te	Airbus, Toulouse Blagnac, France	1419	USB, selcal check DJ-DM, raised "1703," in French	2014-03-05
11360.00	76795	Russian Air Force IL-76	1406	USB, calling Korsar and Davlenie, in Russian	2014-02-25
11360.00	Klarnetist	Russian Air Force, Tver	1248	USB, working 76599, an IL-76, in Russian	2014-02-27
11360.00	Proselok	Russian Air Force, Bryansk	1602	USB, working 76533, in Russian	2014-02-28
11360.00	Chkalovsij	Unknown Russian Air Force	1603	USB, working 78830, in Russian	2014-03-02
13569.50	MEXICALI**	Unknown joint exercise, location unknown	1540	ALE wkg TIJUANA, also on 17478.5	2014-03-10
14665.00	RAMA 31	U.S. Air Force aircraft	2000	USB, possible air refueling with RAMA 32; went to 6761	2014-03-18
16047.00	DAR***	Australian Military HF Comm System, Darwin	1202	ALE sounding	2014-03-05
18003.00	OFF***	U.S. Air Force, Offutt AFB, NE	1920	ALE, calling CGNET1 (unknown)	2014-03-07
18030.00	Korsar	Russian Air Force, Pskov	1112	USB, Russian to 76613, IL-76 departing Chkalovskij	2014-03-13
18030.00	Korsar	Russian Air Force, Pskov	1230	USB, calling Uprava (unknown), in Russian	2014-03-07
31000.00	WPCK809	Preston County Board of Education, WV	1921	FM, "Bus Garage" working drivers	2014-02-24
32250.00	Unid	U.S. military, unknown range control	2030	Wideband FM, usual range coordination traffic	2014-03-10
33560.00	KGC755	Lancaster County Fire/EMS, PA	2124	FM, wkg Ambulance 31 and Sheriff 35, NE fireground	2014-03-17
33600.00	KGC755	Lancaster County Fire/EMS, PA	2121	FM, home receiver paging, tones and dispatches //33.9	2014-03-15
33640.00	KGC755	Lancaster County Fire/EMS, PA	2046	FM, working Engine 801, identified as "Lancaster County"	2014-03-08
33700.00	KGD869	Somerset County, PA	2235	FM dispatches, sent to North-1 (33.84), Central-1 (33.9)	2014-03-15
33700.00	KGH706	Westmoreland County 911 Center, PA	2136	FM, male reading winter storm warning for snow	2014-03-15
33720.00	KGC755	Lancaster County Fire/EMS, PA	2100	FM, 1 kHz tone Morse ID, S. and E. county fireground	2014-03-17
33780.00	KTG669	Allegany County Fire/EMS, MD	2336	FM, EMS dispatch for King First Responders, ID at end	2014-03-01
33820.00	KCO372	Calvert County, MD	2109	FM, dispatching units to a vegetation fire.	2014-03-15
33820.00	KGC755	Lancaster County Fire/EMS, PA	2109	FM, Lancaster city dispatch, on a brush fire	2014-03-15
33900.00	KGC755	Lancaster County Fire/EMS, PA	1810	FM, main dispatch channel, many tones & dispatches	2014-03-08
33980.00	WZC522	Muskingum County Fire/EMS, OH	1956	FM fire dispatch, low band simulcast of WPMB234	2014-03-04
35080.00	WNNU233	Urgent Ambulance Svc, Philadelphia, PA	2155	FM, dispatches followed by Morse ID	2014-02-12
35180.00	WPGG338	Niles Flash Cab Assn., Chicago, IL	1810	FM, voice ID after working drivers	2014-03-07
35480.00	Unid	Spanish taxi dispatcher, S. America	2034	FM; similar on 35.52, 35.7, 35.74, and 35.78	2014-03-17
37260.00	Base	Unknown business	2144	FM, working "Jacob," fading in and out. Not local.	2014-03-07

Shortwave Utility Logs

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Frequency	Callsign	User, Location	Time	System Details	Last Heard
7640.00	???	Russian MIL, ???	2330	75bd/200 FSK UNID System, sync, cont, ACF=0	2014-03-08
8988.00	MKL	Royal Air Force, Inskip	1930	75bd/850 FSK UNID System, KG84 crypto //11213kHz //67	2014-03-08
9145.00	RIW	Russian Navy, Moscow	1115	CW, 5FGs handsent wkg RFH77	2014-03-08
10164.00	???	Russian Navy, Moscow	1230	75bd/200 FSK UNID System, sync, cont, ACF=0	2014-03-08
10965.00	AXAA	Australian MHFCS, Bohle River	0107	MIL-188-110A HF modem, 2 channels continuous mode tfc	2014-03-07
11005.70	JXW	Norwegian Navy, Bodo	2300	600bps/L STANAG4285 HF modem, tfc (on USB)	2014-03-08
12154.00	???	Russian MIL, ???	0107	AT3004D 12 tone HF modem, tfc (on USB)	2014-03-07
13450.20	IBA	Italian Navy, Naples	1100	600bps/L STANAG4285 HF modem, crypto tfc (on USB)	2014-03-07
14436.00	RCV	Russian Navy, Sevastopol	2030	50bd/200 BEE, tfc on sync=[0x1eb41eb2952]	2014-03-04
16134.90	KVM70	Honolulu Meteo, Hawaii	1720	120/576/800 FAX, Weather pix	2014-03-07
17060.60	IBA	Italian Navy, Naples	1350	1200bps/L STANAG4285 HF modem, crypto tfc (on USB)	2014-03-07
17151.20	NMC	US Coast Guard, Point Reyes CA	0005	120lpm/576/800 Fax, WX pix	2014-03-08
17430.00	9VF235	Kyodo News, Singapore	1545	60lpm/576/800 FAX, news in Japanese	2014-03-07
16240.00	???	Russian MIL, ???	1430	75bd/500 UNID FSK System, sync, cont, ACF=0	2014-03-07
16971.00	JJC	Kyodo News, Tokyo	0110	60lpm/576/800 Fax, newspaper pages	2014-03-07
16263.55	ENIGMA M5	French MIL Intel, Favieres	0000	CW, 5LGs offline crypto tfc	2014-03-06
21784.00	RMP	Russian Navy, Kaliningrad	1200	50bd/500 BEE, idle on reversals, tfc on sync=[0x14be14d6	2014-03-05
16010.50	MORTON25*	Polish MIL, HQ Warsaw	1215	125bd/1750 MIL-188-141A, ALE LQA with "ASKAR64" (on U	2014-03-06
16321.00	???	Russian Intel, Moscow	0200	200bd/1000 FSK UNID System, sync, cont, ACF=288 with	2014-03-07
16010.50	IGIELIT37**	Polish MIL, ???	2000	125bd/1750 MIL-188-141A, ALE LQA with "ASKAR64" (on U	2014-03-06
18872.00	???	Russian MIL, ???	1830	75bd/200 FSK UNID System, sync, cont, ACF=0	2014-03-08
16010.50	WATFORD87	Polish MIL, Warsaw	1830	125bd/1750 MIL-188-141A, ALE LQA with "ASKAR64", "SU	2014-03-06
20540.00	???	UK MIL DHFCS, Akrotiri	1250	1200bps/L STANAG4285 HF Modem, crypto tfc (on USB)	2014-03-08
18060.00	VMW	Wiluna Meteo, Australia	2300	120lpm/576/800 Fax, chart	2014-03-08
22392.00	RIT	Russian Navy, Severomorsk	1400	50bd/200 BEE, tfc sync=[0x1414bebe952] & [0x1414bebe	2014-03-06
22733.00	???	Algerian MIL, ???	1450	Thales Systeme 3000 HF modem, data bursts (on USB)	2014-03-08
18234.00	XJN714	SailMail, Lunenburg NS	1615	PacTOR-III HF modem, tfc to yacht "PH5510"	2014-03-07
19680.00	???	???, ???	1418	STANAG4538 FLSU HF modem, burst tfc (on USB)	2014-03-06
19042.00	1410***	???, Middle East	1315	USB, OM/AA with Codan +1200Hz PTT release tone after A	2014-03-07
14527.05	ENIGMA M5	French MIL Intel, Paris	1700	CW, 5LGs	2014-03-08
16011.00	MBZ7Y***	US National Guard, ???	2028	125bd/1750 MIL-188-141A, ALE sounding (on USB)	2014-03-06
14530.00	???	North Korean Embassy, ???	1215	1200bd/1200 FSK UNID ARQ System, tfc (+1500Hz on LSE	2014-03-07
18600.00	RDL	Russian Navy, Moscow	1150	50bd/200 BEE, tfc on sync=[0x1414bebe952] and CW F1B	2014-03-06
18525.00	???	North Korean MFA, Pyongyang	0124	600bd/600 FSK UNID ARQ System, tfc with full carrier (QS	2014-03-07
22773.00	???	NATO MIL, ???	1608	600bps/L STANAG4285 HF Modem, crypto tfc (on USB)	2014-03-06
16350.00	???	Russian MFA, Moscow	1125	40bd CROWD-36, in IRS mode (+2080Hz on USB)	2014-03-07
14434.30	NPM	US Navy, Lualualei HI	2303	50bd/850 FSK UNID System, sync, cont, ACF=0	2014-03-04
19832.00	???	Russian MFA, Moscow	1400	112 tone OFDM HF modem, tfc (on USB)	2014-03-04
9182.00	XCZW***	Mexican Navy, UNID Warship	0100	MIL-188-110A HF modem, tfc with Tadiran link control (on	2014-03-04
16297.00	DOR***	Bulgarian MFA, Sofia	1250	2400bps/S RFSM8000 HF modem, short crypto bursts w/ +	2014-03-06
16772.00	???	???, ???	1300	MIL-188-141B 3G HF data link, tfc (on USB)	2014-03-08
18531.20	???	UK MIL DHFCS, Akrotiri	1538	1200bps/L STANAG4285 HF modem, crypto tfc (on USB)	2014-03-06
10322.00	4XZ	Israeli Navy, Haifa	0033	Hybrid FSK+2400bd PSK HF modem, tfc (on USB)	2014-03-07
16023.00	???	Russian Intel, Moscow	0125	200bd/500 Baudot, offline crypto tfc on link ID="11177 00	2014-03-04
8221.30	???	Peruvian Navy, ???	0200	100bd/200 PacTOR-I, calling "G3RP", "Z5KX"	2014-03-04
8146.50	???	NATO MIL, ???	0200	Link-11 CLEW, tfc (on USB)	2014-03-04
18756.55	ENIGMA M5	French MIL Intel, Favieres	1152	CW, 5LGs	2014-03-04
16249.00	???	Russian Intel, Moscow	1152	200bd/1000 FSK UNID System, ACF=288 tfc on link ID=[0	2014-03-04
23300.00	???	???, ???	1152	STANAG4285 HF modem, brief bursts (on USB)	2014-03-04
14939.50	AAN0BOI	US Army MARS TSA, Boise Airport ID	2300	PacTOR-III HF modem, forwarding mail to AAN1BOS	2014-03-05
14939.50	AAN6CRP	US Army MARS TSA, Corpus Christi Airport TX	2300	PacTOR-III HF modem, forwarding mail to AAN1BOS	2014-03-05
23380.00	???	???, ???	1220	MIL-188-110B HF Modem, tfc (on USB)	2014-03-06
23189.55	ENIGMA M5	French MIL Intel, Favieres	1220	CW, 5LGs	2014-03-06
22920.00	XSS***	UK MIL TASCOMM, Forest Moor	1220	3200bps/S MIL-188-110B HF Modem, crypto tfc (on USB)	2014-03-06
20110.00	???	Australian MHFCS, Various Sites	2350	600bd/640 STANAG4481 FSK System,sync, cont, ACF=0 at	2014-03-06
16121.00	???	North Korean MFA, Pyongyang	0220	600bd/600 FSK UNID ARQ System, burst tfc with full carrie	2014-03-07
10154.50	MST***	US National Guard, Mount Pleasant UT	0245	125bd/1750 MIL-188-141A, ALE sounding (on USB)	2014-03-07
20725.00	???	UK MIL DHFCS, Akrotiri	1145	1200bps/L STANAG4285 HF Modem, crypto tfc (on USB)	2014-03-07
19706.80	PWZ33	Brazilian Navy, Rio de Janeiro	1145	200bd/200 PacTOR-I FEC, news in PP	2014-03-07

Amateur Radio Insights

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

RG-6 to the Rescue

Amateur Radio, like many pursuits that have significant longevity, suffers from a fair bit of disinformation and inaccurate mythology. As beginners cycle into the hobby they're inundated with information and anecdotes, some right, some wrong, some a bit of both. Intermediate hams have a much clearer and much broader understanding of core subjects, but a truly esoteric understanding of certain dark radio arts is left only to those who spend a lot of time in the trenches or happen to connect early on with expert sources.

The progression never ends, of course, and as beginners become intermediates, who in turn become experts, more beginners show up to tread the first steps of a long and interesting journey. These cycles within cycles leave amateur radio with a certain "core curriculum" that everyone should master—or at least encounter—before moving on to personal specialties (much like the way cardiac surgeons start out as MDs).

I have addressed these evergreen topics multiple times over the past 25 years because the need is constant, and because most of us can't become effective cardiac surgeons without first becoming medical doctors! In January I touched on antenna tuner secrets with the intention of following up with a few coaxial cable secrets (a topic equally riddled with misinformation and outdated wive's tales), but an incident at a Twin Cities ham store sealed the deal.

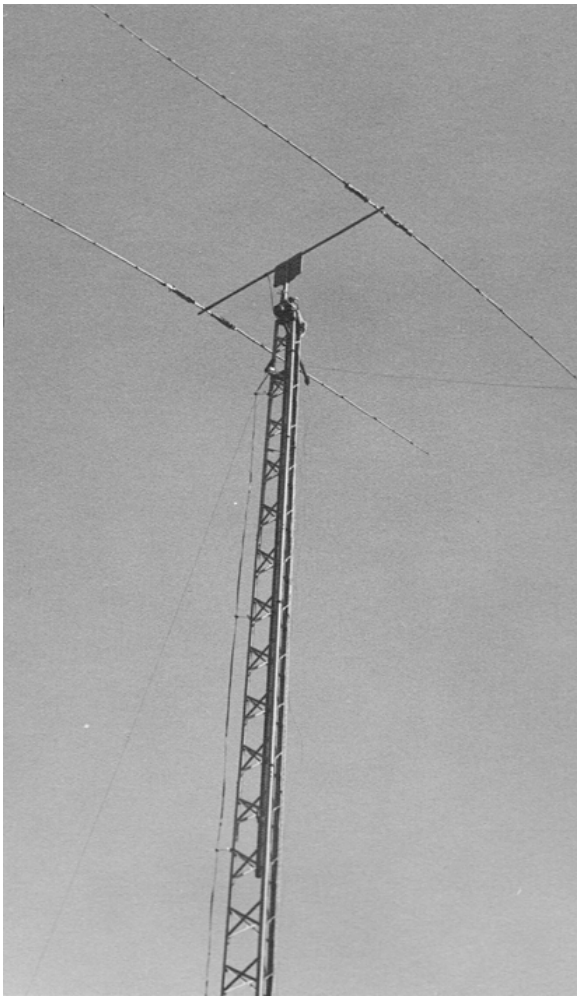
As I was perusing the store's supply of used gear, I overheard two hams talking about how expensive amateur radio coaxial cable was nowadays, and what steps might be taken to reduce the financial burden. One ham innocently wondered whether he might use inexpensive 75-ohm RG-6 "cable TV" coax instead of the much more expensive 50-ohm varieties such as RG-6, RG-213, LMR-400, etc.

The other ham, presumably with more knowledge and experienced, listed a bunch of reasons why RG-6 was completely unsuitable for use in 50-ohm systems, how the losses were greater, how antenna tuners would be thrown into a tizzy, how the shielding was sub-par, how the outer jacket would let water soak in, etc. The pitch was forceful enough to "leave scars" on the newcomer—especially considering that every single item he listed was completely wrong!

RG-6 *does* have a characteristic impedance of 75 ohms, but despite what you may have been told, that *doesn't matter at all*. In fact, the benefits of RG-6 dramatically outweigh the drawbacks.

RG-6: A Real 'Secret'

Performance-wise, you really can't go wrong with beefy, high-quality, 50-ohm RF cable made by name brand makers such as Belden, Andrew, or Times Microwave (other quality brand exist, too), but there's a huge amount of knock-off, counterfeit and just plain junky 50-ohm RF cable in the marketplace, and that stuff will *steal your radio dreams*.



NT0Z's "teenage tower." A two-element, 15-meter Yagi made from bamboo poles and wire is perched up top. Note the fancy plywood boom-to-mast plate and the 300-ohm twin lead (for the G5RV dipole) strung between the stand-offs! (NT0Z Photo)

Avoid it at all costs!

To save money, headaches and frustration while still using a proven solution, do as I do; standardize on good ol' RG-6. For most ham applications below 2-meters, 75-ohm RG-6 "satellite cable" works just as well—*or better*—than "ham cables" and has many additional advantages.

If you compare the number of people who watch TV with the number of ham operators, you'll understand why RG-6 is produced in *huge* quantities and how that contributes significantly to its affordability. A 1,000-foot spool of 50-

This is me, NT0Z (then WD0BDA), at age 17, posing in my bedroom shack with my new Tempo One HF transceiver. When I pawned it to pay tuition in 1984 it was still on its original set of TV sweep tube finals. I wish I still owned it. (NT0Z Photo)

A 1,000-foot box of RG-6 costs between $70 and $130, depending on make, model and vendor. I bought this 900-footer on Craigslist for $20. Two years ago the original purchaser wired up his new big-screen TV (using the first 100 feet) and the box took up residence in his basement until he listed it for sale. With RF performance equal to or better than that of more traditional 50-ohm RG-8 cable, the price difference—about $700 for 900 feet—almost paid for my HF transceiver! (NT0Z Photo)

ohm Belden RG-8/U or RG-213 costs about $800, while a similar spool of 75-ohm Belden RG-6 costs about $130. And that's a top-tier cable sold by an "expensive" commercial jobber. A 1,000-foot spool of "still better than RG-8" from Home Depot costs about $80. That's bizarre, especially considering that RG-6 offers better RF performance than RG-8!

Because it's used in cable-TV and satellite systems, RG-6 is reasonably low-loss up to 700 MHz, while low-cost 50-ohm cables often perform miserably at frequencies above 7 MHz! And you probably can't buy decent 50-ohm coax at odd hours—the stuff at the truck stop *isn't* decent—but you can easily stock up on RG-6 in 50- and 100-foot lengths at any Walmart.

Inexpensive 50-ohm coax often has a skimpy, RF-leaky, 65% braided outer shield, while RG-6 is *at least* double-shielded (having a continuous aluminum foil shield and an outer woven braid), with "quad-shielded" versions readily available. Cable TV operators are fined heavily if their systems leak RF, and money talks, so RG-6 doesn't leak!

Crimp, Don't Solder

RG-6 (and its little brother RG-59, which *isn't* recommended for anything but short runs or audio cables) use compression-type F-connectors, so attaching connectors correctly (and making them water-resistant at the same time) is super easy, requiring only a $20 compression tool and a $5 cable prep tool. By using an appropriate adapter you can transform an F-connector into a PL-259, a BNC, a Type-N, or whatever you need.

Ever try to solder a "bargain" PL-259 UHF connector to the end of a length of "affordable" 50-ohm coax? I thought so! And don't worry, because it can't be done. The task is daunting even with high-quality parts. In fact, even experienced hams often choose to buy ready-made cables so they don't have to attempt the impossible!

Dogmatic types or the uninformed may do their best to convince you that compression connectors will add "impedance bumps" to your feed line or complain about the cable's "unsuitable" 75-ohm impedance, but unless you're making phasing harnesses or coaxial impedance-matching lines, it doesn't matter. Really!

For RF feed lines, 75 ohms is close enough to 50 ohms for just about any purpose, and many "50-ohm antennas" are actually closer to 75 ohms in reality. Your rig (or SWL receiver) won't care, and neither should you! A typical RG-6 feed line (including compression connectors and any necessary adapters) can easily handle 100 watts of RF at almost any feed line SWR (and probably more).

If your feed line SWR is low, 500 W should be fine, even up to 6 meters. Some ops run a cool kilowatt through RG-6 from 160 through 40 meters. Connectors—especially adapters—affect power-handling capabilities much more than the voltage and thermal capacity of the cable itself.

If you need more power or reduced losses, switch to RG-11 (RG-6 on steroids). You'll need different compression tools and connectors (and the beefier cable is more expensive), but it offers nearly double the performance, especially at higher frequencies.

Some RG-6 variants designed for outdoor service drops have an insulated "pilot wire" molded onto the outer jacket. I use this heavy-gage steel wire to provide DC to my antenna feed point (for auto-tuners and relay boxes). Steel has more DC resistance than copper, so if you have a long cable run you may have to boost the DC input voltage a bit to compensate.

I was initially reluctant to give RG-6 a try, but it's been more than 10 years since I've even thought about soldering a PL-259 to a piece of RG-8.

With these affordable tools, connectors and adapters, inexpensive RG-6 "cable TV" coax can become just about any RF or audio cable you might need for your shack or your antenna farm. The compression tool (left) costs about $15 at Harbor Freight Tools or elsewhere online. The cable prep tool costs about $10 at Radio shack or as little as $2.99 online. (All photos by NT0Z)

This cable prep tool is easily adjusted to accommodate a variety of cables and connectors. Simply insert the cable as shown and rotate the tool a few times in the direction shown on the handle. In about five seconds your cable is perfectly prepped and ready for a compression connector. With the prepped cable and connector inserted as shown, an easy squeeze of the handle securely "compresses" the connector onto the end of the cable. More expensive tools can be adjusted to handle specialty connectors, but RG-6 fittings are so "standard," every compression tool should work just fine.

RG-6 is so easy to use, so flexible and so affordable, I just can't find a reason to *not* use it for all of my ham, SWL and scanner needs (and long audio runs, too).

This trend is really catching on. Come on in, the water's fine!

NT0Z's "Elmer" Becomes a "Silent Flyrod"

As every experienced ham knows, HF propagation over the past 10 years hasn't exactly been fabulous. So if you're stuck with an attic antenna and QRP power levels, even brief periods of magical propagation are few and far between. The 2014 ARRL International DX contest (CW), was just such a event. Even with a compromise antenna, 20 meters was open round-the-clock, and I was able to work Asiatic and European Russians over the North Pole with ease, despite fluttery signals and low-power. It was just like the good old days when Minnesota hams could work Russian stations from tip to tail, right over the pole, with little or no competition from East Coast or West Coast stations.

Just after 2 AM, my phone rang. Because I'm a night owl, especially on weekends, I didn't think anything of it. But it was my brother, informing me that my father had just died in our hometown hospital. Although the timing was unexpected, we all knew that time was short. Dad had been battling leukemia for three years, and he'd managed two remissions, but the last round of chemotherapy was almost too much, and we knew there wouldn't be a third. Still, we'd had three "extra" years in which to say our goodbyes, go on fishing trips, and prepare for what would eventually come.

I talked to my younger brother at length. He and the rest of my brothers and sisters were local, while I lived 200 miles away. After the call I was feeling predictably jangled and wasn't sure about what to do next. The inevitable family calls and funeral preparations would begin later that day, but fantastic propagation is fantastic propagation, and I knew that my father—whose passion for trout fishing and sporting collectibles was legendary, even among admitted fanatics—would have been disappointed had I squandered such a rare DX opportunity.

Although he spent some time as a RTTY operator in the Marine Corps, he wasn't a "radio guy." That just wasn't his thing. But he knew that it was "my thing," and he was always supremely encouraging. In 1977, he bought me my first real radio, a Tempo One HF transceiver (essentially a Yaesu FT-101), having watched me build a Tuna Tin 2 crystal-controlled transmitter and pair it with a TCS-6 receiver from a WWII battleship (a gift from local Old-Timers). Of course, I had to landscape the yard of our new house, which took

an entire summer of "hard labor," but as a brand-new teenage ham, it was definitely worth it!

Less than a year earlier, he had driven me to the FCC field office in St. Paul to take my General-class license test (a 200+ mile round trip). In those days, there was no VEC, and written and Morse code proficiency tests were carried out under the stern gaze of an FCC examiner. I had studied relentlessly and passed my General-class test with flying colors, but after giving me the good news, the examiner handed me a copy of the Advanced-class test. I didn't expect to pass—and I hadn't studied for it—but I did want to get a look at it (there were no question pools in those days).

I'd taken forever on the first exam, Morse code, too, and my dad was waiting downstairs in the truck, purportedly reading a newspaper. I couldn't let him know that I was sitting for the next test, so I just took a crack at it and hoped he wouldn't be too upset! Despite practically blazing through it, I passed the test with the maximum possible number wrong. The examiner was fiercely determined to fail me, but after checking the answer key three times, she finally smiled. I was an Advanced-class ham, and when I finally made it downstairs, Dad pretended that my nearly four-hour absence was completely expected.

A year later, after stringing an endless succession of wire loops, dipoles, and end-fed wires all across the backyard, a "free tower" showed up just after my sixteenth birthday. I worked part-time for two local TV repair shops, one of which was owned by a neighbor, and after work one Saturday, Mr. Miller told me that he had received an "extra" 48-foot Rohn tower that "wasn't on the invoice" from his supplier. As a ham friendly TV repair guy, he gave it to me. Dad denied having anything to do with the mystery tower until our final fishing trip, last year, when he finally 'fessed up. He had traded a collectible antique sword (his lifelong "currency") for the tower, but he didn't want me (or Mom!) to know.

Ten years later, at age 26, after working my way through college as a radio newscaster, graduating with a degree in journalism (and not electrical engineering!), Dad chipped in a few bucks to help finance my move to Connecticut, where I had just been offered a job at ARRL HQ as an editor for *QST*. That job, in turn, led to a 25-year stint writing every month for *Popular Communications*, *Monitoring Times* and now—nearly 400 columns and features later—to *The Spectrum Monitor* and this very column.

As he was buried with military honors, the honor guards expertly folded the U.S. flag that had been draped over his coffin and presented it to my brother, thanking us for his service to his country. In the back of my mind, despite the overwhelming emotion in the room, I suddenly imagined him, all those years ago, with the customary twinkle in his eye, secretly arranging for my "teenage tower." If only to ease a bit of the strain, I silently thanked him for his service to the Amateur Radio Service. Especially *my* Amateur Radio Service!

After the phone call with my brother, I went back to the contest and worked a bunch more trans-polar DX QSOs. My hand was shaky on the paddles, but thanks to a pronounced polar flutter, I'm sure none of the Russian and Finnish ops I worked noticed. Dad wouldn't have wanted it any other way.

If you're curious, a humorous article I wrote nearly 20 years ago about a fishing adventure with Dad will be available for a short time at **http://www.stealthamateur.com/dad/fishdad.pdf**.

Radio 101

By Ken Reitz KS4ZR **ks4zr1@gmail.com**

Two Over-the-Air Digital Tuner/Recorders

Channel Master's Ultra-thin DVR+ HDTV tuner/recorder, with built-in 16-GB HD recording capability and Wi-Fi interconnectivity, is just bigger than the thickness of an "F" connector. (Courtesy: Channel Master)

Five years ago the FCC required virtually all broadcast TV stations to switch off their analog signals and enter an all-digital world. A $40 federal subsidy, available to anyone who asked for one, could be used toward the purchase of a converter that allowed consumers, still clinging to their older, analog Over-the-Air (OTA) TV sets, to convert the new digital ATSC signals to analog NTSC signals that the old sets could display.

The problem was that manufacturers of such devices engaged in a race to the bottom, offering the cheapest possible converters in order to chase the millions of dollars in federal subsidies. Consumers didn't seem to care. All they wanted was a converter to watch local TV stations. Most didn't have high-definition TV sets so they didn't care if the signal was not 1080i or 1080p, 720, or worse yet, 480 resolution. They weren't listening to the audio through a five-channel stereo; they were listening through the four-inch speaker on the front of the TV, so monaural or a simple left/right stereo setup was fine.

But, serious, full-featured converters had been around for nearly ten years before the switch. My first ATSC tuner was the Digital Stream HD 1150, which I was using in 2001. After thirteen years it's still going strong. It featured 1080i resolution video, Dolby Surround stereo via fiber optic output, a built-in guide and a very sensitive receiver. It had output connectors to handle anything available in TV sets at the time ("S" video, RCA-video, component video) and audio connectors for left/right stereo, fiber optic digital and coaxial digital outputs. It also has a built-in channel guide with program information. While the newer converters were on offer, I never found a better one than the one I had been using, so my $40 coupon went back into the U.S. Treasury.

Old-time video cassette (you remember those: you paid two dollars per night to rent one and paid a fine when you returned it late) sits atop the iView digital converter/recorder to show size similarities. The iView is a complete tuner/recorder making nearly perfect digital copies of your favorite shows for your later viewing, something video cassettes never did. (Courtesy of the author)

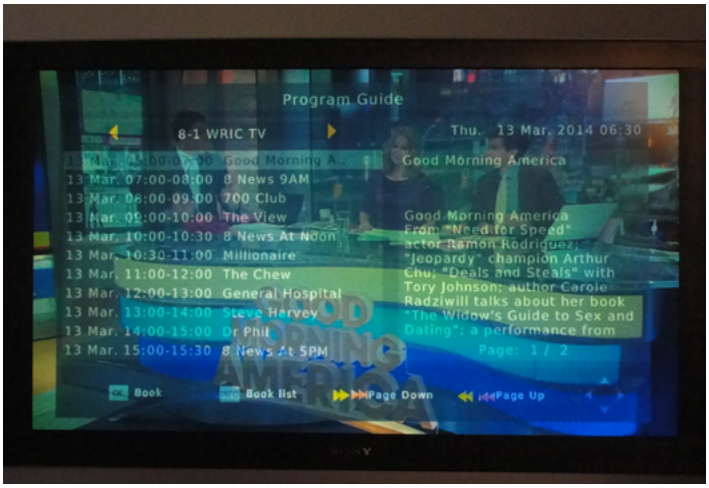
Cord-Cutting Primer

With the collapse of the economy in 2008 and the DTV switch in 2009, beleaguered TV viewers were panicked into thinking their OTA channels were about to disappear in the digital switchover. Millions of former OTA-only TV viewers flocked to cable and satellite-TV companies, taking advantage of "teaser" rates and signing up to watch local TV over cable or satellite, where digital conversion had no effect. But, the economy was slow to recover, the teaser rates ended as cable and satellite-TV bills kept going up. It wasn't too long before hundreds of thousands of TV viewers sought alternatives.

The process of getting away from cable and satellite-TV is called cord-cutting, though the TV industry refers to it as Over-the-Top (OTT), referring to the method of bypassing their established stranglehold on TV entertainment by going over the top; direct to the source for video, or in the case of audio, Wi-Fi radio streaming.

Cord-cutting requires an OTA-TV setup which includes an antenna; usually includes an Internet connection that lets you stream pay or free TV content and a method of recording content (for later playback or for watch-and-pause).

Millions of people use TiVo, a monthly-billed programming guide and digital recorder service. TiVo offers an OTA-only plan in which you'll pay $150 for a set-top box that can record two channels at once and hold up to 75 hours of HDTV programming. You'll pay TiVo $18 per month for as long as you have the service (though you start with a one-year commitment which has a $75 early termination fee). TiVo offers a more capable OTA-TV set-top box



Battle of the on-screen guides: Channel Master's DVR+ guide (left) is easily read from quite a distance, fully integrated in the recording/viewing process. The iView's guide is a little anemic, but every bit as integrated in the recording/viewing process. The DVR+ guide benefits from Internet connectivity via either Ethernet or wireless Wi-Fi (both cable and wireless USB are optional extras). The iView has no Internet connectivity. (Courtesy of the Author)

for $250 that can record up to four channels at once. One year with TiVo could cost $466 without figuring in Internet access.

In the years since the switch in 2009, TV sets underwent a revolution in technology. No more bulky, projection, big-screen sets. Instead, lightweight LCD displays, with the thickness of picture frames and the brilliance of cinema screens, became available at lower and lower prices with bigger and bigger dimensions. In fact, new TV sets have merged with computer monitors to provide bigger and cheaper screens with higher resolution. And, instead of S-video input and RCA jacks, new sets now utilize HDMI and USB inputs. The advantage of HDMI is that high-resolution video and audio are passed along a single cable. USB inputs allow video or other data (music and photos, for example) to be captured on one device and replayed on the TV, all in 1080i or 1080p resolution.

New TV sets are so good that I'm actually using one right now as a computer monitor. It's a Vizio 24-inch 1080p LED screen with a flexible base (tilts forward or backward for better desktop viewing). It has two HDMI inputs; one USB input; Wi-Fi and Ethernet capability; fiber optic audio output; RCA jacks for old-time analog video/audio connectivity; a headphone jack (which you can use to route audio through to a decent stereo and speakers) and an off-air antenna connector. It also has a remote control. Did I mention that it was $200? Newer sets are even more impressively equipped, but the Vizio does an amazing job for such a low price.

But, what if your TV set isn't quite so modern? Suppose you want to record a TV show off-air? What are you going to do, drag out your old VCR from the utility shed where it's been for the last ten years? Or, hook up that balky DVD recorder that you still haven't learned to program? Or, sign up for TiVo, a $466 proposition? Forget about them! There are now OTA converters with built-in hard drive recorders available that give consumers the chance to free themselves from monthly satellite, cable-TV and digital recording bills.

Channel Master's DVR+

Last December, Channel Master introduced its DVR+, an OTA receiver with a 16 GB built-in memory, available direct from **Channel Master** for $250 (plus shipping and applicable taxes). This receiver is notable in that it has two built-in tuners (so that you can watch one OTA channel and record another) and it can be connected to the Internet via an Ethernet cable (not included) or wirelessly via a USB-based Wi-Fi adapter (also not included). An external hard drive may also be purchased to beef up the recording capabilities. The 16 GB built-in drive is good for a couple of hour and a half movies, more if the content is standard definition. It's really intended to be used as a pause-and-play feature that lets you pause the action (the unit starts recording the program you're watching) while you answer the door, phone or get more popcorn. When you get back, just hit the resume button and the program continues where you left off.

Channel Master recommends using their **SMARTenna** ($60), which they claim is good for indoor reception out to 35 miles and outdoor reception to 50 miles. I tested the DVR+ using a similarly capable 16-inch by 16-inch flat antenna; Winegard's SquareShooter SS2000, which has been replaced by their **FlatWave Air** amplified antenna ($70); a **Mohu's Sky** pre-amplified antenna ($150) and a very large UHF-TV antenna, similar to Channel Master's CM-3032 ($60) 25 feet above the ground with mast-mounted high-gain pre-amp ($70) and rotator ($134) plus cable for the rotator and pre-amp as well as 30 feet of steel mast and mounting hardware ($170).

The weak link in an OTA-TV system is the antenna. If you live in a more urban or even suburban location, any of the small flat-plate antennas should give adequate signal strength to allow you to receive all of your local channels. However, if you live outside of a 35 to 50 mile radius, your best results will be had with the large outdoor antenna. One of the drawbacks of the smaller antennas is the lead-in cable, which is often RG-174 or similarly small diameter, lossy coax, which doesn't do well in distances over 20 feet from wherever your TV is located. RG-6 coax is the best at hauling UHF-

Rear view of iView 3500IISTB (above left) shows TV antenna input. Next to it, antenna output can be configured via the remote control to output either channel 3 or 4 or as a loop to send signals from your TV antenna directly to the TV, letting you watch one channel while the converter records another. Other connectors allow output via component RCA video jacks, composite RCA video and audio jacks or HDMI connector. Front panel has main function buttons, bright (too bright) red LED display and USB port for a memory stick/flash drive or to plug in a more substantial external hard drive, typically 300-500 GB to as much as 1-TB with which you can record dozens of TV shows in high definition. (Courtesy: Author)

TV signals from an antenna to the TV. Also, all TV channels don't operate with the same transmit power. Typically, PBS stations are considerably lower power and tuning them in at any distance over 30 miles might not be possible with the small, flat antennas.

All OTA-TV stations transmit program information as part of the digital signal for on-screen guides that are built in to most TV sets. For many TV sets, such an on-screen guide seems more like an after thought. Most don't let viewers look at more than one channel at a time and then it's only to see current program content in small, hard to read text that is on the screen for just a few seconds. The guide feature is a huge asset on new converter/recorders.

The DVR+ has a tuner as sensitive as any of the TV sets and OTA-TV converters I tested. I tried it with a combination of four TV sets: a 12 year-old LCD projection set, a newer LCD set; a two year old set with Wi-Fi connectivity and a much newer set with all the latest connectors. The DVR+'s interactive on-screen guide is the best of the three converters I tested. It loads very quickly and has large, easy to read text that, when highlighted, give viewers the option to "watch this program," "record this program," or "create a manual recording." Pressing the "record this program" option is a one-step process. Creating a manual recording requires you to enter the actual times of the recording using the remote control. This is a helpful feature because some programming details that are transmitted by the station may not have the most accurate time and there's nothing more frustrating than thinking you've recorded an entire program only to find that the last five minutes weren't recorded. Another advantage is that the DVR+ lets you watch other channels while one channel is being recorded.

As this is being written, the DVR+ has only one built-in Wi-Fi app; the pay-per-view movie service Vudu, though it's possible that other apps may be added in the future. To access this service, the DVR+ will have to be connected to the Internet through an Ethernet cable or wireless adapter, neither of which are included with the DVR+. Vudu offers recently released movies from 99 cents to $7.00 each. TV shows may also be viewed on Vudu for $2 per episode.

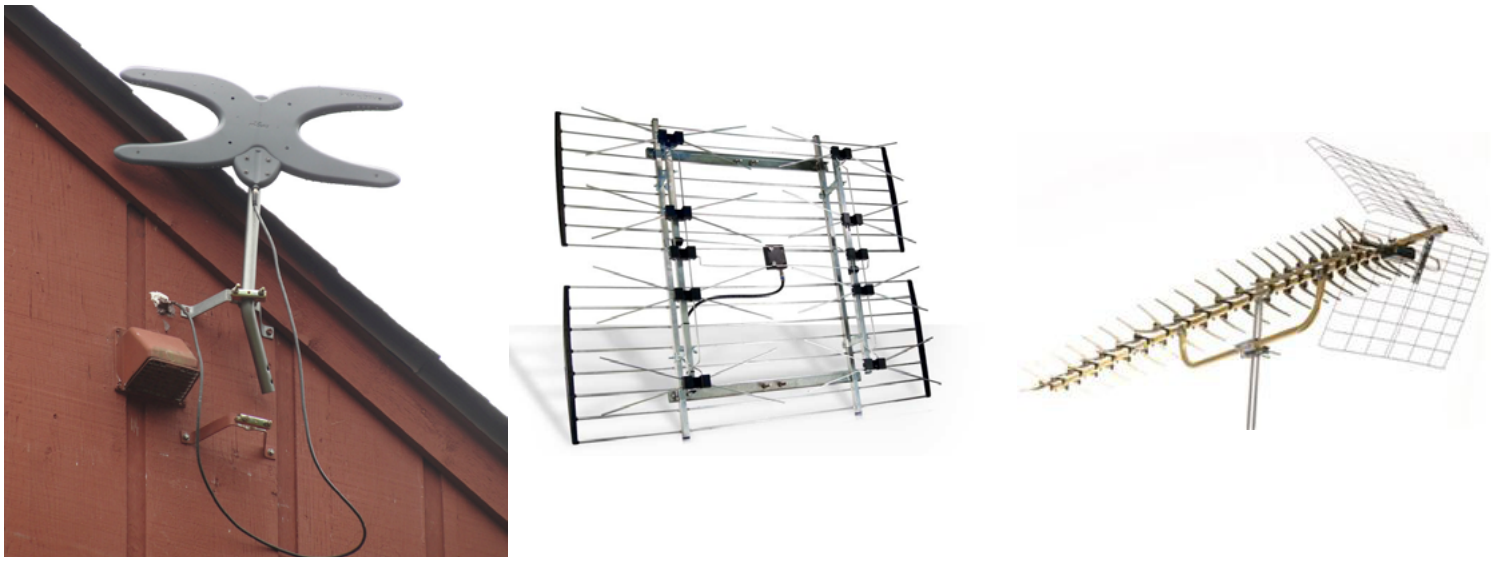
The DVR+ is an amazingly thin device, about the size and thickness of an iPad. A full-function remote control that doubles as a TV remote is well laid out; on-screen commands are easy to navigate. The drawbacks to the DVR+ include no analog outputs, making it impossible to use with TV sets that do not have HDMI or USB inputs. The rear-mounted mini-TOSLINK fiber optic output will require an adapter ($4 at Radio Shack) to use older style fiber optic cables that most stereos use.

iView 3500STBII

A much simpler, less capable, and vastly cheaper option for cord-cutters, is the **iView 3500STBII** ($40 plus shipping). Compared to the Channel Master DVR+, the iView seems a little clunky. But, it's much more versatile when trying to outfit outmoded TV sets for digital viewing and recording (the DVR+'s only serious drawback). Thanks to old-fashioned RCA connectors for composite video output and HD component video output, old TVs still have some life left in them. It does have one HDMI output as well as a coaxial digital audio output; so audio from TV stations transmitting in Surround Sound can be passed through to your stereo, if it is so equipped.

The biggest differences between the two set-top boxes are that the iView has no built-in memory (recording has to be done through a flash-drive or external hard drive plugged into the USB port on the front panel of the device). Unlike the DVR+, it has only one tuner (though you can watch one program and record another at the same time by toggling the antenna output to do so), the program guide is slower to load with small, faint text that, depending on the background of the TV show you're watching, can be almost impossible to read.

However, setting up to record is as easy on the iView as it is on the DVR+. One touch of the remote on a program listed in the guide sets it up to record. Canceling



Unless you live in an urban or suburban area, you'll need all the help you can get from a good outdoor antenna. Three examples of high-performance roof-top antennas are above. Left: Mohu Sky VHF/UHF antenna ($150) is bi-directional and amplified (www.gomohu.com) (Courtesy: Author) Center: Channel Master CM-4228HD 8-bay UHF antenna ($110) (Courtesy: Channel Master) Right: Antennas Direct (right) $65 from www.solidsignal.com serves extreme distant viewers with a range up to 70 miles (UHF only), both will benefit from a mast-mount preamp, which is not included in the price. (Courtesy: Solid Signal)

the recording is equally easy and deleting previously recorded and viewed programming is easily done as well. Both recorders have taken the tediousness out of setting up to record TV shows.

I used a 4 GB flash-drive plugged directly into the iView's front panel to record, and it worked great. A 64 GB flash drive costs about $30 at Walmart and will hold about four two-hour movies or close to ten programs in standard definition. Investing in an external hard drive, such as the Toshiba Canvio USB 3.0 500 GB hard drive ($55) will give you all the room you need to archive favorite shows or special concerts.

One thing I discovered, after making several recordings, is that recordings made on a flash-drive or external hard drive may not play properly when plugged directly into a USB port on a TV equipped with such a port. The reason has to do with the format the iView uses to record, which may not be supported by the TV you are trying to play it on. That's not an issue if you plug the iView directly into the TV you are recording from.

The iView guide leaves a lot to be desired, especially after having used the guide on the DVR+. But once you get used to it, it will seem as easy, just not as convenient and certainly not as easy to read.

One note about external hard drives. In order to set up to record, the converter needs to format the flash drive or hard drive for its own use, deleting anything else that's on either device. That's why it's a good idea to start with a brand new external flash drive or hard drive and not one that you've been using to back up your computer.

And, three other final notes: The iView must be on before automatically starting a recording. If it's off, it won't record. And, with both converter/recorders, if you are using a rotatable antenna, make sure it's pointing at the station you are going to record. If not, it will record but there won't be anything on the recording. Finally, on the iView, you can toggle the output of the antenna-out jack to act as a channel three or four modulator (to display programming on your TV on either channel three or channel four) or to loop-through. The loop-through option affords the convenience of being able to watch and record on the iView at the same time, a nice feature.

More Add-ons complete Cord-Cutting

There are many free options for cord-cutters who don't want to be saddled with monthly cable and satellite-TV bills and the OTA converter/recorder is just one. Another is Free-to-Air satellite (see Mario Filippi's article in this issue) utilizing C and Ku-band dishes (see also *TSM* January 2014 page 62 for "*TSM's* Guide to Satellites.") Yet another cord-cutting accessory is a streaming device such as **Roku 3** ($100), which requires a fairly high-speed Internet connection. Aside from the pay services, such as the aforementioned Vudu and Netflix, there are several hundred "private channels" that are launched by individuals or companies that may be viewed on such streaming devices. Most are free, some you have to subscribe to. All you need to know is the private channel code to access the programming. One place to learn more about private channels is **http://streamfree.tv**.

OK, if you're a sports fan, you'll pretty much have to stick with cable or satellite-TV. While some pro and college sports are found on OTA-TV, the bulk of America's daily sporting events are found only on the ESPN empire or the regional sports channels. Even so, you might find the DVR+ or the iView digital recorder useful in recording OTA-TV programs that are on while you're watching the big game on cable or satellite-TV.

Channel Master's DVR+ has a lot going for it besides being thin: Built-in 16-GB hard drive, excellent guide, Internet connectivity, but falls short in output options for older TV sets (Courtesy: Channel Master)

Digital OTA Tuner/Recorder: Adding up the Costs

TiVo Premiere offers Over-the-Air TV viewers a full-featured (and pricey) recording system that requires a monthly payment. (Courtesy: TiVo)

iView, even with the optional 1-TB Toshiba external hard drive attached ($85), costs about $130; connects to any age TV-set with component, composite video out, even an old-time channel 3 or 4 modulator and, has a full-function interactive, on-screen guide. You can record hundreds of hours of TV shows.

The antenna is the weak link in the cord-cutting system. Small, flat-plate antennas look good and are unobtrusive, but may not perform as well as advertised. Lossy lead-in coax doesn't allow the antenna to stray too far from the recorder. Winegard's FlatWave amplified VHF-UHF antenna ($70) claims reception out to 50 miles and is powered by the TV's USB port. (Courtesy: Winegard) Channel Master's answer is the SMARTenna ($60), below, which claims reception up to 35 miles indoors and 50 miles outdoors.

TiVo OTA-TV service offers a recorder ($150 to $200 plus shipping) with program guide ($18 per month) on a one-year commitment with a $75 early termination fee. Record up to two shows at once (lower-price unit) or up to four shows at once (higher-priced unit) on a hard-drive recorder that can hold 75 hours of HD programming (on both units). The higher-priced model has built-in Wi-Fi; the lower-priced model has optional Wi-Fi. The TiVo recorder must be hooked up to an external antenna; the bigger the antenna, the better the signal ($40 to $100).

Channel Master DVR+ ($250 plus shipping) features a 16 GB built-in hard drive (about two hours in high-definition mode); Ethernet connection, or use an optional USB-based Wi-Fi connector ($40). Add a 1-TB external hard drive ($85-100) that lets you record 160 hours of HD broadcasting. You can get by with far less (a 300-500 GB hard drive will cost between $50 and $60 and store 30 or more movies, 60 or more standard definition, one-hour TV shows). The DVR+ requires an HDMI cable ($10, depending on the quality of the cable) and a $4 mini-TOSLINK adapter to hear the digital Surround Sound audio through a stereo system. The USB wireless adapter and/or Ethernet connection is not necessary if you are using the built-in channel guide, but it is necessary to access Web-related features used by the Channel Master DVR+, including Vudu and other possible future streaming video apps. The DVR+ requires an external antenna ($40 to $100, depending on your location; the farther away from big TV signals you are, the bigger and more capable your antenna will need to be).

iView 3500STBII digital converter box ($40, plus shipping). Analog video/audio RCA cable for connection to TV included. HDMI cables are not needed and no wireless adapter is needed because it doesn't connect to the Web. USB port lets you record with something as simple as a memory stick/flash drive ($10 to $30) or as big as a 1-TB external hard drive ($100) though you can get by with much less (a 300-500 GB hard drive, for example, for $50-60). The iView digital converter will also have to be hooked up to an external TV antenna; the bigger the antenna, the better the signal ($40 to $100).

TSM

Radio Propagation

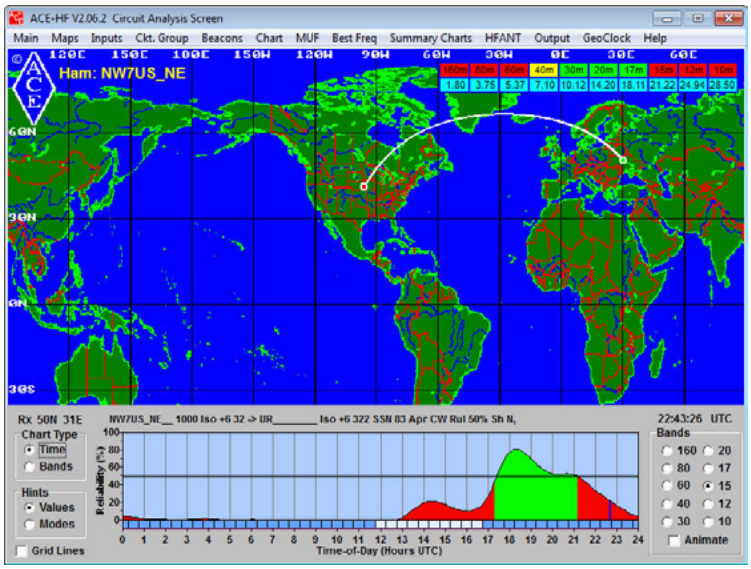
By Tomas Hood NW7US **nw7us@nw7us.us**

Radio Signal Circuit Analysis with ACE-HF

(Graphics credit: NW7US, using the ACE-HF PRO software)

Several months ago, we started to explore the question, "When will good propagation occur?" We've been using the popular ACE-HF System Simulation and Visualization Software (**http://hfradio.org/ace-hf/**) to look at basic radio propagation concepts. Tools such as ACE-HF help you to unlock the science of radio propagation at the high frequencies.

Because of the mathematics involved, and the vast amount of data that must be processed when analyzing and forecasting radio signal propagation via the various ionospheric layers, you need more than a pad of paper and a quick mind. Sophisticated programs that are dedicated to the task make the job much more approachable. With powerful computers available for reasonable prices, and with affordable tools like ACE-HF, any radio hobbyist can begin to make sense of all the factors that play a role in radio communications on HF. This month, let's dive into the VOACAP model (**http://www.greg-hand.com/hfwin32.html**), the underlying engine that drives ACE-HF, and specifically, the "reliability factor."



Firgure 1 Screen-capture of ACE-HF Pro (version 2.06.02), showing the Circuit Analysis Screen plotting of a radio signal circuit between Nebraska and Ukraine. In the upper right area of the map, a visual aid indicates that there is a 50% chance of openings on the 30-, 20-, and 17-meter bands. A marginal 40-meter opening is also likely. The bottom plot shows the Reliability vs. Time-of-Day using my selected 50%. The green area indicates a likely opening at least 50% of the month in question (the analysis is for April 2014) during a window of time between about 1700 UTC and 2100 UTC.

Propagation Reliability

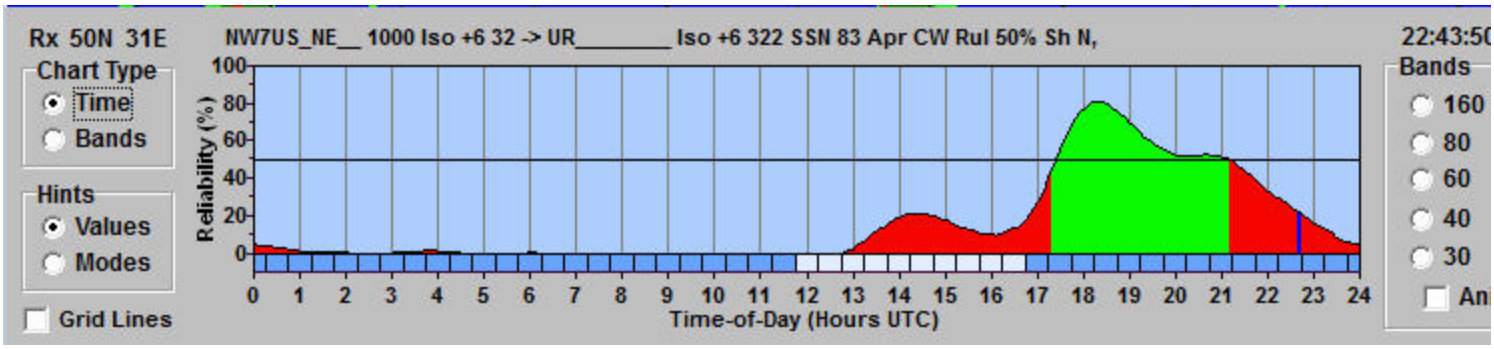
Whether you are a ham or a shortwave listener, anyone who has listened to the HF shortwave bands knows how variable the ionosphere can be. Even without considering the other system factors of transmitter power, receiver sensitivity, noise, frequency, and so forth, the varying ionosphere is always with us, creating ever-changing propagation conditions that can make our DX hunting, or evening listening to a favorite station, a challenging experience.

When we listen on HF radio and hear those elusive signals coming and going, chances are that the changing ionosphere is the cause. Most of the time, HF signals are stronger at night and become weaker during the daytime. Those diurnal effects are easy to understand because when the sun shines on the upper atmosphere, more of the gaseous atoms are converted to ions, and those charged particles multiply and expand the ionosphere to lower altitudes. At night, with the sunlight gone, the masses of charged particles tend to dissipate and the ionosphere's reflection height is said to rise.

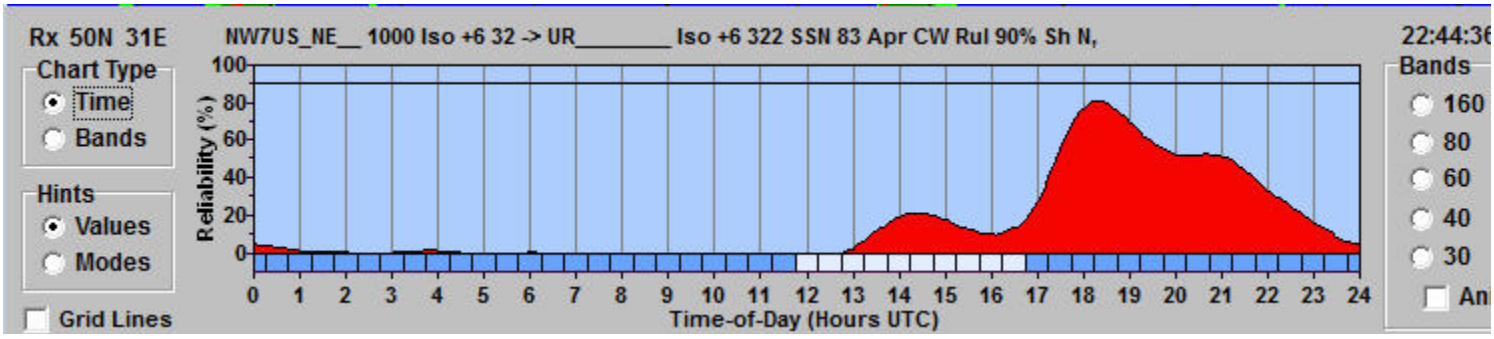
But even when a radio circuit is entirely in daytime or nighttime, the signals still vary because the ionosphere is non-uniform. I've never seen the ionosphere, but I suspect it would look like undulating cloud layers—and in the Seattle area I've seen lots of those!

With all that's going on, how in the world do we answer that old question, "When will good propagation occur?" The solution is to use a propagation prediction program. Modern HF propagation models assume that HF signals "bounce" off a reflection layer of the ionosphere, and VOACAP (and therefore, ACE-HF) includes elaborate ionospheric profiles that describe electron and ion density as a function of height. The profiles vary with day and night, and are applied by the model according to each circuit's geometry. A long circuit may have several ionospheric reflection points—usually called control points—and the profiles may be different at each point. It takes a sophisticated computer model to keep track of all that.

Nevertheless, such models are based on average, or ambient, ionospheres. So, how do they account for the undulating ionosphere that might vary from the average? The answer is that the models use a statistical computation to account for a range of ionospheric (and other system parameter) variability. And, in HF system computations, those variabilities are expressed as reliability.



(Fig. 2) Close-up of the Reliability vs. Time-of-Day chart that graphs the path condition between a station in Nebraska, USA and a station in Ukraine on 15 meters, where the horizontal black line at the 50% reliability mark illustrates an opening starting at about 1730 UTC and ending at about 2100 UTC (but optimal between 1730 UTC and 2000 UTC). The signal is well into the green during most of this opening (see text for explanation).



(Fig. 3) The Reliability vs. Time-of-Day chart graphing the path condition between the same stations (Figs. 1, 2) on 15 meters, where the horizontal black line at the 90% reliability illustrates no window during which the stations will have a reliable QSO. This is the scenario that most likely will occur during 90% of the month in question. Note, this is an analysis using an isotropic antenna at both ends of the radio circuit (see text).

In the world of HF, Reliability means Time Availability. For example, if our model predicts a reliability of 50 percent, it means that the prediction will be as computed or better during 15 days of a 30-day month. If we want a more conservative prediction, we could specify a Required Reliability of 90 percent. Those predicted reliabilities that equal or exceed 90 percent are those that would exist during 27 days of a 30-day month. If we set our Required Reliability at only 10 percent, then the predictions would be less accurate because they would show the conditions that would exist during only three days of a 30-day month.

In ham radio operation, most users set Required Reliability at a median value of 50 percent. But for military HF systems, 90 percent is used. The military wants to know what connectivity will exist most of the time—they don't care what will happen only some of the time.

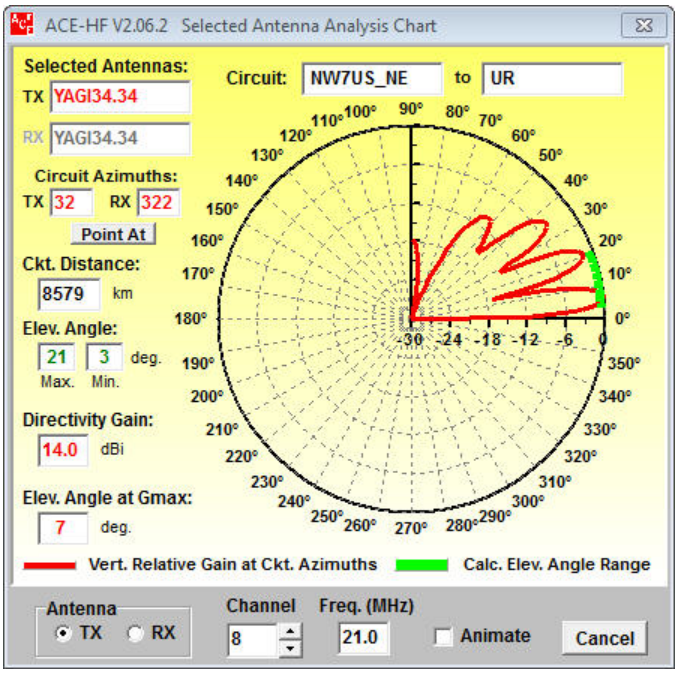
Using ACE-HF, I modeled a circuit from my amateur radio station in Nebraska to some station in Ukraine. At the time that I write this column, Russia has voted to include Crimea, a part of Ukraine, into the Russian Federation—a move condemned by nearly the entire UN and Western nations. There are many amateur radio operators in Ukraine and Crimea, so I want to connect with them via shortwave, and first specified a Required Reliability of 50 percent. Figure 1 shows ACE-HF indicating the path between these two points, and shows some other information, including the quick band-opening chart in the upper right of the map (which shows possible openings on 30-meters, 20-meters, and 17-meters at the time that I was running this analysis). Figure 2 drills down to the bottom plot, where you can see that the Reliability vs. Time-of-Day chart is well in the green from about 1730 UTC until about 1930 UTC on the 15-meter band (21 MHz). That is, the predicted reliabilities are above the 50 percent black line of the chart.

I wondered what would happen if I used the more conservative Required Reliability of 90 percent? With a few click I changed to 90 percent and saw the chart of figure 3. Oh, oh. My nice circuit has turned to mud! Before, except for the hours when even 50 percent wouldn't work, the predicted reliability is now below 90 percent all of the time. What to do?

Well, maybe I could increase power. But, I was already using my 1000-watt power amplifier (wishful thinking; I usually run below 100 watts as I do not actually have an amplifier). I had specified isotropic antennas with gains of +3 dBi at both ends of the circuit, so perhaps I could achieve more power by using directional antennas. Using ACE-HF's new antenna analysis capability, I learned that a typical Yagi antenna has a gain of +14.0 dB at 15 meters, as shown in figure 4. That should work!

Sure enough, when I specified Yagi antennas at both ends of the circuit, I could enjoy 90 percent reliability during a short hour-long time period around 1800 UTC, as seen in figure 5. The band was still dead during most of the daytime hours, but it gave me an opening during that one hour, for about 90 percent of the month! Of course, both of us need to have a good Yagi antenna, and I'd need to use 1000 watts.

But wait! Why is it that, when I added 14.0 dBi of power gain at both ends of the circuit (28.0 dB in all), the reliability didn't jump to 100 percent? After all, that much gain is like increasing my transmitter power level to more than 100,000 watts. The answer is that reliability is non-linear.



(Fig. 4) A plot of the radiation pattern of a typical Yagi antenna designed for 15 meters, with a gain of 14.0 dBi (see text).

Just for fun, I did some testing, varying antenna gain by different amounts to see what would happen to predicted reliability. Starting with my original isotropic antennas, I produced the curve shown in figure 6. Even with an equivalent power level of more than 100,000 watts, the predicted reliability almost never reaches 100 percent. In contrast, a similar graph of Signal-to-Noise Ratio (SNR) would be linear—predicted SNR increases dB for dB as transmitter power and/or antenna gain increases.

Now here's where statistics come in. ACE-HF (and VOACAP) computes reliability as a function of SNR distribution, which in turn is based on the specified Required Reliability. If you specify 90 percent Required Reliability, then the model computes SNR at 90 percent as:

SNR90 = SNR - SNRLW
where SNR is the monthly median SNR
and SNRLW = (SIGLW 2 + Nup2) 0.5
where SNRLW and SIGLW are the lower decile values of SNR and Signal respectively,
and NUP is the upper decile value of total noise power.

These statistical factors are based on many years of field measurements, where distributions of signal and noise power were gathered during a wide range of ionospheric variation. So, when one specifies a higher Required Reliability factor, like 90 percent, the statistical factors come into play and effectively reduce the predicted SNR and predicted Reliability from their 50 percent median values.

Getting back to my circuit, I wondered what would happen to predicted reliability in the other ham bands. Again using ACE-HF, I created a Summary REL chart to determine reliability over the frequency range. Figure 7 shows the result, where the green areas are for reliabilities of 90 percent or more and the yellow areas are for reliabilities of from 50 to 90 percent. The figure shows that 30 meters and 20 meters are favorable at evening/nighttime, but 17 meters and 15 meters are usable late afternoon.

One other ACE-HF tool is useful for understanding the effects of higher reliability settings. As shown in figure 8, I created an area coverage display around my station and selected the combined reliability setting of 50 and 90 percent. In this case, I returned to the original isotropic antennas with +3 dBi gain each, and selected 80 meters for my frequency.

The resulting display clearly shows that higher Required Reliabilities result in more conservative connectivity predictions. In the figure, the inner curve bounds the area in which reception with 90 percent reliability or more can be obtained. The outer, 50 percent, curve shows that we can be assured of much greater coverage if we don't mind that it may not be available on half of the days of the month.

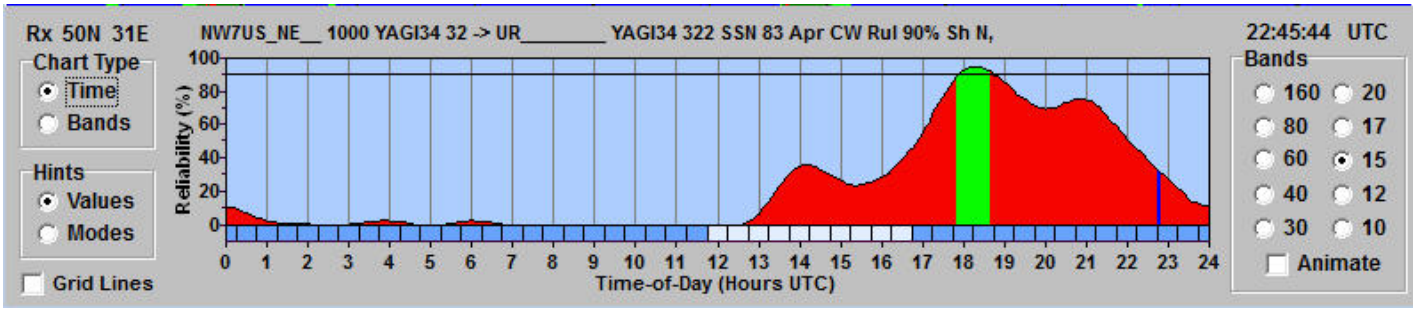
This month we have explored the effects on HF communications of the Reliability, or Time Availability, of our prediction and have shown how variable ionospheric conditions are accounted for by the statistical nature of modern propagation prediction models. As one might expect, the amount of power we focus on the ionosphere is paramount in determining the reliability of our circuit. And, that power is a result of both transmitter power rating and antenna gain.

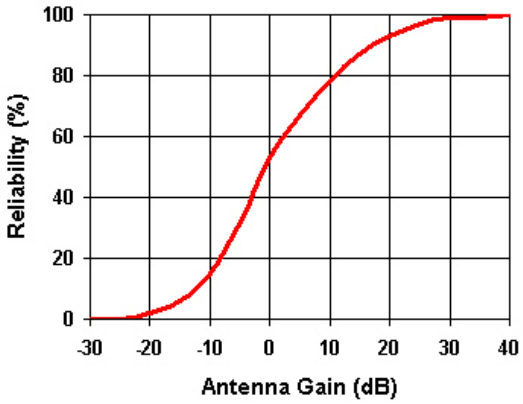
We'll continue diving into the science of the ionosphere and space weather, as well as using computer software tools that aid in understanding, analyzing, and predicting radio signal propagation. Stay tuned, each month!

Solar Cycle 24 Today

The Royal Observatory of Belgium, the world's official

(Fig. 5) Using a typical Yagi antenna designed for 15 meters, with a gain of 14.0 dBi, the reliability of 90% is more encouraging; the same 15-meter circuit between Nebraska and Ukraine is open at least for a short window of time during my local evening than when using a lower-gain antenna (see text).





(Fig. 6) A plot of Reliability vs. the combined antenna gain between the two example stations. Clearly, using antennas with higher gain improves the reliability of the propagation in this 15-meter circuit (see text). This is why many amateur radio stations employ high-gain antenna systems.

keeper of sunspot records, reports a monthly mean sunspot number of 82.0 for January 2014. The mean value for January results in a 12-month running smoothed sunspot number of 65.5 centered on July 2013. Following the curve of the 13-month running smoothed values, a smoothed sunspot level of 84 is expected for April 2014, plus or minus 14 points.

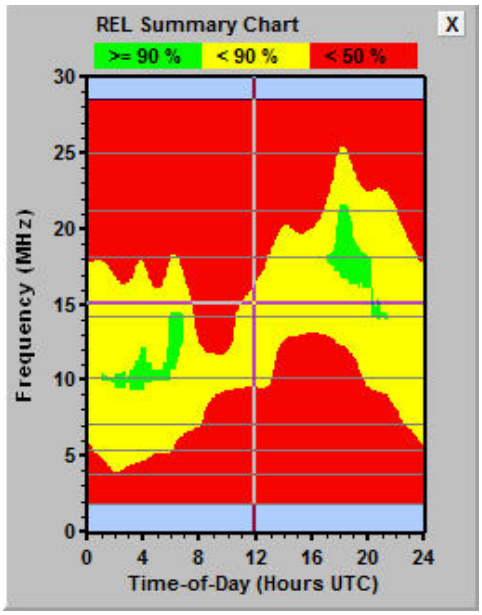
Canada's Dominion Radio Astrophysical Observatory at Penticton, British Columbia, reports a 10.7-cm observed monthly mean solar flux of 158.6 in January 2014, continuing an upward trend (a second peak?). The twelve-month smoothed 10.7-cm flux centered on July 2013 is 123.9, up from June's 120.9. A smoothed 10.7-cm solar flux of about 141 is predicted for April 2014.

The geomagnetic activity, as measured by the planetary-A index (Ap) for January 2014, is 6. The twelve-month smoothed Ap index, centered on July 2013, is a steady 7.3. Geomagnetic activity should be much the same as we have had during March.

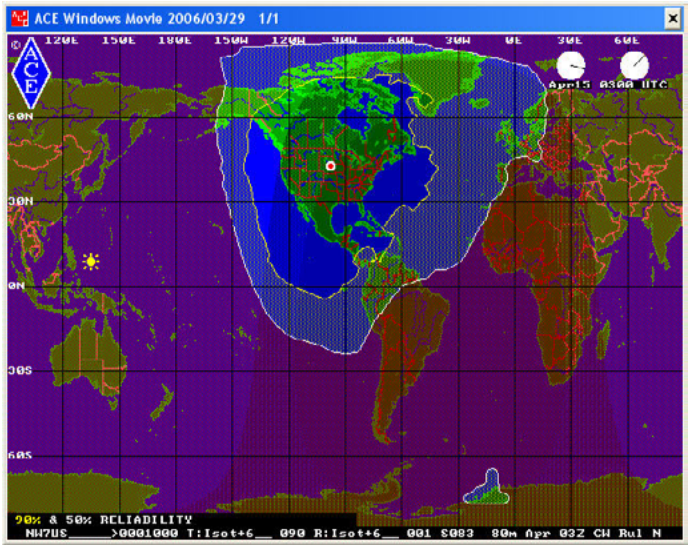
Feedback Requested

Do you have propagation-related questions, or a topic related to the Sun, the Ionosphere, or the Sun-Earth connection, that you'd like answered? Please send in your questions and comments, for possible inclusion in this column. This is your chance to unlock the mystery of this exciting area of science and communications. Your columnist has a website dedicated to space weather, at **http://SunSpotWatch.com** and also provided a Facebook page at **https://Facebook.com/spacewx.hfradio** so please take a look. On Twitter, radio propagation and space weather Tweets are provided in regular updates by @hfradiospacewx. Your columnist is on Twitter, as @NW7US.

Until next month, may your radio journey be exciting and rewarding.



(Fig. 7) Another way of looking at the reliability of the path between the two example stations in question. The green area reveals the time and frequency of an opening, during 90% of the month, while the yellow area reveals openings between 50% and 90% of the month. Red indicates reliability below 50% of the month (see text).



(Fig. 8) The Area Coverage Map produced by ACE-HF Pro for the 80-meter band, with a transmitted power of 1,000 watts using isotropic antennas. The smaller, solid blue footprint illustrates the area of likely coverage during 90% of the month, while the larger area is the likely area of coverage during half of the month (see text). ACE-HF Pro creates an animated "movie" showing these "footprint" maps by the hour.

The World of Shortwave Listening

By Thomas Witherspoon K4SWL **thomas@earstoourworld.org**

Eight Tips for Better Shortwave Listening

Let's face it: SWLers and amateur radio operators are some of the most frugal hobbyists I know. But the good news is that radio is a hobby that favors the frugal. There are many practical and time-tested ways to make radio listening fun and effective–such as improving your shortwave radio reception–that are absolutely free, or that cost very little.

And how do I know this? Among the frugal, *I'm* the most frugal SWLer I know! Yet there's a method to my frugal madness: because I simply can't afford to waste hard-earned radio money on gadgets and accessories that are ineffective; I count my pennies in order to make quality purchases with longevity in mind. Meanwhile, I track down ways to keep my hobby cost-effective.

I've gathered some of my favorite frugal tips and quality purchase suggestions *here.* So, without further delay, let's start SWLing–*and* saving money.

1. Check your shack/home for RFI. ***Cost: Free***

Checking your shack for RFI is vitally important, a procedure every radio listener or amateur operator should undertake.

The truth is, very few of us regularly experience ideal conditions for HF or AM radio listening. Devices like plasma TVs, laptop power supplies, and the ubiquitous AC adapter, inject distracting noise into our otherwise peaceful environs, disrupting our hobby. This noise is known as RFI (Radio Frequency Interference).

A number of times, I've received a message from one of my readers on the SWLing Post claiming that their new shortwave radio can "only" hear strong, blowtorch stations. My simple advice? Put batteries in your radio, turn it on to an unoccupied frequency in your favorite shortwave meter band, go to your circuit breaker box, and *turn off everything in your house*–save, perhaps, your refrigerator/freezer. (Warning: Do warn your housemates beforehand, to avoid any loud protestation! And do reset your clocks after this test.)

Did the noise level on your radio decrease? If the decrease coincided with the power cut, then one or more electronic devices in your house are generating RFI. RFI often sounds like static–very *loud* static–and is often so wide in bandwidth that it can cover several megahertz. RFI can overwhelm your portable radio and basically "deafen" it to anything but the loudest stations that break through the elevated noise floor.

Getting away from it all (the noise, that is). SWLing in the park: fresh air, beautiful scenery and no interference from noise-generating electrical devices at home. (Photo by K4SWL)

Next comes the process of elimination: systematically turn on circuit breakers until you hear the noise return. If you're fortunate enough to have accurately-labeled circuit breakers, you will at least know what area in your house holds the infamous disruptive device. Here's a short list of the usual RFI culprits:

- The ubiquitous AC adapter (aka, "wall wart")
- Laptop power supplies
- Flat screen TVs: especially Plasma TVs
- Heating devices like electric blankets
- External hard drives

The ever-present wall transformer: the voltage is not the only thing delivered through this device. (Photo by K4SWL)

- Lamp dimmers
- Touch lamps

Good luck tracking it down! Chasing RFI can be complex. Check out this list of RFI resources on the ARRL website (**http://www.arrl.org/radio-frequency-interference-rfi**) for methods and ideas to cope with RFI.

2. Take your radio outside. ***Cost: Free***

If you live in a condo, high-rise, or high-density neighborhood, my first suggestion may be of little use to you. In this case, your neighbor(s) may be causing RFI; turning off your own power may have little to no effect. Fortunately, there's an easy–albeit modestly inconvenient–way to deal with neighborhood RFI. Leave the neighborhood! No, not permanently; just for a fun afternoon outing (with radio, of course).

If you live in a city, grab your radio, and head for a park or other area with wide open space and no buildings. Listeners who live in urban areas frequently enjoy radio listening via headphones on a park bench; some even have a favorite bench for their fair-weather pastime.

The benefits in this case are two-fold: first, you're removing yourself from the vicinity of RFI, but second–and the icing on the cake–is that you're taking your radio, and its antenna, outside. Antennas *always* function better outside. Walls and even windows attenuate HF signals. Plus, outdoor settings nearly always equal fun.

By the way, if you have no local parks to which you can escape, consider taking your radio in the car and driving to a national or state park. Better yet, combine camping and SWLing. I like to do this, although I don't have an RFI problem where I currently live.

3. Make a simple wire antenna. ***Cost: Free (or, at most, $10)***

Most shortwave portables radios on the market today have a telescopic whip antenna that will suffice for casual listening. But often you can increase the antenna gain by simply adding more length in the form of a simple thin wire (many radios actually ship with a clip-on antenna wire). Check your original box and make sure you haven't overlooked it, as it's fairly easy to do.

If you didn't receive a factory-supplied, clip-on antenna, no worries! They're a breeze to make and quite cheap: indeed, if you have a junk box of electronics parts like so many hobbyists I know, you may already have what you need. Simply obtain a 20-foot length of jacketed (insulated) wire (gauge is not important), just something thin enough that you can easily roll up to transport. Next, strip ¼ inch of insulation off the end of the wire. Solder and/or crimp an alligator clip to the end of the wire, making sure you have a solid, stable connection.

Now, stretch out this wire and attach it to your antenna. You will most likely find that this improves antenna gain. The effectiveness of the wire varies with the receiver. When I've made clip antennas in the past, I've simply made them longer than I thought I might need, and then later cut it off at the optimum length based upon signal

Tecsun PL-880 does a great job charging the internal batteries, but injects copious amounts of RFI in the process. (Photo by K4SWL)

strength.

Two caveats:

If you live in an RFI-heavy environment, adding a wire antenna at home may only increase your noise level (after all, it will make the radio better at "hearing" the noise).

Some receivers are susceptible to overloading and electrostatic discharge (the Tecsun PL-600, Grundig G5 and G3 come to mind). To be on the safe side, do not attach any wire to your portable that is in excess of twenty feet in length. Twenty feet should be more than sufficient length to increase antenna gain without any negative repercussions.

4. Use batteries—preferably rechargeable ones. ***Cost: $5- $20***

This is one suggestion that may require a modest investment, but will pay off in more ways than one. I honestly can't think of the last time that I listened to a portable radio while it was plugged into mains/grid power via an AC adapter. Since at least 2007, I have been powering my portables exclusively with good-quality rechargeable batteries.

Why rechargeables? First and foremost, with rare exception, shortwave radio manufactures give little thought to the AC adapters they include with a portable shortwave radio; they're simply an accessory that is expected, so they deliver. Indeed, the AC adapter that came with my Tecsun PL-880 (Tecsun's latest flagship portable) came with an AC adaptor that does a great job charging the internal batteries, but injects copious amounts of RFI in the process. Running the radio off batteries solves the problem instantly.

Many radio manufacturers now include rechargeable batteries with the purchase of a radio. Some of these batteries are AA cells, others are slim packs resembling cell phone batteries. Consider purchasing an extra battery if you're worried yours might die away while you're listening to your favorite program; a quick switch, and you scarcely miss a beat. If your portable comes with rechargeable batteries, most likely the radio even has a built-in charge control circuit. These rechargeable battery packs are good for hundreds of charges.

I should add that I'm a fan of the traditional AA battery, even though they're bigger than other battery types. After all, they're nearly always accessible. If a radio takes AA batteries, I never use the radio's built-in recharger, instead I prefer a MAHA brand battery charger, as they condition and give a longer life to the rechargeable cells.

Sure, buying rechargeable batteries and, potentially, a good battery charger require an initial outlay of money, but the rewards are a quieter receiver and a more earth-friendly approach than heavy-duty or alkaline batteries can deliver.

Sony MDREX10LP ear-buds ($15) deliver Sony-quality audio to your ears at a wallet-pleasing price. (Courtesy: Sony)

5. Listen with headphones or earphones. ***Cost: $0 - $100***

Why headphones? Ask any serious DXers (amateur radio or SWL) and they'll tell you that headphones are an indispensable tool. While armchair listening is great with your radio's built-in speaker, headphones give you better sound isolation, and your radio's audio is equally balanced. Digging a weak station out of the ether is easier with headphones.

Almost every portable radio you buy today will come with a complimentary set of earphones. Quality varies among these, but in my experience, the headphones included tend to be of the lowest quality; for shortwave listening, these may suffice.

Though AM and shortwave radio is not considered a "high-fidelity" medium, thus not requiring a wide frequency response, I still prefer listening with quality earphones/headphones. As long as your headphones have a decent frequency response–I usually aim for 8 - 22,000 Hz–you'll be pleased. And, do make sure your headphones or earphones are comfortable to wear for extended periods of time.

One of my favorite pair of in-ear earphones for SWLing are the popular **Sony MDREX10LP** series. They're comfortable, responsive, isolate noise, and are available from a number of retailers for about $10 USD per pair.

For over-ear headphones, I like the **Panasonic RP-HTF600**. They're large, comfortable, and deliver amazing fidelity for about $30 USD.

If you also happen to be an amateur radio operator, the **Yamaha CM500** headphones have a built-in boom-mic that works amazingly well. At $50 USD, they are a steal. When I received mine, I opened the package, plugged the headphone and mic jacks into my Elecraft KX3, and I was on the air with them in seconds.

6. Learn to use Exalted Carrier Reception. ***Cost: Free***

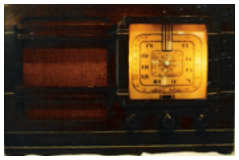
"Exalted Carrier Reception" (ECR) is just a fancy way of saying that an AM broadcast carrier is tuned in while in single-sideband mode. This is most useful when you're trying to listen to weak stations.

This (ECR) is, in a sense, the frugal listener's version of synchronous detection. Why does it work? As my knowledgeable ham buddy Mike (K8RAT) explains: "You're removing any selective fading problems by filtering away one of the sidebands, and injecting a carrier of steady amplitude which eliminates the 'tearing' heard when a broadcast carrier is varying in amplitude." Got that?

Even if you don't understand it exactly, here's how to use ECR: Simply find a strong AM station on your radio. Next, turn on the BFO or SSB mode on your radio. As you adjust the tuning knob, you'll hear an audible whine, the pitch of which will change with every increment of tuning. "Zero-beating" the carrier follows next–this is simply tuning in the signal until that whine is gone, and the AM station can be heard as clearly as if the radio were in AM mode.

The fidelity of ECR/ECSS is typically not as good as AM–mainly because SSB filters are usually narrower than AM filters–but it does lower the noise floor, increase the stability of the received signal, and make this signal "pop out" a bit more.

But don't take my word for it–let your ears be your guide! In the recording below, I tune in a low-power station on my receiver in standard AM mode, but at 15 seconds into the recording, I switch to the upper-sideband (SSB) mode, zero-beat the frequency, then open up the SSB filter a little wider. Then, just before I end the recording, I switch to lower-sideband–something you can do if there is interference in the upper-sideband, for example (click on speaker to hear, right click to stop):



It's amazing how much background noise ECR removes.

If you're lucky enough to have a tabletop radio, chances are that it has an SSB mode (although there are some very rare exceptions). Less than a third of *portables* on the market, however, have SSB. Here is a list of the most popular portables with SSB that are, or have recently been, in production:

Grundig/Eton: YB400, G4000A, E1, G3, G5, E5, G6
Tecsun: PL-600, PL-660, PL-880
Degen/Kaito: KA/DE1102, KA/DE1103
Sangean: ATS-505, ATS-909, ATS-909X
Sony: ICF-SW7600GR

7. Use a web receiver. ***Cost: Free***

If you live in an area with frustrating RFI, but want to listen to the shortwave bands from home, try an online

web-based receiver. Sure, it's not quite like tuning a radio at your fingertips, but it's the next best thing, and also a handy tool for checking propagation or verifying your own signal (if you're an amateur radio operator).

My two favorites site are:

Global Tuners (http://www.globaltuners.com), which has a number of remotely controlled radio receivers all over the world. You must register before you can participate, but registration is free. Global Tuners even has a **free Android app (https://play.google.com/store/apps/details?id=com.amaslyuk.gt)** that permits remote receiver control via your smart phone or tablet.

The University of Twente Wide-band WebSDR (http://websdr.ewi.utwente.nl:8901/)is an amazing resource. Not only can *you* control this receiver, but so, too, can a few dozen other web guests—*all at the same time*! I've used U Twente's receiver on a number of occasions to listen to European pirates. Cost? Again, it's free.

8. Finally, practice listening. ***(Cost: Just some time)***

My final bit of "free" advice sounds a little philosophical, but rest assured, it isn't. I've always likened radio listening to another of my interests, astronomy– an entirely different hobby that, unless you're a radio astronomer, relies on an entirely different sense.

Why the comparison? I've known some talented astronomers who, with just a basic pair of binoculars, can see much more in the night sky than I ever could. Are their eyes better than mine? Not necessarily. Their eyes are just experienced in the field of stargazing; they know what to look for, and most importantly, what to *appreciate.* Their brains decipher the images of bright or faint stars, subtle variations in color or shape, and focus on what they consider important. In short, this is not an ability you can pick up overnight; it takes patience, experience–and true passion.

Radio listening is, in that sense, much the same. Though I'm by no means a good example, I do wish I could go back to the days of my youth with the ability to listen that I have developed over the decades. There must have been so many jewels of stations hidden in the ether that I completely skipped over...My ability to, for example, pick out the ID of a faint station, to tune accurately and quickly, and to cope with adjacent noise, have all been honed since then, a result of time spent *just listening.*

My good friend Vlado (N3CZ) is a case in point: he is one of the most capable ham radio DXers I know. His extraordinary ability to pull intelligible conversations and CW (Morse code) out of the static, even in crowded radio conditions, is simply astounding. Vlado's main transceiver is nearly two decades old, and by no means a benchmark

Sangean ANT-60 roll-up shortwave antenna ($13) extends up to 23 feet, has 3.5 mm plug on the end to attach to many portable shortwave radios but also comes with an adapter that allows it to fit directly onto a telescoping whip antenna. (Courtesy: Universal Radio)

technically. If you ask Vlad if he uses filters and digital signal processing, he will wisely tell you, in his Macedonian accent: "*Your best filter is between your ears."*

The same goes for SWLing. I have spent enough time listening to shortwave and weak DX that I can now pull conversations out of the noise that my (non-radio) friends can barely detect. I'm convinced this is healthy exercise for the old gray matter.

David Goren, a good friend and the highly creative radio producer behind **Shortwaveology.net**, describes how shortwave listening enhanced his career:

"When I first discovered shortwave, I'd strain my ears through the static and all the layers of jumbled up sounds trying to hear as far around the world as I could. Years of this kind of intensive listening tuned my ears in such a way that allows a laser-like focus on the sonic details when working in the production studio making radio stories."

Indeed, I've heard and can certainly appreciate the results of his remarkable "laser-like" listening ability; check out **Shortwaveology.net** for your own experience of David's talented ears. You'll be glad you did.

No doubt you enjoy listening already; my contention is that it has more benefits for your brain than Sudoku puzzles, and is even more fun. Plus, did I mention that it's *free?* You don't need to pay a subscription to listen to the radio. There's no real trick to this: it just takes time...interest...and a pair of ears. Until next month: *Happy Listening!*

TSM

The Shortwave Listener

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

Various Shades of Propaganda

Welcome to another edition of The Shortwave Listener. "Spring has sprung, the grass has riz," as my mother used to say. Or at least I hope it has. This winter has been particularly challenging weather-wise. I am sure those of us in North America could use a break from the winter doldrums! And, even if it hasn't warmed up entirely, there is a lot on the radio to warm your heart.

Thailand is warm most of the time. Radio Thailand is a very interesting listen, these days. Listening in early February, the broadcast opened with domestic news, presented in a countdown format. Thailand has been rocked by demonstrations that have been going on for weeks. Four of the "Top Five" stories involved the demonstrations and protests. The news coverage seems quite evenhanded, giving both the government and opposition points of view.

The local news was followed by a laudatory program about the Thai Monarch, and how he was both a role model and benefactor to the nation. A tad over the top, but interesting nonetheless.

Ads for Bangkok Airways and PSAs for Thai tourism make the idea of visiting the country very appealing... as long as you didn't listen too closely to the local news including the shooting of protest leaders and the lobbing of a grenade at a demonstration, which makes a visit a tad less appealing.

Global Reports followed, with an eclectic mix of reports, about protests in Ukraine, the situation in Syria and Egypt, Iranian nuclear talks, attacks on Suffi Muslims in Pakistan, lynchings in Central African Republic, the arrest of a female governor in Indonesia and a Swiss referendum in favor of curbing EU migration. This segment was perhaps the best reason to listen; a brief, but interesting review of events in the world, from a Thai perspective. The program also covered the bizarre story about a Danish zoo that killed a healthy giraffe, which was fed to the lions.

Radio Romania International QSL card (Courtesy RRI)

Cool music bridge (Dave Brubeck, Take Five) into the next segment: Business. Thailand is open for business and anxious to end the political upheaval. Capitalism is alive and well in the Kingdom. "The current situation is temporary, the country will recover in six months. Growth and investment prospects are favorable." Perhaps whistling past the graveyard.

"Happiness Thailand Paradise" promos from the Thai Tourism authorities, a tad incongruous after serious political and business reports. Sports report focused on British and European soccer. Bizarrely the program finished up with a report about a train in Switzerland! Radio Thailand is an interesting broadcaster, especially in these uncertain times. Try it on 13745 kHz at 0000 UTC

Over the years I've listened to hundreds if not thousands of hours of mostly propaganda broadcasts from the Soviet-bloc countries. Romania was never very exceptional. My favorites were probably Radio Moscow, Radio Prague and Radio Sofia, Bulgaria as they were all then known. For comic relief, I would listen to Radio Tirana in Albania, the Stalinist propaganda being amusingly over the top. Fast-forward 35 years and it seems, Radio Romania International is the "last man standing," so to speak, among international broadcasters in the region, at least it still is standing as of this writing.

It is a shame so many broadcasters from this region have abandoned shortwave. All of these nations are much more interesting, and worth checking out now; Radio Romania especially so. The RRI schedule is an eclectic mixture of news, entertainment, and revisionist history. Sunday (UTC Monday) is a good day to listen, as RRI presents Inside Romania, a great general interest program about the country, followed by Romanian Without Tears, an all too brief learn-Romanian-by-radio course. Romania is one of the few nations to still offer one of these once popular programs. Finally, one can hear All That Jazz, featuring, as the

name implies, Romanian and World Jazz.

As a history geek, I appreciate the Monday (UTC Tuesday) broadcast of Pro Memoria; the weekly history feature. This one would have Ceaucescu spinning in his grave so fast that it might solve the energy crisis. Many political figures from before the Communist take over (several of whom died of extreme lead poisoning as the guests of honor at a firing squad) have not only been rehabilitated, but are now honored. The program is not afraid to attack the wartime policies of the Soviet Union either. It is a remarkable radio program.

Another popular program is The Cooking Show, heard on Saturday (UTC Sunday). Romanian food is fabulous and the recipes presented are rich and varied. (All recipes can be found on the RRI website **www.rri.ro/en_gb/RadioRomaniaInternational/the-cooking-show-40**)

Check out the programming of Radio Romania International, your ears will thank you! Try them at 0100 UTC on 6145 and 7325 kHz, and at 0400 UTC on 6020 and 7305 kHz.

WEWN is heard very well in the afternoons on 13610 kHz each weekday at 1900 UTC; one can hear Open Line. This phone-in program, each day of the week, features a different topic, ranging from Apologetics, Church and Bible topics, Talking to Non-Catholics, Pro-Life issues and Theology. It's an interesting program that explores a lot of topics even beyond the stated parameters. Give it a listen!

Every night, one can hear some fabulous music from Radio Habana Cuba, interspersed amongst the propaganda. We are rapidly running out of stations that provide good listening for great lengths of time. RHC is one of these. I actually prefer sometimes to listen to them in Spanish, the propaganda is much more appealing when I don't understand it! Listen most evenings on 6000 and 6165 kHz.

If there is a program, or a station you particularly like, please drop me a line, and we will feature it in a future column. I eagerly solicit your opinions, praise, criticism, suggestions and ideas. Let me know what you are listening to, and what you like to hear on shortwave. Do you prefer news, culture, music, the arts, travel, something else. Let me know! Until next month, adieu!

TSM

Maritime Monitoring

Ron Walsh VE3GO **maritimemonitoring@gmail.com**

Spring Thaw Opens Maritime Frequencies

(All Photos Courtesy of the Author)

"A warning of freezing rain, accumulation of one-quarter inch or more has been issued. Temperatures below freezing and winds from the North East, gusting to 30 miles per hour. A winter storm advisory is in effect until 2100 this evening. A state of emergency has been declared for South Carolina." Poor driving conditions and power outages are being reported.

I thought I had left all this at home when my wife and I came south for February and March this year. My weather radio, marine monitoring and amateur radio transceiver were put to good use for two days here. I did not expect to see my balcony railings ice coated. I hope that by the time you read this April column, the snow will be a memory.

The winter in Kingston, Ontario had been more severe than usual. We had an ice storm in late December and the ice never left until the spring warm up. My monitoring was mainly for severe weather and road conditions that could be relayed to other amateurs or public services. We had more snow than the normal winter and the winds were strong for many days.

The winds on Lake Ontario were reported many times as gale force and storm force winds were reported on two occasions. Waves in excess of five meters were forecast and freezing spray warnings were issued many times. The temperature was below 0 F many days and the ,0 chills were reported as minus 32 F, or lower, on several occasions.

The snow did not melt so the banks are high along all roadways. Needless to say we had numerous accidents on the major four-lane highway due to white-out conditions caused by wind and blowing snow. Detroit Michigan reported a record snowfall in January. The record stood since 1900.

Elbeborg, a specialty salt water vessel upbound at Brockville. One of my favorite spots to shoot photos.

Another problem was the number of power outages caused by the wind, snow and ice. There are some outages on the islands used in the summer season service that will not be fixed until spring, as crews cannot get to the islands.

Needless to say, the cold, windy weather has caused a great deal of ice formation on the great lakes. As of mid February, they were 78 percent ice-covered and more ice formation was expected. Lake Superior was expected to freeze over for the first time in many years.

It was interesting to note that Lake Ontario has not frozen over as much as the other lakes. This is because of the current effect that causes a welling up of warmer water from the lake bottom. As a result, the open warmer water and the colder moving air above leading to several severe lake-effect snow storms causing heavy snow accumulations at the eastern end of the lake.

The wind and moving ice has caused the local ferries to suspend service on several occasions this winter stranding island residents for a day or so at a time. The suspension of service and alternate transport methods, in case of emergency, were relayed through VBR Prescott Coast Guard radio.

The traffic on the marine VHF radio was heavier than usual this winter. The cold weather caused great difficulty with the exodus of salt-water vessels from the seaway. Ice formation was rapid and the winds and storms caused many delays. We also had two incidents of ships hitting the ship arrestors in the locks, which shut the system down for a while.

The traffic control channels, 11, 12, 13 and 14 were busy relaying information about the pilot service that had a backlog of ships, many of which were forced to go to anchor and wait. Channel 14 was busy with requests for time of pilot arrival, etc.

Further east, the ice blocked the channels and one-way traffic convoys following an icebreaker were needed. To add to the urgency, the motor vessel Ursula ran aground at the entrance to the seaway channel and was there for three days. She

Fairlift. a heavy-lift vessel upbound at Brockville. This vessel is built to carry heavy, bulky items

Whitefish Bay, brand new CSL laker, downbound in the Welland Canal, with her first cargo on the lakes.

had to be lightered and several tugs were needed to get her free. She proceeded, after inspection, with tug escort, to head for Montreal. She was the last ship to exit the Seaway after a four-day voyage, and had to have icebreaker assistance to do so. Channel 77 was used for communications between the various ships involved.

In our area, the ferry service means that the marine radio maintains continuous weather broadcasts all winter. These are very helpful as alerts or warnings are broadcast on these frequencies, even before the regular weather radio service.

Radio traffic in April will be heavier as icebreakers will transit the area. Navigation will be restricted to daylight hours until navigation aids have been commissioned along slow passage due to ice in the river channels, canals and lock entrances. Many harbors will need icebreakers to assist in opening them up this year.

Where to Listen

Since this is my second column for *The Spectrum Monitor*, I want to remind readers of some basic maritime monitoring ideas. There are many listings of the main marine channels in every major port or shipping system. Since the majority of this is on VHF radio it is easy to pick up. However, in your area, there are probably many channels that are not listed. Marinas, tugs, and other marine services also use VHF radio.

I usually scan the marine frequencies several times a year to hear if there are any new channels in use. Remember that there are two frequencies in the duplex channels and the lower, or "A" frequency is often used as a simplex channel. It is also useful to program the frequencies of the ship-to-shore duplex channel so that you can hear both sides of the conversation. Scan from 156.025 to 157.425 MHz as well as 160.625 to 162.025 MHz. Remember that channel 70 is for DSC digital traffic. Frequencies 161.975 and 162.025 are for AIS digital operations. This should reveal any operating frequencies in your area. As I have stated before, as an example, the Canadian Coast Guard uses channel 82A. However, you can monitor the rescue aircraft leaving the base at Trenton, ON, on this frequency as well.

Why Monitor

Like most people who monitor marine radio I have an interest in shipping. I like to keep note of the traffic in the area and any incidents that do occur. I also like to photograph ships and I can find out what ships are in the area. New vessels, unique vessels, ships on their last trip or famous vessels have all been targets of my camera. By listening to the radio, I can determine accurately when they will pass a good photo location. Weather information on the waterways is also readily available. Of course, any mayday situations will be heard.

HF

Marine HF monitoring is one thing I still enjoy doing. While visiting the Joint Rescue Coordination Center in Trenton, I learned that the reduction of ice in the Arctic is causing increased traffic in the area. Thus, there is more likelihood that SAR incidents will occur in the region. We would also expect increased radio traffic.

The Canadian Coast Guard radio station in Iqualuit, Nunavut, still does regular marine radiotelephone HF broadcasts. They also have remote facilities in Killinek, Resolute and Coral Harbor that have HF facilities. They also remotely operate the facilities at Inuvik, NWT on HF.

Iqualuit is on the air from mid-May until late December. The remote facilities usually operate from July to October. Since my next column will be in the July issue, I will give their schedule and frequencies now. Iqualuit is equipped to use 2182, 2582, 4125, 4363, 6215, 6507, 8291, 8752, 12290, 13077 and 16426 kHz on USB.

Tug Margot in Elevator Bay, Kingston

Tug Frances in Elevator Bay, Kingston

Their regular broadcasts are as follows:
0110 UTC Coral Harbor 2514, 6507
0205 UTC Killinek, Coral Harbor 2514, 6507 Iqualuit, Resolute 2582, 4363
1240 UTC Resolute 2582, 4363
1320 UTC Coral Harbor 2582, 4363
1410 UTC Killinek 2154, Iqualuit 2582, 4363, 6507
1705 UTC Coral Harbor 2514, 6507 Killinek 2514, Resolute 2582, 4363
Iqualuit 2582, 4363, 6507
2235 UTC Killinek 2514 Iqualuit 2582, 4363, 6507
2310 UTC Resolute 2582, 4363

The facilities at Inuvik, with remotes at Cambridge Bay and Hay River, share 2182, 2558, 4363, 5803, 6218.6, 6501, 8794 and 13077 kHz USB.

Their regular broadcasts are:
0115, 1315 UTC Inuvik 5803, Hay River 4363
0235, 1435 UTC Inuvik 6218.6, Cambridge Bay 4363

You can receive their Navtex broadcasts in French at 0300 on 490 kHz and in English at 0310 on 518 kHz; they follow the same format every four hours after that.

I would be remiss if I did not mention the broadcasts from the west coast of Canada. VAJ, Prince Rupert Coast Guard and VAE, Tofino Coast Guard radio, both use 2182, 2054 and 4125 kHz.

All broadcasts are on 2054 kHz. Prince Rupert broadcasts start at 0515 and Tofino starts at 0450 UTC. Each station broadcasts every six hours after that. Prince Rupert uses 518 kHz for Navtex starting at 0030 and Tofino also uses 518 kHz and starts at 0110. Each then broadcasts Navtex every four hours after that.

The use of 518 kHz reminds me that amateur radio is hoping for an allocation around 500 kHz. Canadian and American amateurs are doing experimental transmissions on frequencies near there. The Marconi Radio Club of Newfoundland used the call VX9MRC on 478 kHz to bring attention to this potential new amateur radio band. The Marine Radio Historical Society broadcasts their CW traffic list, and press on 426 kHz Saturday beginning at 1700 UTC.

If you want to try for a real catch on the LF, look for the radio beacon from the French-owned islands of St. Pierre and Miquelon on 386 kHz. It is on the air year round and uses the CW identifier of SP.

The 5803 frequency above reminds me that the Canadian authority, Industry Canada, just ratified Canadian amateur use of the 60-meter band. The specific five frequencies, 5332, 5348, 5358.5, 5373 and 5405 kHz, are the same as those used in the United States. We are limited to 100 watts and specific modes. I must admit I have already tested on 5332 kHz CW and USB. There are many marine frequencies in the 60-meter area. Two we can use are 5696 for the US Coast Guard and 5717 kHz for Canadian SAR activities.

Don't forget two good amateur radio frequencies for the annual northward migration of yachts each spring. The Intracoastal Waterway net is on 7268 kHz every morning at 0745 Eastern Time and the Maritime Mobile Service Net is on 14300 kHz every day at 1200 Eastern Time.

I always appreciate information on what you are listening to and what I may be able to add to the column. I hope that when I return home there are still some antennas standing. After this winter, I think a wholesale refurbishing of antennas and cables will be a necessity.

TSM

The Longwave Zone

By Kevin O'Hern Carey WB2QMY wb2qmy@arrl.net

Spring Check-Ups

The month of April—at least here in North America—typically brings a changeover in longwave conditions. There's still plenty of DX to be heard, but before long, natural static (QRN) will be on the rise, and we'll have to cope with digging out signals that were crystal clear just a month or two ago. While conditions may become more challenging, April is also a great time for planning your outdoor antenna projects and making repairs following the ravages of winter. Most would agree that we've had a pretty rough winter this year, even in states that are normally spared from the worst of the season!

As soon as the weather allows, many listeners will want to take stock of their outdoor components, and make any necessary repairs or upgrades. The tasks of re-securing cables, fixing connections, or trimming branches are best performed now, rather than in the middle of winter. The following are some points to check at your station to be sure you're ready for a new season of longwave monitoring…

Cable Entrance Points—The point where your antenna feedline, ground, and control cables enter your home is an especially vulnerable area. No matter how good a grade of sealant you have used, it is subject to drying out and/or pulling away from wall surfaces. Give special attention to this area, and re-seal it as necessary. It's also a good idea to arrange outdoor cables with a "drip leg" in them so that rainwater running down the wires encounters an "uphill" section of several inches prior to entering the outside wall. In this way, rainwater will run off the lowest point of the leg instead of rushing against the wall where it will eventually find its way inside.

Ground Connections—It won't be long before lightning storms will be on the minds of many of us. While nothing can protect against a direct lightning strike, a good ground is an essential first step in protecting your equipment, and making your installation safer. Inspect all ground clamps to make sure they are clean and tight, and ensure that all ground wires are connected to a single ground point—preferably with no splices along the way. As with all cabling, ground wires should be as short and direct as possible. An excellent booklet on the subject of grounding is The Grounds for Lightning and EMP Protection that was published several years ago by PolyPhaser Corporation and is still sometimes available at online used booksellers and auction sites.

Antenna Feedline Connections—Outdoor connections are among the most vulnerable links in an antenna system. The wind, snow, rain, and ice all take their toll, in addition to baking sun. Take a close look at all of your antennas to see if the coax or feedline attachment point is in good shape and weather-tight. Some sort of strain relief should be used at the point where the feedline attaches to the antenna, or it won't last long. Don't want to leave the ground to do your checks? Binoculars can be a useful inspection tool.

Anchor Points & Support Ropes—Several years ago, I came to believe that the re-hanging of wire antennas every few years was a normal and expected activity. That was before I started using black Dacron® rope and a halyard/pulley arrangement at the end of my wire antennas. What a difference this little bit of extra effort makes! The Dacron rope is highly resistant to sun damage, and the pulley/weight arrangement allows an antenna to sway gently in the wind, with the counterweight rising or falling as necessary to keep a constant tension.

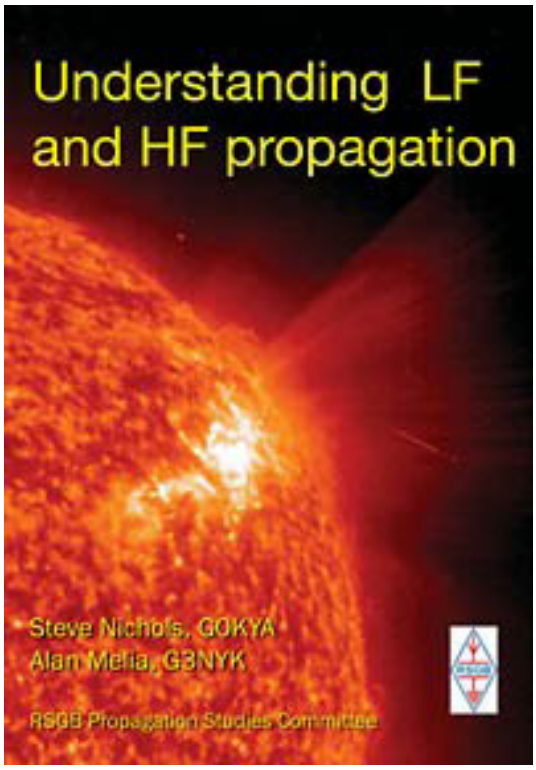
For a pulley, you can use one of the types made for outdoor clotheslines or marine use, and your counterweight can be fashioned from a plastic jug filled with sand. I've had a dipole antenna up for many years with this stress-relieving arrangement, and I can recommend it highly. Check your favorite radio supply house and hardware store for the items you need to build or repair an outdoor antenna. Universal Radio has an excellent selection of supplies at **www.universal-radio.com/catalog/antsup.html.**

Tidying up the Shack—The focus in this column is tending to the outdoor needs at your station. However, every now and then it becomes necessary to "clean house" in the radio room itself. This point was driven home to me a few years ago when I prepared to get on the air with my vintage Heathkit transmitter for an AM net. I don't fire up the old rig very often, but when I do, I usually just apply power, touch up the antenna tuner for the band I'm on, and away I go.

This day was different. The watt-meter wasn't showing any power output, and the usual relays were not activating. After some troubleshooting (and missing the check-in for the net) I discovered that several coaxes in my shack had been switched around to accommodate a temporary setup weeks earlier. I had forgotten exactly what was changed, and as I looked at the maze of wires, I decided it was time to "start over" with my shack wiring. I removed all rigs from the table, cleaned the surface to get rid of the considerable build-up of dust, and then proceeded to reinstall each rig, neatly re-wiring, re-dressing,

and labeling all of cable runs as I went along. This was a liberating experience!

Everything works fine now, and if a problem does occur, I'll be in a better position to resolve it. I also made a basic drawing of my station's cabling, which I keep with my station records for future reference. I even set up an "AUX" position on my antenna switch, which is wired to a spare area on my bench where I can set up a "theme" station for temporary use (antique, military surplus, QRP, homebrew rig, etc.) then rotate it out for something different when I'm ready for a change. Getting things in order inside goes a long way toward improving your on-air experience, whether chasing longwave beacons or working HF DX!



Learn LF Propagation—Free

I've mentioned it before in my longwave writing, but it bears repeating; An electronic book is available for immediate download called Understanding LF and HF Propagation by Steve Nichols, G0KYA and Alan Melia, G3NYK of the Radio Society of Great Britain's (RSGB) Propagation Studies Committee. The book is based on a series of articles that Steve and Alan wrote on LF and HF propagation for the RSGB's RadCom magazine in 2008-2009. It includes three features specifically focused on LF. You can download your free copy at **http://tinyurl.com/LW-Propag**.

Wither Non-Directional Beacons?

We've grown accustomed to hearing about the imminent demise of non-directional beacons (NDBs) over the past several years. So far, it has not happened, in large part because the stations offer a simple and reliable way of performing navigation and positioning. Recent budget cuts are forcing many services to be examined for their continued effectiveness, cost and criticality. The LORAN shutdown in North America was one such example.

NDBs are clearly an area in which there is opportunity for savings. This, along with recent innovations in high accuracy differential GPS (DGPS), mean that we might see more NDB shutdowns in the not too distant future. This is not to say that beacons will go away overnight. Beacons at private airfields, and those serving remote areas appear to be more secure and will likely be with us for some time to come.

Nevertheless, I wanted to assure readers that no matter what happens to traditional beacon service, The Longwave Zone will continue to provide full coverage of the many other activities happening on longwave. These include Experimental/Ham activity, Natural Radio signals, time stations, and other utilities. Ham operation, in particular has a very promising future on longwave, and we'll be there to cover it!

Mailbag & Loggings

A 173 kHz mystery signal has been reported by listener Ron Smith (AL). A sound sample was sent to me by e-mail, and appeared in last month's Dear TSM column. I can best describe the sound as a series of short "pips" occurring roughly once per second. Initially, I thought this could be a telemetry signal used by a power line carrier (PLC) system, or perhaps even a locally generated signal caused by a VHF/UHF scanning receiver as it cycled through its channels. Of course, if it was a scanner, it would be expected to stop sporadically as the scanner landed on an active channel. This signal wasn't stopping. Other clock-based devices around the home also came to mind, but then the signal was reported in the New Orleans area, and that switched my thinking to this being an intentionally radiated signal.

While not impossible, it seems unlikely that this is a Lowfer experimenter signal, as most Lowfer activity is concentrated at the upper end of the band, say 175 kHz and above. Yet another possibility is that it is one of the military RTTY stations in an idle/testing mode, though I have never heard such a signal this high up in the band. I'd be interested in hearing from others who are copying the 173 kHz signal. Please indicate your location, how strongly you hear it, and at what times of the day.

Melvyn Larson KC0P wrote with the following question: "I listen for beacons for beacons here in Rochester, MN. I have a question about beacon propagation. What do you think is the daytime limit on distance? I can hear Fargo, ND 'AA' on 365 kHz most days at a distance of 293 miles. Sometimes it is weak, but solid, and other times it fades into the noise twice in a 10-minute period. I would like to learn more about this propagation mode and how it is affected by D-layer absorption or refraction. For equipment, I use an 80-meter dipole at a height of 25 feet and an Icom R-70 receiver on a narrow CW setting. My best catches so far this winter are: 351 YKQ Waskaganish, QC at 816 miles; 395 YL Lynn Lake, MB at 961 miles; and 380 BBD Brady, TX at 964 miles."

Hello Melvin, and thanks for writing. I don't have any definitive records to point to regarding maximum daytime

range, but I would say from practical experience, that this is typically around 200 miles for a station of 25-50 watts when a good receiving setup is used. Of course, much depends on transmitter power, antenna efficiency, and terrain between you and the station. I would say that you are doing exceptionally well to hear AA at 293 miles. How about it, readers? What kind of daytime distances are you seeing at your monitoring posts? I'll report any updates here.

Melvin also supplied our loggings for this issue, which were made while on a late January DX-pedition to Horseshoe Lake near Morristown, MN. He used a Drake R8B receiver for these intercepts. He explains: "These loggings are from the MDXA winter DX-pedition to Camp Omega. Our 1000 ft. Beverage On Ground (BOG) antenna picked up lots of signals not aligned with the 80-degree azimuth. It had a 50 ft. drop in elevation down to the lake and some meander, but we heard about 20 new stations, particularly in the north of Canada. The antenna worked great! Randall Trapp was the DX-pedition organizer and shared the BOG antenna."

This Month's LW Logs:

Freq	ID	St/Pr	City
198	DIW	NC	Dixon
200	YAQ	ON	Kasabonika
201	GL	QC	LaGrande Riviere
205	XZ	ON	Wawa
209	IB	ON	Atikokan
215	AT	SD	Watertown
215	ISW	WI	Wis. Rapids
219	AWG	IA	Washington
219	YMG	ON	Manitouwadge
220	BX	QC	Blanc Sablon
221	ARV	WI	Minocqua
223	YYW	ON	Armstrong
224	MO	ON	Moosonee
230	BI	ND	Bismarck
236	DO	WI	Blue Lake
239	BBB	MN	Benson
239	EA	WI	Eau Claire
244	TH	MB	Thompson
248	WG	MB	Winnipeg
253	GB	MN	Marshall
254	BOZ	MN	Big Fork
257	JYR	NE	York
264	ON	MN	Winona
266	DU	WI	Marshfield
284	QD	MB	The Pas
323	EBS	IA	Webster City
327	JMR	MN	Mora
329	YEK	NU	Arviat
332	QT	ON	Thunder Bay
332	SBU	MN	Blue Earth
341	DXX	MN	Madison
342	ST	MN	St. Cloud
344	BKU	MT	Baker
345	PUF	IA	Esterville
347	YK	SD	Yankton
348	MC	IA	Mason City
350	DNS	IA	Denison
351	YKQ	QC	Waskaganish
356	RCX	WI	Ladysmith
359	LXL	MN	Little Falls
362	EE	IA	Ames
362	MZH	MN	Moose Lake
362	SB	ON	Sudbury
363	RNB	NJ	Millville
366	YMW	QC	Maniwaki
371	RYV	WI	Watertown
374	EE	MN	Alexandria
385	BA	MN	St. Paul
391	MFI	WI	Marshfield
392	AGZ	SD	Wagner
392	XVG	MN	Longville
397	AIT	MN	Aitkin
400	AHQ	NE	Wahoo
400	MS	WI	Madison
400	PPI	MN	St. Paul
403	AXA	IA	Algona
404	FNB	NE	Falls City
404	XCR	MN	Little Falls
407	AQ	WI	Appleton
410	EGQ	IA	Emmetsburg
413	YHD	ON	Dryden
420	FQ	MN	Fairmont
434	SLB	IA	Storm Lake

TSM

Adventures in Radio Restoration

By Marc Ellis N9EWJ **mfellis@alum.mit.edu**

Resurrecting a Crosley Fiver

A couple of days ago I climbed up to our attic, where I keep my collection of radios destined to become the subject of restoration articles. Usually I have a specific set in mind when I go on this errand, but this time inspiration eluded me. Once I got up there, though, my eye fell almost immediately upon a radio that I thought would be just perfect for my first restoration project in *The Spectrum Monitor*.

The attractive gold-tone, mirror-backed dial of this compact, wood-cabinet table model proclaims that it is a "Crosley Fiver," covering both the broadcast band (550-1700 kHz) and a "Foreign" band of 6 – 15 MHz. A concentric inner dial scale identifies the foreign band as running from 19 to about 50 meters. The same scale also includes the letters "WLW" opposite the 700 kHz mark in the broadcast band. These were the call letters of the famous Crosley broadcasting station that, at its peak, boasted a power of 500,000 watts.

The Crosley Fiver as taken out of storage; the cabinet is in great condition.

Inside the Cabinet

A look inside the cabinet revealed that the set has a power transformer, which places it a cut above most small table models of similar size. The four wires in the cable running from the speaker to a socket on the rear chassis apron tell us that this is a dynamic speaker; the magnetic field required for its operation is supplied by an electromagnet, requiring an extra two wires, rather than the permanent magnet that was used universally in later years.

Instead of a built-in antenna, this set has a terminal strip on the rear chassis apron for connection of antenna and ground wires. The dynamic speaker and lack of a built-in antenna suggest that we are dealing with a radio manufactured before World War II. The unusual extra-long line cord, way over the six-foot size usually provided with most small appliances, suggests that this radio had seen at least some servicing in its past. Both suppositions were soon confirmed by the discovery of a sticker on one of the tubes stating that it had been sold on May 14, 1940 and had a 6-month guarantee.

The cabinet is perhaps five inches wider than the chassis in order to make room for the speaker. For some reason a low partition (about 2.5 inches high) divides this space, forming a little compartment. I can't think of what it might be for, though it could be used to store a hank of antenna wire, and maybe the line cord, when the set is not in use. If that doesn't sound too convincing, can someone come up with a better guess?

As received, this compartment held an odd cylindrical plastic device that had been jury rigged by a previous owner. It is marked "Antenex," and has a heavy screw and nut terminal labeled "ground" plus two wires coming directly out of the case. Right now it is not connected to the radio. It probably is one of those quack radio devices so prevalent in earlier times, and may have been intended as an antenna substitute or perhaps a lightning surge protector.

An Internet search for "Antenex" revealed only the mod-

ern commercial antenna products now being sold under that name. Readers who can tell us more about this antenna accessory are invited to contact me and I will share the information in a future column.

Identifying Our Set

The radio chassis was easily backed out of the cabinet after pulling off the three control knobs, removing the three screws fastening the bottom of the chassis to the bottom of the cabinet, and unplugging the speaker cable from its socket on the chassis rear apron. With the chassis removed, the radio's well-preserved identification sticker, pasted to the inside of the cabinet, could be examined. It indicated that the chassis number is 517. The codes for eight cabinet styles in which the chassis was being used were also listed, but without identifying the code applying to this particular model.

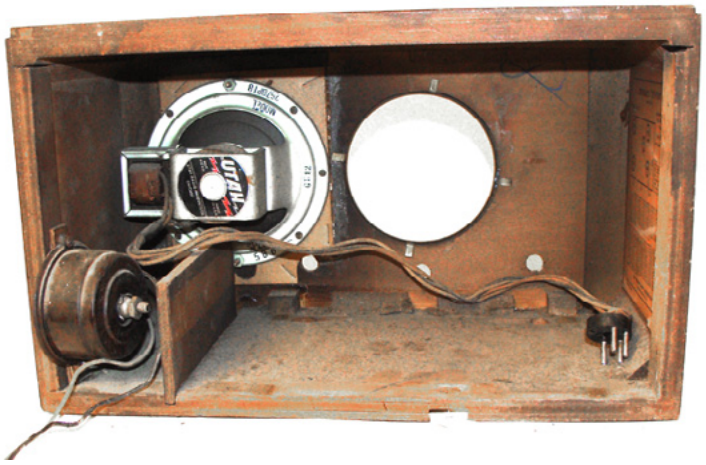
Crosley didn't use model numbers much in identifying its radios. They preferred to use chassis numbers – probably because of the great variety of models that were developed using the same chassis in different furniture. Sometimes, though, they would attach a nickname, such "The Fiver" to a model. These names seemed to have been assigned in an eccentric manner according to no particular system. However, someone in the Crosley marketing department definitely liked the name "Fiver." My Rider's index lists a Fiver (not my set), Fiver Junior, Fiver Console, Fiver DeLuxe, Fiver Romeo and Fiver Teletune.

My own set is listed twice (earlier and later versions) under its chassis number. The Rider's index doesn't have a chassis number column, so the chassis numbers are shown as model numbers. Rider's indicates that sets with serial numbers up to 4032103 are early version; sets numbered above that are later version. After some searching, I finally located the serial number for this set – 4059304 – partly obscured by dust on the chassis rear apron. So I know that I have a later version. The Rider's schematics of the early and late versions are dated March and July 1937, respectively. So far, I don't know the difference between the two versions.

Tube Types and Locations

The tube location chart on the information sticker showed (not surprisingly, considering the set's "nickname") that there are five tubes: a 6A8, 6U7, 6Q7, 6K6 and 5Y3. This tube complement tells us that the radio has a basic superheterodyne circuit including an oscillator/mixer (6A8), intermediate frequency amplifier (6U7), detector/first audio amplifier (6Q7), power amplifier (6K6) and power supply rectifier (5Y3).

This looked like a good time to remove the tubes and check to see if the correct type had been installed in each socket. Though the location chart was the only reference I really needed, it was very helpful to find that each tube socket was labeled with the type of its intended occupant. All tubes were correctly installed, though it was quite difficult to read



After removal of chassis, speaker remains inside. Function of low, factory-installed, partition at left is unknown, as is function of owner-installed antenna gizmo next to it.

the markings on a few of them. I put small stick-on labels on these to make sure that there would be no mix-ups later.
In the process, I noted that three of the tubes, the 6Q7, 5Y3 and 6K6, were Crosley branded and so were probably original with the radio. The other two tubes, apparently replacements, had RCA logos. One of these had also been factory labeled "M-R." I've run into this code before and the best information I have is that it was used during World War II to identify tubes that had not passed stringent military testing, but were still usable and being made available in the civilian market. The letters apparently stand for "maintenance and repair."

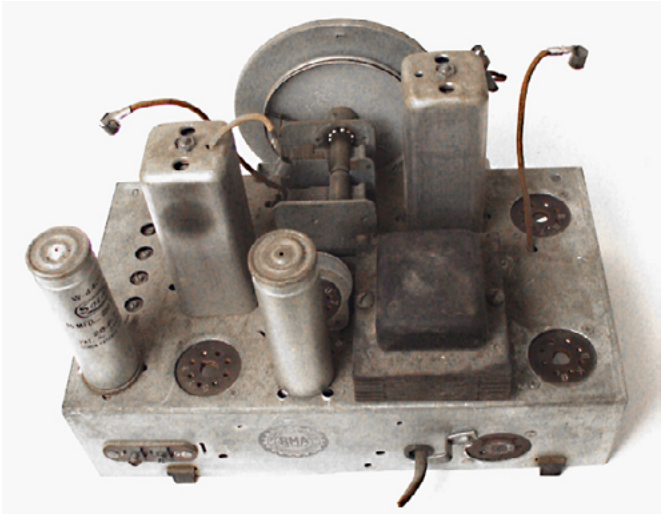
Examining the Chassis

The top of the chassis is covered with a layer of sticky dust that should be fairly easy to remove with a rag and soap solution. There are no signs of corrosion, though it's possible that some will be uncovered once the dust layer is removed. Underneath, the chassis is virtually spotless, suggesting that the radio has always been stored inside in a clean, protected area.

There is no sign of any overheated, melted or burned parts that might suggest trauma due to component failure. Nor is there an indication that any component has been removed or replaced. All solder joints are factory-perfect except on the line cord, which had indeed been replaced, but so long ago that its rubber insulation was stiff and cracking. There are no loose or disconnected wires.

Beside the antenna-ground terminal strip and the serial number, the chassis rear apron has a socket for the speaker cable as well as a stenciled or silk-screened emblem stating "THIS MODEL APPROVED BY THE RMA ENGINEERING INSTITUTE." Though I had seen this emblem on radios in the past and knew about the Radio Manufacturers Association, I wasn't familiar with the Engineering Institute.

A Google search quickly returned a copy of *The Music Trade Review* for November 1932, which contained an article about the establishment of the RMA Engineering Institute. This was part of an initiative to discourage unfair competition



Though the chassis is immaculate underneath, its top surface is covered with a heavy layer of dust

RMA emblem on chassis rear apron. The Radio Manufacturers Association established the Engineering Institute to discourage unfair competition from manufacturers using unlicensed components or circuitry (see text).

from managers of off-brand or no-name radios that used unlicensed circuits or components and were often sold in furniture or chain stores. The RMA would advertise to promote the sale of sets bearing the Institute emblem, which could be applied only to Institute-approved sets produced by manufacturers who were RMA members.

This completes our first look at the Crosley Fiver. Next month we'll begin, and possibly conclude, the restoration work. I expect it will go quickly because I'm not planning to recap the set completely as I have done in many restorations in the past. Where a radio, such as this one, has obviously been stored in a good environment and will not be heavily used, I will attempt a gradual, controlled, start-up after having replaced only a few critical components. Should the start-up fail, I'll then troubleshoot to pinpoint the cause. See you next time, when we may hear the voice of the "Fiver" once again.

TSM

The Broadcast Tower

By Doug Smith W9WI **dougw9wi@gmail.com**

AM on FM

You've seen quite a bit in this column about FM translators. Many AM operators see FM translators as an opportunity to compete. Surveys show most younger listeners simply do not listen to AM radio. Older listeners may try AM, but frequently find it difficult to pull the stations they want to hear out from under the noise and interference. Since the FCC began to allow FM translators to relay AM stations a few years ago, the number of translators doing so has skyrocketed.

I generally refer to an FM translator as a "low-powered" relay station. You might infer that these translators are also limited in coverage area. That's certainly what I think when I hear the word "translator."

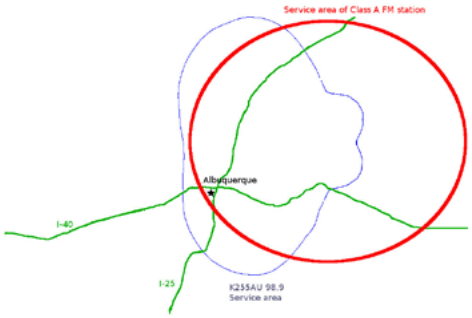
The FCC limits how high the transmitting antenna of a regular "full-power" FM station may be. For the smallest commercial FM stations, Classes A and C3, the antenna may be no higher than 100 meters above average terrain. (that's about 330 feet) If the antenna must be installed in a higher location, the transmitter power must be reduced. For example, if the antenna of a Class A station is 486 meters high (1,600 feet), power must be reduced to 250 watts.

An FM translator with an antenna 100 meters above average terrain is limited to 250 watts. However, as the height of a translator's antenna is increased, the station is not required to reduce power. What this means is that, if a translator's transmitting antenna is more then 1,600 feet high, it may use more power than a regular "full-power" station at the same height!

Sandia Crest is a 10,678-foot high mountain in central New Mexico. It's just a few miles east of Albuquerque, and it's just about the perfect FM/TV transmission site. Stations located there are roughly 4,200 feet above average terrain, and even higher above the major cities of the "Land of Enchantment." It's the highest transmitter site serving any major city in the U.S. Fourteen full-power FM stations and eleven full-power TV stations are located on Sandia Crest.

And, yes, Sandia Crest is also home to FM translators. There are currently ten of these "low-powered" stations up there, all of them achieving more coverage than a "regular" Class A FM station. Two of them have more coverage than a 25,000-watt Class C3 station. Six of the ten rebroadcast AM stations. Most AM operators would do just about anything to get their hands on a 25,000-watt FM signal!

These translators rebroadcast KARS-840 (on 102.9 FM); KKNS-1310 (on 95.9 & 105.5 FM); KOAZ-1510 (on 103.7 FM); and KIVA-1600. (on 94.5 & 98.9 FM)



Coverage area of FM translator K255AU and of a hypothetical Class A FM station (Graphic by Doug Smith)

I did a bit of a survey to figure out just how many AM stations now have low-power FM relays. I knew the number would be large, but was surprised by just how large it is. According to the FCC CDBS database, there are 1,036 FM translators relaying AM stations. The number of AM stations being relayed is slightly smaller, but more than one AM station in five – 20 percent – is relayed on a low-powered FM (some AM stations are relayed by more than one translator).

Many of the AM stations being relayed are small. There are daytime-only AMs like KCTX-1510 in Texas. There are "graveyard" stations on the crowded Class C channels like KLGR-1490 in Minnesota. But there are also 50,000-watt giants like KOMO-1000, Seattle (ironically, KOMO's translator bears the call letters K249DX!). The stigma of AM is severe enough that operators feel it's worthwhile supplementing a 50,000-watt AM signal with a 30-watt FM outlet.

The very largest AM stations are designated "Class A." These are the only stations whose nighttime DX coverage is protected from interference. With one exception, they operate with 50,000 watts day and night. Many of them are not required to protect any other station.

Yet even these stations feel the need to have an FM signal. There are 55 Class A stations on the U.S. mainland. More than a quarter of them simulcast their programming on an FM signal. AM radio is nowhere near dead, but the light at the end of the tunnel is going out.

You may find these FM relays useful in your AM DXing. DX targets always fade at the worst time (Murphy's Law requires it!). Of course, the FCC requires that the AM station identify itself on the hour. If it's relayed by a full-power FM

station, the FM station must be identified as well. That's twice as many opportunities to catch an ID. FM translators need be identified only three times a day. Most AM stations that are simulcast on translators will give the translator frequency often. This can be matched with other lists.

HD-Radio may also be useful here. Many AM stations, that are not relayed on an analog FM signal, are relayed on a HD digital subchannel. For example, Nashville's WLAC-1510 is simulcast on WNRQ-105.9 HD2. The HD subchannels must also be identified. So again, there are twice as many sets of call letters given on the hour, and twice as many opportunities to identify your target!

Whither Radio?

So, we've established AM radio is on the way out, slowly. I don't think it's going to disappear in the next ten years. In twenty years, maybe. What about FM? With the Internet delivering audio, will we see the day when FM stations begin disappearing as well?

A couple of articles on the subject have appeared in the general media in the last few weeks. (I have no idea what triggered them) Terry O'Reilly, writing for the CBC's website, calls radio "the ultimate survivor." He has a point. We've seen radio pronounced dead before. AM was to disappear, replaced by FM. Radio was to disappear altogether, replaced by TV. Obviously, it hasn't happened.

Listening is dropping off. O'Reilly says radio listening in Canada has declined by three hours per week in the last eight years. Commercial radio may be falling faster. The proportion of the audience listening to non-commercial CBC Radio One has increased to record levels. Here in Nashville, NPR affiliate WPLN is the highest-rated news/talk station, beating two commercial outlets and every AM station in the market. NPR stations in Minneapolis beat every news, talk, and sports station except 50,000-watt WCCO.

This sounds like a lot of doom and gloom. I suppose if you own a radio station, it is doom and gloom. Ironically, for the Dxer, failing radio stations are good news. A 250-watt station can easily cover thousands of miles. The reason you can't log an Alaskan station from your home in Maryland is that there are dozens of other stations far closer to Maryland on the same frequency. As more stations fail, interference declines and your chances of logging exotic DX improve.

LPFM: the Taps are Open

The FCC has begun approving LPFM stations from last year's filing window. They've been working pretty hard; as of my deadline in late February, more than 900 new LPFM permits have been issued. Five of the new crop are already on the air.

One of the first of the "Class of 2013" is KHOX-LP, 106.7, Walnut Ridge, Arkansas. It's licensed to Waxman

103.3 WKDF is now known as "Nash FM 103.3." (Photo by Doug Smith)

Educational Corporation. Walnut Ridge borders on Hoxie, presumably explaining the call letters! The application states KHOX will be used to educate the general public on the history of radio by broadcasting historic programming.

The other LPFM premiering on February 7th was Troy Community FM's station in western Ohio. The call letters are WTJW-LP and the station is operating on 107.1. WTJW plans an ambitious schedule of local information programming including high-school sports; interviews with the Miami County Humane Society, the Mayor of Troy and emergency information provided by city government. There is an internship arrangement with the International College of Broadcasting in nearby Dayton.

Other new LPFMs already on the air include WVPV-LP 104.3 (Cairo, West Virginia); WUIC-LP 102.5 (Wallins Creek, Kentucky); and KZBX-LP 92.1. (Williams, Arizona) I'm sure this number will have grown considerably by the time you read this.

New DX Targets

This month's Station Report lists two completely new AM stations on the air. I'm sure most of us would love to log KCIK-740 from Hawaii. I'm thinking KCBS will probably block KCIK on the West Coast, and numerous other stations on 740 will prevent reception further inland. However, I would imagine the lure of an Aloha State logging will spur many of us to try! KCIK is a Catholic religious station.

WIGT-1690 is a more likely target, at least for us in the East. 1690 is a less-crowded channel. Most of us still need a Virgin Islands logging and will welcome this new target to the dial.

CKBI-900 has been on the air for more than 80 years. The station has been using a directional antenna at night. This directs power away from most DXers. A recent technical change reduces nighttime power – but removes the directional antenna. I suspect CKBI will be an easier target for most of us.

A Bit of Trivia, Part 2

Last time I wrote I was only aware of two U.S. stations whose call letters were the same as their location. There's a third, and it's in Ken Reitz's backyard. WISE-FM is an NPR

affiliate located in Wise, Virginia.

Robert E. Lee has decided against locating his new Texas FM station in the town that bears his name. He's asked the FCC to modify his permit to move the station to nearby Rotan.

Changing the name of a radio station is easy. Changing all the promotional material containing the old name can be more difficult! In early February, Nashville station WKDF changed its name from simply "WKDF" to "Nash FM." While on a bike ride around the Tennessee Titans' football stadium three weeks later, I found their bright orange truck in the parking lot – with the old logo.

STATION REPORT:

NEW STATIONS

New stations on the air:		
Kihei, Hawaii	740	KCIK (5,000 watts day & night)
Charlotte Amalie, U.S.V.I.	1690	WIGT (920 watts day & night)

TECHNICAL CHANGES

Changes requested:		
Toronto, Ontario	1690	CHTO to increase day power to 6,000 watts
Prince Albert, Saskatchewan	900	CKBI to go non-directional at night

STATIONS GOING AWAY

Petersburg, Alaska	580	KRSA (license expired)
Seward, Alaska	950	KSEW (license expired)
Tafuna, American Samoa	585	KJAL (license expired)
Hot Springs, Arkansas	590	KZHS (license surrendered for cancellation)
Estes Park, Colorado	1470	KDEB (license surrendered for cancellation)
Kedgwick, New Brunswick	990	CBAF-20 (going to 98.1 FM)
Saint-Quentin, N.B.	1230	CBAF-21 (going to 91.1 FM)
Jacksonville, Oregon	1180	(permit for new station cancelled)
Lexington, Tennessee	1490	WDXL (license surrendered for cancellation)
Shawano, Wisconsin	1460	(permit for new station cancelled)

CLASS A AM STATIONS SIMULCAST ON FM

KEX-1190 Portland	K272EL 102.3, 99 watts
KFBK-1530 Sacramento	K296GB 107.1, 250 watts
KNZR-1560 Bakersfield	KNZR-FM 97.7, 4,100 watts
KOKC-1520 Oklahoma City	K276EX 103.1, 75 watts
KOMO-1000 Seattle	K249DX 97.7, 30 watts
KSL-1160 Salt Lake City	KSL-FM 102.7, 25,000 watts
WBBM-780 Chicago	WCFS 105.9, 4,100 watts
WBT-1110 Charlotte	WBT-FM 99.3, 7,700 watts
WFAN-660 New York	WFAN-FM 101.9, 6,200 watts
WGY-810 Schenectady	WGY-FM 103.1, 5,600 watts
WHO-1040 Des Moines	K230AT 93.9, 250 watts
WLW-700 Cincinnati	W233BG 94.5, 99 watts
WOAI-1200 San Antonio	K269FW 101.7 & K289BN 105.7, 250 & 145 watts
WSB-750 Atlanta	WSBB-FM 95.5, 40,000 watts
WWL-870 New Orleans	WL-FM 105.3, 96,000 watts

Antenna Connections

By Dan Farber AC0LW **ac0lw@att.net**

On the Down-Low: Receiving Antennas for 160 Mters

Welcome back, my friends. This month, let's take a look at a perennial problem: effective reception at 160 meters. The concepts we'll discuss cover 80 and 40 and the SW broadcast bands below 10 MHz besides.

Turn Down that Noise

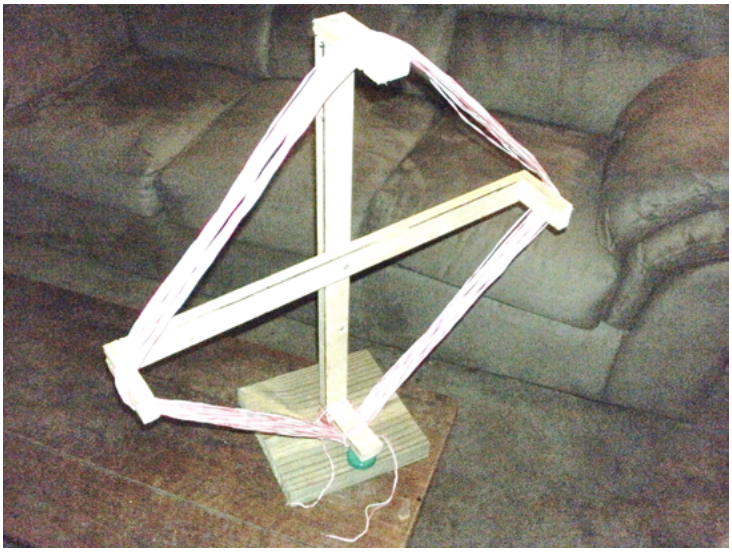
A sad fact of physics is that noise of all sorts makes reception below about 10 MHz a real challenge at times. Lightning is most likely the biggest offender; it is always raining somewhere, and at these lower frequencies the bang and crash propagates all around the globe (lightning strikes the earth hundreds of times a day, I'm told). It may seem weird to hear lightning crashing when the sky in your area is clear blue, but that's the source of most of the "static" you hear on the air.

In the summer, as we all know, lightning and other QRN (man-made noise) sources can make the lower bands difficult or impossible to use. The most frustrating aspect is that our ability to transmit is unaffected, but the noise makes reception difficult or impossible. Even on winter nights, when lower-band propagation is likely to be surprisingly good, noisy reception blocks many of us from enjoying the low bands.

But there are a number of ways that we can combat this problem. As I've said before, QRN is largely vertically polarized. If we can, avoid trying to receive with a vertically polarized antenna, we lose a lot of the noise. A sticky point here is that the vertically polarized antenna is often the effective choice for transmitting, since horizontal antennas are very difficult to get long enough, or high enough in the air, to be useful for transmitting at low frequencies. That's a big reason that many modern rigs have a jack for a separate receiving antenna, and many older rigs get such a jack added after market. So, let's see what sorts of "separate receive antennas" might be effective choices at lower frequencies, especially 160 meters. First up, we look at a marvelous invention: a long, horizontal, receive-only antenna, quite low to the ground.

Hot Beverage, Anyone?

Harold Beverage W2BML (1893-1993) looked at all these low-frequency receiving issues and had a brainstorm. If one were to stretch out a wire a wavelength long, but



One of the author's receive-only loops, wound on a small wooden frame. (Photo by author)

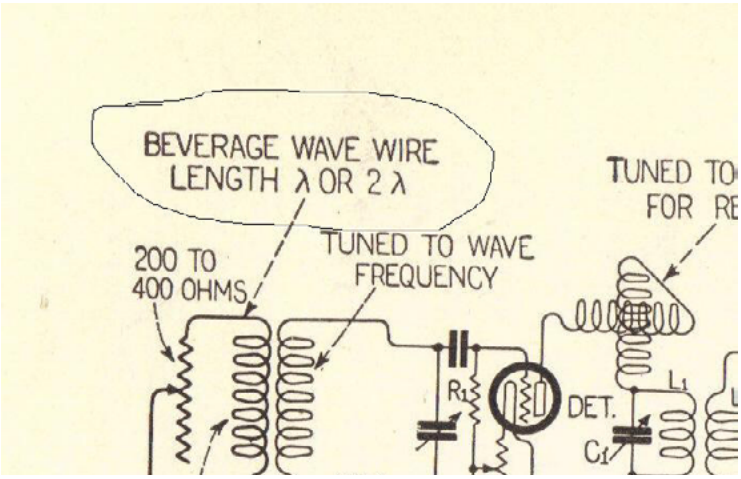
mount it only a few feet off the ground, it might do well at receiving the low-angle (vertically polarized) signals from DX locations, while rejecting the high-angle, local noise and interference.

Direction is important; the Beverage does best with signals in line with the wire. The diagram shows the basic setup. Terminating the Beverage with a resistance close to the antenna's impedance creates a pattern reminiscent of a Yagi; maximum received signal is obtained end-on to the wire, with considerable rejection off the back (the shack end of the wire). Leaving the antenna un-terminated creates a more bi-directional antenna, with deep nulls broadside to the wire.

Interestingly, the impedance of the Beverage is not a function of its length, sort of like a feedline. In fact, the Beverage can be thought of as a two-wire feedline, with one lossy conductor (the ground). The antenna's impedance is far more a function of its height above ground (like the spacing between the conductors of ladder or open-wire line). A Beverage is typically mounted eight or ten feet above ground; impedances around 300 to 500 ohms are common. A balun or tuner to match this impedance to the radio's 50 ohm input will go far to maximize results with this antenna. Remember, low-band reception needs all the help it can get!

The Beverage is a venerable and long-standing concept; I found this schematic of a receiver for transatlantic 200-meter reception, showing a Beverage wire as the antenna, in my 1924 edition of Practical Radio, by Henry Smith Williams.

The major drawback of the Beverage wire, obviously, is



The Beverage antenna appears in this 1920s receiver circuit (left) from Practical Radio, 1924. The author's high-tech switching setup (right) for the ladder line-fed dipole. (Drawing by author)

its ferocious length. A one-wavelength version for 160 meters will be around 530 feet long! If you're lucky, kindly neighbors may allow such a span across part of their property, even if only temporarily for a 160 meter contest. In addition, since the antenna is so very directional, that unending length of wire needs to point in the desired direction. Those with acreage and open spaces will have the best chance to erect a Beverage. For us urban warriors, something smaller and more compact is needed.

In the Loop

Another great discovery in low-frequency reception is the small loop. One form of this familiar to many of us is the "ferrite loop stick," which formed the antenna of many a shirt-pocket AM receiver back in the day. A coil is wound on a form made of ferrite, which increases the coil's inductance, and the loop stick serves as inductor for the receiver's tuned circuit and as antenna. This works well mainly because AM broadcast stations are close by and are running considerable power. For weak-signal work on the low bands, though, we need something better.

The general concept of a loop is a square, triangular, or round length of wire, measuring about a wavelength. Hung in the trees at sufficient height, such a loop is a great transmitting and receiving antenna. But what if you only want to receive with it? Ah ha! The one-wavelength wire can be wound on a much smaller form and used as a receive-only antenna.

Consider a square, wooden form, six feet on a side; if we wind that 530 feet of wire around it about 22 times, we now have a one-wavelength receive antenna for 160 meters that is only six feet square. It would be impossible to transmit with it, of course; but it is an incredibly compact receive antenna for low band. With proper impedance matching to the receiver, and a mounting that allows the loop to be turned broadside to the desired receive direction—the loop has deep nulls off the sides—a very effective solution to low band reception is obtained. Like the Beverage, it will do well not very far off the ground, especially for low-angle DX signals. If mounted and equipped so that it can be rotated, it is often able to null out (minimize) noise and interference.

Poor Man's Top Band

Then there are the less-elegant solutions to low-frequency reception. At my QTH, operating 160 is a real challenge; my 102-foot dipole, fed with about 40 feet of ladder line, is too short to load up on 1.8 MHz, even with my trusty MFJ 969 tuner (sizzle, pop-pop, crackle). To be able to transmit at this low frequency, I must resort to the "tee vertical," or "Marconi," setup; the ladder line conductors are tied together at the shack end and fed as a random wire. This basically results in a 40-foot tall vertical (with 102 feet of "top-loading" wire) that transmits very well at 160 meters (but is a horribly noisy antenna on receive).

On the other hand, in dipole mode, even though it is very short at this frequency, the antenna nevertheless is a much quieter receive antenna. I rigged up a double-pole, double-throw, toggle switch at the back of the tuner to quickly switch between "dipole" and "Marconi," since it's such a pain to keep re-making the binding post connections of ladder line to tuner. By transmitting in Marconi mode, and flipping the toggle back to dipole for receive, I can get out fairly well, and still hear signals that are buried in the noise in Marconi mode.

Become Proactive

And what about the SWL or ham who lives in an apartment or otherwise has severe space and access restrictions? Well, we may have come to an area where transmitting on the low bands is difficult or unobtainable, due to the laws of physics; effective transmit antennas on 160 and 80 meters need some length and/or height to get out in a useful way. But even if transmit is not an option here, the apartment dweller can still receive the lower frequencies, thanks to a marvelous device called the active antenna.

Basically, an active antenna uses a small receiving element (often a telescoping whip or a small loop) and an RF amplifier to boost the small received signal. Usually there are tuning and peaking controls, since the active antenna is normally intended

Balun Designs' QRP 9:1 450-ohm unun, left, ($50) is designed to use with single wire antennas. It covers 1.5 through 54 MHz and can handle 300 watts output. (Courtesy: Balun Designs www.balundesigns.com); MFJ's 1020-C active antenna/preselector, right. (Courtesy MFJ Enterprises)

to cover a large frequency range. Armed with such a device, the SWL or ham can receive all across the desired spectrum without erecting any kind of additional antenna.

One shining example of this device is MFJ's elegant 1020-C. Covering a whopping receive range of 300 kHz to 40 MHz in five bands, the 1020-C fits right on your desk, antenna element and all. The element is a telescoping whip that extends to 20 inches in length. Front panel controls include Gain, Band Select and Tune, as well as an On/Bypass switch. The unit can run on a regular 9-volt battery, or a small power supply such as the MFJ 1312d ($16). Personally, I think I'd prefer battery operation, to remove a potential source of hum from the power supply.

For even greater flexibility, the whip antenna can be removed and a random antenna connected; the 1020-C then becomes a preselector, tuning the random antenna for maximum results at a given frequency. And, here a word to the wise: even if your situation is not space-limited, as the apartment dweller's is, this preselector effect can still maximize receive results with a random antenna. If you live on an upper floor, even a length of wire thrown across the floor is a potentially good receive antenna, due to its height above ground. The connections are regular SO-239 connectors, so you can run coax to your radio, and can connect a coax-fed external antenna if desired. A wingnut-type ground wire connection is also provided.

The 1020-C is neat looking and compact, at 6.4 x 2.5 x 3.3 inches. It has a sweet black finish, and weighs a whopping one-pound. While it lists for $100 at MFJ Enterprises, I found a couple of vendors, such as Universal Radio Inc., selling the unit for $90.

There are a number of other active antennas including All Spectrum Electronics, Inc., which sells an active antenna kit for $58 (**www.allspectrum.com**). It covers a frequency range of 1 MHz to 800 MHz, has up to 20 dB gain available and is touted to be as effective as a 60-foot long wire.

There is also the benefit that building the kit will allow you to see and learn about the circuitry involved first-hand. If you want to try something a bit exotic, check out LZ1AQ's active antenna kit from Bulgaria, priced at 82 Euros, not including shipping (**www.active-antenna.eu**) This one calls for two small loops and a small dipole, with mode switching among the three antennas. It's claimed to have flat response across an incredible frequency range of 20 kHz (!) to 55 MHz. You'll need a 12 to 16 volt DC supply to operate this one.

Get it Together

One of these notions should enable you to improve low-frequency reception, whether on 160, 80 or 40 meters, or on the SW bands below 10 MHz. If you have the good luck to be able to erect the incredibly long Beverage wire, go for it. Even in the 21st century, this is probably the best solution available. If not—and I'm sure a lot of us can't—consider the small loop, or an active antenna, or even my poor man's "double-duty" dipole setup. Don't let lack of space keep you off the low bands!

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TSM Bookshelf

New Releases of Books, Video, Audio, and Software to Enhance your Radio Listening

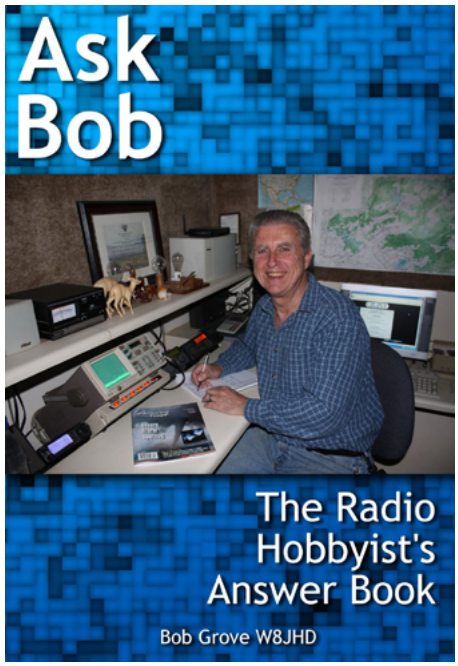
The Return of Bob Grove in Two New Kindle e-Books

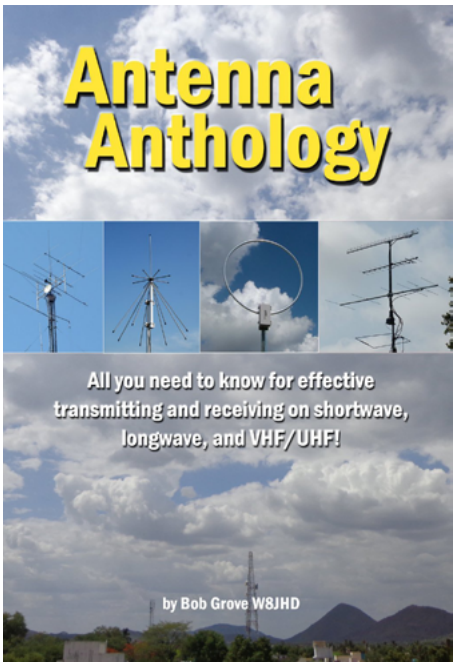
If you wondered what Bob Grove, former publisher of *Monitoring Times*, was doing with his time since that publication ceased in December of last year, wonder no more. He has just released two Kindle e-books, "**Ask Bob: The Radio Hobbyist's Answer Book**" and **"Antenna Anthology: All you need to know for effective transmitting and receiving on shortwave, longwave and VHF/UHF!**"

Published March 4, "Ask Bob" is 148 pages of answers to over 300 technical questions posed by *Monitoring Times* readers for decades on subjects as varied as its readers. Bob's answers are concise, authoritative and easy to understand. No question was ever too simple or too complex and Bob treats them all to his radio-encyclopedic mind; a friendly computer, programmed to explain the intricacies of every possible aspect of radios, scanners, antennas, circuits and components. In "Ask Bob," you'll read questions that you would never have thought to ask yourself, but having read the answer, wondered why you hadn't asked!

"Ask Bob" is an Amazon Kindle publication priced at $2.99 but you can borrow it for free if you are an Amazon Prime customer. This title is also text-to-speech enabled.

"All About Antennas" (69 pages)is part one of a planned series of e-books on the subject. Bob notes, "An antenna is the most important accessory to a receiver, scanner or transceiver. This collection of articles, written by the author and appearing in *Monitoring Times* magazine examines virtually every aspect of proper antenna choice and design."





Missing Bob? Here are two new releases from the former publisher on Monitoring Times that bring together, under two separate covers, the best of Bob Grove W8JHD. "Ask Bob: The Radio Hobbyist's Answer Book" and "Antenna Anthology" are compiled from years of his popular columns in MT. (Covers courtesy Bob Grove W8JHD)

Liberally illustrated, "All About Antennas" makes sense of every aspect of antenna design, from receiving, to transmitting; from portable radios to amateur radio transceivers.

Bob explains the mysteries of vertical and horizontal polarity; ground wave and sky wave; beams and wire antennas; multi-element or single element antennas, propagation and much more.

It's a book that's plainly written but includes plenty of theory that you'd expect to get in a text book, but might not actually understand. It has a generous number of links to websites that help to illustrate concepts explained in the book.

Published March 14, "Antenna Anthology" is an Amazon Kindle publication priced at $2.99 but you can borrow it for free if you are an Amazon Prime customer. This title is also text-to-speech enabled.

Looking for more "Bob" content? Check out his book, "**Misadventures of an Only Child**," now a 191-page Kindle e-book. Of this chronicle of his life, he writes, "My life has been an adventure, an unpredictable progression of tragedies and triumphs, mysteries and discoveries, temptations and opportunities, seasoned with successes and disappointments. But perseverance, accompanied by a sense of humor, has been rewarded by achievement and happiness as shown by my revealing autobiography."

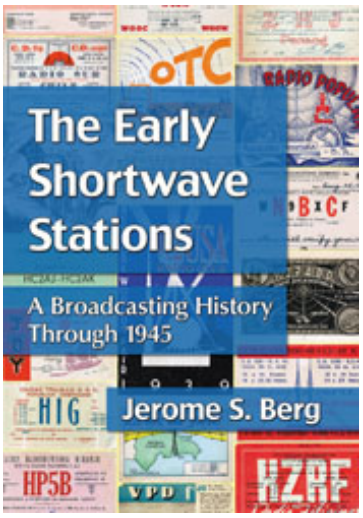
This book is priced at $2.99 and available for borrowing via the Amazon Prime Kindle book loan program.

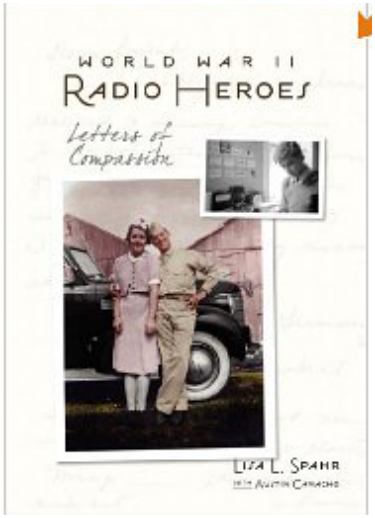
Don't have a Kindle reader? Don't worry, you can read Kindle e-books on any platform: desktop, laptop, e-tablet, or phone (iPhone or Android). All you need is the free **Kindle app**.

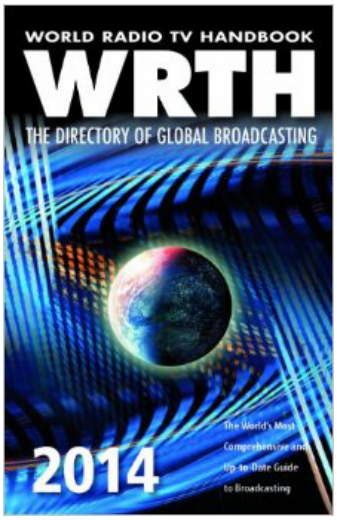
TSM

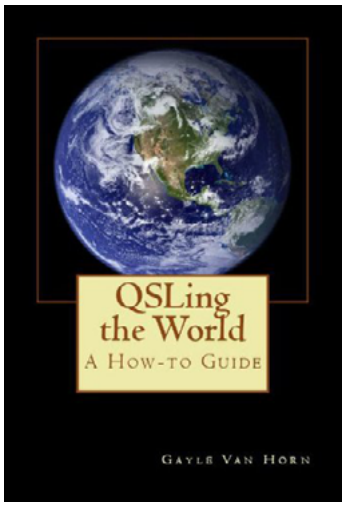
Other Titles of Interest to TSM Readers

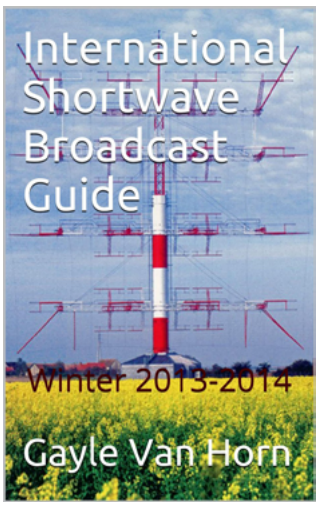
(Click on cover to go directly to the publisher's website)

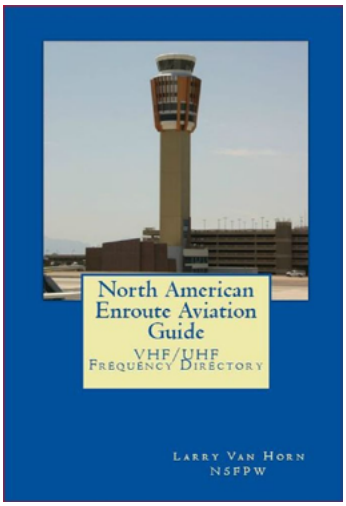


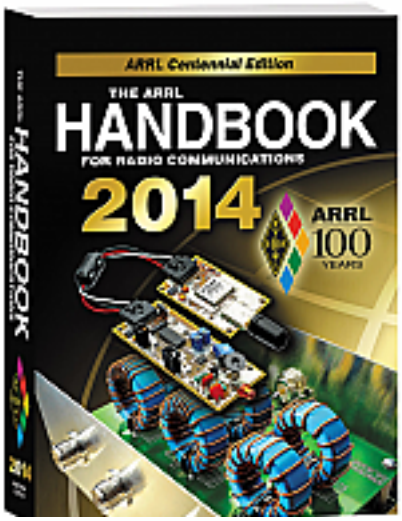


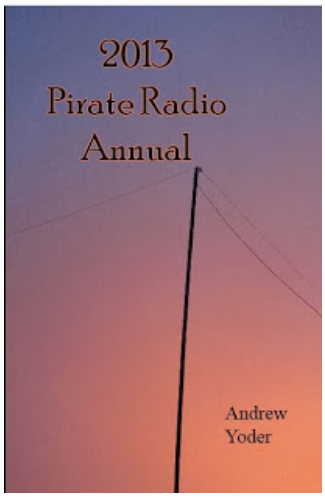


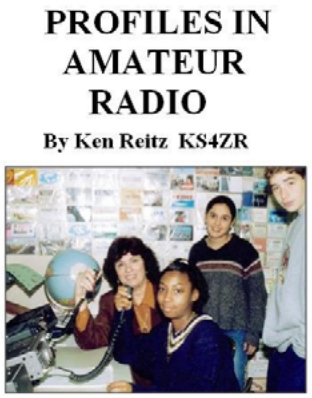












Other Titles of Interest to TSM Readers

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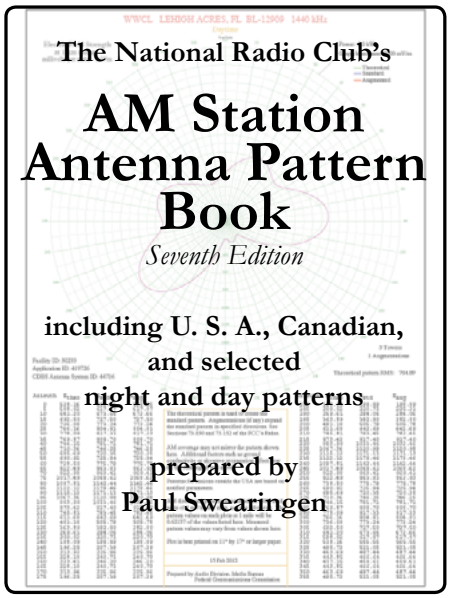

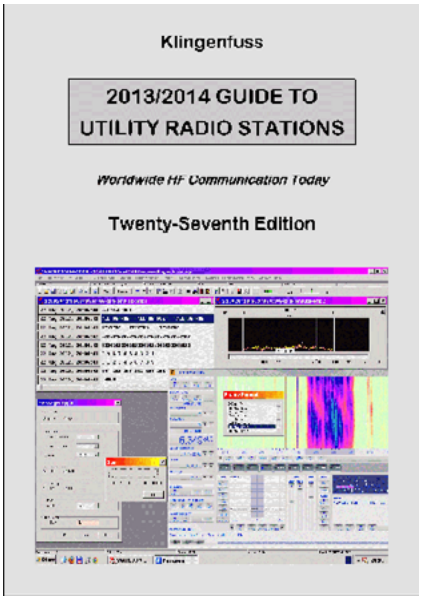

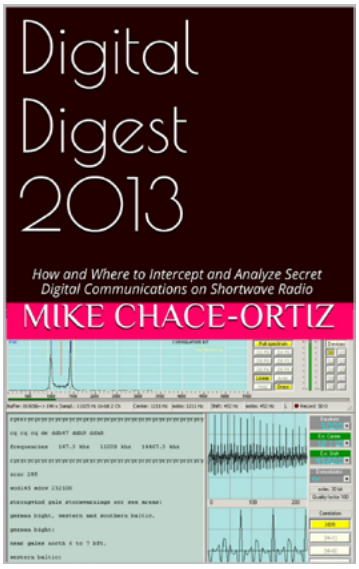

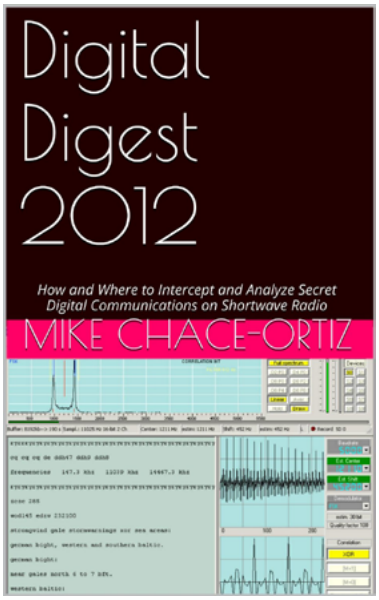

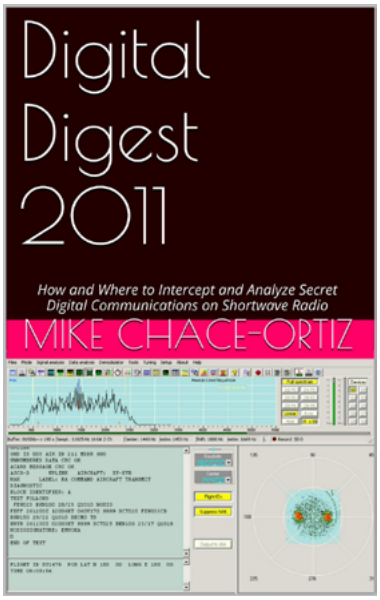

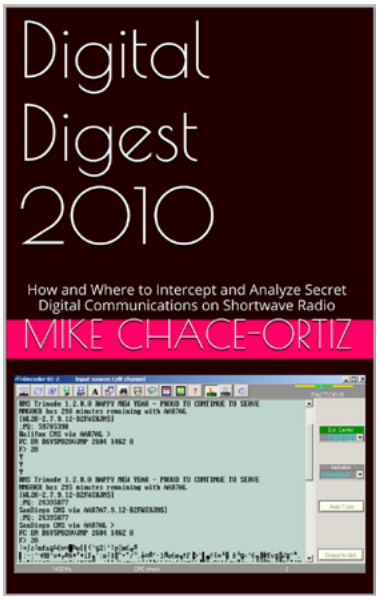

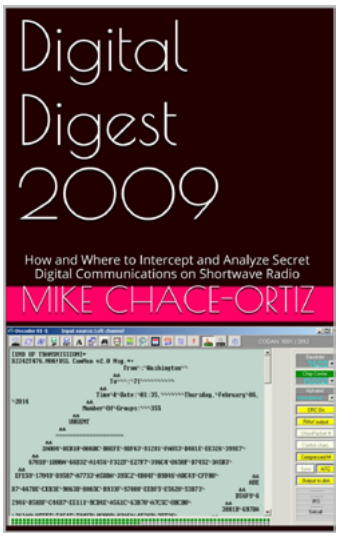

Radio Horizons

Product Announcements of Interest to *TSM* Readers

Icom America Announces New ID-5100A D-STAR Mobile

Kirkland, Wash. (March 2014) – Icom announces the new ID-5100A, a VHF/UHF dual band digital transceiver. The D-STAR mobile enhances core features found in the celebrated IC-2820H mobile and incorporates the user-friendly technology of Icom's IC-7100. The radio features a large responsive touch screen, integrated GPS, optional Bluetooth® connectivity and support for Android™ devices.

The new ID-5100A takes innovation and mobility to the next level. The radio's intuitive 5.5-inch touchscreen display features a menu-driven interface and software keypad (QWERTY keyboard). The built-in GPS receiver shows current position data on screen. With the DV/FM repeater list function, GPS position data can search for nearby repeaters.

The ID-5100A has V/V and U/U simultaneous receive capability. DV/DV dualwatch allows two digital voice signals to be monitored for receive on either channel. Other digital functions include enhanced D-PRS (with object, position, item and weather formats) and DPlus reflector linking.

Hands-free communications and remote control of the ID-5100A is possible with the optional VS-3 Bluetooth® headset and UT-133 unit installed. To connect wirelessly to the ID-5100A and remotely set DR functions, send/receive text messages and pictures, and link with a map application, users may download the free Android™ RS-MS1A application (optional UT-133 Bluetooth® unit must be installed) from Google Play™ at **https://play.google.com/store/apps/details?id=co.jp.icom.rs_ms1a.menu.**

The ID-5100A features 50W output power on both VHF and UHF

bands. Its controller head affords convenient operation with independent main dial, volume and SQL knobs for A/B bands. The built-in SD card slot in the main unit accommodates voice and data storage and the import/export of repeater lists. Other radio features include AM airband dualwatch, weather channel and alert, and auto repeater function. Supplied accessories include a multi-functional microphone and hanger, DC power and controller cables, and CS-5100 cloning software.

ID-5100 A/E Feature Details:

The ID-5100A/E has integrated GPS which allows you to transmit and receive position data from the built-in GPS receiver. Position, course, speed and altitude are shown on the display. The GPS position information can be used for exchanging position reports, tracing the GPS log and searching for nearby repeater sites. The GPS antenna is located in the remote head, no external GPS antenna required.

The ID-5100A receives 118–174MHz and 375–550MHz with dual receiver capability that allows you to receive two bands simultaneously (including within a single band). Almost all VHF & UHF communications are available to you!

The DV/FM repeater list function assists you in accessing near-by repeaters, even where you are visiting an area for the first time. The function searches for near-by repeaters using the repeater memories with the GPS position information.

Suggested retail pricing and release date for the ID-5100A will be available at a later date. Interested parties should visit Icom America's ID-5100A product page periodically for updates at:
http://www.icomamerica.com/en/products/amateur/mobile/id5100a/default.aspx.

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The Spectrum Monitor Writers' Group

The Spectrum Monitor is edited and published by Ken Reitz KS4ZR, managing editor for *Monitoring Times* since 2012, features editor since 2009, columnist and feature writer for the magazine since 1988. Former feature writer and columnist for *Satellite Times, Satellite Entertainment Guide, Satellite Orbit magazine, Dish Entertainment Guide* and *Direct Guide*. Contributing editor on personal electronics for *Consumers Digest*. Author of the Kindle e-books "How to Listen to the World" and "Profiles in Amateur Radio." e-mail: editor@thespectrummonitor.com

The Spectrum Monitor Writers' Group consists of former columnists, editors and writers for *Monitoring Times*, a monthly print and electronic magazine for thirty-three years, which ceased publication with the December, 2013 issue. Below, in alphabetical order, are the columnists, their amateur radio call signs, the name of their column in *The Spectrum Monitor,* a brief bio and their websites and contact information.

Keith Baker KB1SF/VA3KSF, "Amateur Radio Satellites"

Past president and currently treasurer of the Radio Amateur Satellite Corporation (AMSAT). Freelance writer and photographer on amateur space telecommunications since 1993. Columnist and feature writer for *Monitoring Times, The Canadian Amateur* and the *AMSAT Journal*. kb1sf@hotmail.com **www.kb1sf.com**

Kevin O'Hern Carey WB2QMY, "The Longwave Zone"

Reporting on radio's lower extremes, where wavelengths can be measured in miles, and extending up to the start of the AM broadcast band. Since 1991, editor of "Below 500 kHz" column for *Monitoring Times*. Author of "Listening to Longwave" (**http://www.universal-radio.com/catalog/books/0024u.html**). This link also includes information for ordering his CD, "VLF RADIO!," a narrated tour of the longwave band from 0 to 530 kHz, with actual recordings of longwave stations. E-mail: wb2qmy@arrl.net

Mike Chace-Ortiz AB1TZ/G6DHU "Digital HF: Intercept and Analyze"

Author of the *Monitoring Times* "Digital Digest" column since 1997, which follows the habits of embassies, aid organizations, intelligence and military HF users, the digital data systems they use, and how to decode, breakdown and identify their traffic. **www.chace-ortiz.org/umc**

Marc Ellis N9EWJ, "Adventures in Radio Restoration"

Authored a regular monthly column about radio restoration and history since 1986. Originally writing for Gernsback Publications (*Hands-On Electronics, Popular Electronics, Electronics Now*), he moved his column to *Monitoring Times* in January 2000. Editor of two publications for the Antique Wireless Association (**www.antiquewireless.org**): The *AWA Journal* and the *AWA Gateway*. The latter is a free on-line magazine targeted at newcomers to the radio collecting and restoration hobbies. E-mail: mfellis@alum.mit.edu

Dan Farber AC0LW, "Antenna Connections"

Monitoring Times antenna columnist 2009-2013. Building ham and SWL antennas for over 40 years. E-mail: ac0lw@att.net

Tomas Hood NW7US, "Radio Propagation"

Tomas first discovered radio propagation in the early 1970s as a shortwave listener and, as a member of the Army Signal Corps in 1985, honed his skills in communications, operating and training fellow soldiers. An amateur Extra Class operator, licensed since 1990, you'll find Tomas on CW, digital and voice modes on any of the HF bands. He is a contributing editor for *CQ Amateur Radio*, *Popular Communications, CQ VHF* , a contributor to an ARRL publication on QRP communications, and *Monitoring Times* . e-mail: nw7us@nw7us.us Website: **http://nw7us.us**/

Kirk Kleinschmidt NT0Z, "Amateur Radio Insight"

Amateur radio operator since 1977 at age 15. Author of "Stealth Amateur Radio." Former editor, "ARRL Handbook," former *QST* magazine assistant managing editor, columnist and feature writer for several radio-related magazines, technical editor for "Ham Radio for Dummies," wrote "On the Ham Bands" column and numerous feature articles for *Monitoring Times* since 2009. Web site: **www.stealthamateur.com**. E-mail: nt0z@stealthamateur.com

Cory Koral K2WV, "Aeronautical Monitoring"

Lifelong air-band monitor, a private pilot since 1968 and a commercial pilot licensee since 1983, amateur radio licensee for more than 40 years. Air-band feature writer for *Monitoring Times* since 2010. E-mail: cory@jordanriverfarm.com

Stan Nelson KB5VL, "Amateur Radio Astronomy"

Amateur radio operator since 1960. Retired after 40-plus years involved in mobile communications/electronics/computers/automation. Active in radio astronomy for over twenty years, specializing in meteor monitoring. Wrote the "Amateur Radio Astronomy" column for *Monitoring Times* since 2010. A member of the Society of Amateur Radio Astronomers (SARA). www.RoswellMeteor.com. e-mail: Stan.Nelson@RoswellMeteor.com

Chris Parris, "Federal Wavelengths"

Broadcast television engineer, avid scanner and shortwave listener, freelance writer on federal radio communications since 2004, wrote the "Fed Files" column for *Monitoring Times*. **http://thefedfiles.com** **http://mt-fedfiles.blogspot.com** Twitter: @TheFedFiles E-mail: cparris@thefedfiles.com

Doug Smith W9WI, "The Broadcast Tower"

Broadcast television engineer, casual cyclist and long distance reception enthusiast. "Broadcast Bandscan" columnist for *Monitoring Times* since 1991. email: dougw9wi@gmail.com blog: **http://americanbandscan.blogspot.com** Web site: **http://w9wi.com**

Hugh Stegman NV6H, "Utility Planet"

Longtime DXer and writer on non-broadcast shortwave utility radio. Former "Utility World" columnist for *Monitoring Times* magazine for more than ten years. Web site: **www.ominous-valve.com/uteworld.html** Blog: **http://mt-utility.blogspot.com**/ email: mtutilityworld@gmail.com Twitter: @UtilityPlanet

Dan Veeneman, "Scanning America"

Software developer and satellite communications engineer writing about scanners and public service radio reception for *Monitoring Times* for 17 years. Web site: **www.signalharbor.com** E-mail: dan@signalharbor.com

Ron Walsh VE3GO, "Maritime Monitoring"

Retired career teacher, former president of the Canadian Amateur Radio Federation (now the Radio Amateurs of Canada), retired ship's officer, licensed captain, "Boats" columnist and maritime feature writer for *Monitoring Times* for eight years. Avid photographer of ships and race cars. E-mail: MaritimeMonitoring@gmail.com.

Fred Waterer, "The Shortwave Listener"

Former "Programming Spotlight" columnist for *Monitoring Times*. Radio addict since 1969, freelance columnist since 1986. Fascinated by radio programming and history. E-mail: programming_matters@yahoo.ca

Thomas Witherspoon K4SWL, "World of Shortwave Listening"

Founder and director of the charity Ears To Our World (**http://earstoourworld.org**), curator of the Shortwave Radio Archive **http://shortwavearchive.com** and actively blogs about short¬wave radio on the SWLing Post (**http://swling.com/blog**). Former feature writer for *Monitoring Times*. E-mail: Thomas@earstoourworld.org.

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